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Effect of dietary inclusion of babul pods (*Acacia nilotica*) in concentrate mixture on growth performance, nutrient utilization and economics of feeding in growing Osmanabadi goats

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ABSTRACT

This study evaluated the effect of dietary babul pod (*Acacia nilotica*) inclusion at 15 and 25% in the concentrate mixture on growth performance, nutrient utilization, and feeding economics of 18 growing Osmanabadi goats aged four to five months (12.95 kg body weight), assigned to three groups of six and fed a control, 15%, or 25% babul pod diet for 90 days, followed by a seven-day digestibility trial. Average daily gain, dry matter intake, and feed conversion efficiency were numerically higher, and nutrient digestibility was similar, in babul pod-fed groups than control, though differences were non-significant. Ration cost fell progressively with inclusion, lowering feed cost per kilogram of weight gain and giving the highest net profit per goat at 25% inclusion. Babul pods can be safely incorporated up to 25% in the concentrate mixture of growing Osmanabadi goats without adversely affecting growth or nutrient utilization, while improving feeding economics.

Keywords: *Acacia nilotica*, Babul pods, Economics of feeding, Growth performance, Nutrient utilization, Osmanabadi goats

1. Introduction

Goat farming is an important component of the livestock sector in India, providing meat, milk, and income to millions of smallholder farmers. Osmanabadi goats (*Capra hircus*), indigenous to Maharashtra, are a dual-purpose breed valued for their adaptability and meat production potential. Rising costs of conventional feed ingredients such as maize, oilseed meals, and cereal byproducts have made feeding the major cost centre in commercial goat production, necessitating exploration of locally available and economical alternative feed resources (Chaudhari *et al.*, 2022) [1]. Babul pods (*Acacia nilotica* Willd. ex Delile), a leguminous tree widely distributed across arid and semi-arid regions of India and Africa, produce pods that are rich in nutrients and increasingly recognized as a potential feed supplement for small ruminants (Rubanza *et al.*, 2007) [2]. The pods contain moderate energy, moderate protein (~16.6% crude protein on dry matter basis), high fibre, and low starch, along with moderate levels of condensed tannins, providing diet formulation flexibility (Makkar, 2003) [3]. At moderate concentrations, condensed tannins protect dietary protein from rumen degradation by forming stable protein-tannin complexes, thereby increasing the flow of bypass protein and essential amino acids to the small intestine, which can positively influence growth and feed efficiency (Barman, 2004) [4].

Several studies have reported beneficial effects of *A. nilotica* pods in small ruminant diets. Uguru *et al.* [5] found that goats fed 25% sun-dried *A. nilotica* pods recorded higher weight gain and feed conversion efficiency, along with the lowest feed cost per unit weight gain. Paswan *et al.* [6] observed significantly higher average daily gain and improved feed conversion ratio in Black Bengal kids fed babul pod meal at 20% of the ration. Chaudhari *et al.* [1] reported that Surti goat kids fed total mixed ration containing 3% condensed tannin from babul pods showed significantly better feed conversion efficiency and 20.04% lower feed cost per kg of body weight gain compared to controls. However, adverse effects such as reduced dry matter intake and weight gain have been reported at high inclusion levels providing more than 4% tannins in the ration (Paswan *et al.*, 2017; Barman *et al.*, 2008) [6, 7], suggesting a threshold-dependent response. Despite growing evidence from other breeds and species, data on indigenous Osmanabadi goats under the feeding and agro-climatic conditions of Maharashtra are lacking. The present study was therefore planned to evaluate the effect of dietary inclusion of babul pods (*A. nilotica*) at 15 and 25% in the concentrate mixture on growth performance, nutrient utilization, and economics of feeding in growing Osmanabadi goats.

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2. Materials and Methods

2.1 Experimental site, duration and animals

The experiment was conducted at the Department of Animal Nutrition, College of Veterinary and Animal Sciences, Maharashtra Animal and Fishery Sciences University (MAFSU), Parbhani, Maharashtra, India during 2023–24, for a duration of 90 days following a 15-day acclimatization period. Eighteen growing Osmanabadi goats (nine males and nine females) aged 4–5 months with a mean initial body weight of 12.95 ± 0.36 kg were procured from the Samale goat farm, Parbhani. All goats were administered standard anthelmintic treatment before the trial and individually housed in a well-ventilated shed. Animals were randomly allocated to three equal groups of six each (three males + three females) in a completely randomized design: T⁰ – control (total mixed ration without babul pods); T (Chaudhari *et al.*, 2022) [1] – total mixed ration with 15% babul pods in concentrate mixture; T (Rubanza *et al.*, 2007) [2] – total mixed ration with 25% babul pods in concentrate mixture. Ethical approval for the use of experimental animals was obtained from the Institutional Animal Ethics Committee, COVAS, MAFSU, Parbhani.

