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Impact of Turmeric Powder-supplemented Diets on Growth Performance and Feeding Economics in Konkan Kanyal Goat Kids

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study was undertaken to evaluate the effect of turmeric (*Curcuma longa* L.) powder supplementation on growth performance, body measurements and economics in Konkan Kanyal goat kids. Twenty weaned kids were randomly allotted to five dietary treatments (T_1: basal diet only, T_2: basal diet + 3 g turmeric d^{-1}, T_3: basal diet + 6 g d^{-1}, T_4: basal diet + 9 g d^{-1} and T_5: basal diet +

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12 g d^{-1}) and reared for 90 days. The basal diet consisted of Sampoorna grass, Jowar kadbi and compounded goat pellets. Growth traits including body weight, body length, height at withers and chest girth were recorded, along with economic parameters. Supplementation at 9 g/day (T_4) significantly ($p < 0.05$) improved body length (8.55 cm), height (8.40 cm) and chest girth (7.13 cm) gains compared to the control. T_4 also achieved the highest average daily gain (71.94 g/day) and final body weight (15.70 kg). Economic evaluation revealed the lowest cost per kg gain (₹905.53), highest net profit (₹1777.16) and most favorable B:C ratio (1.30) under T_4. It is concluded that turmeric supplementation at 9 g/day, along with a basal diet of Sampoorna grass, Jowar kadbi and goat pellets, optimizes growth performance and profitability in Konkan Kanyal kids under Konkan conditions.

Keywords: Economic efficiency; herbal feed additive; Konkan Kanyal goats; indigenous; ruminants.

ABBREVIATIONS

DM : Dry Matter
CP : Crude Protein
CF : Crude Fibre
EE : Ether Extract
Ash : Total Mineral Matter
NFE : Nitrogen-Free Extract
₹ : Indian Rupee;

1. INTRODUCTION

India's meat production has witnessed substantial growth, rising from 6.69 million tonnes in 2014–15 to 10.25 million tonnes in 2023–24, with a compound annual growth rate (CAGR) of 4.85% (PIB, 2024). Goat farming plays a crucial role in sustaining the livelihoods of rural communities in India, particularly in the Konkan region of Maharashtra, where the indigenous Konkan Kanyal breed is traditionally reared for meat production. According to the 20th Livestock Census (Anonymous, 2019), India has a goat population of 148.88 million, contributing significantly to the rural economy through the production of meat, milk and manure. Enhancing the growth performance and profitability of native breeds like the Konkan Kanyal through strategic nutritional interventions is therefore essential to improve productivity and strengthen farmer incomes.

In recent years, the use of phytogenic feed additives natural products derived from herbs and plants—has gained considerable interest as a sustainable and safer alternative to synthetic growth promoters in livestock nutrition (Adebisi et al., 2022; Ashraf et al., 2020). Among these, turmeric (*Curcuma longa* L.), rich in bioactive compounds such as curcumin, has drawn wide attention for its antioxidant, antimicrobial, antiparasitic and growth-promoting properties. The city of Erode in Tamil Nadu, the largest producer and trade hub of turmeric, is popularly known as the "Yellow City," "Turmeric City," and "Textile City." Sangli in Maharashtra ranks second in turmeric production and commerce (Prasad & Aggarwal, 2011). Given its wide availability and traditional use in India, turmeric represents a promising phytogenic additive in livestock feeding systems.

Several studies have demonstrated the positive effects of turmeric supplementation in goats. Oderinwale et al. (2017) reported improved body weight gain in kids from three goat breeds when turmeric was supplemented at graded levels. Bansal et al. (2002) and Mane et al. (2018) attributed these benefits to curcumin, which acts as an antioxidant, anti-inflammatory and digestive stimulant. Ashraf et al. (2020) further demonstrated turmeric's antiparasitic efficacy, which may indirectly support growth. Adebisi et al. (2022) observed an average daily gain of 55 g/day in goats fed 10 g of turmeric powder over a 56-day period, while Habeeb and Tarabany (2012) reported improved weight gain in curcumin-supplemented Zaraibi kids, particularly under heat stress conditions. Similarly, Pingale (2022) found that inclusion of 0.6% turmeric powder in the concentrate feed of Osmanabadi kids reduced the cost per kilogram of weight gain to ₹313.08, compared with ₹418.05 in the unsupplemented control group. These findings highlight turmeric's potential not only to enhance growth performance but also to reduce production costs.

