# LONG TERM FEEDING OF CONCENTRATE MIXTURE CONTAINING *PROSOPIS JULIFLORA* POD POWDER TO LACTATING CATTLE AND ITS EFFECT ON PALATABILITY, NUTRIENT UTILIZATION AND HEALTH

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**ABSTRACT**

In order to assess palatability, digestibility and health performance, feeding trials of *Prosopis juliflora* pods powder containing concentrate mixture were conducted on lactating Tharparkar cattle over the year. Eight lactating cows were divided into control (CG) and treatment (TG) groups. CG cows were fed traditional concentrate mixture in their diet, however, TG cows were fed concentrate mixture prepared utilizing *Prosopis juliflora* pods powder mixed with other locally available feed resources of arid region. The DMI/100 kg b. wt. was 2.85 and 3.0 kg for CG and TG groups, respectively. The digestibility coefficient of ration was comparable between the groups and the DM digestibility coefficient was 62.23 and 63.07 % for CG and TG groups, respectively. The water intake/animal/day was 45.0 ± 0.38 and 44.0 ± 0.77 litres for CG and TG groups, respectively. Haemato-biochemical parameters remained unaffected. The results revealed comparable palatability and digestibility of *Prosopis juliflora* included diet with fairly good nutritive value. The inclusion of *Prosopis juliflora* pods in concentrate mixture had no adverse effect on the health of lactating Tharparkar cattle.

***Key words:*** Cattle, digestibility, haemato-biochemistry, *Prosopis juliflora*

## Introduction

Mesquite or Vilayatibabool (*Prosopis juliflora)* trees are extensively grown in desert areas, especially to check the shifting of sand dunes. It is an evergreen, fast growing, drought resistant, widely distributed not only in India but also in other arid and semi-arid tropical countries. *P. juliflora* colonized the industrial effluent laden soils produced by textile, paper products, tannery, chemical products, basic metal products, machinery parts and transport equipment's industry (Harsh, 2011).

*P. juliflora* provides highly palatable and nutritious pods in large quantities (Mathur *et al.,* 2002) and the flowers produce good quality nectar for honey. Ripe pods which have fallen on the ground are widely consumed by domestic stock and wild ungulates. Non-availability of green fodder was a major constraint in Tharparkar breeding tract in Rajasthan (Saharan *et al*., 2017). Tharparkar cattle have a capacity for production under unfavourable environmental conditions and highly resistant to many tropical diseases with good heat tolerance capacity (Kumar *et al*., 2015) and are also offered mesquite pods in variable quantity. The pods are rich in protein and free sugar, which gives them a sweet taste. Low intake of this plant doesn't affect the health of cattle but excessive intake is harmful and can cause nervous breakdown, weight loss, imbalance in nutrient levels, etc. and in severe cases it can be fatal (William and Jafri, 2015). However, palatability of *P. juliflora* leaves was very low even in goats (Mathur and Bohra,1999). Majority of the studies on *P. Juliflora* pods have been conducted for a short experimental period (Mathur *et al*., 2003), however, results might differ when conducted for a long period. Keeping in view these points, the present study was initiated to evaluate the effects of *P. juliflora* pods powder containing concentrate mixture on palatability, digestibility and health performance of lactating Tharparkar cattle for a long period.

## Materials and Methods

The present study was performed at Research-cum-Demonstration Unit of Tharparkar cattle, Krishi Vigyan Kendra, Central Arid Zone Research Institute, Jodhpur. Under this study, feeding and digestibility trials with two different feed formulations were conducted on eight Tharparkar lactating cows. These cows were randomly divided into two groups of 4 in each forming Control (CG) and Treatment (TG) groups.The animals were managed under semi-intensive system of rearing, housed in loose housing and were allowed for grazing during day time (about 6 hours) on *C. ciliaris* dominated grass pasture. All the cows were fed as per their requirement on the basis of maintenance and production with a ration comprising chaffed lentil fodder and concentrate mixture comprising locally available feed ingredients like Tumba (*Citrullus colocynthis*) seed cake, Guar (*Cyamopsis tetragonaloba*) korma, Til *(Sesamum indicum)* seed cake, wheat bran, maize grain, mineral mixture and common salt. The wheat bran content of concentrate mixture of TG cows was partially replaced by *P. juliflora* pod powder. The ration was having around 11.5% crude protein (CP) and 57% total digestible nutrient (TDN). Concentrate mixtures of both the groups were near about iso-nitrogenous and iso-caloric. Fresh drinking water was made available to these animals round the clock.

