



Effect of Poly-Herbal Mixture Supplementation during Post partum Period on Feed Intake and Reproductive Performance of Sahiwal Cows

Piyali Kuri, Parveen Kumar*, Nishant Kumar, Anjali Aggarwal and Mahendra Singh
Animal Physiology Division, ICAR-National Dairy Research Institute, Karnal-132001, Haryana, India

ABSTRACT

To investigate effect of poly-herbal mixture supplementation on feed intake and reproductive parameters, 12 Sahiwal cows at peri-parturient period were selected and divided into two groups of 6 animals each on the basis of body weight, parity and expected producing ability. Control group was fed basal diet alone while in supplemented group alongwith basal diet, poly-herbal mixture was given @ 450 g/animal/d from day of calving up to 7 days continuously and then on alternate days up to day 21 and then at weekly interval up to day 60. Body weight, feed intake and milk production were better ($P<0.05$) in supplemented group. There were no cases of RFM and metritis in supplemented group and rapid rate of cervix and uterine involution was observed in supplemented group compared to control. There was significant ($P<0.05$) reduction in interval from calving to 1st observed estrus, number of services per conception and service period while increase ($P<0.05$) in first service conception rate in cows of poly-herbal mixture supplemented group. Hence, poly-herbal mixture supplementation in diet of Sahiwal cows @ 450 g/animal/d improved post partum reproductive performance.

Key words: Feed intake, Milk production, Poly-herbal mixture, Reproduction, Sahiwal cows

INTRODUCTION

Sahiwal is one of the most important milch breeds of cattle in Indian subcontinent. Improvement of post partum reproductive efficiency of Sahiwal cattle is of major concern. Multifarious strategies are emerging worldwide to improve reproductive performance of dairy animals which include use of hormones, antibiotics, nutritional supplements (Narvariya *et al.*, 2018; Raheja *et al.*, 2018), semi-synthetic products *etc.* but many of them are associated with suppressing symptoms, less accessibility, cost and side effects (Malviya *et al.*, 2011). Thereby, people are again oriented back to herbal and ayurvedic medicines having the holistic approach to improve performance of dairy animals. Herbal remedies are gaining more attention as an alternative to supplementation for female fertility. As recognized by the World Health Organization, local ethno-veterinary medicines could play an important role in ensuring general well-being and welfare of livestock in the developing world (WHO, 2008). Previous studies have documented that herbs exert multiple effects such as growth promoting, anti-inflammatory and anti-oxidant activity (Ao *et al.*, 2011; Huang *et al.*, 2010) and can regulate metabolism in livestock (Grela and Semeniuk,

2006). Ginger is one of the famous traditional medicinal herbs because of its anti-oxidant, anti-inflammatory and immuno-modulatory effects (Ali *et al.*, 2008). Turmeric (*Curcuma longa*) has been shown to possess anti-inflammatory (Santoskar *et al.*, 1986) and antioxidant properties (Sreejayan and Rao, 1994). Krishnamoorthy and Madalageri (1999) reported that seeds of Ajwain act as anthelmintic, carminative, laxative and stomachic. It also cures abdominal tumors, abdominal pain and piles. *Shatavari* has been documented in dairy animals as reproductive system tonic, immune-modulator, anti-oxidant and anti-stress compound (Kumar *et al.*, 2008). Fenugreek is one of the world's oldest medicinal herbs whose immunomodulatory effect, anti-inflammatory and anti-neoplastic effect, antimicrobial effect and antioxidant effect have been reported (Priyanjali *et al.*, 2005). Synergistic interactions of bioactive compounds in herbal plants are mainly responsible for their potent health beneficial effect (Liu, 2004).

Supplementation of poly-herbal improved performance of Murrah buffaloes (Chandra, 2015). However, very scanty literature is present regarding its efficacy in improvement of reproductive parameters in indigenous breeds of cattle. Hence. the present work

*Corresponding author: E-mail: drpk1959@gmail.com

was conducted to assess the effect of supplementation of poly-herbal mixture on feed intake and reproductive performance of Sahiwal cows.

MATERIALS AND METHODS

Twelve pregnant Sahiwal cows were selected during transition period from Livestock Research Center, NDRI, Karnal. The animals were free from any anatomical, physiological and infectious disorders. Present study was conducted at Livestock Research Center of ICAR-National Dairy Research Institute, Karnal, Haryana, India during September 2017 to March, 2018. Karnal is situated at an altitude of 250 m above mean sea level, latitude and longitude position being 29°42" N and 79°54" E, respectively. Experiment was approved and conducted under the established standards of the Institutional Animal Ethics Committee (IAEC).

The cows of treatment group were fed individually at the time of poly-herbal mixture supplementation daily during the experiment. Experimental animals were maintained as per the standard conditions of feeding (ICAR, 2003) and management followed at NDRI.