The Konkan Kanyal goat is an indigenous breed of the Konkan region of Maharashtra, particularly prevalent in the Sindhudurg district. It is primarily reared for meat production and is well adapted to the humid coastal agro-climatic conditions of the region. Known for its adaptability, disease resistance and ability to thrive under low-input systems, the breed also provides high-quality

meat, making it a valuable resource for local farmers (Patil et al., 2021). Despite these desirable traits, Konkan Kanyal goats often exhibit suboptimal growth performance due to traditional feeding practices and limited nutritional inputs. While turmeric supplementation has been studied in other goat breeds with encouraging results, there is a lack of scientific evidence regarding its effects on Konkan Kanyal goats. Considering the breed's genetic and economic importance and turmeric's well-documented bioactive properties, research focused on nutritional strategies to enhance growth and profitability in Konkan Kanyal goats is both timely and essential.

Therefore, the present study was undertaken to evaluate the effects of graded levels of turmeric powder supplementation on growth performance and economic returns in weaned Konkan Kanyal kids under controlled feeding conditions, with the objective of developing a cost-effective and sustainable feeding strategy for smallholder farmers.

2. MATERIALS AND METHODS

The present study was conducted to evaluate the effect of turmeric (*Curcuma longa* L.) powder supplementation on the growth performance of Konkan Kanyal kids. The 90-day feeding trial was carried out at the Goat Unit, Livestock Research Station, Nileli, Sindhudurg District, Maharashtra, India.Turmeric powder was procured from the College of Forestry, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli.

2.1 Management of Experimental Animals

The experimental kids were housed in a clean, well-ventilated shed, dewormed with Fendikind Plus and the shed was disinfected with Deltamethrin 19 (1.25%) a week before the trial. Each kid was provided with individual feeders and tied with nylon ropes. Clean drinking water was supplied twice daily and its intake was recorded. General management practices such as vaccination, deworming (Fendikind Plus @ 3 g/10 kg body weight), grooming, tagging and routine care were followed throughout the 13-week experiment.

2.2 Experimental Layout and Treatment Details

A Randomized Block Design (RBD) was used with 5 treatments and 4 replications per treatment, involving a total of 20 weaned Konkan Kanyal kids of similar average body weight. The experimental animals were randomly allotted to five dietary treatment groups, each comprising four Konkan Kanyal kids with similar average body weight. All animals were fed a basal diet consisting of green Sampoorna grass, Jowar kadabi and goat pellets. The control group (T_1) received only the basal diet without any supplementation. The treatment groups T_2, T_3, T_4 and T_5 were supplemented with turmeric powder at levels of 3 g, 6 g, 9 g and 12 g per animal per day, respectively. The turmeric powder was thoroughly mixed with the concentrate portion (goat pellets) and offered along with the basal diet throughout the 90-day trial period.

2.3 Chemical Composition of Experimental Feed

The quality of livestock feed is determined by its chemical composition, which reflects its capacity to meet animal nutrient requirements. For the experimental rations, locally available feed resources were utilized to ensure both nutritional adequacy and regional relevance (Kearl, 1982). The proximate composition of green Sampoorna grass, Jowar kadabi, compounded goat pellets and turmeric (*Curcuma longa* L.) powder was analyzed to establish their nutrient profile.

The proximate composition of the experimental feed, comprising Sampoorna grass, Jowar kadabi, compounded goat pellets and turmeric (*Curcuma longa* L.) powder, was analyzed to determine its nutrient profile (Table 1).

In the present study, the proximate composition of the experimental feed ingredients was evaluated for dry matter (DM), crude protein (CP), crude fibre (CF), ether extract (EE), ash and nitrogen-free extract (NFE). Turmeric powder contained 91.15% DM, 9.95% CP, 12.11% CF, 2.46% EE, 6.82% ash and 68.66% NFE. Jowar kadabi recorded 89.10% DM, 3.25% CP, 35.80% CF, 1.62% EE, 6.80% ash and 52.53% NFE. Sampoorna grass showed 23.50% DM, 9.90% CP, 23.70% CF, 5.80% EE, 8.90% ash and 52.00% NFE. Goat pellet feed contained 86.65% DM, 19.40% CP, 10.90% CF, 3.80% EE, 10.50% ash and 55.40% NFE.

