



## A Retrospective Case Study on Fetal Mummification in Egyptian Cows, Focusing on its Management Strategies and Fertility Feedback

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### Abstract

Eight cows, aged 4 to 8 years, were brought to Assiut University's Veterinary Teaching Hospital, Faculty of Veterinary Medicine, Assiut, Egypt due to prolonged gestation with no signs of labor. Examination revealed mummified fetuses, leading to a cesarean section to remove them. Postoperative care included fluids, antibiotics, and antiseptics. The incidence of mummified fetuses was 0.873%, and the pregnancy rate after removal was 62.5%. The study recommends improved hygiene, management, and breeder education to prevent fetal mummification. The study suggests that fetal mummification can be prevented through good hygiene and sanitation, good management, and awareness programs for breeders on the importance of caring for animals during the reproductive period.

**Keywords:** Mummified Fetus; Corpus Luteum (CL)

### Introduction

A mummified fetus is a reproductive disorder that leads to fetal loss and extended gestation. It is responsible for economic losses to the farmers. Mummification is the condition of late sterile embryonic death [1,2]. Fetal mummification occurs after the placenta formation and fetal ossification begins, which typically happens around 70 days into gestation, typically without cervical dilation or contamination. This condition most commonly arises between the 3<sup>rd</sup> and 8<sup>th</sup> months of gestation and occurs without the concurrent luteolysis of the corpus luteum (CL) or the opening of the cervix [3,4]. Fetal mummification is associated with a persistent CL that produces progesterone (P4) to continue the mummification inside the uterus [4,5].

This condition is characterized by a decrease in fetal fluid and the presence of brown material surrounding the fetus [6]. The defining characteristics of fetal mummification include the inability to expel the dead fetus, the involution of the fetal cotyledon and maternal caruncle, and the presence of a hard fetal body within the uterine horns without showing clinical symptoms [3]. Mummification of bovine fetuses is a rare condition, occurring in 0.01% to 2% of cattle during gestation [4,7,8].

Several potential realistic causes for this condition have been proposed, including mechanical factors, such as compression or torsion of the umbilical cord, uterine torsion, defective placentation, genetic anomalies, abnormal hormonal profiles, and chromosomal abnormalities [5,9-12]. In cases of fetal mummification, the prevailing hypothesis suggests that the condition results from fetal dehydration and the effects of the fetal membranes, which

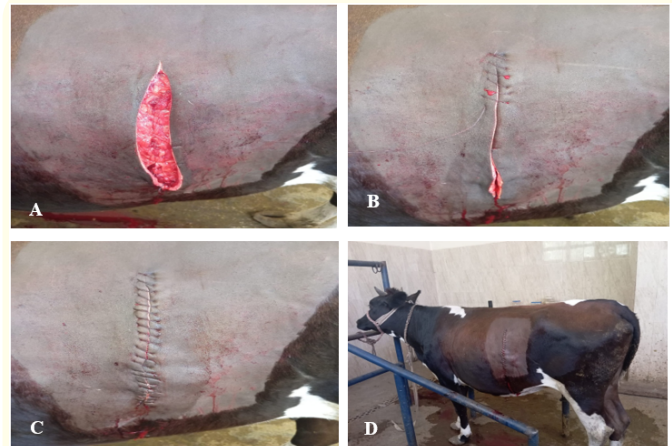
neutralize tissue autolysis in the absence of oxygen and bacteria [4]. However, determining a definitive etiology is often challenging due to tissue degeneration and autolysis, which can complicate the mummification process. As a result, analysis of bacteria, viruses, biopsies, and chromosomes is typically ineffective [12].

### Case history and clinical findings

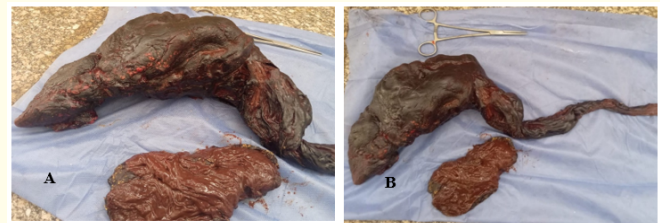
A retrospective study was conducted from October 2018 to September 2025 at the Veterinary Teaching Hospital, Faculty of Veterinary Medicine, Assiut University, Assiut, Egypt, involving 916 Egyptian cows. Among these cases, eight cows were diagnosed as experiencing fetal mummification. The ages of the affected cows ranged from 4 to 8 years. According to the owners, these cows showed no signs of parturition, even after exceeding the normal gestation period by a significant margin. Additionally, the owners noted that the cows' abdomens appeared smaller than expected for their pregnancy stage, which typically should be much larger. Veterinarians attempted to induce cervical dilation using various medications, but without success. The cows were in good body condition, and all clinical parameters were within normal limits. Diagnoses were made through rectal palpation, which revealed an enlarged uterine horn containing a hard intrauterine mass without any fluid. A vaginal examination indicated that the cervixes were tightly closed.

### Handling of the cases

After diagnosis, the decision to treat the cows carrying a mummified fetus is to perform a cesarean section (C-section) operation (Figure 1). It was performed through a left flank incision, using an inverted 'L' block and local infiltration of 2% lignocaine hydrochloride to extract the mummified fetus (Figure 2). After C-section, the cows received postoperative therapy for seven days. This treatment included intravenous fluids, antibiotics, anti-inflammatories, antihistamines, and daily antiseptic dressings to prevent complications from potential secondary bacterial infections that could have occurred during the surgery or the recovery period. Throughout the seven days, the cows were closely monitored, with regular communication with the owners to ensure a smooth and uneventful recovery. Seven days after the procedure, the skin sutures were removed.



