SHORT COMMUNICATION

Effect of Feeding Bypass Fat on Reproductive Performance in Surti Buffaloes

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Abstract

An experiment was conducted to evaluate the effect of feeding bypass fat on reproductive performance of Surti buffaloes. Fourteen advanced pregnant Surti buffaloes were selected based on their records of daily milk yield and milk fat percent. The buffaloes were divided into two groups: Control (T1) and Treatment group (T2) with seven animals in each group. The buffaloes in control group were fed with green fodder, dry fodder and concentrate mixture as per ICAR requirements, while animals of treatment group received the same ration but were supplemented with bypass fat @ 130 g/d prepartum for one month and 30 g/kg milk yield for three months postpartum. The days required for uterine involution was significantly ($p < 0.05$) reduced by 7 days (32.00 ± 0.76 vs. 39.29 ± 0.97) in bypass fat supplemented group as compared to control group. First estrus (50.29 ± 1.25 vs. 62.29 ± 0.57 days) observed after calving (days) and service period (81.14 ± 7.81 vs. 97.00 ± 10.44 days) were decreased ($p < 0.05$) by 12 and 16 days, respectively, in bypass fat supplemented group over control. The number of service per conception was also reduced (1.43 ± 0.20 vs. 2.71 ± 0.18, $p < 0.05$) with higher conception rate (85.71 vs 57.14 %) in bypass fat supplemented group as compared to control group. It was concluded that supplementation of bypass fat peripartum to Surti buffaloes hastens uterine involution and significantly improves postpartum fertility.

Keywords: Bypass fat, Postpartum fertility, Surti buffaloes, Uterine involution.

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Introduction

Livestock is an integral part of Indian agricultural economy and plays a versatile role through providing livelihood support to the rural population. Lactating dairy animals during the early lactation require additional nutrients for their body needs and to sustain their health status. Commonly the lactating animals at the early stage remain in the state of negative energy balance because of deficient supply of nutrients rich feed, which leads to a changed metabolic status which is directed to poor fertility and body weight loss (Mobeen *et al.,* 2019). To improve the energy availability to early lactating dairy animals bypass fats are the alternate sources, which may not restrict the process of fermentation and fiber digestion in the rumen. Fats are made inert by treating them with some salts e.g. calcium soap/salt of long-chain fatty acid (Ca-LCFA), which bypass the rumen degradation, especially for high milk producing dairy animals. The positive impact of feeding bypass fat is reflected in terms of reduced service period, increased conception rate and increased pregnancy rate (Moriel *et al.,* 2009). Therefore, the present study was planned to evaluate the effect of feeding bypass fat on reproductive performance of Surti buffaloes.

Materials and Methods

The present experiment was conducted at Reproductive Biology Research Unit, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, Gujarat during the year 2019. Fourteen advanced pregnant buffaloes (2-4 lactation) were divided into two equal groups; Control (T1) and Treatment (T2). The buffaloes of both the groups were fed with green fodder, dry fodder and concentrate mixture as per ICAR (2013) feeding standard. The buffaloes in T2 group were fed additional supplement of bypass fat with the concentrate @ 130 g/d prepartum for one month and 30 g/kg milk yield for three months postpartum.

Individual buffaloes were under observation of gynecologist from 30 days postpartum and were checked per-rectally to judge the uterus involution at weekly interval. The animals were detected for estrus behaviour twice a day (8:00 and 16:30 h) for 30-45 min, along with ovarian changes, starting from day 30 of calving. The buffaloes were observed

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for signs of estrus (*i.e.* vulval discharge, allow mounting, bellowing, restlessness) and were served only after 60 day of calving. Approximately 75 days after service, pregnancy diagnosis was carried out by rectal palpation of the uterus. Days for first estrus postpartum and service period were recorded in both the groups. The conception rate was defined as the number of buffaloes became pregnant per 100 inseminations (Tyagi *et al.,* 2010). The data were analyzed following completely randomized design and the level of significance was decided using method of Snedecor and Cochran (1994).

Results and Discussion

The data on involution of uterus is given in Table 1. Days required for involution of uterus were 39.29 ± 0.97 and 32.00 ± 0.76 in T1 and T2 group, respectively. The days required for uterine involution was significantly ($p < 0.05$) reduced in bypass fat group as compared to control group. This observation concurred well with Ramteke *et al.* (2014) in Murrah buffaloes. However, Nirwan *et al.* (2019) found no significant difference for average number of days required for uterus involution.