2.2 Experimental diets and feeding management

Mature, fallen pods of *A. nilotica* were sourced from adjoining areas, shade-dried, mechanically ground along with seeds using a Willey mill, and stored in airtight bags. Three isonitrogenous concentrate mixtures were formulated (Table 1) using locally available ingredients. All total mixed rations were composed of 50% dry fodder (jowar kadbi), 20% green fodder (chopped Hybrid Napier), and 30% concentrate mixture on an as-fed basis, as per (ICAR) [8] norms. The total mixed ration was offered twice daily (10:00 h and 17:00 h), with feed quantity adjusted fortnightly based on body weight changes. Feed offered and residues were weighed daily. Fresh, clean drinking water was provided ad libitum throughout the trial.

2.3 Chemical analysis

Feed and residue samples were analysed in duplicate for dry matter, crude protein (Kjeldahl N $\times$ 6.25), ether extract (Soxhlet), crude fibre, and total ash as per (AOAC) [9]. Nitrogen-free extract was calculated by difference (100 – crude protein – ether extract – crude fibre – total ash) and organic matter as (100 – total ash) on dry matter basis.

2.4 Growth performance parameters

Body weight was recorded fortnightly using an electronic balance before morning feeding. Average daily gain (g/d) was calculated from fortnightly weight differences. Feed conversion efficiency was calculated as daily dry matter intake (kg)/daily body weight gain (kg).

2.5 Digestibility trial

A seven-day total collection digestibility trial was conducted at the end of the 90-day feeding period. Faeces voided during each 24-h period were collected, weighed, and a 1/10th aliquot preserved for proximate analysis. Apparent digestibility coefficients were computed from nutrient intake and faecal outgo.

2.6 Economics of feeding

Feed cost per kg of live weight gain was calculated from total mixed ration consumed (kg, dry matter basis) multiplied by the total mixed ration cost per kg, divided by total body weight gain. Net profit per goat was computed as selling price (final body weight $\times$ Rs. 325/kg) minus total production cost (initial cost of goat + feed cost + 10% miscellaneous charges), based on prevailing market prices.

2.7 Statistical analysis

Data were analysed by one-way analysis of variance in a completely randomized design as per (Snedecor and Cochran) [10]. Differences among group means were considered significant at $p < 0.05$.

Table 1. Percent ingredient composition of concentrate mixtures

Sr. No.	Ingredients	Conc. I (T ⁰)	Conc. II (T ¹)	Conc. III (T ²)
1	Maize	30	30	35
2	Soybean meal	27	30	30
3	Babul pod meal	–	15	25
4	Gram remnant	35	18	4
5	Jowar remnant	5	4	3
6	Mineral mixture	2	2	2
7	Common salt	1	1	1
	Total	100	100	100

3. Results and discussion

3.1 Proximate composition of feedstuffs and total mixed ration

The proximate composition of babul pods (*A. nilotica*) on dry matter basis was: dry matter 93.16%, organic matter 95.64%, crude protein 16.60%, ether extract 4.21%, crude fibre 15.10%, nitrogen-free extract 59.73%, and total ash 4.36% (Table 2). The crude protein content of babul pods (16.60% dry matter) was comparable to that of

conventional protein supplements, confirming its suitability as a partial replacement for traditional concentrate ingredients. All three concentrate mixtures were isonitrogenous, with crude protein uniformly at 21.60% dry matter. Similarly, the three total mixed rations (T⁰, T (Chaudhari *et al.*, 2022) [1], T (Rubanza *et al.*, 2007) [2]) were comparable in composition (crude protein: 11.30% for all; crude fibre: 24.15, 24.18, 24.22%; ether extract: 3.26, 3.28, 3.32% dry matter, respectively), ensuring that observed differences in performance were attributable to babul pod inclusion and its tannin content rather than differential nutrient supply (Table 2).

