Effect of polyherbal-potash alum mixture supplementation on production performance of crossbred cows

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ABSTRACT

The present studies were designed to evaluate the effect of supplementation of polyherbal-potash alum mixture on milk yield and milk composition of crossbred cows. For this study fourteen Karan Fries cows (about 30 days ante-partum) were blocked by most probable producing ability, body weight and parity and randomly divided into 2 groups. Supplementation of polyherbal-potash alum mixture was done for 60 days ie 30 days ante-partum to 30 days postpartum. Milk yield and composition of milk were analyzed. Results indicated that milk yield was significantly ($P < 0.05$) high in treatment group. However no significant ($P < 0.05$) differences were observed for milk composition. It can be concluded that polyherbal-potash alum supplementation potentially improves milk yield without affecting the composition during post-supplementation period in crossbred cows.

Keywords: Cow; milk; polyherbal-potash alum mixture; supplementation

INTRODUCTION

India has emerged as a world leader in milk production currently with the productivity of 155.5 MT (Anon 2017). Crossbred cows have played important role in making India to reach at this status with contribution of 26 per cent (Anon 2016). Owing to their higher milk production capacity and lower cost of per liter milk production farmers are tempted to rear crossbred cows (Pathania and Vashist 2004) but comparative higher susceptibility of crossbred cows to environmental stress, diseases and infertility makes farmers reluctant to rear these cows (Deshmukh and Kaikini 1999). Therefore to make dairy farming more profitable a preventive approach at appropriate time is necessarily required. This appropriate time is usually the most stressful time in life of cows ie transition period (3 weeks ante-partum to 3 weeks postpartum). During this period challenges to pathogenic microbes increase however animal resistance decreases which renders animal more susceptible to various diseases (Goff 1999). Therefore strengthening the non-specific immunity can be used as alternative to overcome the incidence of diseases during this period. Herbal medication claims better action in controlling stress of different origins and in curing many serious ailments. The constraints and limitations of allopathic medication have been greatly replaced by phytotherapy because these are easily available, are cost-effective, have no side effects and do not leave residues in tissues, secretion, excretion and milk.

Several in vivo and in vitro trials have been conducted which report that herbs have excellent immunomodulatory potential and can be safely tried during transition period. Literature reveals that they have also influence on yield, quality and composition of milk. Sharma et al (2014) reported that supplementation of polyherbal mixture containing *Asparagus* (19%)*, Ocimum* (19%) and *Emblica* (19%) @ 250 mg/kg body weight can significantly improve udder health. Hashemzadeh-Cigari et al (2014) reported that supplementation of 185 g phytobiotic-rich herbal extract containing dried cinnamon bark (18%) has strong lipophilic and hydrophilic antioxidant properties which can effectively reduce somatic cell counts as well as milk production. The scientific evidence of galactopoietic and mammogenic

properties of *Asparagus racemosus* and *Trachyspermum ammi* are reported in dairy animals (Tanwar et al 2008, Mishra et al 2005, Derville 2010). Kumar et al (2014) also reported that supplementation of *Asparagus* @ 100 mg/kg body weight ante-partum and 200 mg/kg body weight postpartum can significantly improve milk production as well as fat content in the milk.

Keeping in mind the efficacy of these herbal immunomodulatory products on production performance of cows the present investigations were conducted to address the scientific validation of supplementation of polyherb-potash alum mixture on yield, quality and composition of milk.

MATERIAL and METHODS

The experiment was conducted at Livestock Research Centre, ICAR- National Dairy Research Institute, Karnal, Haryana located at 29°422′ N (latitude) and 72°022′ E (longitude) at an altitude of 250 m amsl in the bed of Indo-Gangetic alluvial plain. The soil texture of the location is sandy loam. The average annual maximum and minimum ambient temperature ranges between 40 and 4°C. The mean annual relative humidity ranges between 41 and 85 per cent and the annual rainfall from 760 to 960 mm. The experiment was carried out from September to December. During the study period mean environmental minimum temperature was 19.15 ± 0.39°C, maximum temperature 31.20 ± 0.48°C and relative humidity 69.36 ± 5.54 per cent.

At the beginning of experiment dried herbs viz *T ammi, A racemosus*, *Ocimum sanctum*, *Emblica officinalis*, *Cinnamomum zeylancium* and potash alum were purchased from local market and stored in cool and dry place. These were pulverised and mixed in specific proportion.