Weighed quantity of fodder and concentrate feed were offered to individual cow and left over were collected and weighed daily for estimation of dry matter intake. Faeces of individual animal were collected as and when animal passes out and pooled sample of 24 hrs were collected and were subjected to analysis as per standard procedure.

All the experimental animals were weighed in morning before feeding at fortnightly interval, in addition to daily examination for health by veterinarian. During the feeding experiment, blood was collected at monthly intervals from all experimented animal in the morning before offering feed through jugular vein puncture. Blood was immediately taken to laboratory for haematology and then

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plasma was separated for estimation of biochemical parameters (glucose, total protein, albumin, blood urea nitrogen, cholesterol, creatinine, calcium and inorganic phosphorus).

The conventional digestion studies were undertaken to determine the digestibility coefficient of dry matter and gross nutrients in CG and TG. The seven days average feed intake of animals during the collection period was calculated from the figures of feed offered and left over. The faeces voided by the animal were recorded and samples were analysed for proximate constituents (AOAC, 1995).The data were subjected to statistical analysis as per Snedecor and Cochran (1994).

**Results and Discussion**

The nutrient composition of ration offered in both the groups and of faeces voided by the animals in respective group is given in Table 1. The values of nutrients were comparable in ration and faeces of both the groups.The concentrate mixture was acceptable to the experimental cows as they finished it within a bout. The data of dry matter consumption of all the animals in the feeding trails were pooled and palatability scores were calculated as dry matter intake (DMI) of experimental concentrate mixture and lentil straw and was 2.85 and 3.0 kg/100 kg body weight for CG and TG groups, respectively. Similar to this, Sirohi *et al.* (2017)and Mathur *et al.* (2002) reported that average daily dry matter intake (DMI)/ 100 kg body weight did not differ between groups having different restricted levels of *P. juliflora* in the diet of goats and sheep. The persistency of milk production was also comparable between the cows of both the groups, and in agreement to this study, Mathur *et al*. (2011) reported that incorporation of *P.juliflora* pod powder as ingredient of economical concentrate mixture increased milk yield without any ill effect on health.

The average water intake/animal/day of CG and TG group cows were 45.0± 0.38 and 44.0± 0.77 litres, respectively. The study showed non-significant difference of water intake between the groups.

Fig.1 depicts body weight changes of experimental cows of both the groups at different intervals during entire study period. The average live body weight (kg) of CG and TG group were 376.5 ± 57.67 and 354.5 ± 17.55 respectively, during feeding trial. The cows of both groups gained in body weight up to winter months however, a final body weight loss of 15.49 and 07.00 kg was observed in cows of CG and TG, respectively. They maintained their live body weights and there body weights are comparable between the groups. The study of Mathur*et al*. (2012) showed that inclusion of *P. juliflora* pods in concentrate mixture had no adverse effect on health, growth, reproduction and production.

The digestibility coefficientsand nutritive values of nutrients were comparable between the groups (Table 2). Non-significant

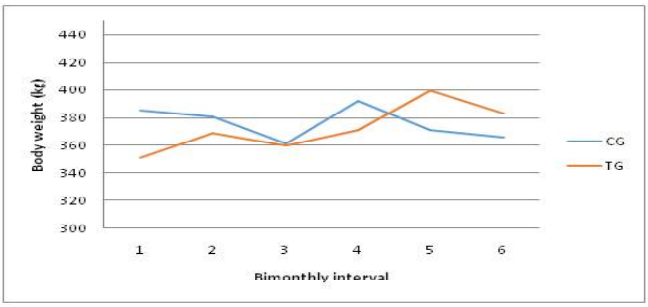


Fig. 1: Pattern in body weight changes

difference was observed for values of digestibility coefficient and nutritive values of nutrients between both the groups. However, increased ($p<0.05$) digestibility of dry matter, organic matter and crude protein was observed by addition of *P. juliflora* pod meal in the diet of sheep (Santos *et al*., 2015).The results are in line with observations of Talpada and Shukla (1988) feeding 30 per cent *P. juliflora* pods to lactating cows.