**Figure 1:** This figure shows the final suturing process in the subcutaneous tissue (A), the skin (B and C), and then the cow (D) appears after a C-section performed to remove fetal mummification.



**Figure 2:** This figure illustrates a hematic mummified embryo, removed via cesarean section, where the fetal fluids are absorbed and surrounded by a viscous, chocolate-colored substance, as shown in images A and B.

### Results and Discussion

Through communication with the owner regarding each case and follow-up visits, it was observed that all eight cows resumed normal estrous cyclicity, and uterine involution occurred, resulting in a return to normal uterine size. Five of the cows became pregnant following artificial insemination (AI). However, two cows did not achieve pregnancy despite multiple AI attempts and were sold for fattening and slaughter. Additionally, during the follow-up period, another cow was fattened for slaughter, not been used for breeding. The study indicates that the mummification ratio is 0.873%. This ratio agrees with that recorded by Barth (1986) [7] and Kumar and Saxena [8] that mention that mummification

of bovine fetuses is a rare condition, occurring in less than 2% of cows during the gestational period, with an incidence ranging from 0.13% to 1.8%. Concerning the pregnancy rate, the current study revealed that the pregnancy rate for cows after the removal of mummified fetuses was 62.5% (5 out of 8 cases), within a few months after the extraction of the mummified fetus by C-section. However, Lefebvre, *et al* (2009) [5] reported a 36% pregnancy rate within a few months after extraction of the mummified fetus by hysterotomy, using the flank approach. The findings in the present study indicate that cesarean section is the preferred approach for managing mummification in cattle when alternative treatments are unsuccessful. These findings agree with those recorded by Kumar, *et al.* (2017) [6] and Katiyar, *et al.* (2015) [13], who mention that the suitable handling in case of a mummified fetus is C-section when the therapeutic regimen fails.

After reaching out to the animal's owners and performing follow-ups examination one-month post-surgery, we noted the cows complete recovery. Approximately three months later, we reassessed the cases and found that the cows were pregnant again. This finding aligns with reports from several authors [5,14-16], which indicate that C-sections in dairy cows do not influence the interval between the first and subsequent calvings [6,13]. These results suggest that C-sections are the preferred method for managing fetal mummification in cows when other treatments are ineffective, and they do not adversely affect postoperative fertility [17].

Concerning the pathogenesis of the mummification, the exact mechanism behind intrauterine mummification is not fully understood. The formation of a fetal mummy typically occurs at the end of the second trimester or the beginning of the third trimester in most species, which coincides with the time just before the skin keratinization takes place and is influenced by the fetal age at the time of death. The absence of keratinization facilitates the flow of fluids through the skin [5,18]. Dead fetuses in the late second/early third trimester rapidly lose body fluid into the amniotic cavity due to low skin keratinization. Capillaries quickly reabsorb this fluid, returning it to the mother's circulation via the umbilical cord [19]. Fetal mummification can only occur under specific conditions: 1) the fetus must die after bone development is complete; otherwise, rapid autolysis will occur, leading to the breakdown of soft tissues [1,20]. This breakdown happens before the tissues can be absorbed

through the endometrium due to the release of digestive enzymes and bacterial decomposition. 2) Uterine and fetal fluids must be resorbed relatively quickly [1,21,22]. 3) There must be no oxygen present in the uterus until the mummification process is complete [20]. 4) The uterus must be free of bacteria, which is achieved by the cervix remaining closed to prevent the entry of putrefactive organisms from the vagina and vestibule [23]. Additionally, the endometrium must remain intact, blocking any entry of organisms that might be present in the surrounding vascularization [24-26].

After fetal death, the placental caruncles begin to shrink, leading to hemorrhage between the endometrium and the fetal membranes. This process results in a reddish-brown, gummy, and tenacious mass composed of autolyzed red blood cells, clots, and mucus after the absorption of plasma. This brown, viscous adhesive material coats the fetus, which is why this type of mummification is called hematic or chocolate mummification. It typically occurs between the 4<sup>th</sup> and 8<sup>th</sup> months of gestation, with most cases happening during the 5<sup>th</sup> and 6<sup>th</sup> months. In definite cases, a mummy may appear dry and shriveled, characterized by a stiff fetoplacental unit and the absence of exudate. This condition is a papyraceous mummification and has been documented [19,20].

The low incidence of fetal mummification reported in scientific literature may be misleading. One reason for this is that some authors attempt to estimate the prevalence of fetal mummification, but there are several challenges in providing accurate statistics. These challenges include the infrequent submission of data for analysis, the lack of specificity in routine tests conducted for abortion cases (such as serological tests), and difficulties associated with studying mummified tissues, which are often not sent to laboratories for examinations [1,18,27]. Additionally, many reports on gestational losses do not distinguish between mummified and aborted fetuses. Furthermore, females carrying mummified fetuses are often asymptomatic, and the condition occurs sporadically [1,5,28].

## Conclusion

Management of fetal mummification involves both surgical and non-surgical methods. Non-surgical approaches, such as prostaglandin injections, are attempted first. If these methods fail, a cesarean section is performed to protect the animal's reproductive health.

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