Table 2. Proximate composition of babul pods (*A. nilotica*) and total mixed rations (% dry matter basis)

Nutrient parameter	Babul pods	TMR T ⁰	TMR T ¹	TMR T ²
Dry matter	93.16	58.64	58.68	58.76
Organic matter	95.64	91.16	91.12	91.13
Crude protein	16.60	11.30	11.30	11.30
Ether extract	4.21	3.26	3.28	3.32

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Crude fibre	15.10	24.15	24.18	24.22
Nitrogen-free extract	59.73	52.03	52.09	52.12
Total ash	4.36	9.26	9.15	9.04

TMR = total mixed ration

3.2 Growth performance

The fortnightly body weights, average daily gain, dry matter intake, and feed conversion efficiency of growing Osmanabadi goats across treatment groups are presented in Table 3. At the commencement of the trial, initial body weights were statistically similar among T⁰ (12.75 ± 0.53 kg), T (Chaudhari *et al.*, 2022) [1] (12.78 ± 0.56 kg), and T (Rubanza *et al.*, 2007) [2] (12.85 ± 0.69 kg) ($p > 0.05$). At the end of the 90-day trial, final body weights were 17.08 ± 0.53, 17.21 ± 0.57, and 17.34 ± 0.69 kg for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively, yielding total weight gains of 4.33, 4.43, and 4.49 kg, with non-significant ($p > 0.05$) differences among groups. The overall mean average daily gain was 48.05 ± 0.67, 49.20 ± 0.65, and 49.87 ± 0.64 g/d for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively, with no significant difference ($p > 0.05$), though T (Rubanza *et al.*, 2007) [2] showed the highest numerical average daily gain. Within each group, average daily gain showed a steady increase from the first to the sixth fortnight, consistent with progressive increase in body weight and nutrient intake.

The non-significant but numerically higher weight gain and average daily gain in T (Chaudhari *et al.*, 2022) [1] and T (Rubanza *et al.*, 2007) [2] groups could be attributed to the protein protection effect of condensed tannins present in babul pods at moderate levels. Tannins at low-to-moderate concentrations form complexes with dietary protein in the rumen, reducing the rate of rumen degradation and increasing the flow of essential amino acids to the small intestine for absorption (Makkar, 2003) [3], which can enhance tissue accretion. These findings are consistent with Uguru *et al.* [5], who reported improvement in total weight gain and average daily gain in Red Sokoto goats fed 25% sun-dried *A. nilotica* pods. Similarly, Chaudhari *et al.* [1] observed that the overall gain and average daily gain were higher by 35.82% and 20.26%, respectively, in tannin-fed Surti goat kids compared to controls. Rubanza *et al.* [2] found significantly ($p < 0.05$) improved average daily weight gains when goats were supplemented with *A. nilotica* leaf meal at 20% of expected dry matter intake. Contrary to the present findings, Paswan *et al.* [6] found that inclusion of *A. nilotica* pod meal at 30% significantly ($p < 0.05$) reduced average daily gain, likely due to higher tannin concentrations exerting anti-nutritional effects. Similarly, (Barman and Rai) [7] reported reduced body weight gain in crossbred cows fed 20–40% babul pods owing to significantly lower dry matter intake.

The mean dry matter intake (g/d) recorded for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2] groups throughout the experimental period was 515.84 ± 10.64, 520.47 ± 11.10, and 523.28 ± 12.49, respectively, with non-significant ($p > 0.05$) differences among groups. The absence of reduced dry matter intake at 15 and 25% babul pod inclusion indicates that the levels of condensed tannins in these diets did not exert an appreciable *anti*-palatable effect on feed intake. Chaudhari *et al.* [1] and Uguru *et al.* [5] similarly reported non-significant differences in dry matter intake in goats fed babul pod-supplemented diets. The overall feed conversion efficiency values for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2] were 10.78 ± 0.25, 10.60 ± 0.19, and 10.51 ± 0.23, respectively ($p > 0.05$). Numerically, T (Rubanza *et al.*, 2007) [2] showed the best feed efficiency, reflecting the combination of higher average daily gain with relatively similar dry matter intake compared to T⁰. Paswan *et al.* [6] found a 22.60% lower feed conversion ratio in kids fed 20% babul pod meal, and Chaudhari *et al.* [1] observed significantly ($p < 0.05$) better feed conversion efficiency in the tannin-fed group, in agreement with the trend observed here.