All the blood parameters werewithin normal physiological range and showed non-significant difference between both the groups except the values towards higher side for blood urea nitrogen, which might be due to low urine output in these arid cattle (Table 3). The result of the blood study showed that animals had normal body function with no change in blood chemistry was observed and lactating Tharparkar cattle maintain normal health. In agreement to this study, Sirohi *et al.* (2014) reported that the values of haemoglobin, total protein and blood urea nitrogen were within the physiological limits in goats fed fodder block supplemented with *P. juliflora* and none of these animals was found suffering from any health problem related with chewing the cud.

The present investigation concluded that the diets containing *Prosopisjuliflora* pod powder were acceptable to Tharparkar lactating cows and showed comparable digestibility of these rations with fairly good nutritive value. The inclusion of *Prosopis juliflora* pods in concentrate mixture had no adverse effect on the performance of animals.

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Table 1: Nutrient composition of ration (concentrate mixture and roughage) and faeces of control and treatment groups

| Nutrient | Feed (%) | | Faeces (%) | |
|---|---|---|---|---|
| | CG | TG | CG | TG |
| DM | 80.06 | 81.10 | 20.33 | 19.41 |
| CP | 12.25 | 11.18 | 10.13 | 10.65 |
| EE | 4.20 | 3.37 | 1.79 | 2.23 |
| CF | 27.77 | 27.85 | 26.13 | 25.50 |
| NFE | 41 | 40.37 | 45.55 | 44.53 |
| Ash | 14.35 | 16.98 | 16.39 | 17.17 |

Table 2: Digestibility coefficient of ration and its nutritive value in lactating Tharparkar cattle

| S.No | Nutrient | Digestibility Coefficient of Ration | |
|---|---|---|---|
| | | Control Group | Treatment Group |
| 1 | DM | 62.23±2.64 | 63.07±1.19 |
| 2 | CP | 79.15 ± 9.98 | 64.73 ± 0.38 |
| 3 | EE | 85.72 ± 0.22 | 77.89 ± 1.92 |
| 4 | CF | 68.01 ± 3.71 | 66.15 ± 0.21 |
| 5 | NFE | 62.21 ± 4.69 | 58.30 ± 5.92 |
| Nutritive value | | | |
| 1. | TDN | 61.04 ± 2.84 | 55.21 ± 0.85 |
| 2. | NR | 1 : 5.43 | 1 : 6.53 |
| 3. | SE | 60.36 ± 1.79 | 53.92 ± 0.89 |

Table 3: Mean ± SE of Haemato-biochemical parameters at monthly interval in experimental cows

