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Effect of Sex Sorted Semen in Synchronized Estrus on Pregnancy Rate and Female Ratio in Gir Cows

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ABSTRACT

Background: At present there is huge demand for Gir cow females however, prolonged inter calving period, more inseminations per conception and post-partum anestrus are the predominant reproductive disorder along with use of unsexed semen limit the birth of more females in Gir cows. The present research study was conducted to study the effect of sex sorted semen in synchronized estrus with Ovsynch protocol on pregnancy rate and gender ratio in Gir cows.

Methods: Total twenty Gir cows that have completed post-partum period of sixty days with normal reproductive genitalia, without clinical as well as subclinical infection were selected and divided into two equal groups. The cows from both the groups were synchronized with Ovsynch protocol. In Group- I (n=10), the cows were inseminated with sex sorted semen while in Group-II, the cows were inseminated with coneventional semen. The pregnancy rate and gender ratio was recorded.

Result: Efficacy of estrus synchronization was 100.00 per cent for Gir cows treated by Ovsynch protocol in both groups. The pregnancy rate was numerically lower after AI with sex sorted semen (40%) than conventional semen (50%) and results are non significant (P<0.05) with 100% calving rate. The proportion of female calves born from sex sorted semen AI was 75% and from conventional semen was 60%. The proportion of live calves born from sex sorted and conventional semen AI was 100%. The sex sorted semen may be used in Ovsynch protocol in Gir cows.

Key words: Estrus, Gir, Ovsynch, Sex sorted semen, Syncronization.

INTRODUCTION

Gir cow is considered as the best breed due to its superior qualities and best milker among Indigenous cattle. In India presently, Indigenous cow's ghee and urine is considered useful for making medicines based on Panchgavya and used as a best mixture in Ayurved (Parkavi *et al.,* 2021). Its milk is of premium quality milk due to the presence of A-2 beta casein and has more demand in urban educated pepoles. The average milk yield of Gir cows is 1930 litres in 300 days, average age at first heat and calving were 1149 and 1534 day, respectively while average dry period and inter-calving period were 123 and 423 days, respectively. At present there is huge demand for Gir cow females in India however, prolonged inter calving period, more inseminations per conception and post-partum anestrus are the predominant reproductive disorder that limit the birth of more females in cows.

Reduced reproductive efficiency leading to prolonged inter calving period is one of the most important causes of economic losses in livestock (Sewalem *et al.,* 2008). For archiving maximum reproductive efficiency, each cow must be reproduced as frequently as possible and maintain a standard inter-calving period of 12 months. Various management strategies and estrus synchronization protocols are implemented to induce estrus and ovulations in cows. Ovsynch is one of the estrus synchronization protocols consisting of two injections of gonadotropic releasing hormone (GnRH) combined with single administration of prostaglandin $F_2\alpha$ ($PGF_2\alpha$) and used in cyclic animals for synchronization of ovulation and fixed time artificial insemination (Singh, 2014). The main advantage of Ovsynch protocol is estrus synchronization can be done at all the stages of estrus cycle and synchronization of estrus as well ovulation which occur are very effective for improving reproductive performance (Paul and Praksh, 2005).

The predetermining of sex has valuable impact on livestock industry because of its economic gains with objective to obtain a calf of a particular sex. Use of sorted semen decouples the number of replacement of heifers required for milk production and increases the rate of genetic progress. Sexed semen is generally accessible now however, the main factors in the degree of utilization of sex sorted semen are pregnancy rate, per cent of female calves born and cost of calf production.

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The growing demands for Gir females can be achieved by application of sex sorted semen in spontaneous estrus as well as in synchronized estrus. Considering the above paucity and meager research on use of sex sorted semen in estrus synchronized Gir cows in India, the present research work was conducted to study the pregnancy rate and female ratio of sexed semen in estrus synchronized Gir cows with Ovsynch protocol.

MATERIALS AND METHODS

The present research work was carried on twenty lactating multiparous Gir cows from Adarsh Gorakshan farm Mhaispur, at farmer's doorstep in nearby villages in Akola and at Department of Animal Reproduction, Post Graduate Institute of Veterinary and Animal Sciences, Akola.

The average age was 5.9 years, average milk yield was 6.4 litters per day and average parity was 3.2 in selected cows. The vaccination and deworming status, any reproductive abnormalities and last date of parturition were recorded. The Gir cows that have completed post-partum period of sixty days with normal reproductive genitalia, without clinical as well as subclinical infection were selected randomly. All cows were housed in shed with clean dry flooring system. The cows were sent in open for grazing from 10 am to 3 pm and provided compounded concentrate according to milk yield. All cows were provided with fresh drinking water twice daily.

