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## Effect of *Sesbania Grandiflora* (Agati) Supplementation on Weight Gain of Crossbred Jersey Heifer Calves

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### Abstract

An overarching factor that influences age at puberty in heifers is nutritional management during the preweaning and postweaning periods. The objective of this study was to evaluate supplementation of *Sesbania grandiflora* (Agati) as a legume forage resource for improving growth in crossbred Jersey heifer calves under cut-and carry feeding system in India. Twelve crossbred Jersey heifer calves (mean weight 70.17±3.79 kg) were randomly allocated into two groups (control and treatment) with six animals in each group. Results showed that average daily gains in treatment and control groups were 453.70±50.87 g day<sup>-1</sup> and 416.66±30.33 g day<sup>-1</sup>, respectively. Similarly, average body weight gain in treatment and control groups were 40.83±4.58 kg and 37.5±2.73 kg, respectively.

**Keywords:** Agati, average body weight gain, legume

### 1. Introduction

Heifer calf is the foundation stock of the future dairy herd, hence deserves to have best nutrition management. Most of the farmers in India sell male calves at an early age and retain the female's calves as dairy replacement heifers (Vijayakumar et al., 2020). A predominant factor that influences the heifers rearing is nutritional management during the preweaning and postweaning rearing periods. Feeding of high energy and protein rich diet to rapidly growing heifers will enable heifers to achieve better breeding size earlier, potentially decreasing age at first calving and costs associated with raising replacement heifers (Radcliff et al., 2000; Raeth-Knight et al., 2009). In return, they will repay the investment through higher milk production, longer productive life and selling of excess heifers to earn more income.

Heifers present a significant investment in dairy farms. Previous research undertaken in India indicates that the indigenous heifer calves show oestrus signs at 36 months of age or more (Vijayakumar et al., 2019). Further, age at puberty is mostly determined by heifer body weight rather than the age of the animal. Hence, to attain target body weights in heifers, the heifer calves must be well grown from day one through efficient feeding management practices. The demand for good quality legume fodder feed resources must be identified and aptly addressed to meet out protein requirement of growing heifer calves. One such alternative protein-rich legume tree fodder is *Sesbania grandiflora*.

*Sesbania grandiflora* (Agati) is a fast-growing perennial legume tree used for ruminants as a tree fodder in humid tropical regions. It is used in grazed paddocks as mature trees are out of browse height, or as cut-and-carry forage integrated into cropping systems (Cook et al., 2005). Besides, the leaves, flowers, and pods of *Sesbania grandiflora* are eaten as a vegetable and dried leaves are used for their ethno medicinal properties in Southeast Asia (Gutteridge et al., 1994; FAO, 2010). Other uses include firewood and green manure. Further, *Sesbania grandiflora* offers a large supply of fresh legume fodder during most of the dry season when only rice straw and dry grass are available (Heuze et al., 2016). It also contains anti-nutritional factors like sterols, saponins and tannins (Fojas et al., 1982). This study is planned to know the effect of supplementation of *Sesbania grandiflora* on weight gain of crossbred Jersey heifer calves.

The *Sesbania grandiflora* leaves, the young branches, and the pods are very palatable to cattle feeding (Gutteridge et al., 1995; NAS, 1979). *Sesbania grandiflora* comprises up to 70% of the total forage allowance of ruminant diets in Eastern Indonesia during the dry season (Cook et al., 2005). In Lombok island, *Sesbania grandiflora* is one of the most readily available legume fodder sources offered to goats (Dahlanuddin, 2001). Only scanty information is available on feeding *Sesbania grandiflora* for growing young ruminants in India. Hence, the present study was evaluated to know the effect of feeding *Sesbania grandiflora* on weight gain of crossbred Jersey heifer calves.



## 2. Materials and Methods

This study was conducted at cow unit, Livestock Farm Complex, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu, India. Cow unit maintains around 110 crossbred Jersey cattle. Around 12 heifer calves with an age range from 3–6 months were selected for experiment purpose. A total of 12 heifer calves were randomly separated into two groups with 6 animals in each group (control and treatment group). Before starting the experiment trial, all animals are first dewormed with Fenbendazole and Praziquantel drugs. All animals in both groups received the concentrate mixture @ 500 g day<sup>-1</sup>, *ad libitum* access to non-leguminous green fodder, dry fodder and water for 12 weeks. The treatment group heifer calves were supplemented with *Sesbania grandiflora* @ 2 kg day<sup>-1</sup> and the animals in the control group were not supplemented with *Sesbania grandiflora*. The measurement of body weight was done at 15 days intervals. Statistical analyses of experimental data were done as per Snedecor and Cochran (1994). The data obtained were subjected to Student's t-test.