Turmeric powder was mixed with the concentrate portion (goat pellets) of the diet. Feed cost was calculated at the end of the 13th week using prevailing market prices. Economic analysis was done using:

Table 1. Proximate analysis of experimental feed ingredients (% DM basis)

Sr. No	Attributes (%)	Feed ingredients			
		Turmeric Powder	Jowar kadabi	Sampoorna grass	Goat pellet
1	DM	91.15	89.10	23.50	86.65
2	CP	9.95	3.25	9.90	19.40
3	CF	12.11	35.80	23.70	10.90
4	EE	2.46	1.62	5.80	3.80
5	Ash	6.82	6.80	8.90	10.50
6	NFE	68.66	52.53	52.00	55.40

- Total Cost = Fixed Cost + Variable Cost
- Net Profit = Total Revenue – Total Cost
- Benefit Cost Ratio = Total Revenue / Total Cost

Statistical analysis was performed using ANOVA as per Rangaswamy (2000), considering replication, treatment and sampling error.

3. RESULTS AND DISCUSSION

3.1 Growth Performance of Experimental Kids

The initial body weight, weekly body weights, weekly weight gain and total weight gain of goats fed the experimental diets in treatments T_1, T_2, T_3, T_4 and T_5 are presented in Table 2, Table 3 and Table 4.

Table 1 presents the goats' average weekly body weight gain throughout the trial. In this study, treatment T_4 showed the highest increase in body weight, followed by T_5, T_3, T_2 and T_1. Specifically, the weight gain in T_4 (fed with 9 g of turmeric powder) was greater than that observed in T_5, T_3, T_2 and T_1.

The weekly body weight data show a consistent increase across all treatments over 13 weeks. Starting around 9.10 – 9.23 kg in week 1, goats in T_4 (9 g turmeric) reached the highest final weight at 15.70 kg by week 13, followed by T_5 (15.20 kg), T_3 (14.93 kg), T_2 (14.88 kg) and T_1 (14.63 kg). Throughout the trial, T_4 consistently recorded higher weights, particularly after week 6, indicating that 9 g turmeric supplementation most effectively boosted growth performance compared to the other groups.

The initial body weights of goats across treatments were similar, ranging from 9.10 to 9.23 kg. After the trial, final body weights increased in all groups, with T_4 showing the highest final weight of 15.70 kg, followed by T_5 (15.20 kg), T_3 (14.80 kg), T_2 (14.73 kg) and T_1 (14.63 kg). Total weight gain was greatest in T_4 (6.48 kg), with T_5 at 6.10 kg, T_3 at 5.88 kg, T_2 at 5.65 kg and T_1 at 5.43 kg. Average daily weight gain followed the same pattern, peaking at 71.94 g/day in T_4 and lowest in T_1 at 60.28 g/day. The total body weight gains across treatments are illustrated in Fig. 1.

Table 2. Average weekly body weight in kids during experimental period (kg/week)

Week	T_1	T_2	T_3	T_4	T_5
1	9.20	9.23	9.15	9.23	9.10
2	9.53	9.54	9.50	9.61	9.45
3	9.84	9.90	9.91	10.04	9.86
4	10.18	10.33	10.32	10.48	10.30
5	10.59	10.77	10.76	10.94	10.78
6	11.05	11.20	11.21	11.44	11.28
7	11.54	11.66	11.70	11.99	11.82
8	12.03	12.14	12.19	12.54	12.36
9	12.54	12.66	12.71	13.11	12.92
10	13.05	13.18	13.24	13.71	13.46
11	13.57	13.73	13.78	14.35	14.03
12	14.09	14.30	14.35	15.03	14.60
13	14.63	14.88	14.93	15.70	15.20

Table 3. Average weekly body weight gain in kids during experimental period (kg/week)

Week	T_1	T_2	T_3	T_4	T_5
1	0.32	0.31	0.35	0.39	0.35
2	0.32	0.36	0.41	0.42	0.41
3	0.34	0.43	0.41	0.44	0.44
4	0.41	0.44	0.44	0.45	0.48
5	0.46	0.44	0.45	0.50	0.49
6	0.49	0.46	0.49	0.55	0.54
7	0.50	0.48	0.49	0.55	0.55
8	0.51	0.52	0.52	0.57	0.55
9	0.51	0.52	0.53	0.60	0.55
10	0.52	0.55	0.54	0.64	0.56
11	0.52	0.57	0.57	0.67	0.57
12	0.53	0.58	0.58	0.68	0.60
13	0.54	0.60	0.64	0.70	0.66