The selected Gir cows were examined gynaeco-clinically and cows with palpable ovarian structure like follicle and corpus luteum were divided irrespective of age, milk production and parity. All the selected multiparous Gir cows were dewormed using injection Ivermectin @ 1 ml per 50 kg body weight subcutaneously, initial treatment with injection vitamin AD_3E and H, 5 ml I/M and supplemented with chelated mineral mixture (1 kg) 50 gm daily orally after first gynaecological examination. These randomly selected cows were divided into two groups (n=10).

Group- I (Ovsynch with sex sorted semen)

One week after presynchronization treatment, cows from this group were treated with Ovsynch protocol with Inj. Buserlin acetate 10 µg on day first Inj. Cloprostenol Sodium 500 µg on day 7 and Inj. Buserlin acetate 10 µg i/m on day 9 and inseminated with sex sorted Gir bull semen.

Group- II (Ovsynch with conventional semen)

One week pre synchronization treatment, cows from this group were treated with Ovsynch protocol with Inj. Buserlin acetate 10 µg on day first Inj. Cloprostenol Sodium 500 µg on day 7 and Inj. Buserlin acetate 10 µg i/m on day 9 and inseminated with conventional Gir bull semen.

The cows were observed for estrus exhibition after the injection of $PGF_2\alpha$ (d 7) and different estrus symptoms like congestion of vaginal mucus membrane, vaginal discharge and tumification of vulva were noted by visual observations in the morning and evening. Gir bull conventional and sex sorted semen straws were purchased from Bhartiya Agro Industries Foundation (BAIF) Development Research Foundation, Uruli Kanchan, Pune (M.S.) India which were stored in Liquid Nitrogen (LN_2). In both the group, inseminations were carried out after 16-20 hrs of last GnRH injection. The pregnancy diagnoses were carried out by per rectal (P/R) examination in inseminated buffaloes after two months. The pregnancy rate of sex sorted semen and conventional semen groups were analyzed by Chi-sequare test by using software WASP of ICAR, Goa.

RESULTS AND DISCUSSION

Efficacy of Ovsynch protocol in Gir cows

Efficacy of estrus synchronization was recorded to be 100.00 per cent in present study for Gir cows treated with Ovsynch protocol in both groups (Table 1). The Gir cows showed better treatment response for Ovsynch protocol.

Table 1: Relative efficacy of Ovsynch protocol on pregnancy rate and distribution of gender after AI with sex sorted and conventional semen in Gir cows.

Particulars	Group-I Sex sorted semen	Group-II Conventional semen
Efficacy of Ovsynch syncronization protocol		
No. of cows synchronized with Ovsynch protocol	10	10
No. of cows exhibited oestrus	100	100
Pregnancy rate		
No. of cows insmeinated	10	10
No. of Gir cows became pregnant	4	5
Pregnancy rate (%)	40	50
Calving rate		
No. of cows calved	4	5
% calved	100	100
Gender of calves		
No. of calves	4	5
No. of female calves	3	3
% female calves	75	60

These findings are in harmony with earlier results reported by Ammu *et al.* (2012) in anestrus Gir cows, Dhami *et al.* (2015) in cross bred anoestrus cows, Barolia *et al.* (2016) in repeat breeding Gir cows.

Estrus signs in Ovsynch protocol in Gir cows

Estrus signs such as tumification of vulvar lips, vaginal discharge and congestion of vaginal mucus membrane were recorded in the Ovsynch synchronized Gir cows. The tummification of vulval lips symptom was shown by 60 per cent (6/10) cows and 50 per cent (5/10) cows in Group I and II, respectively. Congestion of vaginal mucus membrane shown by 70 per cent (7/10) cows and the signs of vaginal discharge was shown by 60 (6/10) per cent cows in both the groups. Congestion of vaginal mucus membrane sign was predominantly shown by Gir cows in Ovsynch synchronized estrus.

The findings observed in the present research are not in harmony with Stevenson *et al*. (1996) reported signs of nervousness, mucous discharge and occasional mounting activity in only 3 of 85 cows (3.5 per cent) in Ovsynch protocol in buffaloes. Kundalkar *et al.* (2014) reported the estrus signs like congestion of vaginal mucous membrane were exhibited by 87.50 (7/8) per cent, tumification of vulva by 50 (4/8) per cent and vaginal discharge by 37.50 (3/8) per cent by buffaloes synchronized with Ovsynch protocol in buffaloes.

Neglia *et al.* (2003) that reported 88 per cent of Italian Mediterranean buffaloes had a tonic uterus on the day of AI which treated with Ovsynch protocol. The variation in the estrual signs shown may be due to variation in species, breed, season, feeding and management, frequency of estrus detection and yield of animals.

Pregnancy rate of sex sorted and conventional semen in Gir cows

The pregnancy rate was lower after AI with sex sorted semen (40%) than conventional semen (50%) and results are non significant ($P<0.05$). There was no difference between sex sorted and conventional semen for calving rate. The average pregnancy and calving rates for sex sorted semen AIs were 40% and 100% and for conventional semen AIs were 50% and 100%, respectively. The proportion of female calves born from sex sorted semen AI was 75% and from conventional semen was 60%. The proportion of live calves born from sex sorted and conventional semen AI was 100% (Table 1).

