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Full-Length Research Paper

Non-Surgical Artificial Insemination in Sudanese Breed of Ewe as a circumventing Procedure in Infertility due to Incomplete Copulation

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ABSTRACT: In the genetic improvement of sheep production, artificial insemination is a critical reproductive technology. The inability of Sudanese sheep ewes to complete copulation during natural mating due to their broad, heavy tail is a basic infertility issue. As a result, no surgical artificial insemination using freshly collected sperm from a Sudanese ram was performed. The ram's sperm was collected while it was standing using the eclectro-ejaculation method. The semen sample was immediately analyzed for gross motility before being non-surgically (transcervical) implanted into two estrus synchronized ewes. The ewes were properly restrained on standing position and a sterile vagina speculum was introduced into their vagina, and the external os of the cervix was gradually drawn out through the vulval opening with Allis tissue forceps. A bovine teat dilator was used to manipulate the cervical canal before inserting a loaded fresh semen sample in a modified syringe and depositing the semen in the uterus. The ewes were scanned with two multi Iscans after insemination and both were found to be closed (pregnant). The two ewes were closely monitored throughout, and one of them successfully lambed at the end of gestation.

Keywords: Artificial, Breed, Insemination, Sudanese, Transcervical

INTRODUCTION

Sheep domestication dates back to the Stone Age in the Middle East around 9000 BC. According to DNA analysis, domestic sheep are descended from two ancestral species, one of which is mouflon (Muigai and Hanotte, 2013). Reproductive technologies such as estrous synchronization, superovulation, embryo recovery, and transfer are valuable productivity tools that allow for homogeneous groups of parturition and, as a result, a year-round supply of animals and animal products (Pedro Dos Santos et al., 2015). The act of collecting an embryo from a donor animal and depositing it in the uterine tube of a recipient animal is referred to as embryo transfer (Kraemer, 1989). Sheep, with their small body size, high productivity capacity, and rapid growth rate, have played an important role in the well-being of resource-poor small-holders that predominate in developing countries like Nigeria (Agaviezor et al., 2013). They supply 30% of the meat, 16% of the milk, and 50% of the domestically produced meat in Sub-Saharan Africa (Yunusa et al., 2013). They thrive in a variety of tropical and subtropical environments. Sheep can be entirely sustained on pastures and agricultural waste, so raising them is inexpensive. A flock of sheep can provide daily necessities for families such as food and milk. Fresh sheep milk is widely consumed in Southern and Eastern Europe, as well as in some developing countries such as Syria and Turkey, and it is an excellent raw material for milk processing industries (Agaviezor et al., 2013).

In Nigeria, according to Yunusa et al. (2013), there are four breeds of sheep and they include. They are the most common breed in the humid tropics from southern West Africa to central Africa. They are a small-bodied, compact breed that can be all white, all black, all brown, or spotted black or brown on white. Adult rams weigh about 37 kg, while mature ewes weigh about 25 kg.

Controlled strategic manipulation and genetic enhancement of a herd or lock through the use of assisted reproductive technologies can be a powerful tool for the modern livestock industry in meeting the ever-increasing demands for increased productivity and quality of animals and their products (Campbell and Baired, 2003). The widespread use of artificial insemination has increased genetic gains in the cattle, swine, goat, and poultry industries, but its application in the sheep industry is still insignificant (Dekkers and John 1992).

Artificial insemination in sheep can be performed surgically (Bruno-Galaraga et al., 2014), laparascopically (Flores-Foxworth et al., 1992), or transcervically/non-surgically (Fonseca et al., 2013). Intra uterine semen deposition is the best method for artificial insemination in sheep because it results in the highest lambing rate (Ivanka and Pawel, 2011). Artificial insemination with fresh sperm when deposited in the vagina or mid cervix is acceptable with a high conception rate if the sperm is handled as little as possible before insemination and the lambing rate is between 20 and 40%. (King et al., 2004).
Frozen thawed ram semen has significantly lower semen motility than fresh semen because cryopreservation causes a redistribution of lipids comprising the cell membrane of the spermatozoa, which alerts lipid-lipid and lipid-protein relationships required for sperm functioning (Bailey et al., 2003).