Table 4. Total gain in body weight of experimental kids

Treatments	Initial BW (kg)	Final BW (kg)	Gain in total BW (kg)	Av. Gain in BW (g/day)
T_1	9.20	14.63	5.43^{c}	60.28^{c}
T_2	9.23	14.73	5.65^{bc}	62.78^{bc}
T_3	9.15	14.80	5.88^{b}	65.28^{b}
T_4	9.23	15.70	6.48^{a}	71.94^{a}
T_5	9.10	15.20	6.10^{ab}	67.78^{ab}
SE ±	0.32	0.32	0.10	1.08
CD (5%)	NS	NS	0.30	3.33

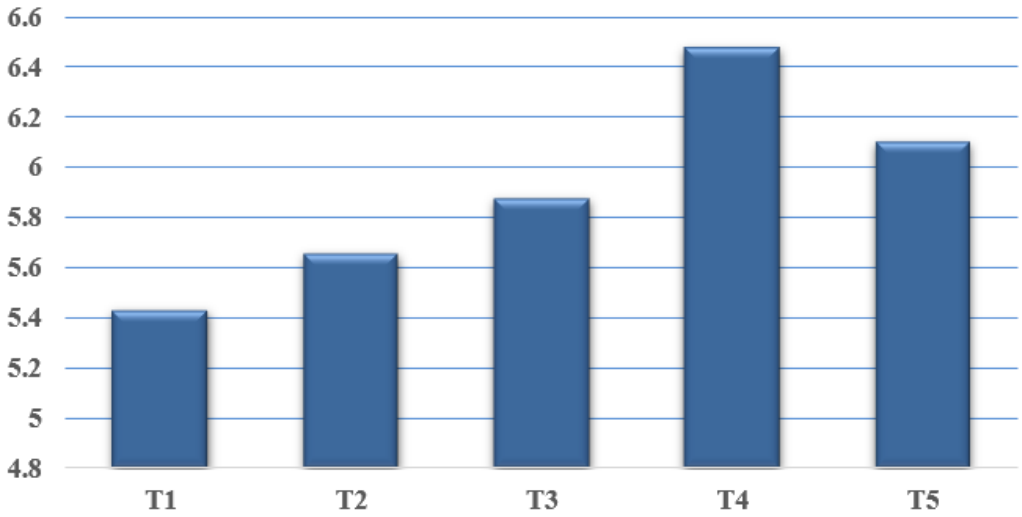

Fig.1. Total gain in body weight of experimental kids

Adebisi et al. (2022) observed a 3.08 kg gain over 56 days (55 g/day) with 10 g turmeric in goats, while the control gained 2.90 kg. Amosu et al. (2020) reported higher maternal weight gains in (Kalahari Red × West African Dwarf) KalaWAD goats (6.92 kg; 74.93 g/day) and (West African Dwarf) WAD does (3.85 kg; 60.82 g/day), further enhanced by turmeric. Similarly, Habeeb and Tarabany (2012) found that curcumin supplementation in Zaraibi kids led to a 4.80 kg gain and 54.2 g/day under heat stress, supporting turmeric's role in improving growth.

3.2 Body Measurements of Experimental Kids

The assessment of physical biometric parameters can serve as an indicator of the animal's nutritional status. Therefore, live body weight and external measurements including body length, height and chest girth were recorded weekly throughout the feeding trial and the results are presented in Table 5.

The initial body length across treatments T_1 to T_5 ranged from 48.60 to 50.98 cm, with no significant variation. By the end of the trial, the final body length increased to 54.03, 57.13, 58.40, 58.35 and 58.25 cm for T_1, T_2, T_3, T_4 and T_5, respectively. The total gain in body length was significantly higher in T_4 (8.55 cm), followed by T_5 (8.20 cm), T_3 (7.43 cm) and T_2 (6.78 cm), while the lowest gain was observed in T_1 (5.43 cm). Similar but comparatively lower gains were reported by Kore (2023) in Konkan Kanyal goats supplemented with Spirulina, where the total gain ranged between 5.15 and 8.15 cm across treatments.