3.3 Nutrient utilization

The apparent digestibility coefficients of dry matter, organic matter, crude protein, ether extract, crude fibre, and nitrogen-free extract from the seven-day digestibility trial are presented in Table 4. Non-significant ($p > 0.05$) differences were observed in intake, faecal outgo, and apparent digestibility of all nutrients among the treatment groups. Dry matter digestibility was 64.76 ± 0.24, 65.24 ± 0.14, and 65.47 ± 0.29% for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively. Organic matter digestibility was 69.00 ± 0.23, 69.31 ± 0.17, and 69.59 ± 0.22% for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively. Crude protein digestibility was 71.30 ± 0.19, 71.70 ± 0.15, and 71.81 ± 0.21%, ether extract digestibility was 69.72 ± 0.23, 70.34 ± 0.19, and 70.40 ± 0.29%, crude fibre digestibility was 54.99 ± 0.40, 55.17 ± 0.28, and 55.35 ± 0.34%, and nitrogen-free extract digestibility was 74.84 ± 0.19, 75.23 ± 0.25, and 75.62 ± 0.26% for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively. Numerically, treatment groups T (Chaudhari *et al.*, 2022) [1] and T (Rubanza *et al.*, 2007) [2] showed slightly higher digestibility values for all nutrients compared to T⁰.

Table 3. Effect of dietary inclusion of babul pods (*A. nilotica*) on growth performance parameters of growing Osmanabadi goats (Mean ± SE)

Parameter	Fortnight/Period	T ⁰	T ¹	T ²	<i>p</i> -value
Body weight (kg)	Day 1 (Initial)	12.75 ± 0.53	12.78 ± 0.56	12.85 ± 0.69	0.992
	Fortnight 2	14.11 ± 0.55	14.18 ± 0.57	14.26 ± 0.71	0.986
	Fortnight 4	15.56 ± 0.56	15.68 ± 0.57	15.78 ± 0.69	0.967
	Fortnight 6 (Final)	17.08 ± 0.53	17.21 ± 0.57	17.34 ± 0.69	0.952
	Overall mean	14.86 ± 0.28	14.95 ± 0.30	15.05 ± 0.34	—
ADG (g/d)	Fortnight 1	45.00 ± 1.72	46.22 ± 1.57	46.56 ± 1.56	0.777
	Fortnight 3	48.11 ± 0.83	49.56 ± 1.89	50.67 ± 1.67	0.513
	Fortnight 6	50.56 ± 2.00	51.56 ± 1.10	52.44 ± 0.92	0.651
	Overall mean	48.05 ± 0.67	49.20 ± 0.65	49.87 ± 0.64	—
DMI (g/d)	Fortnight 1	452.50 ± 23.30	459.53 ± 16.82	462.35 ± 31.08	0.958
	Fortnight 3	503.85 ± 21.64	505.23 ± 19.30	508.33 ± 25.40	0.989
	Fortnight 6	578.45 ± 23.19	583.28 ± 19.11	586.31 ± 24.98	0.970

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	Overall mean	515.84 ± 10.64	520.47 ± 11.10	523.28 ± 12.49	—
FCE	Fortnight 1	10.05 ± 0.27	10.01 ± 0.54	9.92 ± 0.55	0.980
	Fortnight 3	10.50 ± 0.53	10.27 ± 0.54	10.13 ± 0.69	0.599
	Fortnight 6	11.61 ± 0.89	11.34 ± 0.44	11.18 ± 0.42	0.886
	Overall mean	10.78 ± 0.25	10.60 ± 0.19	10.51 ± 0.23	—

ADG = average daily gain; DMI = dry matter intake; FCE = feed conversion efficiency (DMI kg/body weight gain kg)

