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Use of sexed semen to mitigate the problem of stray cattle in India

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INTRODUCTION

One of the emerging problems that needs immediate attention in India is stray cattle menace. These animals are roaming on highways, destroying the farmers field, involved in multiple animal attacks causing casualties and financial burden on farmers. India has over five million stray cattle, as per the 20th Livestock Census released by the Union Ministry of Fisheries, Animal Husbandry and Dairying in January 2020. There are several reasons for the high share of stray cattle in the country: from neglect of the indigenous populations to excessive focus on crossbreeding in the past few decades. Increased mechanization and the national ban on cow slaughter have further added to the problem. To address the growing problem of stray cattle, the state governments have launched a series of schemes and projects. These include setting up of cattle shelters (*gaushala*), adoption of stray cows, levying taxes, giving stray cows to malnourished families, cow protection centres, and more. These measures are not working and It is not surprising that gaushalas under the Rashtriya Gokul Mission met with little success. In this chaos we can try to mitigate the problem of stray cattle by use of sexed semen.

What is sexed semen?

George E. Seidel, a reproductive physiologist at Colorado State University (CSU) in the US is credited for his pioneering research in the 'sorting process'. However, for cattle, it was in the late 1990s that Seidel and his team at CSU developed a process for creating sex-sorted cattle semen for freezing and use in artificial insemination and also got patent rights. Sexed semen is processing of semen of bulls to ensure that 'Y' chromosomes in sperm cells either removed through a 'sorting' process or killed. Semen

which has only 'X' chromosomes are retained which ensures that a female calf is born. There are two techniques to produce sexed semen: One is the 'sorting process' in which 'X' and 'Y' chromosomes are separated. 'X' are retained and 'Y' discarded. The other is in which 'Y' chromosomes are altogether killed. Both technologies are pioneered by the United States-based companies and use an instrument called 'Flow Cytometer'. Cows are impregnated using sexed semen through the artificial insemination process with consumption of one straw per cow.

How sexed semen can mitigate the problem of stray cattle?

Increased mechanization, unaffordability by farmers to raise the male calves, cows abandoned when they stop giving milk and the national ban on cow slaughter have forced the farmers to leave the animals on roads and streets. The possibility of birth of male calves is fifty percent in a natural conception in most of the mammals. If we could reduce the number of male calves births, we can avoid many unwanted animals on the roads. This can be achieved by inseminating the animals with only sexed semen through the artificial insemination.

What are the benefits of sexed semen for farmers and industry?

The main purpose of this technology is for production of higher genetic merit heifers and to maintain economic sustainability at both farm and industry levels. There is an increasing demand for dairy and beef products across the globe, which will necessitate a greater focus on improving production efficiency. In dairy farming, there is surplus production of unwanted male calves. Male dairy calves increase the risk of dystocia compared with heifer calves, and as an unwanted by-product of breeding with conventional semen, they have a low economic value. Incorporating sexed semen into the breeding programme can minimize the number of unwanted male dairy calves and reduce dystocia. Sexed semen can be used to generate herd replacements and additional heifers for herd expansion at a faster rate from within the herd, thereby minimizing biosecurity risks associated with bringing in animals from different herds. Furthermore, the use of sexed semen can increase herd genetic gain compared with use of non-sorted semen.

What are the limitations of using sexed semen?

The patent, intellectual property right and technology have its cost. The sex sorting machine is very costly. The machine has low sorting efficiency and speed. Highly skilled technical manpower is required to operate this machine. More over the sorted sperm has reduced freezing potential. All these factors have made the final product very costly, which is approximately around Rs. 1500-4500/- dose in India as compared to Rs. 15-20/- dose for conventional semen. The conception rate with sex sorted semen could dip to as low as 50 percent if artificial insemination is done by inexperienced person. The sperm concentration of sexed semen ranges between 2 and 4 million/dose whereas it is 20 million/dose in conventional semen. Managing lower sperm concentration will be a challenge in the field under Indian condition. Presently it is commercially available

only for HF and Jersey breeds of cattle. Sexed semen is not available for any other Indian breed of cattle and buffaloes. Considering the high fertility rate of the heifers, it is recommended that sexed semen should be used only in heifers (especially virgin heifers) for better conception rate. However, it can also be used in cows up to third lactation with excellent reproduction record.

How to maximize the chances of success at artificial insemination (AI) with sexed semen

Few precautions and some basic rules have to be followed for success while using sexed semen: Insemination has to be done only by highly trained professional. The cow should be regular cyclic. It is recommended should only be inseminated with sexed semen after 90 days of calving and animal has normal uterine involution and showing normal oestrus cycle. For optimum results the cow should be not more than on third lactation. It has been documented that **heifers** are best suited for sex sorted semen having age less than 24 months. A well balanced diet having all the essential macro and micronutrient should be fed. The housing of the animal should be good and comfortable. All the above factors bears good results.

Where to buy sex sorted semen?

Sexed semen is not available with all government hospitals and agencies. Prior approvals from Central Government (DADF) and State Governments (State AH department) would be required to obtain import permit from Director General of Foreign Trade (DGFT). Keeping complete records of its use and progeny born out of imported semen is mandatory for all users. The sexed semen is commercially available mainly from Sexing Technology, USA. However, many other breeding companies in USA, Canada and Europe are producing sexed semen commercially using licence from Sexing Technology, USA.

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