

Effect of Different Levels of Asparagus Root Powder Supplementation on Body Weight and Milk Composition of Lactating Crossbred Cows

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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 present study was conducted to evaluate the effect of supplement feeding of Shatavari root powder (*Asparagus racemosus*) on milk composition and body weight of Holstein Friesian lactating crossbred cows. Fifteen lactating crossbred cows were selected and divided into three groups; T₁ (control), T₂ and T₃ (treatment) of five animals each on the basis of nearness in their body weight and milk yield in completely randomized design. In T₁ no Shatavari was supplemented while in T₂ and T₃ Shatavari was supplemented @ 150 mg and 200 mg/kg body weight, respectively. The study was conducted for a period of 90 days. Milk composition of each animal was determined once every fortnight. Results indicated that the Shatavari root powder supplementation had significant (P<0.05) effect on milk fat, SNF, total solid, lactose and protein percent. The increase in body weight gain was significantly (P<0.05) higher in the treatment groups than the control group. The result showed that supplementing shatavari to the diet of crossbred cows enhanced body weight and improved milk composition.

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1. INTRODUCTION

Herbals are concentrated foods that provide vitamins, minerals and other nutrients which are capable of sustaining and strengthening the human and animal body. The ancient history of India is very rich in herbal medicine. Ayurveda, one of the oldest surviving systems of health care in the world is totally based on herbs. There are several herbs which have been described in the Ayurveda to improve the general well beings, milk production and reproduction of both human and animals. These herbs were being used since pre-vedic time because they were safe to use, cheap and easily available, has no side effect and no residual effect in milk [1]. So, their inclusion in the diet should be encouraged to enhance animal's performance, improve feed efficiency, maintain health and alleviate adverse effect of environmental stress. Traditional herbal medicines in veterinary practice have a large potential as an alternate therapy. According to Bakshi et al. [2], herbal plants were broadly used as animal feed additives, having galactogogue properties like Shatavari (*Asparagus racemosus*), Jivanti (*Leptadenia reticulata*) and Methi (*Trigonella foenum*).

Herbal feed additives could either affect feeding pattern, or affect the growth of favourable microorganisms in the rumen, or stimulate the secretion of different digestive enzymes, which in turn can improve the efficiency of nutrients utilization or stimulate the milk secreting tissue in the mammary glands, resulting in improved productive and reproductive performance of dairy animals [3].

Shatavari (*Asparagus racemosus*) is most frequently used in indigenous medicine. The name Shatavari means curer of a hundred diseases ("shat" means hundred and "vari" means curer). It is also locally known as 'Satavar' and 'Shatmul'. Shatavari (*Asparagus racemosus*) is one of the most commonly used herb in traditional medicine due to the presence of steroidal saponins and sapogenins in various

parts of the plant [1]. The general pharmacology of shatavari are galactogogue and mammogenic, it enhances the blood prolactin level and stimulates the cellular division in the mammary gland [4].

Asparagus racemosus are widely used as animal feed additives, improved feed palatability, utilization and animal productivity due to these increased the animal products and productivity especially milk yield and milk composition [5]. Choudhary and Kar [6] recorded that Shatavari root is rich source of minerals and it contains macro minerals such as calcium, magnesium, potassium and iron having concentration of 0.22, 0.40, 2.50 and 0.01 g/100g, respectively and micro minerals such as copper, zinc, manganese, cobalt and chromium having concentration of 5.29, 53.15, 19.98, 22.0 and 1.8 µg/gm, respectively. Considering its beneficial effects, the present study was undertaken to determine the effect of shatavari root powder on body weight and milk composition of lactating crossbred cows.

2. MATERIALS AND METHODS

The study was conducted to examine the effect of Shatavari on milk composition and body weight of crossbred cows. Fifteen lactating H.F crossbred cows at early stage of lactation were selected from the herd of livestock farm Rajasthan College of agriculture, MPUAT, Udaipur (Rajasthan) for the study purpose. After that, the animals were randomly placed into three groups of five animals each on the basis of nearness in their body weight and milk yield. All the animals were fed as per ICAR [7] feeding standards to meet out the requirement of nutrients. The experiment was carried out for a period of 90 days. The *Asparagus* root powder was mixed with the concentrate uniformly and fed individually to each animal during morning hours. Throughout the experiment, all experimental cows were kept in a well-ventilated shed. Three different dietary trial feeds were given to the cows (Table 1).

