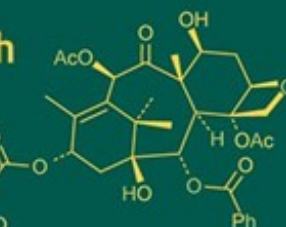


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Evaluation of maize silage feeding on growth performance of Osmanabadi kids

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ABSTRACT

A feeding trial was conducted to examine how increasing proportions of maize silage influenced the growth of Osmanabadi goat kids. Eighteen healthy kids, 4–7 months old and having comparable initial body weights, were randomly assigned to three dietary treatments. The control group (T_0) received no maize silage, whereas T_1 and T_2 received maize silage at 50% and 75% of dry matter intake (DMI), respectively. Body weight was monitored at weekly intervals throughout the trial. The recorded mean average daily gains were 59.78 ± 1.02 , 63.02 ± 1.30 and 68.55 ± 0.77 g/day for T_0 , T_1 and T_2 , respectively. Mean total live-weight gains were 5.822 ± 0.092 , 6.016 ± 0.117 and 6.322 ± 0.06 kg for the three groups, respectively. The treatment receiving 75% maize silage showed the greatest overall growth response, with the differences in the overall means reported as highly significant ($P < 0.01$).

Keywords: Osmanabadi kids, Maize silage, Body-weight gain, Average daily gain, Growth performance

Introduction

Goat production contributes substantially to rural livelihoods in India because goats require comparatively modest investment and can provide several products, including milk, meat, fibre, hide and skin. Their adaptability and relatively low recurring management costs make them useful for small and marginal farming households. One of the recurring constraints in goat production, however, is maintaining an adequate supply of good-quality feed during periods when green fodder and grazing resources are limited.

Feed availability becomes particularly important in areas affected by seasonal fodder scarcity or limited rainfall. Preserved forages such as silage can help bridge this seasonal gap by making green forage available beyond its normal harvesting period. For small-ruminant production, an appropriately formulated silage-based ration may therefore provide a practical alternative when fresh fodder is insufficient.

Osmanabadi goats originated in the Marathwada region of Maharashtra and are now reared in several parts of India because of their adaptability. Earlier work has also indicated that the breed can perform under different management systems, with semi-intensive production being an important option (Motghare *et al.*, 2004; Rathod, 2018).

Silage is produced by preserving green forage through fermentation under anaerobic conditions. Maize and other carbohydrate-rich crops are commonly suited to this process. Properly conserved silage can extend forage availability and provide a consistent source of nutrients to ruminants. Because feeding represents a major component of livestock production expenditure, reported to account for approximately 50–85% of production costs in some systems, efficient feed planning is important (Ouin, 1995) [1]. Such planning should also consider the production potential and adaptability of the breed being used.

Despite the potential advantages of maize silage, its use as a substantial component of diets for growing goats remains relatively limited among farmers. Determining an appropriate inclusion level could help improve nutrient use and support desirable growth. The present study was therefore undertaken to compare the growth response of Osmanabadi kids offered diets containing 0%, 50% or 75% maize silage.

Materials and Methods

The experiment was conducted at the Livestock Farm Complex, Unit No. 3, Aarey Colony, Mumbai Veterinary College, Goregaon (East), Mumbai, Maharashtra 400065. The feeding trial extended for 90 days, covering the period from November 2023 to February 2024.

Eighteen Osmanabadi kids between 4 and 7 months of age were selected and randomly allotted to three groups, with six animals in each group. T_0 served as the control treatment and received dry fodder, green fodder and concentrate without maize silage. In T_1 , 50% of the specified fodder component was replaced by maize silage, while T_2 received maize silage at the 75% level, with the remaining roughage and concentrate supplied as described in the experimental diet.

