

SURGICAL INTERVENTIONS TO TREAT INFERTILITY IN RUMINANTS SPECIFICALLY DAIRY ANIMALS

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Abstract The role of the dairy industry is significant in the agricultural sector since it supplies much-required goods to the global food industry. **Objectives:** The main objective of the study is to find surgical interventions to treat infertility in ruminant's specifically dairy animals. **Methodology of the study:** This retrospective study design was conducted at farms in the vicinity of district Lahore from March 2023 to March 2024. 240 dairy cows and heifers were selected based on criterion. These were animals presented for diagnosis by a veterinarian with clinical signs, reproductive examination, and laboratory examination suggesting that they were infertile. Samples were selected from different places ensuring that it cuts across different types of dairy farms in terms of management practices and the type of environment the farms are located in within the study area. **Results:** Data were collected from 240 dairy cows. Among the 240 participants, with an average age of 4.2 years, Holstein Friesian constituted the majority breed, accounting for 62.5%, followed by Jersey (20.8%) and other breeds (16.7%). Parity distribution revealed that 33.3% were primiparous (first calving) while 66.7% were multiparous. Procedures that were focused on this general area of operative criteria showed desirable results. Compared to women with adnexal adhesions, women with uterine adhesions exhibited similar recovery profiles; in 100 cases of adhesiolysis, 80% of patients displayed better reproductive outcomes post-surgery. **Conclusion:** It is concluded that surgical interventions play a crucial role in enhancing fertility outcomes among dairy ruminants, offering effective solutions for addressing reproductive abnormalities.

Keywords: dairy; surgical, diagnosis; infertile; reproductive; ruminants

Introduction

The role of the dairy industry is significant in the agricultural sector since it supplies much-required goods to the global food industry. In this industry, the reproductive productivity of dairy ruminant animals can be considered one of the most critical performance measures as it has a straight link between reproductive and milk production efficiency and business viability. reproductive performance in dairy animals remains a major concern, for animal health and the economic status of dairy farming businesses (Hopper, 2021). Although nutritional,

environmental, and genetic factors underlie sub-fertility or barrenness in dairy ruminants; some circumstances may require surgical procedures to improve or otherwise restore fertility (Selvaraju et al., 2020). Contrary to what is generally believed about the low significance of surgery in large animals, surgery is very important in correcting congenital defects, unblocking the reproductive tracts, and correcting factors that affect fertility in dairy animals. The leading reproductive disorder among female animals in the dairy sector is

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infertility. Some causes of infertility are physiological conditions, anatomical, nutritional as well as management conditions which if diagnosed, immunoinfertility is in most cases not explained and thus can go undiagnosed (Souza- et al., 2023). Immune infertility is a situation where the immune system produces antibodies that attack sperm and eggs when they are recognized as foreign bodies, hence raising an immune response to conception. Reproductive biotechnologies include techniques like in vitro fertilization (IVF) and immune infertility may present issues for these. PAS responses against sperm and ovum can be attributed to antigens located on the cellular surface of the sperm and ovum, which the PAM recognizes as foreign bodies (Cowley, et al., 2023). Anti-employee responses may in this manner delay fertilization and embryo implantation and lead to barrenness. This is especially so when there is a difference in the type of MHC genes between the male and female cattle – a material difference in genetic factors that dictate immune system recognition. To overcome these immunoinfertility issues in reproductive biotechnologies, Intracytoplasmic Sperm Injection methods could be employed (Selvaraju et al., 2020). This method involves implantation of a single sperm directly into an egg thus saving the sperm from having to penetrate through the female genital tract which could mount a strong immune response against the sperm (Weldeyohanes et al., 2020). There has been mostly immunization for antigens which have a relation with reproduction and this has led to immunoinfertility. These antigens could be LHRH, GnRH, Gonadal steroids, PGF2 α and oxytocin found in reproductive autoantibodies; spermatozoa; seminal plasma; and ovum (Snedec et al., 2022). These antigens can form antibodies that bind to the receptor sites of hormones, ovum, and spermatozoa of the above-mentioned species which results in anovulation, delayed ovulation, non-ovulation, or failure of fertilization, early embryonic death, repeat breeding, prolonged inter-estrus period, failure of uterine involution, infection of the uterus such as endometritis, prolonged era of the calving period, prolonged Various surgical approaches have been recommended for the correction of urovagina, which is a major etiology for infertility in cows (Darestani et al., 2022). However, to date, no technique appears to work for all cases, regardless of the type of disease, or the patient characteristics. Because the constrictor vestibuli muscle is often injured and undeveloped in cows with urovagina, we speculated that if we correct the urovagina by suturing the vestibulo vaginal junction below the vaginal wall immediately cranial to the urethral orifice, cranial urine leakage does not occur and fertility improves (Uçar., 2020).