Control group was fed basal diet alone and poly-herbal mixture was supplemented in treatment group @ 450 g/animal/d during first 7 days after calving, then

at alternate day up to day 21 (9, 11, 13, 15, 17, 19 and 21) and then at weekly intervals up to day 60 (28, 35, 42, 49, 56 and 60). The composition and quantity of poly-herbal mixture has been presented in Table 1. Individual herb was purchased from local market after assessing their quality in consultation with ayurvedic practitioners. Each herb was ground separately. The herbal mixture was prepared after mixing the herbs in correct quantity. Body weight and feed intake of all animals was recorded at weekly intervals. Daily milk yield of individual cows was recorded.

Involution status of cervix and uterus was assessed by ultrasound examination. Ultrasonography of cervix and uterus was performed at weekly interval by a real time B-Mode diagnostic ultrasound scanner equipped with a 7.5 MH linear array transducer. Diameter of cervix and uterus was measured after freezing the ultrasound image and recorded.

The reproductive parameters (incidence of retention of fetal membranes (RFM), metritis, involution status of cervix, involution status of uterus, interval from calving to 1st observed estrus, calving to day of 1st service, 1st service conception rate, number of services per conception and service period) were recorded. For calculating days to first observed estrus, both groups of cows were observed twice daily in the

Table 1. The composition and quantity of poly-herbal mixture

Name of Herb (in Hindi)	Common name	Botanical name	Part of herb used	Quantity
Ajwain	Carom	<i>Trachyspermum ammi</i>	Seed	25 g
Jeera	Cumin	<i>Cuminum cyminum</i> linn	Seed	25 g
Methi	Fenugreek	<i>Trigonella foenum graecum</i>	Seed	25 g
Sundh	Ginger	<i>Zingiber officinale</i>	Rhizome	25 g
Saunf	Fennel	<i>Foeniculum vulgare</i>	Seed	25 g
Sowa	Indian dill	<i>Anethum graveolens</i>	Foliage	25 g
Haldi	Turmeric	<i>Curcuma longa</i>	Rhizome	25 g
Satavari	Shatavari	<i>Asparagus racemosus</i>	Root	50 mg
Other ingredients				
Kala Namak	Black salt			25 g
Gur	Jaggery			250 g
Total				450 g

Table 2. Body weight (kg) of Sahiwal cows in post partum period

Group	Week							
	1	2	3	4	5	6	7	8
Control	356.63 ±4.76	362.03 ±3.18	353.58 ^A ±2.42	364.67 ±9.45	365.20 ^A ±6.17	363.54 ^A ±8.34	363.67 ^A ±6.23	360.33 ^A ±5.65
Treatment	360.23 ^A ±4.14	368.23 ±2.67	373.39 ^B ±5.09	380.79 ±7.6	386.80 ^B ±7.6	395.33 ^B ±8.72	386.70 ^B ±7.34	384.72 ^B ±3.24

^{A,B}Mean having different superscripts within column differs significantly (P≤0.05)

morning and evening to determine the signs of estrus by the experienced and skilled personnel and estrus chart was prepared for each cow so that they were brought for A.I. after voluntary waiting period (VWP) which was approximately set as 60 days postpartum period at LRC, NDRI, Karnal. Service period was calculated by counting the number of days from calving to the service that resulted in pregnancy (effected service) and this was confirmed by pregnancy diagnosis after 45-60 days of last service. Number of inseminations per conception was calculated as the number of insemination required for successful conception. 1st service conception rate are based on a rectal diagnosis of pregnancy conducted 6-8 weeks after insemination.

First-service

$$\text{conception rate (\%)} = \frac{\text{No. pregnant first service}}{\text{No. bred first service}} \times 100$$

Statistical analysis was done using student's t-test which was performed for comparison of various parameters between the control and treatment group using the SPSS statistical software program (version 21.0).

RESULTS AND DISCUSSION

Results pertaining to body weight, DM intake and milk yield of Sahiwal cows of control and supplemented groups have been presented in Tables 2, 3 and 4, respectively. Body weight of Sahiwal cows was higher

(P<0.05) in treatment group compared to control at 3rd and 5th week onwards. Increased body weight in treatment group might be attributed to higher DM intake in treatment group. Weekly milk yield was better (P<0.05) in treatment group compared to control group which might be attributed to galactopoietic activity of herbs like ajwain, fenugreek, shatavari *etc.*