## 3. Results and Discussion

Heifers are the future of the dairy herd and deserve to have better management practices. The growth performances of heifer calves are generally low mainly due to the poor quality and inadequacy of available feed resources in India (Sonawane et al., 2019). Moreover, conventional protein feed resources like oil cakes for animal production are highly expensive. Hence, the demand for alternative protein feed resources must be identified and rightly used in heifers rearing. One such alternative feed for ruminant livestock is *Sesbania grandiflora*.

The daily supplementation of *Sesbania grandiflora* @ 2 kg day<sup>-1</sup> animal<sup>-1</sup> increases the body weight gain in treatment group calves compared to control group calves. The average body weight gain of heifer calves in the treatment and control group were 40.83±4.58 kg and 37.5±2.73 kg, respectively. The average daily body weight gain in *Sesbania* supplemented group of heifer calves was 453.70±50.87 g day<sup>-1</sup> and in control group heifer calves was 416.66±30.33 g day<sup>-1</sup> (Table 1). The higher average daily body weight gain is achieved in treatment group growing calves is because of supplementing good quality nutritious legume fodder. However, average body weight gain and average daily body weight gain did

not significantly differ between the two groups of crossbred Jersey heifer calves ( $p>0.05$ ) (Table 1). This may be due to the small sample size and heterogeneous nature of experimental animals. Hence, further studies are required to statistically validate our findings with a large sample size and homogenous nature of experimental animals.

Our results indicate that supplementation of legume fodder will meet out the protein requirements of growing animals. The crude protein content of *Sesbania grandiflora* foliage is generally above 25–30% DM (Suchitra et al., 2008; Cook et al., 2005). Previous works of the literature suggest that *Sesbania* contains less fiber than other major tropical legumes like *Gliricidia sepium* and *Leucaena leucocephala* (Van Eys et al., 1986). Further, the digestibility of crude protein, NDF, ADF and cellulose was significantly higher in ruminants fed with *Sesbania* than in those fed with other forages like gliricidia, groundnut and *Leucaena* (Gutteridge et al., 1994; Nhan, 1998; Muthukumar et al., 2005). Similarly, the high rumen degradability of *Sesbania* forage compared to other legumes of *Leucaena* and *Gliricidia* were observed (Rao et al., 1993; Suchitra et al., 2008). Because of this higher digestibility and degradability of *Sesbania grandiflora* in the rumen; there were significant increases in propionate, butyrate and rumen microbial protein production in the rumen. Hence, most of its rumen microbial proteins were effectively utilized for young calves' growth related metabolism.

A similar kind of result was reported in cattle fed with 1.8 kg day<sup>-1</sup> of fresh *Sesbania grandiflora* leaves supplemented with rice straw diet showed growth increases comparable with formulated diets (NAS, 1979). In lactating cows, supplementation of *Sesbania* @ 5 kg head<sup>-1</sup> day<sup>-1</sup> increases the milk production, milk protein percentage and percentage of fat were remained unchanged (Vijayakumar et al., 2000a). Further, a diet supplemented with *Sesbania grandiflora* leaves @ 5 kg head<sup>-1</sup> day<sup>-1</sup> had no deleterious effects on ruminants and had been beneficial for the ecology of the rumen (Vijayakumar et al., 2000b). Holstein heifer calves fed with a conventional diet showed daily gain of 450 g (Davis Rincker et al., 2011) and crossbred (Ankole×Jersey) heifers fed with Napier grass (*Pennisetum purpureum*) showed daily gain of 375 g (Mutimura et al., 2016).

## 4. Conclusion

Average body weight gain and average daily body weight gain of heifer calves fed on *Sesbania grandiflora* leaves (2 kg day<sup>-1</sup>) diet showed no statistically significant difference but numerically exceeded those fed on the control diet. Considering nutrient intakes as well as the quality attributes of *Sesbania grandiflora*, this legume forage can be integrated into a cut-and-carry feeding system in small holder farms to feed growing heifer calves to achieve earlier breeding size, decreasing age at first calving and costs associated with raising replacement heifers.

Table 1: Effect of *Sesbania grandiflora* supplementation on weight gain of crossbred Jersey heifer calves

Particulars	Treatment group	Control group	P-value
Initial body weight (kg)	72.33	68.00	0.29
Body weight gain after 12 weeks (kg)	113.17	105.50	0.28
Average body weight gain (kg) after 12 weeks	40.83	37.50	0.27
Average daily body weight gain (g day <sup>-1</sup> )	453.70	416.67	0.27



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