

Effect of polyherbal galactogogue supplementation on milk yield and quality as well as general health of Surti buffaloes of south Gujarat

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Abstract

Aim: A polyherbal galactogogue based on indigenous knowledge of tribles (Bhagats) belonging to Patakot (Madhya Pradesh), Dangs (Gujarat) and Aravallis (Rajasthan) was evaluated on lactating Surti buffaloes (medium sized buffalo breed of South Gujarat which is best suitable for small and marginal farmers as well as landless labourers/tribal with less input resources).

Materials and Methods: A total of 22 lactating Surti buffaloes maintained at Livestock Research Station, Navsari Agricultural University, Gujarat, India were randomly allotted to treatment and control group (11 buffaloes in each group). Two polyherbal galactogogue biscuits (19 g each) per day for initial 10 days of the month over a period of three months were supplemented to buffaloes in treatment group. The daily milk yield of all 22 buffaloes was recorded. Milk samples from all experimental buffaloes at fortnight interval were analyzed on automatic milk analyzer. The pooled gain/loss of BCS in all the buffaloes was worked out. DMI (%) were also worked out by averaging all fortnight observations.

Results: A significant higher ($p < 0.05$) total milk yield (14.24 %) of treatment group was recorded. The effect of polyherbal galactogogue biscuits was non-significant on milk compositions. Dry matter intake /100 kg body weight (DMI %) was found significantly ($p < 0.01$) better in treatment over control. The buffaloes of treatment group had lost significantly ($p < 0.01$) lesser body condition scoring (BCS) than control however, both groups had lost BCS from initial BCS. The net profit of treatment was Rs.339.90/animal/month higher than control and calculated cost-benefit ratio of treatment and control groups was 1:1.62 and 1:1.52 respectively.

Conclusion: It was concluded that supplementary feeding of polyherbal galactogogue to lactating Surti buffaloes is cost effectively beneficial for milk yield and general health condition.

Keywords: body condition scoring, DMI, milk yield, net return, poly herbal galactogogue, surti buffaloes

Introduction

Optimal milk production is the basic requirement in the management of dairy economics. As a highly demanding period, transition can be affected by many factors that could compromise the health, productivity and reproductive performance of dairy animals. Nutritional strategies can be used to prevent metabolic diseases in the early days post-calving and to increase milk production. A wide variety of additional feed additives exist that may also have potential for use over a few weeks pre-partum and post-partum. Beyond appropriate feeding management, the administration of some additives such as plant extracts, enzymes, glucose precursors, probiotics, choline and vitamin E may be helpful in ameliorating nutrient utilization and availability with a consequent improvement of milk yield, milk protein, milk fat and milk somatic cell count. These additives may also improve health status, which implies a decrease of early post-partum diseases and better reproductive performance [1-3].

Galactogogues / lactogogues are medications or other substances believed to assist in the initiation, maintenance, or augmentation of maternal milk

production. Keeping in view the preservation of animal health and prevention of excessive stress on its production capacity through hormone and alike, a holistic approach making use of herbal formulations has come up as a desirable approach. Majority of these herbal preparations have however not been thoroughly scientifically evaluated but their traditional use suggested some safety and efficacy [4]. In order to restore the animal productivity and to optimize the milk production in individual animals for better profits, various drugs, herbal preparations, hormones, mineral supplements and feed additives have been tried with variable results [2-11].

Leptadenia reticulata, *Asparagus racemosus*, *Nigella sativa* and many more are known for galactogogue effect [12]. Researchers have also reported significant galactopoietic response in various milch animals [3-9, 11-19]. Singhal [9] observed as high as 31.10% increase in milk yield of Payapro[®] fed cows, whereas, Qureshi [7] not only observed an increase in milk yield but also an increase in the fat percentage of milk in dairy cows fed with Lectovet[®] (a herbal combination). Baig and Bhagwat [5] also reported

improvement in milk yield, CLR, Fat % and SNF % on use of Galactin Vet[®] in dairy cows. Herbal preparations have also been shown to relieve the heat stress in dairy cows and ultimately improve their productivity [20]. Sridhar and Bhagwat [21] also reported significant improvement in hemoglobin, serum calcium and total protein levels after treatment of Galactin Vet[®] with 5.48% increased milk yield which indicates the good health of the animals. Kolte and co-workers [15] also reported that indigenous herbal preparations effectively restored the altered milk constituents and increased the milk production in cows with sub-clinical mastitis. However, Ekerden [22] reported that in milking animals, lactation stage is one of the major factors influencing yield and compositions of milk in buffalo. Whereas, Mech and co-workers [23] found that Total protein, Lactose, SNF and Ash did not vary significantly except fat content of milk on use of herbal preparations in animals.