Pregnancy rate for sex sorted semen obtained in present research work was similar to those obtained by Sharma *et al*. (2018) who observed 40% pregnancy rate in cows. Joshi *et al.* (2021) observed the overall conception rate of sex sorted semen was 39.92±0.5 per cent which is similar to present research findings.

In concurrence with present research findings, Weigal, (2004) reported higher pregnancy rates for sexed semen in Jersey and Holstein heifer 43% and 46% at dose of 1.5×10^6 and 6×10^6 respectively. Presicce *et al.* (2005) observed 42.8% at dose of 4×10^6, Borchersen and Peacock, (2009) reported pregnancy rate in Holstein, Jersey and Red breed as 49.3%, 46.6% and 60.2%, respectively. DeJarnette *et al.* (2010) observed pregnancy rate of 44% and 46% at dose of 2.1×10^6 and 3.5×10^6. Lu *et al.* (2010) recorded 69.7%. DeJarnette *et al.* (2011) observed 44% at dose of 10×10^6. Gaviraghi *et al.* (2013). observed 49.8%, 48% and 47% at dose of 4×10^6, $6\times10^6$and 8×10^6, respectively. Kurykin *et al*. (2016) reported pregnancy rate in induced estrus AI (41.7%) which is lower than spontaneous estrus AI (53.4%).

Lower pregnancy rates in sex sorted semen than the results of present findings were recorded by Doyle *et al.* (1999) 31.8% andersson *et al.* (2004) recorded 21% at sperm dose of 2×10^6. Weigal (2004) observed 31% in Jersey cows. Andersson *et al*. (2006) observed 21%, Norman *et al.* (2010) reported 39%. DeJarnette *et al.* (2011) observed 38%, Rhinehart *et al.* (2011) observed 38% in heifers and 33% in cows. Gaviraghi *et al. (*2013) reported 31.2%. Healy *et al*. (2013) and Mallory *et al.* (2013) observed 31.6% and 38%, respectively. Karakaya *et al.* (2014) recorded pregnancy rate at day 31 and at day 62 as 31.8% and 25.7%, respectively. Abdalla *et al*. (2014) recorded 34% and 32.2% at day 40 and 90, respectively and Patel and Jethwa (2019) observed 39.53% pregnancy rate.

Pregnancy rate for conventional semen insemination obtained in present research work was similar to those obtained by Sharma *et al.* (2018) who recorded 49.32%. In comparison with present research findings, the higher pregnancy rates were recorded for conventional semen by Weigal (2004) reported 62% at dose of 20×10^6 in New-York, in Jersey 61% at California. Bodmer *et al.* (2005) observed 59.3% at dose of 2×10^6. Borchersen and Peacock (2009) reported pregnancy rate in Holstein, Jersey and Red breed as 61.9%, 53.9% and 65.4%, respectively. DeJarnette *et al.* (2010) observed 61% at dose of 15×10^6. Norman *et al.* (2010) recorded 56% in heifers. De Jarnette *et al.* (2011) observed 55% and 60% at dose of 2.1×10^6 and 10×10^6 respectively. Gaviraghi *et al.* (2013) recorded 54.9% at dose of 2×10^6. Mallory *et al.* (2013) observed 68%. Djedovic *et al.* (2016) recorded 55%. Abdalla *et al.* (2014) recorded 62.5%, 57.8% at day 40 and day 90 of pregnancy. Dowad and Elbaz (2020) recorded 61.47% pregnancy rate in heifers.

While lower pregnancy rates in conventional semen than result of present study were recorded by Doyle (1999) 40.9% andersson *et al.* (2004) observed 32% and 46% at dose of 2×10^6 and 15×10^6, respectively. Anderson *et al.* (2006) observed 46%, Healy *et al.* (2013) and Karakaya *et al.* (2014) observed 39.6% and 39%, respectively. The variation in the pregnancy rate may be difference in species, breed, parity, managemental conditions, season, body condition score, exogenous supplementation of hormones and time inseminations.

The proportion of female calves born after application of sex sorted semen recorded in the current study is lower than other earlier reports obtained by Andersson *et al.,* (2006) 82%, Healy *et al.* (2013) 86%, Abdalla *et al.* (2014) 89.6%, Lu *et al.* (2015) 87.6%, Sharma *et al*. (2018) 82.14%

and Patel and Jethawa (2019) 86.15%. The female calves born after insemination with conventional semen in current study is higher than the earlier reports by Andersson *et al.* (2006) 49%, Healy *et al.* (2013) 48%, Abdalla *et al.* (2014) 50% and Sharma *et al.* (2018) 50.68%.

CONCLUSION

The Ovsynch is effective protocol for estrus synchronization and the sex sorted semen may be used in Ovsynch protocol in Gir cows.

Conflict of interest

All authors declare that they have no conflict of interest.

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