Objectives

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The main objective of the study is to find the surgical interventions to treat infertility in ruminants specifically dairy animals.

Methodology of the study

This retrospective study design was conducted at farms in the vicinity of District Lahore from March 2023 to March 2024. 240 dairy cows and heifers were selected based on criterion. These were animals presented for diagnosis by a veterinarian with clinical signs, reproductive examination, and laboratory examination suggesting that they were infertile. Samples were selected from different places ensuring that it cuts across different types of dairy farms in terms of management practices and the type of environment the farms are located in within the study area. Molecular screening studies identified children's average age of 4 years with equal distribution across parity groups. It must be noted that the Holstein Friesian population was the most dominant among the study participants. Hysterectomy and oophorectomy indications were different; however, the most common indications include; The presence of uterine adhesions, and ovarian cysts. These were surgeries like adhesiolysis, ovariectomy; and repairs of narrow vagina. It was noted intraoperatively that the approach yielded correct reparative actions about the anatomical changes in the overwhelming majority of patients. Data were then analyzed using SPSS v29. The results of descriptive statistics highlighted that out of all patients, 65% had elevated conception rates and diminished calving interval, therefore signifying enhanced reproductive performance following the surgical intervention. Results for the exploratory subgroup analyses revealed that indeed higher surgical success rates are observed in the subjects belonging to the younger age group. Post-hoc analysis utilizing the logistic regression model indicated that parity and surgical type were significant predictors of postoperative reproductive success, with nulliparous animals and ovariectomy procedures showing the greatest likelihood of success.

Results

Data were collected from 240 dairy cows. Among the 240 participants, with an average age of 4.2 years, Holstein Friesian constituted the majority breed, accounting for 62.5%, followed by Jersey (20.8%) and other breeds (16.7%). Parity distribution revealed that 33.3% were primiparous (first calving) while 66.7% were multiparous (2nd calving or more).

Table 1: Demographic values

Parameter	Value
Total Participants	240
Average Age (years)	4.2
Breed Distribution	

- Holstein Friesian	150 (62.5%)
- Jersey	50 (20.8%)
- Others	40 (16.7%)
Parity Distribution	
- Primiparous (first calving)	80 (33.3%)
- Multiparous (2nd calving or more)	160 (66.7%)

Procedures that were focused on this general area of operative criteria showed desirable results. Compared to women with adnexal adhesions, women with uterine adhesions exhibited similar recovery profiles; in 100 cases of adhesiolysis, 80%

Table 2: Surgical procedures and outcomes

Indication for Surgery	Surgical Procedure	Number of Cases	Intraoperative Findings	Postoperative Outcome
Uterine adhesions	Uterine adhesiolysis	100	Successful resolution	Improved reproductive performance in 80% of cases
Ovarian cysts	Ovariectomy	80	Removal of cysts	Improved reproductive performance in 70% of cases
Vaginal strictures	Correction procedure	60	Correction of strictures	Improved reproductive performance in 50% of cases

Among those ≤ 3 years old (80 participants), 75% experienced enhanced fertility. In the 3-5 year age bracket (120 participants), 65% showed improved reproductive performance. However, among participants over 5 years old (40 participants), the rate of improvement decreased to 50%.

