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Effect of feeding tamarind (*Tamarindus indica*) seed husk on dry matter intake and body weight of lactating crossbred cattle

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Abstract
The present investigation entitled "Effect of Feeding of Tamarind (*Tamarindus indica*) Seed Husk on Digestibility and Production Performance of Crossbred Cattle" was undertaken to study effect of feeding tamarind seed husk (TSH) as a source of tannin on feed intake, nutrient digestibility, milk production and composition Twenty-one crossbred lactating cows were selected on the basis of milk yeild, body weight, number of lactation completed and days in lactation. Selected cows were randomly divided into 3 groups of 7 cows in each treatment and been fed as per treatment. Lactating cows were offered a complete feed with conc. Miixture containing 0%, 2.5%, 7.5% TSH to Groupn T_1, T_2 and T_3. DMI in cows of all the treatments was sufficient to meet out nutritional norms. It was observed that there was statistically nonsignificant ($p > 0.05$) difference among the groups in dry matter intake and body weight gain.

Keywords: Tamarind seed Husk, Tannin, DMI, body weight, cattle

Introduction
In India, livestock plays an important role for the nutritional security, particularly of the small and marginal farmers. The India's cattle population has been estimated of about 192.49 million while there are 109.85 million buffalo, 148.88 million sheep and 74.26 million goat (Department of Animal Husbandry & Dairying releases 20th Livestock Census). Livestock industry is able to generate self employment opportunities round the year and regular income to the livestock. Hence, it is essential to rear the livestock on improved management practices for economical and profitable systems. identification of tanninferous feed stuff having beneficial effects on ruminant digestion would provide useful hints to exploit the use of such feed stuff to improve efficiency of ruminant digestion instead of the cost additive detannification of such feedstuffs. Anti-methanogenic property of tanniferous tamarind (Tamarindus indica) seed husk has recently been explored both in vitro and in vivo [Malik *et al*. 2017] [8]. Although tannins are generally regarded as antinutritional, certain types/kinds of tannins at low concentrations are known to alter rumen fermentation of carbohydrates and proteins and microbial protein synthesis (Makkar *et al*. 1993) [7] to the benefit of ruminants. Reducing the rumen protein degradability of ensiled crops could improve the efficiency of utilization of dietary protein and carbohydrates by improving the synchrony of nutrient supply in the rumen (Sinclair *et al*. 1993) [9]. Supplementing ruminant diets with plant secondary compounds such as tannins is one of the methods among several techniques that has been used to reduce protein degradability in the rumen. Tannins are described as water soluble polyphenolic compound with high molecular weight, that are found in various plant. In general tannins can be divided into two main groups, condensed tannins (CT) and hydrolysable tannins (HT) (Lorenz, 2011) [6]. Tannins have been shown to create a reversible bonds with different compounds including proteins, carbohydrates and minerals (McSweeney *et al*. 2001) with the ability of both types to create a tannin-protein complex.
Therefore, this study was undertaken with the objectives of identifying the roles of tannin in TSH and the effect of two levels of TSH in the diet on DMI, nutrient digestibility and production performance

Materials and Methods

The present research work was undertaken to study the status of broiler farm in Latur tahsil of Latur district. It includes the tools and techniques employed for completion of the study. The present study was carried out in the Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra state. A Comprehensive Questionnaire was prepared to collect the information by personal interview with individual farmers. The present reasearch entitled "Effect of Feeding of Tamarind (*Tamarindus indica*) Seed Husk on Digestibility and Production Performance of Crossbred Cattle " was conducted at the Research Cum Development Projet on Cattle, Rahuri, for a period of 90 days (5 January 2025 to 5 April 2025 excluding pre-experimental period). The object was to study supplementation of tamarind seed husk (*Tamarindus indica*) and its effect on diestibility of prodcuction performance of crossbred cattle.