Table 1. Experimental feeds offered to lactating crossbred cows

Groups	Experimental feed
T ₁ (Control)	Wheat straw ad-lib. + 10 kg green fodder + Concentrate mixture
T ₂	T ₁ + Shatavari @ 150 mg/kg BW
T ₃	T ₁ + Shatavari @ 200 mg/kg BW

2.1 Milk Composition

For carrying out study on proportional milk composition samples of morning and evening milk were collected every 15 days intervals for the analysis of milk components viz. Fat, Protein, Solid not fat, Lactose and Total solids. Each time 100 ml of milk sample was collected in sterile plastic bottle after cleaning and disinfecting the teats and stripping of the foremilk. There were a total of seven sampling on each lactating cow during the period of 90 days. Representative amount of each sample was used for the estimation of milk components by using Lacto Star- automatic milk analyzer.

2.2 Body Weight

Body weight of lactating animals were recorded at the beginning of experiment and at monthly intervals during the experimental period. Weight was taken at each occasion on two consecutive days and average of the two was considered as the actual weight. The weight was recorded during morning at 8.00 AM before providing water, feed and fodder to the animals.

Table 2. Proximate composition (% DM basis) of Shatavari root powder

Particulars	% content (On DM basis)
Total Phenolics	4.57
Total Tannin	3.70
DM	88.13
OM	92.3
CP	6.37
CF	13.26
EE	0.76
NFE	67.74
Total Ash	11.87

2.3 Statistical Analysis

Completely randomized design (CRD) was used to conduct the experiments and data were analyzed as per the procedure of Snedecor and Cochran [8]. Treatment means were tested by critical difference test.

3. RESULTS AND DISCUSSION

3.1 Feed Composition

The chemical compositions of different feeds used in the experiment have been given in the Table 3. Proximate analysis of *Asparagus*

racemosus (% DM basis) revealed that DM, OM, CP, CF, EE, NFE and total ash were 88.13, 92.3, 6.37, 13.26, 0.76, 67.76, and 11.87, respectively.

3.2 Milk Composition

Data pertaining to the influence of *Asparagus* supplementation on milk composition is presented in Table 4. The average milk fat per cent was 3.83 ± 0.072 , 4.04 ± 0.036 and 4.12 ± 0.037 , in T₁, T₂ and T₃, respectively. The results revealed that milk fat percentage was significantly (P<0.05) higher in supplemented groups (T₂ & T₃) in comparison to the control group (T₁). In other words, milk fat % was higher by 5.48% in T₂ and 7.57% in T₃ as compared to the control group. The average SNF per cent in supplemented groups (T₂ & T₃) and control group (T₁) were 8.87 ± 0.097 , 8.96 ± 0.070 and 8.59 ± 0.034 , respectively.

The results showed that the values of SNF per cent was significantly (P<0.05) higher in shatavari supplemented groups (T₂ & T₃) than control (T₁) group. However, no significant difference was observed between T₂ and T₃ groups. Average total solid per cent was 12.42 ± 0.076 , 12.91 ± 0.110 and 13.08 ± 0.090 in T₁, T₂ and T₃ groups, respectively. Total solid per cent was significantly (P<0.05) higher in treatment groups as compared to control group. Milk lactose % and milk protein % in supplemented groups (T₂ & T₃) and control (T₁) group were 4.72 ± 0.064 , 4.80 ± 0.056 and 4.45 ± 0.075 ; 3.06 ± 0.018 , 3.20 ± 0.039 and 2.92 ± 0.054 , respectively. The results indicated that lactose and protein per cent were significantly (P<0.05) higher in shatavari supplemented groups (T₂ & T₃) as compared to (T₁) control group. However, no significant difference was found between T₂ and T₃ groups.

These results are in agreement with Saini et al. [9] who reported that shatavari supplementation significantly (P<0.01) increased percent fat, SNF, TS, lactose and protein in crossbred cows. The findings are in line with Divya et al. [10] who reported that Shatavari roots supplementation increased milk fat, solid not fat (SNF) and total solids (TS) percent significantly. Sukanya et al. [11] reported that supplementation of Milkplus a Shatavari based herbal preparation enhanced the milk fat per cent from 3.95% to 4.38% in control and experimental animals, respectively. Kumawat et al. [12] also observed that Milk fat and total solid contents were increased (P<0.01) in *Asparagus racemosus* supplemented group as

compared to control group. Gautam et al. [13] observed that supplementation of polyherbal mixture significantly ($P<0.05$) increased the average milk protein per cent in treatment group as compared to control group. Muwal et al. [14] reported that SNF and total solid values differed significantly ($P<0.05$) between control and treatment group when shatavari root powder was supplemented in the diet of Sahiwal crossbred cows.