A polyherbal galactagogue which is a purely herbal and based on indigenous knowledge of tribes (Bhagats) belonging to Patalkot (Madhya Pradesh), Dangs (Gujarat) and Aravallis (Rajasthan) for inducing and maintaining lactation in humans. It includes unique formulation that included various parts of 16 medicinally important plants as listed out in Table-1.

Table-1. Scientific and common names of herbs used in formulation of polyherbal galactagogue

Sr. No.	Scientific Name	Common Name in India (Gujarat)
1	<i>Acacia catechu</i>	Khair
2	<i>Acacia nilotica</i>	Desi babul
3	<i>Alstonia scholaris</i>	Saptaparni
4	<i>Anethum graveolens</i>	Suva
5	<i>Asparagus racemosus</i>	Shatavari
6	<i>Coriandrum sativum</i>	Dhania
7	<i>Cuminum cymium</i>	Jeera
8	<i>Foeniculum vulgare</i>	Saunf
9	<i>Lepidium sativum</i>	Asalio, Halim
10	<i>Leptadenia reticulata</i>	Dodi
11	<i>Madhuca indica</i>	Mahua
12	<i>Pueraria tuberosa</i>	Phagvel, Khakarvel, Patal kumhra
13	<i>Saccharum officinarum</i>	Ganna
14	<i>Sesamum indicum</i>	Til
15	<i>Tephrosia purpurea</i>	Sarphonka
16	<i>Tinospora cordifolia</i>	Jiwantica

The present study had been planned to assess the effect of a polyherbal galactagogue on lactating Surti buffaloes in respect of milk yield, milk compositions and general health status.

Materials and Methods

Ethical approval: Necessary permission of Institutional animal ethics committee was taken before initiation of experiment.

The present experiment was conducted at the Livestock Research Station, Navsari Agricultural University, Navsari, Gujarat state, India. The duration of this study was 89 days i.e. from 1st February to 30th April, 2011 excluding Initial 10 days that was considered as preliminary period. The experiment was conducted in both sides of pakka animal shed with separate iron experimental stalls for each animal. The

experimental animals were tied with GI chain in their respective stalls. The identification number of respective animal was written on the inner upper edge of feeding passage wall just in front of the respective treatment group of animals for convenience in feeding and management.

A total of 22 lactating Surti buffaloes (medium sized buffalo breed of South Gujarat which is best suitable for small and marginal farmers as well as landless labourers/tribal with less input resources) maintained at LRS, NAU, Navsari were selected. They were randomly allotted to treatment and control group (eleven buffaloes in each group). The mean lactation yield of previous month, parity, days in milk and milk compositions did not differ significantly at $p < 0.05$ between two groups at the start of experiment. All animals were dewormed in the month of January, 2011 with Liq. Zycloze[®] (Zydus Pharmaceuticals). All the animals remained always tied except for milking as it was done in milking parlor.

The fodders and feed used in the experiment was paddy straw as dry fodder, lucerne and hybrid napier grass as green fodders and Sumul Dan as concentrate. Fodder crops were cultivated either on the fodder farm of LRS, Navsari or other research farms of NAU at Navsari and Sumul Dan manufactured by co-operative cattle feed factory of Sumul dairy at Chalthan, Surat was purchased. In both groups, the animals were offered balanced ration to fulfill requirements as per ICAR [24] feeding standard. The percent proportion of the daily ration used to feed is given in Table-2. Based on guideline of feeding standard, the proportion of ingredients was calculated in such a way that they provide daily DCP and TDN requirements to all the experimental animals.

A total of eleven Surti buffaloes under treatment group were fed two biscuits of a polyherbal galactagogue orally only in morning (between 8:00 to 9:00 a.m.). Biscuits were fed to each of the buffaloes of treatment group by mixing them into 150g of concentrate i.e. Sumul Dan for first 10 consecutive days of the month during the treatment period for 89 days (1st February to 30th April, 2011). Same quantity of Sumul Dan was also been given to each of the buffaloes in control group over and above routine feeding of concentrate at the time of milking to buffaloes of both the groups.