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Table 1. Experimental groups and maize-silage inclusion

Sr. No.	Experimental Groups	No. of experimental Animals	Experimental Diet (level of silage inclusion)
1.	T_0	06	Dry + Green Fodder + concentrate
2.	T_1	06	Dry + Green Fodder (50%) + Maize silage (50%) + concentrate
3.	T_2	06	Dry + Green Fodder (25%) + Maize silage (75%) + concentrate

Each kid was weighed at the beginning of the trial using an electronic weighing balance and was subsequently weighed at weekly intervals. Weekly observations were used to determine average daily weight gain (g/day) and average weekly weight gain (g/week), allowing comparison among the three dietary treatments.

The observations were statistically evaluated using a Completely Randomized Design to assess the effect of dietary treatment on the measured growth variables.

Results and Discussion

A. Average daily body-weight gain (g/day)

Across the experimental period, the mean average daily gain (ADG) differed among treatments. Values of 59.78 ± 1.02 , 63.02 ± 1.30 and 68.55 ± 0.77 g/day were obtained for T_0 , T_1 and T_2 , respectively. Thus, the group receiving 75% maize silage recorded the largest mean ADG, while the control group recorded the smallest.

Table 2. Weekly average daily body-weight gain of Osmanabadi kids (g/day)

Weeks	T_0 (N = 06)	T_1 (N = 06)	T_2 (N = 06)	CD
1	51.01 ± 1.94	56.48 ± 0.23	61.13 ± 0.30	NS
2	55.32 ± 3.44	60.02 ± 0.45	65.00 ± 6.23	NS
3	55.42 ± 0.47	61.45 ± 0.85	65.03 ± 0.34	NS
4	57.90 ± 0.47	62.02 ± 0.43	67.55 ± 0.30	NS
5	58.11 ± 1.39	62.09 ± 0.47	67.56 ± 0.30	NS
6	58.21 ± 0.47	62.23 ± 0.47	68.00 ± 0.31	NS
7	60.01 ± 0.70	62.45 ± 0.47	69.11 ± 0.51	NS
8	61.33 ± 1.44	64.55 ± 0.57	69.65 ± 0.47	NS
9	61.87 ± 1.09	65.00 ± 0.52	71.09 ± 2.43	NS
10	64.70 ± 0.47	65.12 ± 0.57	71.33 ± 0.57	NS
11	65.67 ± 0.47	67.32 ± 0.71	72.54 ± 0.68	NS
12	67.87 ± 0.47	67.56 ± 0.60	74.61 ± 0.68	NS
Mean $\pm$ SE	59.78 ± 1.02^a	63.02 ± 1.30^b	68.55 ± 0.77^c	4.401

Note: Means carrying different superscripts within a row differ significantly ($P < 0.01$).

The weekly observations show a general rise in ADG over the 12-week period. Although the treatment differences within individual weeks were reported as non-significant, the overall treatment means were significantly different ($P < 0.01$). The mean ADG increased from 59.78 ± 1.02 g/day in T_0 to 63.02 ± 1.30 g/day in T_1 and 68.55 ± 0.77 g/day in T_2 .

The higher ADG associated with the silage treatments may be related to the nutrient supply and utilisation of well-preserved forage. Improved availability of fermentable nutrients can support rumen microbial activity and subsequent nutrient use, which may contribute to body-weight gain. The present observation is consistent with earlier

reports in goats in which good-quality silage supported greater body-weight gain than hay (Hussain *et al.*, 1996) [2]. Hwang *et al.* (2008) [3] likewise reported improved daily gain in Korean black goats receiving diets based on whole-crop barley silage with appropriate concentrate levels.

B. Average weekly body-weight gain (g/week)

Mean weekly body-weight gain also varied among the three groups. The reported overall means were 402.90 ± 0.007 g/week for T_0 , 441.00 ± 0.009 g/week for T_1 and 494.40 ± 0.005 g/week for T_2 . The highest mean was therefore recorded in the 75% maize-silage treatment.