3.3 Body Weight Change

The average body weight gain per day was 197.77 ± 7.37 , 240.00 ± 13.42 and 275.55 ± 7.37 gm in T_1 , T_2 and T_3 , respectively. The body weight gain per day (gm) was significantly ($P<0.05$) higher in T_3 as compared to T_2 and T_1 , but there was significant difference between T_2 & T_1 and T_3 & T_2 . The total gain in body weight was highest in T_3 (24.80 ± 0.66) as compared to T_2

(21.60 ± 1.20) and T_1 (17.80 ± 0.66). However, there was a significant difference between T_2 & T_1 and T_3 & T_2 . The total body weight gain in 90 days period was more ($P<0.05$) in treatment groups in comparison to control group.

These findings are in accordance with the results of Kumar et al. [15] who reported that the increase in body weight gain and body weight change per day was more in Shatavari supplemented group than non supplemented group. Similarly, Kumawat et al. [12] reported that the increase in body weight gain was more in *Asparagus* supplemented group than control group. Similar results were also reported by Jamara [16] and Kumar et al. [17]. Rawat et al. [18] assessed the effect of Shatavari supplementation on body weight of lactating cows and found that the body weight gain was significantly ($P<0.05$) higher in treatment groups than the control group.

Table 3. Proximate composition (% DM basis) of different feeds used in trial

Attributes	Green fodder (Berseem)	Wheat straw	Concentrate mixture	<i>Asparagus racemosus</i>
DM	15.33	90.00	91.00	88.13
OM	87.60	88.44	91.10	92.3
CP	16.93	3.40	20.16	6.37
CF	24.20	30.63	9.21	13.26
EE	2.87	1.42	5.36	0.76
NFE	43.60	52.99	56.37	67.74
Ash	12.40	11.56	8.90	11.87

Table 4. Effect of shatavari supplementation on milk composition (Mean±SE)

Attributes	Treatments		
	T_1 (Control)	T_2	T_3
Fat %	$3.83^b\pm 0.072$	$4.04^a\pm 0.036$	$4.12^a\pm 0.037$
SNF %	$8.59^b\pm 0.034$	$8.87^a\pm 0.097$	$8.96^a\pm 0.070$
TS %	$12.42^b\pm 0.076$	$12.91^a\pm 0.110$	$13.08^a\pm 0.090$
Lactose %	$4.45^b\pm 0.075$	$4.72^a\pm 0.064$	$4.80^a\pm 0.056$
Protein %	$2.92^b\pm 0.054$	$3.06^a\pm 0.018$	$3.20^a\pm 0.039$

Means with various superscripts within a row differ significantly ($p<0.05$)

Table 5. Mean body weight changes in lactating crossbred cows (Mean±SE)

Treatments	Initial body wt. (kg)	Final body wt. (kg)	Mid body wt.(kg)	Total gain in 90 days (kg)	Body wt. gain per day (gm)
T_1 (Control)	382.80 ± 9.06	400.60 ± 8.62	391.70 ± 8.83	$17.80^c\pm 0.66$	$197.77^c\pm 7.37$
T_2	381.40 ± 12.67	403.00 ± 13.42	392.20 ± 13.04	$21.60^b\pm 1.20$	$240.00^b\pm 13.42$
T_3	380.60 ± 21.36	405.40 ± 21.72	393.00 ± 21.54	$24.80^a\pm 0.66$	$275.55^a\pm 7.37$

Mean values having different superscripts within a column differ significantly ($P<0.05$)

4. CONCLUSION

On the basis of the present investigation, it may be concluded that the milk composition (including fat, SNF, total solids, protein and lactose, percent) in lactating crossbred cows differed significantly ($P < 0.05$). In addition the body weight gain per day was significantly higher in shatavari supplemented groups than control group. It can be concluded, based on the above findings, that supplementation of Shatavari in the diet of lactating crossbred cows was significantly improved animal performance by enhancing milk fat percent, SNF per cent, total solid per cent and by increased body weight gain in lactating crossbred cows.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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