All buffaloes were milked twice a day in milking parlor i.e. morning between 4:00-5:00 a.m. and evening 4:00-5:00 p.m. The milk had been collected after hand milking of each buffalo into a clean and dried stainless steel bucket and was weighed on electronic weighing balance and recorded in daily milk yield register. The milk samples were collected from all experimental buffaloes during morning and evening at fortnight interval. The collected milk samples were analyzed on automatic milk analyzer i.e. Lactoscan Milk Analyzer from Bulgaria. All animals were weighed on weighing balance at the start of the

Table-2. Percent proportion and proximate compositions of feed ingredients offered (DM basis)

Sr. No	Name of Feed Ingredients	Proportion	Proximate composition					
			OM	CP	CF	EE	NFE	Ash
1	Concentrate	33	81.33	18.05	10.48	2.81	49.99	18.67
2.	Lucerne	17	90.88	18.54	26.15	2.71	40.48	9.12
3.	Hybrid Napier	17	87.31	9.48	31.77	1.83	44.23	12.69
4.	Paddy straw	33	81.35	6.78	29.24	2.01	43.32	18.65
5.	DudhNahar	Only in treatment group	89.18	3.0	0.00	0.00	86.18	10.82
	Calculated CP	12.96 %						

Table-3. Means of milk yield and compositions in Surti buffaloes influenced by polyherbal galactogogue biscuits

Parameter	Control Group	Treatment Group	Difference	Percent increase over control
Total Milk Yield in 89 days (litres)	364.85±15.57 ^a	416.82±17.16 ^b	51.97	14.24
Milk composition (%)				
Fat	6.34±0.27	6.55±0.29	--	--
SNF	9.43±0.20	9.68±0.23	--	--
Protein	3.50±0.14	3.36±0.27	--	--
Lactose	4.90±0.14	5.09±0.12	--	--

Means differing by superscript in a row are significant ($p < 0.05$)

Table-4. Effect of polyherbal galactogogue biscuits on DMI and BCS of Surti buffaloes

Parameter	Control Group	Treatment Group
DMI kg/d	11.11 ^a	11.64 ^b
DMI %	2.99 ^a	3.12 ^{ba}
Initial BCS	3.98	3.84
Final BCS	3.70	3.82
Loss in BCS	-0.28 ^a	-0.02 ^b

Means differing by superscript in a row are significant ($p < 0.01$)

experiment. The body condition scoring of buffaloes were recorded by using 1-5 score with increment of 0.25 at first and last day of experiment. The pooled gain/loss of BCS in all the buffaloes was also worked out. The feed and fodders as per the feeding schedule were weighed before feeding and supplied separately to the experimental buffaloes. The DMI % was calculated by considering initial body weight of animals. The pooled observations pertaining to DMI were worked out by averaging all fortnight observations. Feed cost was calculated based on feed ingredients offered daily. The rates of feed ingredients were taken in to calculation as fixed by Navsari Agricultural University except concentrate and mineral mixtures as their actual purchase price were taken into consideration. Milk yield and cost of feed was calculated on monthly basis. Cost-benefit ratio was calculated based on market value of milk and total feeding cost of the month.

The means of all particular observations were analyzed as per standard statistical procedure using Student t-test described by Snedecor and Cochran [25].

Results and Discussion

The average milk yield of control and treatment group is given in Table-3. The average milk yield of control group over a period of 89 days was recorded as 364.85 litres, whereas, in treatment group, it was recorded as 416.82 litres with the difference of 51.97 litres. The milk yield of treatment group was found significantly higher than the control group ($p < 0.05$) with 14.24% higher in average milk yield over control group. Earlier, number of researchers had reported an