Fourteen crossbred (Karan Fries, Tharparkar × Holstein-Friesian) cows were selected at 30 days before the expected date of calving from the institute's experimental herd. The experimental cows had an average body weight of 503.37 ± 7.32 kg. Cows were randomly divided into two groups of seven animals each on the basis of parity (2-5), body condition score (3-4) and 305 day milk yield (4679.36 ± 256.84 kg). The animals were kept in individual house and offered feed and water in separate mangers and troughs. Both groups were fed as per standard feeding practices employed as per Anon (2001). The seasonal green fodder such as barseem, maize and jowar were fed to both groups of experimental cows. The concentrate mixture with 70 per cent total digestible nutrients and 20 per cent crude protein was fed to the cows as per the milk yield of the group throughout the experimental period. Group I without any supplementation acted as control. Cows in group II supplemented individually with polyherbal-potash alum mixture acted as treatment. At the start of experiment (30 days ante-partum) each cow was weighed and subjected to polyherbal-potash alum mixture. Feeding was done as top dressing on concentrate mixture in morning up to 30 days postpartum. Milk yield was recorded on daily basis. Composition of milk was analysed with the help of lactoscan. All analysis was done using two-way ANOVA by Sigmaplot version 11 software to account for effects of treatment, period, interactions between treatment and period as well as animal within treatment. The treatment was considered a fixed effect period and animals within treatment were considered random effects.

RESULTS and DISCUSSION

Milk yield was recorded on daily basis. Weekly average of milk yield has been presented in Fig 1. At day 7 of early lactation no significant ($P < 0.05$) change in milk yield was recorded between the groups. At day 14 of early lactation milk yield of control was significantly ($P < 0.05$) lower as compared to treatment. This trend continued up to day 49 of early lactation. The results showed that even after suspension of supplementation milk yield remained higher in treatment compared to control. At 56 days postpartum no significant ($P < 0.05$) difference was observed between the groups. Average milk yield during this period was significantly ($P < 0.05$) higher in treatment group (19.48 ± 0.47^{A} kg) as compared to control (17.03 ± 0.36^{B} kg).

Therefore it is evident from the results that supplementation not only improved milk production but also sustainsedit at higher levels for longer period even though there was near consistent decline in milk yield during post-supplementation period in treatment group being the descending phase of lactation. Results are suggestive of fact that ingredients used in polyherbal-potash alum mixture had galactopoietic property (Kaur 1998). Similar

Table 1. Composition of milk of different groups of cows

Milk component	Days early lactation								
	7	14	21	28	35	42	49	56	63
Fat (%)									
Control	4.41 ± 0.12^{Aa}	4.32 ± 0.39^{Aa}	4.27 ± 0.19^{Aab}	4.43 ± 0.31^{Aa}	4.21 ± 0.46^{Aab}	4.03 ± 0.24^{Bb}	4.37 ± 0.39^{Aa}	4.31 ± 0.24^{Aa}	4.34 ± 0.33^{Aa}
Treatment	3.80 ± 0.23^{Bc}	4.10 ± 0.26^{Bab}	4.06 ± 0.22^{Bab}	4.09 ± 0.29^{Bab}	4.20 ± 0.29^{Aab}	4.17 ± 0.17^{ABab}	4.30 ± 0.16^{Aa}	4.11 ± 0.14^{Bab}	4.03 ± 0.20^{Bbc}
Protein (%)									
Control	3.20 ± 0.09^{Be}	3.28 ± 0.10^{de}	3.31 ± 0.11^{cde}	3.31 ± 0.18^{cde}	3.34 ± 0.12^{cd}	3.41 ± 0.10^{bc}	3.56 ± 0.11^{a}	3.50 ± 0.11^{ab}	3.51 ± 0.08^{ab}
Treatment	3.46 ± 0.13^{Aab}	3.26 ± 0.27^{c}	3.40 ± 0.16^{b}	3.54 ± 0.09^{a}	3.47 ± 0.19^{ab}	3.53 ± 0.24^{ab}	3.51 ± 0.19^{ab}	3.47 ± 0.15^{ab}	3.47 ± 0.19^{ab}
Solid not fat (%)									
Conrol	8.11 ± 0.13^{Bd}	8.14 ± 0.08^{d}	8.38 ± 0.10^{c}	8.36 ± 0.07^{Bc}	8.43 ± 0.13^{bc}	8.40 ± 0.08^{b}	8.49 ± 0.07^{bc}	8.54 ± 0.08^{b}	8.68 ± 0.13^{a}
Treatment	8.41 ± 0.15^{Ac}	8.41 ± 0.29^{c}	8.54 ± 0.22^{abc}	8.64 ± 0.08^{Aa}	8.54 ± 0.16^{abc}	8.50 ± 0.23^{c}	8.50 ± 0.17^{bc}	8.51 ± 0.19^{abc}	8.61 ± 0.21^{ab}
Lactose (%)									
Control	4.59 ± 0.15	4.58 ± 0.14	4.75 ± 0.08	4.64 ± 0.14	4.72 ± 0.14	4.77 ± 0.07	4.61 ± 0.08	4.62 ± 0.08	4.76 ± 0.03
Treatment	4.64 ± 0.05	4.67 ± 0.12	4.74 ± 0.09	4.60 ± 0.12	4.61 ± 0.11	4.51 ± 0.11	4.60 ± 0.12	4.70 ± 0.07	4.71 ± 0.05

