Short Communication

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EFFECT OF SEX SORTED SEMEN ON PREGNANCY RATE AND SEX RATIO IN MURRAH BUFFALOES

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ABSTRACT

The present investigation was undertaken to study the efficacy of sex sorted semen on pregnancy rate and sex ratio in Murrah buffaloes. Twenty buffaloes were inseminated with sex sorted semen, out of which 8 (40%) were found pregnant and 9 (45%) buffaloes were found pregnant inseminated with conventional semen. The pregnancy rate for sex sorted semen was 40% and for conventional semen was 45%. Out of eight calves born with inseminations of sorted semen, 7 (87.50%) were female calves and nine calves born with conventional semen, 5 (55.55%) were females. From the study it may be concluded that sex sorted semen can be effectively used to produce more female calves in buffaloes.

Keywords: *Bubalus bubalis*, buffaloes, calving, pregnancy, sex sorted semen

INTRODUCTION

Buffalo possesses 20.50% of the total livestock population as well as produces 51% of total milk production in India (20th Livestock census). This species has a key importance in the livestock sector as well as milk production of the country. To meet 266.5 million MT projected demand of milk in 2030, it is essential to significantly increase the number of elite milk-producing females. This can be achieved by shifting the sex ratio towards females in buffaloes.Artificial Insemination (AI) is a dynamic potential scientific breeding tool for livestock production with advantages like genetic gain, cost effectiveness, disease control, safety and flexibility. Sexed semen is a new reproductive technology aimed to change the sex ratio of the offspring toward a desired sex up to 90% of effectiveness. Sexed semen was first used in the bovines in United Kingdom at the start of the 21st century. Application of sexed semen is an excellent way to increase the dairy herd without spending a large amount on replacement and virtually a breeder need not to buy new buffalo heifers. Sex pre-selection decouples the number of replacement of heifers in the herd for milk production. The use of sexed semen increases the rate of genetic progress. Male calves produced through conventional semen have loss of approximately half of progenies. The percentage of total males in case of crossbreed, Indigenous and buffalo bull used for breeding and allied activities are 36.6, 64.8 and 29.56,

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respectively (Mohanty *et al*., 2013) thus there is large number of unproductive young bulls. The high cost and lower pregnancy rate are two factors which limit its usage, especially in developing countries like India (Karakaya *et al*., 2014; Sharma *et al*., 2018; Abdalla *et al*., 2019).

Desired sex of calf is an important aspect in animal husbandry and buffalo farmers prefer female calves as progeny for replacement for milk production. The male calves in buffaloes are commonly not reared by buffalo owners. The application of sexed semen in buffalo reproduction would be of great awareness both on fertility and in economic terms. The most important variables in the use of sexed semen are pregnancy rate and cost of calf production. The studies on the practical applicability of sexed semen are very meager worldwide while in India practical use of sexed semen in buffaloes at field level is not reported. Considering the importance of the topic, the present research work was conducted to study efficacy of sex sorted semen on pregnancy rate and sex ratio in Murrah buffaloes.

MATERIALS AND METHODS

The present research work was carried during the period of January 2020 to March 2021 in well-organized buffalo farms located nearby Akola city in Maharashtra, India. The buffaloes completed the post-partum period of sixty days with normal reproductive genitalia were selected. All the chosen buffaloes were treated with injection Ivermectin 1 ml per 50 kg body weight subcutaneously and initial pre-synchronization treatment like injection vitamin AD_3 E and H 5 ml I/M and provided chelated mineral mixture 50 gm daily orally after the first gynaecological examination. After the buffaloes were divided into groups.

Group 1 (n = 10)

The buffaloes exhibiting spontaneous estrus after deworming and pre-synchronization were inseminated at mid estrus with sex sorted semen.

Group 2 (n = 10)

The buffaloes from this group were synchronized with Ovsynch synchronization protocol (Day 0: Inj. Buserline acetate 10 µg i/m, Day 7: Inj. Cloprostenol sodium 500 µg and Day 9: Inj. Buserline acetate 10 µg i/m) and inseminated with sex sorted semen after 16 to 20 h after last GnRH injection.

Group 3 (n = 10)

The buffaloes exhibiting spontaneous estrus after deworming and pre-synchronization treatment were inseminated at mid estrus with conventional buffalo semen.

Group 4 (n = 10)

The buffaloes were synchronized with Ovsynch synchronization protocol (Day 0: Inj. Buserline acetate 10 µg i/m, Day 7: Inj. Cloprostenol sodium 500 µg and Day 9: Inj. Buserline acetate 10 µg i/m) and inseminated with conventional semen after 16 to 20 h after last GnRH injection. Sex-sorted semen straws containing approximately two million sex sorted sperms produced by BAIF Central Research Station in parternship with ST Genetics India with ST Urli Kanchan, Dist Pune Maharashtra, India were used in the present research work. The advanced flow cytometry (Sexed UlLTRA 4M™) technology was utilized for production of sex-sorted semen. The thawing

of sex sorted, and conventional semen was carried out at 37°C for one minute and the thawed semen was deposited in the body of the uterus during insemination. The pregnancy rate and female male sex ratio was recorded. The obtained data during present research was analyzed by applying Chi Sequare Test.