Material Required

Selection of crossbreed cows

Twenty one crossbred lactating cows were selected from R.C.D.P. on cattle, Dept. of AHDS, MPKV Rahuri on the basis of milk yeild, body weight, number of lactation completed and days in lactation. Selected cows were randomly divided into 3 groups of 7 cows in each treatment and been fed as per treatment. The selected cows were tested under different treatment by adopting "Randomized Block Design" (RBD).

Requirement of feeds

Tamarind seeds husk were purchased from the Adinath processing industries Pvt. Ltd which is located at Industrial area, MIDC, Ahmednagar and it was directly used for feeding of experimental crossbred cattle. Experimental cattles were fed on dry fodder ie. soybean straw and green fodder like maize and concentrate mixture which was available in the dairy LIF. The experimental animals fed as per ICAR (1985) feeding standard to meet the nutritional requirement.

Feeding Management

All the selected crossbred cattle were dewormed and vaccinated against FMD before start of the experiment. Feeding trial of 13 weeks duration (1 January 2025 to 5 April 2025) was conducted by providing required amount of nutrients as per ICAR. (1985) standards through prepared experiment feeds treatment wise with combination of concentrate and tamarind seed husk keeping the roughages and green fodder as constant for all the treatment groups. The cattle were fed at 3 per cent DM for 100kg of body weight. The feeding details were as below.

Preparation of diets containing tamarind seed husk

The present experiment was conducted by randomized block design with three treatments as detailed below in Table 1.

Table 1: Experimental dietary treatments and their composition

Treatment	Details
T_1	Dry roughages+ Green roughages + Concentrate (control)
T_2	Dry roughages+ Green roughages + Concentrate (control)+ 2.5% TSH
T_3	Dry roughages+ Green roughages + Concentrate (control)+ 7.5% TSH

(Concentrate requirement was calculated and provided as per standard)

Chemical composition of concentrates, roughages and fresh ground tamarind Seed husk is shown in Table 2. Furthermore, proximate analysis of the basal diet and diet containing different concentration of tamarind seed husk are shown in Table 3. respectively

Table 2: Chemical composition of feed and fodder (% DM) basis

Sr No.	Particulars	Conc. Mix	Soybean Straw	Green Maize	Tamarind Seed Husk
1	DM	90.12	91.25	24.2	96.85
2	OM	92.60	89.45	88.84	98.30
3	CP	18.08	11.60	9.21	7.47
4	EE	5.22	3.13	2.32	0.23
5	NDF	29.84	73.99	60.23	35.62
6	ADF	27.87	55.57	38.60	44.02
7	NFE	66.78	39.24	68.18	51.50
8	CF	15.40	28.85	42.36	19.69
9	TA	7.2	6.6	6.2	1.7
10	Tannin	-	-	-	18.00

Analysis and equipment used

Dry matter, Crude Protein, Crude fibre, Ether Extract, Total ash and NFE for the samples were determined as per procedures given for proximate principles analysis according to AOAC (1990).

Experimental procedures

In the present experiment twenty one crossbred lactating cows were randomly assigned into three groups of seven each and served with diets containing tamarind seed husk at various concentrations of 0, 2.5 and 7.5%, respectively where 0% served as control in the group. Initial body weight (IBW), body weight gain (BWG), feed intake (FI) and faecal output from each cows were measured at the beginning and every 15 days thereafter for 90 days.

Feeding performance analysis

1) The amount of fortnightly diet ingested was calculated as the difference in the total weight of feed offered at the beginning and balance at the end of the fortnight. The

fortnight data collected were then used to calculate daily feed intake according to Ennouri *et al.* with the following formula:

$$\text{Feed intake (g/day)} = \frac{\text{Feed placed} - \text{Feed remaining}}{7 \text{ days}}$$

Fecal dry matter (DM) was determined after drying faeces collected in 24 h at 105 C to constant weight.
Macro nutrients digestibility were assessed as the difference between daily DM intake and 24 h DM excretion in faeces according to Ennouri *et al.*:

$$\text{Digestibility (\%)} = \frac{\text{Dietary DM intake} - \text{Faecal DM excretion}}{\text{Dietary DM intake}} \times 100$$

Estimation of Total Phenol and Tannin
It was estimated according to the procedure of Sadasiyan and Manickam (1993).