MATERIALS AND METHODS

Estrus synchronization of the two ewes

Following evaluation of the ewes through clinical examination and ultrasound scan to establish the health status of the ewes, their cyclicity and ruling out of pregnancy, they were subjected of OvSynch synchronization protocol as demonstrated below:

Day 0 gonadotropin releasing hormone was administered
Day 7 prostaglandin $F2_{\alpha}$ was administered
Day 9 second dose of gonadotropin releasing hormone was administered
The ewes were inseminated 20 hours of the last administration of gonadotropin releasing hormone.

Semen collection from ram

The ram after conducting breeding soundness examination on it was subjected to semen collection through electro-ejaculation method as described by (Evans and Maxwell, 2005). The semen collected was analyzed with the following seminal biometrics:

Color; Milky
Consistency; Creamy
PH; 7.0
Motility; 90%
Volume; 1mL/ejaculate

With the semen characteristics above, it has met the minimum gross motility of at least 70% before it can be used for artificial insemination in ewes (Purdy *et al*., 2009).

Artificial insemination

Non-surgical intra-uterine technique was used to carry out the procedure from freshly collected semen from a ram on the day of artificial insemination.

Procedure

The ewe on heat following synchronization was properly restrained with the two hind limbs liberally raised. A sterile vagina speculum was inserted into the vagina to aid in proper visualization and access to the external os of the cervix. The organ was gradually drawn to the roof of the vulva using some Allis tissue forceps to grasp one lateral cervical ring. The vaginal speculum was carefully removed while the other lateral cervical ring was grasped with Allis tissue forceps. To dilate the cervix further, a bovine teat dilator was inserted and screwed into the cervical canal. A modified 5 mL syringe was used to remove two (2) mL of fresh sperm from the collection vial, which was then gently inserted through the dilated cervix and placed inside the uterus. The ewes were held with their two hind limbs raised for a brief period of time before being set free. 35 days after insemination, the ewes underwent post-insemination ultrasound scans (USS), one with her eyes closed and the other with hers open (Plates 1-4).

RESULTS AND DISCUSSION

Lack of intromission during copulation is a major cause of infertility in Sudanese breed of sheep. The breed is expensive but farmers are interested in rearing them because is one of the biggest breed of sheep and an adult can weigh up to 70kg. Artificial insemination in sheep is not very popular due to many factors which include but not limited to low percentage conception, difficulty in manipulating the reproductive tract of sheep because of its size e.t.c. In this experiment, the major

Plate 1: The ewe showing broad dropy tail covering the vulval opening.

Plate 2: After pacement of vagina speculum, the external os of the cervix is being drawn to the roof of the vulva.

Plate 3: Showing cervical lumen being exposed with two Allis tissue forceps.

Plate 4: Showing the dam and its lamb after a successful gestation and lambing.

complaint by farmers rearing Sudanese breed is that of the animal not being able to conceive for several years mostly between three and five years. Upon receiving such complaint, a through flock investigation will be carried out on both male and female members of the flock with special emphasis on the ewes. The commonest findings of such investigation reveal that most rams in such flocks are fertile because they successfully breed other breed in the flocks e.g. balami, uddah and yankasa. Nutritional plane of the Sudanese ewes were usual standardized and proper breeding soundness evaluation conducted. After determining that incomplete corpulence caused by a lack of intromission during mating is the primary cause of infertility in the breed, non-surgical artificial insemination is usually performed on them. We have successfully carried out several such procedures, but only a few have been documented. After the procedure, the two ewes were scanned 35 days later, and we recorded 100% conception as opposed to 80% recorded by Sandor et al., 2011, but we lost one of the

pregnancies during gestation but one delivered successfully.

Conclusion

Following the high conception rate attain in this experiment, we recommend the following:

- Non-surgical artificial insemination should be encouraged among farmers.
- Ovsynch protocol resulted in high percentage synchrony and conception following breeding.
- Larger group of ewes should be subjected to similar experiment.

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