The initial height at withers varied from 48.93 to 50.39 cm across treatments, with final values ranging between 56.30 and 58.64 cm. Although initial and final values were comparable, the total gain in height showed significant differences. The highest gain was recorded in T_4 (8.40 cm), followed by T_5 (8.25 cm) and T_3 (7.85 cm), which were statistically superior to T_1 (7.05 cm). The results indicate that supplementation of turmeric at higher levels improved height gain in kids. Comparable results were reported by Sawant (2024), who observed gains ranging from 6.55 to 7.58 cm with ginger powder supplementation in Konkan Kanyal goats.

For chest girth, the initial measurements were comparable (50.45–51.50 cm). By the end of the study, the final values increased to 56.25–57.58 cm across treatments. The gain in chest girth was significantly highest in T_4 (7.13 cm), followed by T_5 (6.70 cm) and T_3 (6.50 cm), while the lowest gain was observed in T_1 (5.69 cm). These findings are in agreement with Pingale (2022), who also reported a significant improvement in chest girth with turmeric supplementation in goat kids.

Overall, turmeric supplementation, particularly at 9 g/day (T_4), produced the most notable improvements in body length, height and chest girth, indicating enhanced growth performance in Konkan Kanyal kids.

3.3 Estimation of Feeding Cost of Turmeric (*Curcuma longa* L.) Powder

The cost-benefit analysis of feeding Konkan Kanyal kids with and without turmeric powder supplementation is presented Table 6. The analysis includes the average total cost (covering both fixed and variable expenses), average weight gain per treatment and the overall economic evaluation of incorporating turmeric powder into the basal diet.

Table 5. Effect of different treatments on average initial and final height, body length and chest girth of animals, along with total gains

Treat-ments	Avg. Initial Height (cm)	Avg. Final Height (cm)	Total Gain in Height (cm)	Avg. Initial Body Length (cm)	Avg. Final Body Length (cm)	Total Gain in Body Length (cm)	Avg. Initial Chest Girth (cm)	Avg. Final Chest Girth (cm)	Total Gain in Chest Girth (cm)
T1	49.30	56.35	7.05^{c}	48.60	54.03	5.43^{d}	51.08	56.76	5.69^{c}
T2	48.93	56.30	7.38^{bc}	50.35	57.13	6.78^{bc}	51.50	57.58	6.08^{bc}
T3	49.00	56.85	7.85^{b}	50.98	58.40	7.43^{b}	50.60	57.10	6.50^{b}
T4	49.33	57.73	8.40^{a}	49.80	58.35	8.55^{a}	51.10	56.25	7.13^{a}
T5	50.39	58.64	8.25^{a}	50.05	58.25	8.20^{ab}	50.45	57.13	6.70^{a}
SE ±	0.69	0.87	0.31	0.76	1.00	0.34	1.06	1.72	0.28
CD (5%)	NS	NS	0.95	NS	3.07	1.06	NS	NS	0.87

Table 6. Economics of feeding Turmeric powder (Rs.) during experimental period

Sr. No.	Particulars	T_1	T_2	T_3	T_4	T_5
1	Initial average body weight (kg)	9.20	9.23	9.15	9.23	9.10
2	Total body weight gain (kg/goat)	5.43	5.65	5.88	6.48	6.10
3	Final average body weight (kg)	15.16	15.48	15.58	16.40	15.86
4	Total feed intake DM (kg/goat)	106.13	108.50	106.72	105.10	104.54
5	Initial cost @ 450 Rs./kg live weight	4140.00	4153.50	4117.50	4153.50	4095.00
6	Cost per kg body weight gain (Rs./kg)	1037.14	1019.17	982.51	905.53	963.77
7	Final cost @ 450 Rs./kg live weight	6822.00	6966.00	7011.00	7380.00	7137.00
	A Fixed cost (Capital Cost)					
8	House rent charges	55	55	55	55	55
9	Initial cost of kids @ 450/kg live weight	4140.00	4153.50	4117.50	4153.50	4095.00
	Total	4195.00	4208.50	4172.50	4208.50	4150.00
	A. Variable cost					
10	Feed Cost (Sampoorna grass + Jowar kadbi + goat pellet)	13.4	13.4	13.4	13.4	13.4
11	Cost of Turmeric powder	0	0.75	1.5	2.25	3
12	Total cost of feed (11+12)	13.4	14.15	14.9	15.65	16.4
13	Total cost of feed (Rs. for 90 days)	1422.14	1535.28	1590.13	1644.82	1714.46
14	Average equipment cost (bucket, feed trays, roaps) (Rs.)	0.94	0.94	0.94	0.94	0.94
15	Depreciation cost of equipment's (bucket, feed trays, roaps) (Rs.)	0.09	0.09	0.09	0.09	0.09
16	Misc. expenditure (Drug, water, labour etc.) (Rs.)	13.5	13.5	13.5	13.5	13.5
	Total variable cost 13+14+15+16	1436.67	1549.81	1604.66	1659.35	1728.99
	C Total cost (A+B)	5631.67	5758.31	5777.16	5867.85	5878.99
	D Returns after sale					
17	Final weight	15.16	15.48	15.58	16.40	15.86
18	Final cost of kids @450/kg live weight	6822	6966	7011	7380	7137
19	Average total manure obtained (kg/kid)	38	42	48	53	56
20	Total price of manure(5 Rs/kg)	190	210	240	265	280
	Total return	7012	7176	7251	7645	7417
	Net profit per kid (D-C)	1380.33	1417.70	1473.84	1777.16	1538.01
	B:C Ratio (D/C)	1.25	1.25	1.26	1.30	1.26