RESULTS AND DISCUSSIONS

Twenty buffaloes were inseminated with sex sorted semen, out of which 8 (40%) buffaloes were found pregnant. While twenty buffaloes were inseminated with conventional semen, out of which 9 (45%) buffaloes were found pregnant. The average pregnancy rate for sex sorted semen was 40% and 45% for conventional semen and found non-significant difference for pregnancy rate in sex sorted and conventional semen in spontaneous as well as synchronized estrus (P>0.5). Out of eight calves born with inseminations of sorted semen, 7 (87.50%) were female calves, while one (12.50%) calf was male. Out of nine calves born with inseminations with conventional semen, 5 (55.55%) were females, while four (44.45%) calves born were male. The 31.95% more female calves were born in sexed semen compared to conventional semen in buffaloes (Table 1).

The average pregnancy rate was lower with sex sorted semen compared to conventional semen. There was no difference between sex sorted and conventional semen for calving rate and health of calves. Pregnancy rate after sex sorted use in the present research work was similar to that reported by Sharma *et al*., 2018 observed 40% pregnancy rate.

In contrast with present research findings, the higher pregnancy rates were recorded for sexed semen 43% and 46% at dose of 1.5×10^6 and 6×10^6 in Jersey and Holstein heifer, respectively (Weigal, 2004). Presicce *et al.* (2005) recorded 42.8% pregnancy rate at dose of 4×10^6, Borchersen and Peacock (2009) reported 49.3%, 46.6% and 60.2%, pregnancy rate in Holstein, Jersey and Red breed cows. DeJarnette (2010) reported pregnancy rate 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 pregnancy rate as 44% at dose of 10×10^6. Gaviraghi *et al.* (2013) observed pregnancy rate as 49.8%, 48% and 47% at dose of 4×10^6, 6×10^6 and $8\times10^{6,}$ respectively. Higher pregnancy rate was also recorded in Swamp buffalo 48.5% in Murrha buffalo 52.5% in *Nili-Ravi* buffalo by Lu *et al.* (2015); Djedovic *et al.* (2016) observed 44%, Kurykin *et al*. (2016) reported increased pregnancy rate at spontaneous estrus AI (53.4%) than induced estrus AI (41.7%). Shekalgorabi *et al.* (2017) observed 48.3%, Oikawa (2019) reported 47.3%. Sharma *et al.* (2019) observed 49.1% and 42.7% pregnancy rate in cow and buffalo, respectively. Dawod and Elbaz (2020) reported 51.45% pregnancy rate in heifers, while lower pregnancy rates were recorded by Doyle *et al.* (1999) 31.8%, Andersson *et al.* (2004) recorded 21% at dose of 2×10^6. Weigal (2004) observed 31% in Jersey cows. Bodmer *et al.* (2005) observed 33.3% at day 30 to 40, 27.6% at day 70 to 90 of pregnancy. 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); Mallory *et al.* (2013) observed 31.6% and 38%, respectively. Karakaya *et al.* (2014) recorded pregnancy rate at day 31 and at day 62 was 31.8% and 25.7%, respectively. Abdalla *et al*. (2019) recorded 34% and 32.2% at day 40 and 90, respectively. Patel and Jethwa (2019) observed

Table 1. Pregnancy rate and sex ratio with sex sorted and conventional semen in buffaloes.

Sr. No.	Groups	No. of buffaloes inseminated	No. of buffaloes pregnant	Calving rate	No. of female calves born
Sex-sorted semen					
1	Group 1 (n = 10)	10	4 (40 %)	4 (100%)	4 (100%)
2	Group 2 (n = 10)	10	4 (40%)	4 (100%)	3 (75%)
Total number of buffaloes		20	8 (40%)	8 (100%)	7 (87.50%)
Conventional semen					
3	Group 3 (n = 10)	10	5 (50%)	5 (100%)	3 (60%)
4	Group 4 (n = 10)	10	4 (40%)	4 (100%)	2 (50%)
Total number of buffaloes		20	9 (45%)	9 (100%)	5 (55.55%)

39.53% pregnancy rate.

Sharma *et al.* (2018) recorded 49.32% pregnancy rate with conventional semen inseminations was similar to findings recorded in present sturdy. In comparison with current research observations, 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 was 61.9%, 53.9% and 65.4%, respectively. DeJarnette (2010) observed 61% at dose of 15×10^6. Norman *et al.* (2010) recorded 56% in heifers. DeJarnette *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%. Shekalgorabi *et al.* (2017) observed 63.8%. 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 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); Karakaya *et al.* (2014) observed 39.6% and 39%, respectively.

The proportion of female calves born with sex sorted semen recorded in the current research is higher than earlier findings which were reported by Andersson *et al.* (2006) as 82%, Healy *et al.* (2013) as 86%, Abdalla *et al.* (2019) as 89.6%, Lu *et al.* (2015) as 87.6%, Sharma *et al.* (2018) as 82.14%, Patel and Jethawa (2019) as 86.15%. The female calves born after insemination with conventional semen in current study is lower 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) as 50.68%.

The variation in the pregnancy rate may be differences in parity, body condition score, managemental and nutritional conditions, season, exogenous supplementation of hormones and time inseminations.

CONCLUSION

From the present research, it may be concluded that sex sorted should be used to get a higher number of female calves in buffaloes under field conditions.

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