The slight numerical improvement in nutrient digestibility in babul pod-fed groups may be attributed to the moderate levels of condensed tannins, which at low concentrations can improve rumen fermentation efficiency and gastrointestinal health, and reduce the rate of rumen protein degradation, thereby improving overall nitrogen utilization and nutrient flow to the lower digestive tract (Makkar, 2003) [3]. These findings are consistent with Paswan *et al.* [6], who reported non-significant differences in nutrient digestibility in Black Bengal kids fed varying levels of babul pod meal (0, 10, 20, and 30% of concentrate). Similarly, (Bayssa) [11] found no significant differences in organic matter digestibility or total digestible nutrient intake in goats fed untreated babul pods up to 22% of total mixed ration. Uguru *et al.* [5] observed comparable nutrient digestibility in Red Sokoto goats fed different levels of sun-dried *A. nilotica* pods. In contrast, (Mousa) [12] observed declining digestibility with increasing acacia levels in Awassi lambs, likely due to higher tannin concentrations exerting interference with digestive enzymes. (Barman) [4] reported significantly reduced organic matter and neutral detergent fibre digestibility in lactating crossbred cows fed 4% *A. nilotica* tannins. The non-significant differences in the present study at 15 and 25% inclusion levels support the view that the condensed tannin content of babul pods at these dietary levels remains within the threshold that does not adversely affect apparent nutrient digestibility.

3.4 Economics of feeding

The economics of feeding data are presented in Table 5. The cost of the concentrate mixture decreased progressively with babul pod inclusion: Rs. 26.36, Rs. 25.62, and Rs. 24.92/kg for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively, owing to

the substantially lower market price of babul pods (Rs. 8/kg) compared to conventional ingredients such as gram remnant and soybean meal. Correspondingly, the cost of total mixed ration per kg on dry matter basis was Rs. 13.05, Rs. 12.76, and Rs. 12.50 for T⁰, T (Chaudhari *et al.*, 2022) [1], and T (Rubanza *et al.*, 2007) [2], respectively, representing a saving of Rs. 0.29/kg (T (Chaudhari *et al.*, 2022) [1]) and Rs. 0.55/kg (T (Rubanza *et al.*, 2007) [2]) over the control.

Feed cost per kg of live weight gain was lowest in T (Rubanza *et al.*, 2007) [2] (Rs. 131.12), followed by T (Chaudhari *et al.*, 2022) [1] (Rs. 134.87) and T⁰ (Rs. 140.02), representing a 6.36% and 3.68% reduction in T (Rubanza *et al.*, 2007) [2] and T (Chaudhari *et al.*, 2022) [1] over the control, respectively. The net profit per goat was highest in T (Rubanza *et al.*, 2007) [2] (Rs. 860.50), followed by T (Chaudhari *et al.*, 2022) [1] (Rs. 832.08) and T⁰ (Rs. 791.52), with T (Rubanza *et al.*, 2007) [2] generating approximately Rs. 69 more profit per goat than the control over the 90-day trial. The higher net profit in T (Rubanza *et al.*, 2007) [2] was driven by the dual benefit of reduced feed cost per kg weight gain and greater final body weight, which fetched a higher selling price. These findings agree with Chaudhari *et al.* [1], who reported a 20.04% reduction in feed cost per kg weight gain and significantly ($p < 0.05$) higher return over feed cost in babul pod-fed Surti goat kids. Uguru *et al.* [5] similarly concluded that the cheapest cost per unit weight gain was obtained in goats fed 25% sun-dried *A. nilotica* pods. (Mousa) [12] also noted improved economic efficiency and lower feed cost per kg body weight gain in Awassi lambs fed up to 40% acacia in the diet. (Denbela and Deribe) [13] confirmed that 58% *A. nilotica* pod meal was the most economical option compared to commercial concentrate in crossbred goat production systems.

Table 4. Effect of dietary inclusion of babul pods (*A. nilotica*) on nutrient digestibility of growing Osmanabadi goats (Mean ± SE)