At the beginning of the trial, average body weights were comparable across all groups, ranging from 9.10 kg in T_5 to 9.23 kg in T_2 and T_4. The lowest total body weight gain was observed in the control group (T_1) at 5.43 kg, while the highest gain was recorded in T_4 (6.48 kg), indicating enhanced growth performance with a 9 g turmeric supplement. Final body weights reflected these gains, with T_4 reaching the highest value (16.40 kg), followed by T_5 (15.86 kg), whereas T_1 concluded at 15.16 kg.

Dry matter intake was relatively uniform across treatments, ranging from 104.54 kg in T_5 to 108.50 kg in T_2. The cost per kilogram of body weight gain was highest in T_1 (₹1037.14) and gradually decreased with higher turmeric inclusion, reaching the lowest in T_4 (₹905.53), suggesting better feed efficiency with turmeric supplementation.

Fixed costs (comprising housing and initial animal purchase) varied slightly, from ₹4172.50 in T_3 to ₹4208.50 in T_2 and T_4. Feed costs increased proportionally with turmeric levels, starting from ₹1422.14 in T_1 to ₹1714.46 in T_5. When combined with other variable costs such as equipment, depreciation and miscellaneous items total variable expenses ranged from ₹1436.67 in T_1 to ₹1728.99 in T_5. Accordingly, total costs (fixed + variable) were lowest in T_1 (₹5631.67) and highest in T_5 (₹5878.99).

Revenue from final body weight (valued at ₹450/kg) was greatest in T_4 (₹7380) and lowest in T_1 (₹6822). Additional income from manure (₹5/kg) ranged between ₹190 (T_1) and ₹280 (T_5). Overall returns increased from ₹7012 in T_1 to ₹7645 in T_4. Net profit per kid was highest in T4 (₹1777.16), followed by T_5 (₹1538.01), T_3 (₹1473.84), T_2 (₹1417.70) and lowest in T_1 (₹1380.33). The benefit-cost ratio (BCR) was also most favourable in T_4 at 1.30, compared to 1.25 in T_1 and T_2 and 1.26 in T_3 and T_5.These findings demonstrate that supplementing the basal ration with 9 g of turmeric powder (T_4) leads to the most economically advantageous results, improving growth performance, feed efficiency and profitability in Konkan Kanyal kids.

Pingale (2022) reported that supplementing Osmanabadi kids with 0.6% turmeric powder (T_4) resulted in the lowest cost per kg live weight gain (₹313.08), compared to the control group (T_1) at ₹418.05, indicating improved economic efficiency with turmeric inclusion.

4. CONCLUSION

The present study demonstrated that turmeric powder supplementation had a positive effect on the growth performance and body measurements of Konkan Kanyal kids. Significant improvements were observed in body length, height and chest girth, with the highest gains recorded in T_4 (8.55 cm, 8.40 cm and 7.13 cm, respectively), followed by T_5, while the lowest gains were in T_1. Turmeric supplementation at 9 g/day (T_4) also recorded the highest average daily gain (71.94 g/day) and final body weight (15.70 kg). From an economic perspective, T_4 achieved the lowest cost per kg gain (₹905.53), the highest net profit (₹1777.16) and the best B:C ratio (1.30). These findings suggest that turmeric supplementation at 9 g/day can be recommended as an effective, economical and natural feed additive for improving growth, body conformation and profitability of Konkan Kanyal kids under Konkan conditions.