| Monthly interval | Group | Haemoglobin (g/dl) | Glucose (mg/dl) | Protein (g/dl) | Albumin (g/dl) | Blood Urea Nitrogen (mg/dl) | Cholesterol (mg/dl) | Creatinine (mg/dl) | Calcium (mg/dl) | Phosphorus (mg/dl) |
|---|---|---|---|---|---|---|---|---|---|---|
| I | CG | 10.85 ±0.29 | 44.91 ±1.50 | 7.04 ±0.29 | 3.32 ±0.12 | 33.12 ±0.95 | 203.17 ±7.71 | 1.94 ±0.05 | 9.34 ±0.14 | 6.97 ±0.34 |
| | TG | 11.63 ±0.29 | 48.35 ±0.46 | 7.11 ±2.31 | 3.26 ±0.06 | 36.50 ±0.92 | 201.09 ±9.35 | 1.99 ±0.059 | 10.03 ±3.27 | 6.85 ±0.66 |
| II | CG | 11.15 ±0.18 | 46.62 ±0.84 | 7.24 ±2.45 | 3.52 ±0.07 | 37.3 ±1.86 | 206.71 ±9.26 | 1.93 ±0.07 | 10.53 ±0.36 | 6.33 ±0.31 |
| | TG | 11.67 ±0.18 | 57.795 ±0.43 | 6.94 ±0.08 | 3.47 ±0.05 | 40.34 ±1.14 | 257.29 ±3.56 | 1.63 ±0.16 | 10.28 ±0.26 | 6.07 ±0.54 |
| III | CG | 10.2 ±10.2 | 58.91 ±42.08 | 7.86 ±0.65 | 3.66 ±0.08 | 32.97 ±3.36 | 177.94 ±51.71 | 1.95 ±0.09 | .9.46 ±0.11 | 5.12 ±0.07 |
| | TG | 10.00 ±0.10 | 55.58 17.96 | 8.00 ±0.52 | 3.84 ±0.08 | 49.53 ±4.00 | 216.33 ±26.23 | 1.97 ±0.07 | 9.91 ±0.34 | 5.53 0.60 |
| IV | CG | 09.62 ±0.18 | 49.67 ±33.06 | 8.29 ±0.52 | 3.04 ±0.10 | 59.40 ±6.97 | 203.33 ±6.75 | 1.72 ±0.07 | 8.04 ±2.66 | 6.57 ±2.45 |
| | TG | 09.23 ±0.05 | 48.75 ±22.58 | 7.64 ±0.67 | 3.02 ±0.15 | 57.70 ±9.69 | 178.50 ±23.68 | 2.03 ±0.15 | 7.82 ±3.12 | 6.93 ±0.11 |
| V | CG | 09.20 ±0.14 | 47.77 ±10.06 | 11.87 ±0.74 | 3.70 ±0.08 | 48.71 ±4.44 | 201.91 ±1.45 | 2.06 ±0.01 | 9.53 ±2.39 | 6.84 ±0.19 |
| | TG | 09.40 ±0.27 | 53.28 ±9.09 | 11.33 ±0.54 | 3.57 ±0.13 | 47.33 ±4.86 | 208.06 ±2.09 | 2.06 ±0.005 | 09.43 ±6.09 | 5.89 ±0.47 |
| VI | CG | 08.96 ±0.25 | 51.75 ±1.73 | 10.36 ±1.14 | 2.87 ±0.05 | 61.91 ±6.46 | 164.85 ±14.83 | 2.25 ±0.08 | 10.48 ±0.14 | 7.30 ±0.46 |
| | TG | 09.00 ±0.12 | 57.83 ±1.82 | 10.29 ±0.67 | 2.65 ±0.01 | 54.98 ±6.75 | 237.12 ±31.18 | 2.25 ±0.262 | 10.94 ±0.79 | 7.00 ±0.17 |
| VII | CG | 08.85 ±0.22 | 59.34 ±1.62 | 11.20 ±0.39 | 3.35 ±0.10 | 37.06 ±8.03 | 282.50 ±53.31 | 1.54 ±0.08 | 6.32 ±1.21 | 7.10 ±0.94 |
| | TG | 9.00 ±0.00 | 53.57 ±4.19 | 10.02 ±0.72 | 3.12 ±0.10 | 49.98 ±8.07 | 284.50 ±56.84 | 1.69 ±0.19 | 7.50 ±1.73 | 7.92 ±0.66 |
| VIII | CG | 09.73 ±0.07 | 51.18 ±2.71 | 9.87 ±0.75 | 4.46 ±0.17 | 40.53 ±2.57 | 168.75 ±25.78 | 1.14 ±0.03 | 9.75 ±0.93 | 4.65 ±0.29 |
| | TG | 10.07 ±0.18 | 50.88 ±12.65 | 8.94 ±0.48 | 4.24 ±0.16 | 46.12 ±1.90 | 255.35 ±36.79 | 1.43 ±0.14 | 9.18 ±0.96 | 5.28 ±0.38 |


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