Standard errors bearing upper case superscript are significantly ($P < 0.05$) different between the groups while lower case superscript are significantly different between day

results were also reported by Kumar et al (2014) when polyherbal-potash alum mixture was supplemented with *Asparagus* @ 100 mg/kg body weight 60 day ante-partum and 200 mg/kg body weight 60 days postpartum and Sharma et al (2014) when supplemented with polyherbal mixture containing *Asparagus* (19%), *Ocimum* (19%), *Emblica* (19%) from 60 days ante-partum to 60 days postpartum. Mahantra et al (2003) also reported that feeding herbal formulation containing 25 per cent Shatavari enhanced milk production (25.1%) significantly ($P < 0.05$) over control group. Derville (2010) reported that supplementation of *T ammi* @ 50 and 25 g daily increased the milk production.

The results of milk composition of different groups of cows have been presented in Table 1. At day 7 postpartum fat percentage in treatment was significantly ($P < 0.05$) lower as compared to control. Up to day 28 of early lactation fat (%) was significantly lower in treatment as compared to control. Initial reduction in milk fat (%) was probably due to dilution effect in response to the production of more milk in treatment. After 35 days no significant difference was observed.

Berhane (2000) and Singh et al (2005) also observed no significant differences in milk fat percentage on supplementing Shatavari during pre and postpartum period. At 7 day postpartum protein (%) in treatment was significantly ($P < 0.05$) higher as compared to control. After that no significant difference was observed between the groups. There were also no significant differences in milk protein percentage on supplementing Shatavari during pre and postpartum period. At day 7 postpartum solid not fat (SNF) percentage was significantly ($P < 0.05$) higher in treatment as compared to control. After that no significant difference was observed between treatment and control. No such difference was found in lactose (%) during the experiment.

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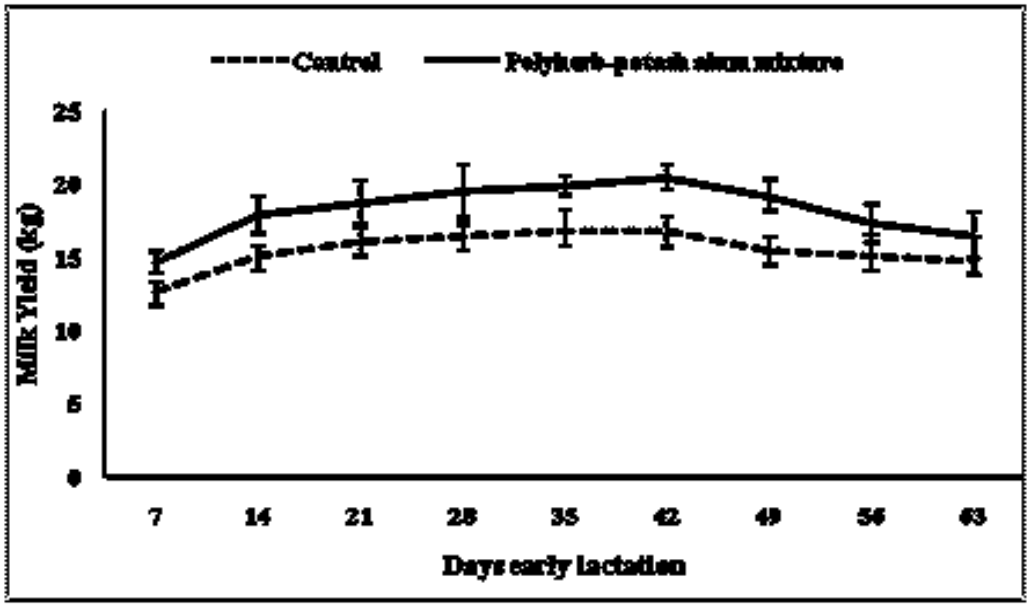

Fig 1. Weekly average of milk yield of two groups of cows during early lactation

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