It is clear from the results that supplementation of herbal mixture exerted positive influence on rate of cervix as well as uterine involution as demonstrated by lower diameter of cervix and uterine horn in supplemented group compared to control group throughout the experiment (Table 5). The overall mean values of diameter for supplemented and control group were 4.16±0.19 and 4.79±0.17 cm, respectively. Chandra (2015) in Murrah buffaloes and Barjibhe (2016) in Sahiwal cows reported similar results. The overall diameter of uterine horn in supplemented and control group was 4.33±0.14 and 5.09±0.16 cm, respectively. This lowering of uterine diameters occurred at rapid rate in supplemented group of animals compared to control from 1st to 6th week of post partum period. Chandra (2015) found similar positive influence of herbal mixture supplementation on involution of uterus of Murrah buffalo. Beneficial effects of herbal extracts may arise from activation of feed intake, immune-stimulation, anti-inflammatory and anti-oxidant

Table 3. DM intake in Sahiwal cows

Parameter	Group	
	Control	Treatment
DM intake (kg/d/animal)	9.00 ^A ±0.46	9.96 ^B ±0.31
DM intake (kg//100 kg BW)	2.57	2.62

Table 4. Milk yield (kg/animal/d) of Sahiwal cows in post partum period

Group	Week							
	1	2	3	4	5	6	7	8
Control	6.89 ^A	6.93 ^A	7.53 ^A	6.77 ^A	7.06 ^A	6.43 ^A	5.94 ^A	6.08 ^A
	±0.32	±0.21	±0.23	±0.35	±0.14	±0.21	±0.27	±0.36
Treatment	7.73 ^B	7.73 ^B	7.48 ^B	7.69 ^B	7.73 ^B	7.63 ^B	7.55 ^B	7.17 ^B
	±0.12	±0.15	±0.15	±0.20	±0.15	±0.37	±0.26	±0.32

^{A,B} Means having different superscript within column differ significantly ($P \leq 0.05$)

properties (Yan *et al.*, 2011).

In the present study, 2 cows of control group suffered from RFM and metritis while cows of herbal mixture supplemented group had no incidence of metritis which might be attributed to anti-oxidant and immune-modulatory action of herbal mixture which prevent infections (Ao *et al.*, 2011; Huang *et al.*, 2010). The interval from calving to day of first observed estrus was shorter ($P < 0.05$) in cows of herbal mixture supplemented group. In our study, herbal mixture supplemented cows showed shorter interval between calving and 1st observed estrus which indicated beneficial role of herbal mixture in improving uterine health as indicated by rapid involution rate of cervix and uterus, and strengthening of estrus expression intensity. Consequently, 1st observed estrus after calving occurs earlier in cows of herbal mixture supplemented group.

Number of services per conception was lower ($P < 0.05$) in cows of herbal mixture supplemented group. Our results regarding the effect of herbal mixture in reducing the number of services required per conception is correlated with no incidence of RFM and metritis and better uterine involution in herbal mixture

supplemented cows suggesting the favorable action of herbal mixture in improving conception rate with minimum services.

Service period was shorter ($P < 0.05$) in cows of herbal mixture supplemented group. In cows of control group, incidence of RFM and metritis was higher as compared to cows in herbal mixture supplemented group where there was no case of uterine infection supporting our results of positive effect of herbal mixture in reducing service period (Chandra, 2015).

CONCLUSIONS

Supplementation of poly-herbal mixture in the diet of Sahiwal cattle improved in post partum reproductive performance in terms of involution of uterus and cervix, incidence of RFM and metritis, interval from calving to 1st observed estrus, interval from calving to 1st observed estrus, service period, number of insemination per conception and 1st service conception rate.

ACKNOWLEDGEMENT

The financial grant for the study was provided by National Initiative on Climate Resilient Agriculture, Indian Council of Agricultural Research (NICRA-

Table 5. Cervix and uterus diameter (cm) during post partum period in Sahiwal cows

Group	Week					
	1	2	3	4	5	6
Cervix diameter (cm)						
Control	6.08 ^a ±0.27	5.49 ^a ±0.23	4.95 ^a ±0.18	4.38 ^a ±0.13	4.04 ^a ±0.05	3.84 ^a ±0.07
Treatment	5.4 ^b ±0.21	4.78 ^a ±0.16	4.31 ^b ±0.13	3.87 ^b ±0.19	3.39 ^b ±0.16	3.21 ^b ±0.16
Uterus diameter (cm)						
Control	6.208 ^a ±0.15	5.72 ^a ±0.15	5.27 ^a ±0.13	4.83 ^a ±0.13	4.4 ^a ±0.13	4.09 ^a ±0.07
Treatment	5.44 ^b ±0.16	4.99 ^a ±0.13	4.44 ^b ±0.16	4.00 ^b ±0.16	3.7 ^b ±0.21	3.42 ^b ±0.16

^{a,b} Means bearing different superscripts in a column differ significantly ($P < 0.05$)

Table 6. Reproductive performance in control and treatment groups of Sahiwal cows

Reproductive parameter	Group	
	Control	Treatment
Incidence of RFM and metritis	2	0
Interval from calving to first observed estrus	75 ^b ±2.9	46.67 ^a ±3.81
Service period (days)	121.33 ^b ±6.94	93.34 ^a ±4.41
Number of insemination per conception	2.6 ^b ±0.33	1.6 ^a ±0.33
1 st service conception rate (%)	16.66	50.0

^{a,b}Means bearing different superscripts in a row differ significantly (P<0.05)

ICAR), New Delhi. The authors would like to thank the Director, ICAR-NDRI for providing necessary facilities to conduct this research work.