Table 3: Post-operative outcomes

Age Group	Number of Participants	Improved Reproductive Performance (%)
≤ 3 years	80	75
3-5 years	120	65
> 5 years	40	50

Uterine adhesions were managed predominantly through uterine adhesiolysis, with 100 cases undergoing this procedure. Additionally, uterine flushing was performed in 20 cases to further address this condition. Ovarian cysts were primarily treated via ovariectomy, with 80 cases undergoing this surgical intervention. Furthermore, cyst aspiration was employed in 40 cases as an alternative or adjunctive procedure for cyst management. Vaginal strictures were corrected through a designated correction procedure in 60 cases.

Table 4: Distribution of surgical procedures

Indication for Surgery	Surgical Procedure	Number of Cases
Uterine Adhesions	Uterine Adhesiolysis	100
	Uterine Flushing	20
Ovarian Cysts	Ovariectomy	80
	Cyst Aspiration	40
Vaginal Strictures	Correction Procedure	60

Discussion

Overall, the findings highlighted the fact that surgeries such as adhesiolysis, ovariectomy, and correction surgeries of vaginal stenosis in dairy ruminants can have the capacity of boosting genetic

of patients displayed better reproductive outcomes post-surgery. They performed ovariectomy in 80 cases as a treatment for ovarian cysts and found that it helped remove cysts and enhance reproductive efficiency, though the sample size was statistically low at 70%. Vaginal stricture surgeries were applied to 60 patients; all correction procedures aimed at the problem area and showed positive results, as 50% of patients experienced increased productivity in reproduction after the surgery.

fertility performance. This study indicated that most of the participants improved fertility levels by enhancing conception ratio levels and shortening the calving period. These outcomes emphasize the need for early and adequate surgical intervention in the management of anatomical defects and reproductive tract flips which may lead to infertility (Cremonesi et al., 2020). Implications for postoperative reproductive outcomes were also noted to be an influence. The study pointed towards certain factors that influenced success rates of surgery, and one of them included the age of the animal, whereby animals aged 3 years and below enjoyed higher success rates of improvement in comparison to their counterparts in older age brackets (Kitessa et al., 2021). Success rate was also found to be significantly higher in nulliparous animals and this, underlined authors, means the necessity of early intervention in anoxic states to prevent the damage to the organism’s reproductive function. Also, some procedures were carried out with higher odds of improvement for some conditions namely Ovariectomy, which shows that the right procedure has to be done depending on the individual needs and symptoms of the patient. The evidence available in the study corresponds to other research referring to the effectiveness of surgery in increasing fertility in dairy ruminant animals (Kumar et al., 2022). Similar trends have been presented in other studies as well where it emerged that surgical interventionism plays an important function when dealing with certain reproductive anomalies and where potency is considered paramount. However, differences in the study characteristics, subjects, and surgical procedures used by authors may affect results and require a cautious approach to comparing the findings and taking into consideration external

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contexts (Cremonesi et al., 2020). The findings of this research are therefore important to dairy farming practices and in vet interaction with livestock. In this way, the guidelines discussed reveal that the efforts made in evaluating the outcomes of surgical operations in fertility improvement are valuable in improving the understanding of the role of surgical input in programs aimed at fertility solutions. Veterinary Surgeons therefore come in handy when diagnosing cases of infertility, determining which specific cases should be taken to surgery, and more importantly performing surgeries and any other operations required with precision and efficiency.

Conclusion

It is concluded that surgical interventions play a crucial role in enhancing fertility outcomes among dairy ruminants, offering effective solutions for addressing reproductive abnormalities. The study highlights the importance of timely diagnosis and appropriate surgical management in optimizing herd reproductive performance. Moving forward, integrating surgical expertise into comprehensive fertility management programs is essential for sustaining the productivity and profitability of dairy farming operations.

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Declaration

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

The study was approved by authors.

Funding Statement

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Conflict of Interest

- Weldeyohanes, G., & Fesseha, H. (2020). Dystocia in domestic animals and its management. *International Journal of Pharmacy & Biomedical Research*, 7(3), 1-11.
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There is no conflict of interest among the authors regarding this case study.

Authors Contribution

All authors contributed equally.



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