Reagents

a) **Folin Denis reagent:** Dissolve 100g sodium tungstate and 20 g phosphomolybdic acid in 750 ml distilled water in a soluble flask and add 50 ml phosphoric acid. reflux the mixture for 2 hr and make up to one litre with water. protect the reagent from exposure to light.
b) **Sodium carbonate solution (20%):** Dissolve 350 gram of sodium carbonate in distilled water at 70-80 °C. filter through glass wool after allowing it to stand overnight
c) **Standard tannic acid solution:** Dissolve 100 mg tannic acid in 100ml of distilled water.
d) **Working standard solution:** Dilute 5 ml of the stock solution to 100 ml with distilled water. one ml contaings 50 µg tannic acid.

Analytical procedure

1. Weight 0.5 g of the powdered material and transfer to a 250 ml conical flask.
2. Add 75 ml water. heat the flask gently and boil for 30 min. centrifuge at 2000 rpm for 20 min and collect the supenatant in 100 ml volumetric flask and make up the volume.
3. Transfer 1 ml of the sample extract to a 100 ml volumetric flask containing 75 ml water.
4. Add 5 ml of foline denis reagent, 10 ml of sodium carbonate solution and dilute to 100 ml with water.
5. Shake well read the absorance at 700 nm after 30 min.
6. If the absorance greater than 0.7, make a 1+4 dilution of the sample.
7. Prepare a blank with water instead of the sample.
8. Preapare a standard graph bu using 0-100µg tannic acid

Statistical Analysis
The data obtained was subjected to the statistical analysis by Randomized Block Design (RBD) for testing their differences as per procedure described by Amble (1975).

Result and Discussion
Effect of TSH Supplementation on Fortnightly Dry Matter Intake in Crossbred Lactating Cows
The tamarind seed Husk was supported with concentrates in order to fulfill nutritional requirements of lactating cows. Hence the observations on total feed intake of cows on fresh basis under soyabean straw, maize, concentrates are tabulated in table 4. and graphically presented in fig 1. It is seen from table 4. that total DMI was differing non-significantly between the feeding treatments.

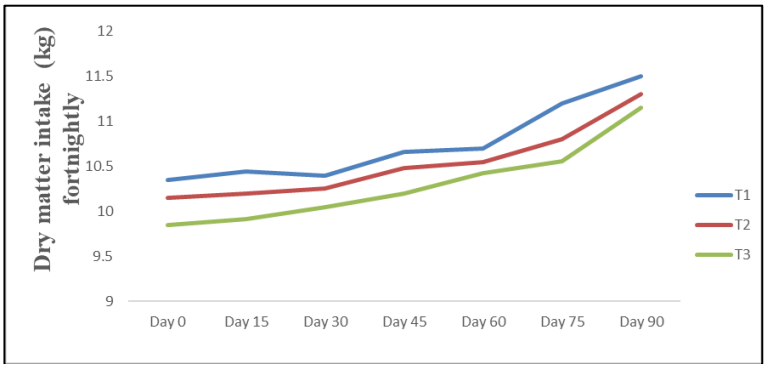

Fig 1: Average dry matter intake (kg/day/lactating cow) over experimental period under different treatment

Moreover, irrespective of the treatments the table 4. showed a DMI by crosssbred cattle was differs non significantly in all three treatments over experimental period. On day 0 it was about 10.35, 10.15, 9.85 Kg/day/cow and 11.50, 11.30 and 11.15 Kg/day/cow on 90th day of the trial in T_1, T_2 and T_3, indicating increase in total feed intake with the advancement of trial. The overall averages dry matter intake/day/cow under different feeding treatments during different fortnight interval are tabulated in table 4. with graphical presentation in fig 1.