REFERENCES

- Ali, B.H., Blunden, G., Tanira, M.O. and Nemmar, A. 2008. Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale Roscoe*): A review of recent research. *Food Chem. Toxicol.* 46: 409-420.
- Ao, X., Yan, L., Zhou, T.X., Wang, J.P., Kim, H.J., Cho, J.H. and Kim, I.H. 2011. Effects of *Saururus chinensis* extract supplementation on growth performance, meat quality and slurry noxious gas emission in finishing pigs. *Livest. Sci.* 138: 187-192.
- Barjibhe. 2016. *Effect of Polyherbal Mixture, Butyrate and Mustard Oil Supplementation During Transition Period on Productive and Reproductive Performance of Sahiwal Cows*. M.V.Sc. Dissertation. National Dairy Research Institute (Deemed University), Karnal-132001, Haryana, India.
- Chandra, S. 2015. *Effect of Poly Herbal Mixture and Butyrate Feeding on Postpartum Reproductive Performance in Murrah Buffaloes*. M.V.Sc. Dissertation. National Dairy Research Institute (Deemed University), Karnal-132001, Haryana, India.
- Huang, Y., Yoo, J.S., Kim, H.J., Wang, Y., Chen, Y.J., Cho, J.H. and Kim, I.H. 2010. Effects of dietary supplementation with blended essential oils on growth performance, nutrient digestibility, blood profiles and fecal characteristics in weanling pigs. *Asian- Australas. J. Anim. Sci.* 23: 607-613.
- ICAR. 2013. *Nutrient Requirement of Cattle and Buffalo*. Indian Council of Agricultural Research, New Delhi, India.
- Krishnamoorthy, V. and Madalageri, M.B. 1999. Bishop weed (*Trachyspermum ammi*): An essential crop for north Karnataka. *J. Med. Aromatic Plant Sci.* 21: 996-998.
- Kumar, S., Mehla, R.K. and Dang, A.K. 2008. Use of shatavari (*Asparagus racemosus*) as a galactopoietic and therapeutic herb: A review. *Agric. Rev.* 29: 132-138.
- Liu, R.H. 2004. Potential Synergy of photochemicals in cancer prevention : Mechanism of action. *J. Nutr.* 134: 3479-3485.
- Malviya, N., Jain, S., Gupta, V.B. and Vyas, S. 2011. Recent studies on aphrodisiac herbs for the management of male sexual dysfunction : A review. *Acta Pol Pharm.* 68: 3-8.
- Narvariya, D.S., Chandra, R., Kumar, N., Roy, A.K., Chander Datt and Mehla, R.K. 2018. Supplementary feeding: Effect on growth and blood metabolites in Sahiwal heifers *Indian J. Anim. Nutr.* 35: 161-165.
- Priyanjali., Saroj, D., Mohan, G.H. and Devasagayam, T.P.A. 2005. Anti-oxidant properties of germinated fenugreek seeds. *Phytotherapy Res.* 19: 977-983.
- Raheja, N., Kumar, N., Patel, B. and Lathwal, S.S. 2018. Effect of dietary betaine on reproductive performance of Karan Fries cows during hot humid season *Int. J. Curr. Microbiol. Appl. Sci* 7: 1451-1460.
- Santoskar, R.R., Shah, S.J. and Shenoy, S.G. 1986. Evaluation of anti-inflammatory property of curcumin (diferuloyl methane) in patients with postoperative inflammation. *Int. J. Clin. Pharmacol. Ther. Toxicol.* 24: 651-654.
- Sreejayan, N. and Rao, M.N. 1994. Curcuminoids as potent inhibitors of lipid peroxidation. *J. Pharm. Pharmacol.* 46: 1013-1016.
- WHO. 2008. <http://www.who.int/dg/speeches/2008/20081107/en/index.html>
- Yan, L. and Kim, I.H. 2011. Effect of dietary grape pomace fermented by *Saccharomyces boulardi* on the growth performance, nutrient digestibility and meat quality in finishing pig. *J. Anim. Sci.* 12: 1763-1770.

Received on 01-01-2019 and accepted on 13-02-2019