The intervals for first observed estrus after calving recorded were 62.29 ± 0.57 and 50.29 ± 1.25 days in T1 and T2 group, respectively. This interval was significantly ($p < 0.05$) lower in bypass fat supplemented group by 12 days as compared to control group. The corresponding service periods recorded in T1 and T2 groups were 97.00 ± 10.44 and 81.14 ± 7.81 days, respectively, which however did not differ statistically (Table 1). The initiation of cyclicity is related with the process of involution of uterus, as the duration for uterine involution was reduced in bypass fat supplementation, it may be responsible for relatively early commencement of cyclicity. Savsani *et al.* (2013) and Ramteke *et al.* (2014) reported reduced period for occurrence of first postpartum heat in bypass fat supplemented than control group of buffaloes. Rohila *et al.* (2018) recorded the average numbers of days to come in estrus postpartum in experimental buffaloes as 56, 60 and 52.33 days in control, 100 and 150 g/day bypass fat supplemented buffaloes, respectively. Prajapati (2018) observed 14 days earlier postpartum heat ($p < 0.05$) in bypass fat supplemented buffaloes compared to control group. However, Nirwan *et al.* (2019) recorded the first postpartum estrus at par in both control and bypass fat supplemented groups. Tyagi *et al.* (2010) and Ramteke *et al.* (2014) found reduced service period in crossbred cows and buffaloes, respectively, that were fed bypass fat peripartum over the control groups.

The number of service per conception was 2.71 ± 0.18 and 1.43 ± 0.20 in T1 and T2 group, respectively, which was significantly ($p < 0.05$) less in treatment group as compared to control group. The conception rate recorded was higher in T2 (85.71 %) as compared to T1 (57.14 %) group. Similar results were also obtained regarding number of AIs per conception by Savsani *et al.* (2013), Ramteke *et al.* (2014), Prajapati (2018), while Sahoo *et al.* (2016) recorded higher conception rate in bypass fat supplemented (55 %) group as compared to control group (15 %). According to Shelke *et al.* (2012), the reproductive performance is strongly connected with energy status. Dietary fats can provide fatty acids precursors for cholesterol and prostaglandin production, which have an effect on ovarian function, uterine function, and conception rates.

Feeding of Ca-LCFA in the diet had a positive effect on reproductive performance of dairy cows and buffaloes, which is further dependent up on the precise fatty acids profile of the Ca salt. Supplementation of Ca-LCFA increases pregnancy rate and reduces open days (Moriel *et al.,* 2009; Ramtake *et al.,* 2014). The role of the fatty acids on reproductive performance of dairy animals (Moriel *et al.,* 2009) includes enhanced energy balance resulting in an earlier return to postpartum ovarian cycling, increase linoleic acid may increase $PGF_2\alpha$ and stimulate ovarian cycling and increase follicular recruitment; and increase in progesterone secretion either from improved energy balance or from altered lipoprotein composition from dietary fat improves fertility.

Bypass fat typically increases the concentrations of circulating cholesterol, the precursor of progesterone (Grummer and Carroll, 1991). Ruminants fed supplemental fat often have a slight increase in blood progesterone concentration (Staples *et al.,* 1998). Progesterone, secreted by the corpus luteum prepares the uterus for implantation of the embryo and helps in maintaining pregnancy by providing nourishment for the conceptus via induction of heterotrophic proteins from the endometrium.

From the present study, it can be concluded that the supplementation of bypass fat @ 130 g/d prepartum for one month and 30 g/kg milk yield for three months postpartum

Table 1: Reproductive Performance of Surti buffaloes supplemented peripartum with bypass fat (T2) over control (T1)

Particulars	*T1*	*T2*
Involution of uterus (days)	39.29 ± 0.97^a	32.00 ± 0.76^b
First estrus after calving (days)	62.29 ± 0.57^a	50.29 ± 1.25^b
Service period or Days open	97.00 ± 10.44	81.14 ± 7.81
Number of service per conception	2.71 ± 0.18^a	1.43 ± 0.20^b
Conception rate during experimental period	57.14%	85.71%

Means with different superscripts in a row differ significantly ($p < 0.05$).

reduced the time required for uterine involution, enhanced early onset of first postpartum estrus, and reduced number of services required per conception with improved conception rate in Surti buffaloes.

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