Table 4: Effect of feeding TSH on dry matter intake of crossbred cows (kg/day)

Attributes	T1	T2	T3	SEm	CD
0 Day	10.35	10.15	9.85	0.28	NS
15 Day	10.44	10.20	9.91	0.30	NS
30 Day	10.40	10.25	10.05	0.35	NS
45 Day	10.66	10.48	10.20	0.33	NS
60 Day	10.70	10.55	10.42	0.29	NS
75 Day	11.20	10.80	10.56	0.33	NS
90 Day	11.50	11.30	11.15	0.26	NS

It is reported in Table 4. that dry matter intake was not affected by inclusion of TSH even upto 7.5 per cent in the concentrate mixture in the ration of crossbred cattle.

These results were not in accordance with Glick and Joslyn (1970) [4] who reported that tannin leads to astringent effect on oral mucosa through binding to salivary glyco protein and thus reduced the lubricant properties of mucin that results in decrease in feed intake.

Kibon and Maina (1993) [5] found that feeding of tannin content babul pods up to a level of 45 in the concentrate mixture of lamb did not affect dry matter intake.

Waghorn *et aI. (*1994) [10] observed that tannin also lowers the rumen turnover rate as well as digestibility of nutrients, which has greater impact on reducing feed intake than decreasing palatability. Reduction in digestibility causes filling effect associated with undigested feedstuffs, which lead to low feed intake.

Effect of feeding TSH on dry matter intake per Kg body weight

A reference to Table- 5 and fig 2. indicates that the DMI did not change significantly by feeding treatments. DMI was remained similar in all groups. The average initial BW of crossbred cows recorded under treatment T1, T2 and T 3 were 360.57, 366.10 and 365.86. and the average initial DMI in terms of kg/100 kg body weight was 10.85, 10.97 and 10.93 which was under treatment T_1, T_2 and T_3.

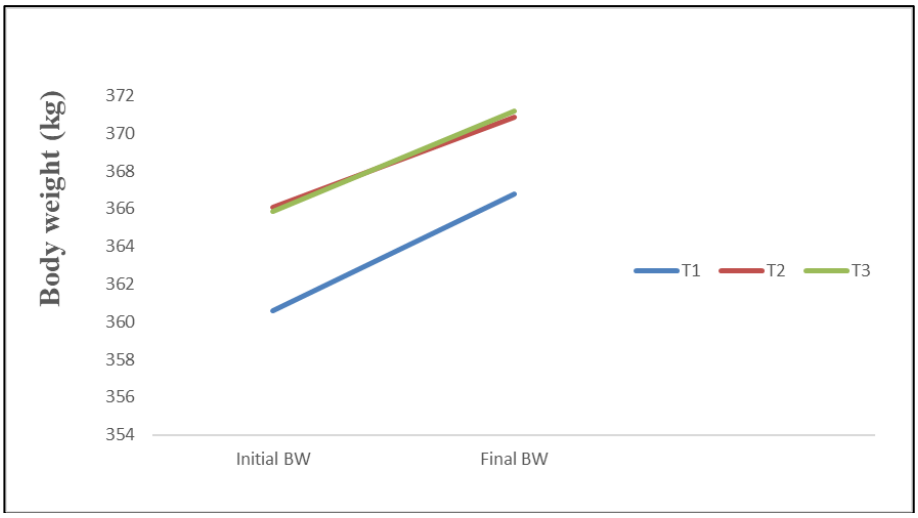

Fig 2: Average body weight of crossbred cows over experimental period under different treatment

However, there was no difference in dry matter intake per kg BW between 0 2.5 and 7.5 per cent levels inclusion of TSH supplemented group.