Table 3. Weekly average body-weight gain of Osmanabadi kids (g/week)

Weeks	T_0 (N = 06)	T_1 (N = 06)	T_2 (N = 06)	CD
1	345.01 ± 13.60	388.33 ± 1.66	356.70 ± 2.10	NS
2	345.05 ± 24.14	391.7 ± 1.62	413.33 ± 43.64	NS
3	390.02 ± 3.33	395.00 ± 1.96	413.33 ± 2.39	NS
4	393.5 ± 3.33	400.05 ± 3.07	416.67 ± 2.10	NS
5	405.06 ± 25.74	410.03 ± 3.33	423.00 ± 2.10	NS
6	408.60 ± 3.33	415.02 ± 3.33	465.00 ± 2.23	NS
7	409.66 ± 4.94	431.66 ± 3.33	475.00 ± 3.65	NS
8	416.00 ± 10.13	432.01 ± 4.01	476.67 ± 3.33	NS
9	416.67 ± 7.63	441.67 ± 3.65	476.7 ± 17.06	NS
10	345.05 ± 3.33	451.67 ± 4.01	478.33 ± 4.01	NS
11	345.01 ± 3.33	462.04 ± 5.0	483.33 ± 4.77	NS
12	416.67 ± 3.33	470.03 ± 4.21	502.00 ± 4.77	NS

(continued on next page)

Weeks	T0 (N = 06)	T1 (N = 06)	T2 (N = 06)	CD
Mean $\pm$ SE	402.90 $\pm$ 0.007 ^a	441.00 $\pm$ 0.009 ^b	494.40 $\pm$ 0.005 ^c	0.034

Note: Means carrying different superscripts within a row differ significantly ($P < 0.01$).

The pattern observed in the present trial agrees with findings from studies examining different silage sources in growing small ruminants. Przemyslaw *et al.* (2012) [4] evaluated grass and legume silages in weaned lambs and observed differences in growth performance among silage types. Nkosi *et al.* (2010) [5] also compared diets containing potato-hash silage and maize silage and reported better lamb performance with the maize-silage-related treatments. These studies

provide supporting evidence that the type and quality of conserved forage can influence animal growth.

C. Average total weight gain (kg)

The cumulative body-weight gain over the experimental period was 5.82 $\pm$ 0.09 kg in T₀, 6.02 $\pm$ 0.11 kg in T₁ and 6.32 $\pm$ 0.06 kg in T₂. The lowest total gain was observed in the control group, whereas the 75% maize-silage group recorded the highest value. The reported treatment effect was significant ($P < 0.01$).

Table 4. Mean total body-weight gain of Osmanabadi kids (kg)

	T0(N = 06)	T1(N = 06)	T2(N = 06)	CD
Mean $\pm$ SE	5.82 $\pm$ 0.09 ^c	6.02 $\pm$ 0.11 ^b	6.32 $\pm$ 0.06 ^a	0.396

Note: Means carrying different superscripts within a row differ significantly ($P < 0.01$).

The higher cumulative gain in T₂ suggests that replacing a greater proportion of the green-fodder component with maize silage was associated with improved growth under the conditions of this trial. Comparable evidence has been reported by Abbasi *et al.* (2012) [6], who found greater total weight gain in Kamori kids receiving the higher dietary energy treatment. Raut (2021) [7] and related work on maize and maize-alfalfa silage in Osmanabadi kids have also reported improvements in growth-related measurements with silage-based feeding.

Conclusion

In this 90-days feeding trial, maize silage inclusion was associated with an improvement in the growth performance of Osmanabadi kids. The treatment containing 75% maize silage (T₂) produced the highest reported mean ADG, weekly weight gain and total live-weight gain, and the overall differences among treatments were statistically significant ($P < 0.01$). These findings indicate that a 75% maize-silage inclusion level may be a useful feeding option for growing Osmanabadi kids, although practical adoption should consider forage quality, ration balance and farm-level cost.

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