Nutrient	Parameter	T ⁰	T ¹	T ²
DM	Intake (g/d)	604.05 ± 8.54	614.36 ± 8.20	617.31 ± 11.18
	Outgo (g/d)	212.67 ± 3.04	213.66 ± 3.23	212.04 ± 2.62
	Digestibility (%)	64.76 ± 0.24	65.24 ± 0.14	65.47 ± 0.29
OM	Intake (g/d)	554.81 ± 7.89	561.24 ± 8.16	564.81 ± 10.34
	Outgo (g/d)	171.88 ± 2.62	172.15 ± 2.63	171.37 ± 2.85
	Digestibility (%)	69.00 ± 0.23	69.31 ± 0.17	69.59 ± 0.22
CP	Intake (g/d)	68.26 ± 0.96	69.42 ± 0.93	69.76 ± 1.26
	Outgo (g/d)	19.59 ± 0.30	19.66 ± 0.32	19.58 ± 0.28
	Digestibility (%)	71.30 ± 0.19	71.70 ± 0.15	71.81 ± 0.21
EE	Intake (g/d)	19.69 ± 0.28	20.15 ± 0.27	20.49 ± 0.37
	Outgo (g/d)	5.96 ± 0.10	5.99 ± 0.10	6.03 ± 0.08
	Digestibility (%)	69.72 ± 0.23	70.34 ± 0.19	70.40 ± 0.29
CF	Intake (g/d)	145.88 ± 2.06	148.55 ± 1.98	149.51 ± 2.71
	Outgo (g/d)	65.68 ± 1.14	66.73 ± 1.19	66.48 ± 0.90
	Digestibility (%)	54.99 ± 0.40	55.17 ± 0.28	55.35 ± 0.34
NFE	Intake (g/d)	320.98 ± 4.58	323.11 ± 5.02	325.05 ± 6.00
	Outgo (g/d)	80.64 ± 1.13	79.77 ± 1.12	79.27 ± 1.68
	Digestibility (%)	74.84 ± 0.19	75.23 ± 0.25	75.62 ± 0.26

DM = dry matter; OM = organic matter; CP = crude protein; EE = ether extract; CF = crude fibre; NFE = nitrogen-free extract

4. Conclusion

The dietary inclusion of babul pods at 15 and 25% in the concentrate mixture of growing Osmanabadi goats did not adversely affect body weight gain, average daily gain, dry matter intake, feed conversion efficiency, or nutrient digestibility. Treatment groups showed numerically higher values for all growth and digestibility parameters compared to the control, though differences were statistically non-significant. Babul pods, as a locally available, low-cost, and nutritionally adequate feed resource, can be safely incorporated up to 25% in the concentrate mixture of growing Osmanabadi goats, supporting the formulation of least-cost rations and improving the profitability of small-scale goat production systems without compromising animal health or productive performance.

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Authorship contribution statement

S. D. Nagre: conceptualization, experimental design, field work, data collection, laboratory analysis, data interpretation, and preparation of manuscript. S. M. Wankhede: supervision, guidance, and critical review of the manuscript. V. K. Munde: supervision and advisory support. T. K. Rathod: assistance in field work and data collection. A. B. Patil: statistical analysis, data interpretation, and manuscript revision.

Table 5. Effect of dietary inclusion of babul pods (*A. nilotica*) on economics of feeding in growing Osmanabadi goats

Sr. No.	Particulars	T ⁰	T ¹	T ²
1	Cost of concentrate mixture (Rs./kg)	26.36	25.62	24.92
2	Cost of Hybrid Napier (Rs./kg)	2.00	2.00	2.00
3	Cost of jowar kadbi (Rs./kg)	5.00	5.00	5.00
4	Cost of babul pods (Rs./kg)	—	8.00	8.00
5	Miscellaneous cost (%)	10	10	10
6	Cost of TMR per kg (dry matter basis, Rs.)	13.05	12.76	12.50
7	Initial average body weight (kg/goat)	12.75	12.78	12.85
8	Cost of goat @ Rs. 325/kg BW (Rs./head)	4143.75	4153.50	4176.25
9	Final average body weight (kg/goat)	17.08	17.21	17.34
10	Average price realised @ Rs. 325/kg BW (Rs./head)	5551.00	5593.25	5635.50
11	Total body weight gain (kg/goat)	4.33	4.43	4.49
12	Average DMI (g/goat/d, dry matter basis)	515.84	520.48	523.29
13	Total dry matter consumed/goat/90 d (kg)	46.42	46.84	47.10
14	TMR required to gain 1 kg BW (feed efficiency)	10.73	10.57	10.49
15	Cost of feed per kg live weight gain (Rs./kg)	140.02	134.87	131.12
16	Total cost of feed consumed (TMR, Rs.)	605.78	597.67	588.75
17	Total cost of production (Rs./goat)	4759.48	4761.17	4775.00
18	Net profit per goat (Rs.)	791.52	832.08	860.50

BW = body weight; DMI = dry matter intake; TMR = total mixed ration

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