ETHICAL APPROVAL

All procedures involving animals in this study were carried out following ethical standards and welfare guidelines. Prior approval was obtained from the Institutional Animal Ethics Committee (IAEC), Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. The animals were handled humanely, with due care taken to minimize discomfort and ensure well-being throughout the research period.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Adebisi, A. A., Omotoso, O. B., Olufemi-Amodu, B., & Fajemisin, A. N. (2022). Effect of feeding frequency of *Curcuma longa* L. supplemented diets on nutrients intake, growth performance and rumen fermentation characteristics of goats. *Acta Fytotechnica et Zootechnica*, *25*(3), 185–193.

https://doi.org/10.2478/afz-2022-0018

Amosu, S. D., Oluwatosin, B. O., Fasae, O. A., Ajadi, T. A., Oderinwale, O. A., & Jolaosho, O. O. (2020). Performance characteristics of pregnant goats fed diets containing turmeric (*Curcuma longa*) powder supplementation. *Agricultural Science Digest*, *40*(2), 178–183.

https://doi.org/10.18805/ag.D-4931

Anonymous. (2019). *20th Livestock Census 2019 – All India Report*. Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India.

Ashraf, A., Shahardar, R. A., Bulbul, K. H., Wani, Z. A., Allaie, I. M., Makhdoomi, D. M., Bhat, H. F., & Rather, M. A. (2020). Anticoccidial efficacy of *Curcuma longa* (turmeric) and *Zingiber officinale* (ginger) in goats in central Kashmir. *Journal of Pharmacognosy and Phytochemistry*, *9*(4), 354–360.

Bansal, R. P., Bahl, J. R., Garg, S. N., Naqvi, A. A., & Kumar, S. (2002). Differential chemical compositions of the essential oils of the shoot organs, rhizomes and rhizoids in the turmeric (*Curcuma longa* L.) grown in Indo-Gangetic plains. *Pharmaceutical Biology*, *40*(5), 384–389.

https://doi.org/10.1076/phbi.40.5.384.8475

Habeeb, A. A. M., & El Tarabany, A. A. (2012). Effect of *Nigella sativa* or curcumin on daily body weight gain, feed intake and some physiological functions in growing Zaraibi goat during hot summer season. *Journal of Radiation Research and Applied Sciences*, *5*(2), 60–78.

Kearl, L. C. (1982). *Nutrient requirements of ruminants in developing countries*. International Feedstuffs Institute, Utah State University.

Kore, R. (2023). *Effect of feeding spirulina (Spirulina platensis) on growth performance of Konkan Kanyal kids* (Master's thesis). Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India.

Mane, R. P., Kshirsagar, R. B., Sawate, A. R., Patil, B. M., & Kale, R. G. (2018). Studies on evaluation of physicochemical and nutritional properties of fresh turmeric rhizome. *Journal of Pharmacognosy and Phytochemistry*, *7*(2), 2895–2897.

Oderinwale, O. A., Oluwatosin, B., Amosu, S. D., & Omotayo, S. G. (2017). Performance of kids produced by three breeds of goat fed diets supplemented with graded levels of turmeric powder. *Tropical Animal Health and Production*, *52*(10), 1239–1248.

https://doi.org/10.1007/s11250-019-02115-4

Patil, R., Joshi, S., & Deshmukh, A. (2021). Adaptability and economic contribution of Konkan Kanyal goats in Maharashtra. *Journal of Livestock Research*, *12*(3), 45–50.

Pingale, R. (2022). *Effect of feeding turmeric powder on growth performance of Osmanabadi kids* (Master's thesis). Vasantrao Naik Marathwada Krushi Vidyapeeth, Parbhani, Maharashtra, India.

Prasad, S., & Aggarwal, B. B. (2011). Turmeric, the golden spice: From traditional medicine to modern medicine. In I. F. F. Benzie & S. Wachtel-Galor (Eds.), *Herbal medicine: Biomolecular and clinical aspects* (2nd ed., Chap. 13). CRC Press.

Press Information Bureau (PIB). (2024). *India's meat production increases by 53% in the last decade: DAHD report*. Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.

Rangaswamy, R. (2000). *A textbook of agricultural statistics* (1st ed., pp. 293–294). New Age International Publishers.

Sawant, D. D. (2024). *Supplementation of ginger (Zingiber officinale) powder on growth performance of Konkan Kanyal kids* (Master's thesis). Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India.

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