increase in milk yield from 9.12 to 31.10 % on supplementation of herbal galactogogue preparations [3-9, 13-18, 21]. Anjaria and Gupta [14] reported the significant increase in milk yield of goats, sheep, cows and buffaloes with *Leptadenia reticulata*. Ramesh and associated [8] also reported net gain in milk yield of 0.819 litres per HF cross-bred cow per day after feeding of Galactin® - a polyherbal galactogogue. Further, they found that increased milk yield during the declining phase after peak production of milk was sustained for a minimum period of 3 weeks. The effect of herbal preparations might have helped in optimizing the ruminal fermentation that ultimately increased the nutrient availability for milk production [6]. Dadkhah and Yeganehzad [26] resulted 20-40% increase in daily milk production in cows due to using the plant extracts (*Medicago Sativa*, *Trigonella Foenum* and *Carum Carvi*). They further found 12-25.2% and 3-17% increased levels of prolactin and insulin as well as blood glucose levels, respectively. Increased appetite and noticeable improvement in their general health condition was also observed by them. During the present study, the effect of polyherbal galactogogue biscuits was not observed better as compared to previous reports as Surti buffaloes of LRS were maintained on standard managerial conditions as well as feeding schedule. While it might have better effect at farmer's door step as animal may or may not be on balanced ration and standard managerial conditions.

The means of various milk compositions are given in Table-3. The milk compositions i.e. Fat, SNF and Lactose except protein in treatment group were

Table-5. Net return and cost-benefit ratio as influenced by supplementation of polyherbal galactogogue biscuits

Parameter	Control Group	Treatment Group
Feed Cost/animal/month (INR)	2393.30	2393.30
Cost of treatment/month (INR)	--	180.00
Total feeding cost/animal/month (INR)	2393.30	2573.30
Average milk yield/ animal/month (litres)	121.61	138.94
Market value of milk/animal/month @ INR.30/litre of milk	3648.30	4168.20
Net return over feed cost (INR/animal/month)	1255.00	1594.90
Cost : Benefit ratio over feed cost	1:1.52	1:1.62

recorded slightly higher than that of control group and means did not differ significantly ($p < 0.05$) between two groups. The results were in accordance with earlier findings of scientists [5,27-29].

However, contradictory to the results of present study significant effects on the milk compositions on feeding of herbal galactogogues in animals were also reported by the scientists [13, 14, 18, 30].

The mean dry matter intake (kg/d), DMI %, gain/loss in body condition scoring (BCS) are given in table-4. The mean dry matter intake (kg/d) and DMI % was found significantly higher ($p < 0.01$) in buffaloes of treatment group. Earlier, similar results were reported by Kirtikar & Basu [31] where Ruchmex- a polyherbal preparation acted as good appetizer and stomachic. Gupta and co-workers [32] also reported the significant increase in dry matter intake of crossbred heifers supplemented with *A. racemosus*. Many herbal preparations increased the salivary secretions, boosted the populations of friendly bacteria and protozoa, optimized the digestive functions and ultimately helped in the assimilation and metabolism of feeds [6, 33-35].

Buffaloes selected for the present study were in initial phase of mid lactation at the time of peak yield. Hence, all have lost the BCS as a result of production stress. But, the buffaloes of treatment group have lost less BCS as compared to control group may be due to an efficient microbial digestion enhanced by the feeding of polyherbal galactogogue biscuits.

The calculated costs of feeding, net return over feeding and cost-benefit ratio are given in table-5. The net return over feed cost/animal/month was found higher (INR 1594.90) in treatment group than control (INR 1255.00). The calculated cost-benefit ratio was 1:1.62 in treatment and 1:1.52 in control group. These results were in accordance to findings of scientists [18, 36] that herbal galactogogue preparations safely enhance the production and thereby improve dairy economics.

Conclusion

The results of the present study indicated that supplementary feeding of polyherbal galactogogue biscuits to lactating Surti buffaloes is cost effectively beneficial for milk yield and general health condition. Evaluated polyherbal galactogogue biscuits is non-hormonal and a combination of different herbs which can be considered as safe and cost effective. Therefore, the inclusion of such herbal preparation in dairy animal's diet should be encouraged to improve the

efficiency of feed utilization to alleviate adverse effects of environmental stress and to enhance the overall animal performance and health.

Authors' contribution

MDP: Overall monitoring and implementation of study, data collection, tabulation, drafted and revised the manuscript. KKT: Helped in planning of experiment and carried out the statistical analysis. LMS: provided necessary help for data collection during the study. ABF: Sanctioned necessary permission and provided technical guidance as and when required. All authors read and approved the final manuscript.

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Competing interests

Authors declare that they have no competing interest.

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