Table 5: Effect of feeding TSH on dry matter intake per 100 Kg body weight (%BW) (kg/day)

Attributes	T1	T2	T3	SEm	CD
Average initial body wt.	360.57	366.10	365.86	3.73	NS
DM Requirment kg / kgBW)	10.85	10.97	10.93	0.11	NS
Average final body wt.	366.80	370.89	371.20	3.70	NS
DM Requirment kg / kgBW)	11.00	11.15	11.18	0.20	NS
Avg DM Intake	10.75	10.53	10.31	0.15	NS

Average body weight and DMI on sixth fortnight was 366.80, 370.89 371.20 kg and 10.85, 10.97, 10.93 (Table 5) at 0, 2.5 and 7.5 per cent levels of TSH supplemented groups respectively. The Average dry matter intake (kg/d) was 10.75, 10.53, 10.31 (Table 5) at 0, 2.5 and 7.5 per cent TSH supplemented groups during overall experimental period respectively. However, there was non significant difference in dry matter intake per kg BW between 0 2.5 and 7.5 per cent levels of TSH supplemented group.

Bhatta *et al.,* (2000) investigated the effects of including tamarind seed husk (TSH), a tannin-rich by-product of tamarind processing, in the diets of crossbred dairy cows in mid-lactation on dry matter intake (DMI), nutrient digestibility, nitrogen balance, milk yield, and milk composition. body-weight gain and milk protein content tended to be higher in cows fed 7.5 % TSH.

Barman *et al.* (2005) [1] reported that in spite of lower DMI Animals were lost body weight at 0 (5%) and 40 (2%) per cent levels of babul pods (Tanniniferous feed) supplementation due to increase in milk production compared to 20 per cent supplemented group. Dry matter intake was reduced (P<0.01) at 20 and 40 per cent levels of babul pods by 5 per cent in both the groups compared to 0 per cent level of babul pods.

Conclusions

It is concluded that the feeding of tamarind seed husk in combination with concentrate mixture meet the maintenance and growth requirement of experimental crossbred cattle. The difference among the groups in DMI and body weight gain (p < 0.05) was non significant (p > 0.05). The feed intake recorded was sufficient to fulfil the dietary requirement and appetite of the crossbred cattle. Economic point of view TSH can be replaced by 2.5 and 7.5% concentrate mixture without adverse effect on health and cost of feeding

Reference

1. Barman K. Biodegradation of tanniniferous feeds and their influence on nutrient utilization and productivity of dairy animals [thesis]. Karnal: National Dairy Research Institute; 2004.
2. Barry TN, McNabb WC. The implication of condensed tannins on the nutritive value of temperate forages fed to ruminants. British Journal of Nutrition. 1999;81:263-272.

3. Ennouri M, Fetoui H, Bourret E, Zeghal N, Attia H. Evaluation of some biological parameters of *Opuntia ficus-indica*. I. Influence of seed oil-supplemented diet on rats. Bioresource Technology. 2006;97:1382-1386.
4. Glick Z, Joslyn MA. Food intake depression and other metabolic effects of tannic acid in rats. Journal of Nutrition. 1970;100:509-517.
5. Kibon A, Maina AH. Dry *Acacia sieberiana* pods as a supplement to a low-quality forage diet for growing lambs in Northern Nigeria. Tropical Animal Health and Production. 1993;25:59-64.
6. Lorenz MM, Uden P. Influence of formic acid and dry matter on protein degradation in the tanniniferous legume sainfoin. Animal Feed Science and Technology. 2011;164:217-224.
7. Makkar HPS, Blümmel M, Borowy NK, Becker K. Gravimetric determination of tannins and their correlations with chemical and protein precipitation methods. Journal of the Science of Food and Agriculture. 1993;61:161-165.
8. Malik PK, Kolte AP, Bakshi B, Baruah L, Dhali A. Effect of tamarind seed husk supplementation on ruminal methanogenesis, methanogen diversity and fermentation characteristics. Carbon Management. 2017;8(4):319-329.
9. Sinclair LA, Garnsworthy PC, Newbold JR, Buttery PJ. Effect of synchronizing the rate of dietary energy and nitrogen release on rumen fermentation and microbial protein synthesis in sheep. Journal of Agricultural Science (Cambridge). 1993;120:251-263.
10. Waghorn GC, Shelton ID, McNabb WC. Effect of condensed tannins in *Lotus pedunculatus* on its nutritive value for sheep: non-nitrogenous aspects. Journal of Agricultural Science (Cambridge). 1994;123:99-110.