

## Successful management of fetal mummification using prostaglandins in a Sahiwal cow

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### Abstract

The current study documents a case of mummification in a primiparous Sahiwal cow presented to the Health Complex of ICAR-NDRI, Karnal. Following thorough clinical and reproductive examinations, the cow underwent induction of parturition, supplemented by additional supportive treatments such as antibiotics and NSAIDs. Subsequently, the mummified female fetus was successfully expelled in 48-50 hours of treatment. The cow resumed its cyclicity in 60 days of delivery, displaying no signs of illness.

**Keywords:** Cow, Gestational disorder, Mummification, Induction of parturition

### Highlights

- Mummification has a sporadic occurrence in domestic animals
- Prostaglandins is the treatment of choice for mummification
- Prognosis depends on the duration of the condition

Fetal mortality stands as a significant challenge in cow-calf operations worldwide, inflicting substantial economic losses on farmers by extending inter-calving intervals (Azizunnesa et al., 2009). It often manifests in various forms such as abortion, maceration, and mummification, where abortion and maceration indicate a lack of endocrine support for pregnancy (Noakes et al., 2018). Fetal mummification, a gestational disorder occurring sporadically in both indigenous and exotic cattle, exhibits the highest prevalence in swine, followed by sheep, goats, and cattle, with horses exhibiting the lowest prevalence (Kennedy & Miller, 1993). The reported incidence of fetal mummification in cattle ranges from 0.13 to 1.8% (Barth, 1986). This condition is characterized by fetal mortality without luteolysis of the corpus luteum, accompanied by adequate cervical dilation and no bacterial involvement (Kumar et al., 2013). Typically occurring between the third to eighth months of gestation, fetal mummification only arises after fetal ossification around 70 days of gestation. During this process, uterine and fetal fluids are resorbed, leading to the dehydration of fetal tissues and membranes, ultimately surrounded by a viscous, chocolate-colored material. Mechanical factors like umbilical cord torsion or compression, uterine torsion, and infectious agents such as bovine viral diarrhoea (BVD), leptospirosis, and mold infections are among the potential causes of mummification. Additionally,

genital anomalies, abnormal hormonal profiles, and chromosomal abnormalities contribute to its occurrence. Two types of mummification are recognized: papyraceous, which results in a dry, stiff fetoplacental unit with no exudate (commonly found in dogs and cats), and hematic, characterized by a viscous, chocolate-type adhesive material enveloping the mummified fetus (typically seen in cattle and buffalo). The mummification process extends over several weeks, depending upon the fetus's age at the time of death. In cases where there is no fetal signal for parturition onset, pregnancy is maintained for an unpredictable duration, serving as a diagnostic sign of mummification (Noakes et al., 2018). In most instances, the mummified fetus remains retained in the uterus until treatment is administered for its expulsion. Treatment options for mummification include inducing abortion through luteolysis using prostaglandins or resorting to cesarean section in non-responsive cases.

A 40 month (3.2 yrs) Sahiwal cow, in her first parity, was brought to the Health Complex of the Livestock Research Centre (LRC), ICAR-National Dairy Research Institute, Karnal, Haryana. The cow had a history of prolonged gestation lasting approximately 10.5 months. The cow exhibited normal feed and water intake, posture, and gait. Gynaecological and physiological body parameters, including heart rate, pulse rate, respiration rate, and temperature, were

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**Table 1. Physiological and gynaecological parameters**

Parameters	Cow
<b>Physiological observation</b>	
Breed	Sahiwal Cow
Parity	First
Age (years)	3.2
Body Condition Score	3.5
Body Temperature (°F)	101.5
Heart rate (beats/min.)	50
Respiration rate (breaths/min.)	20
Colour of the mucous membrane	Pinkish/ pink
<b>Gynaecological observation</b>	
Pregnancy period (months)	10.5
Cervical dilation (in fingers)	Completely closed
Uterine adhesion	No
Vaginal discharge (amount, color, and smell)	No discharge
Recovery and Resumption of ovarian cyclicity	Recovered and resumed cyclicity after 60 days of delivery

**Fig. 2. Sahiwal cattle with a female mummified fetus along with placenta**

within normal ranges and duly recorded (Table 1).

During per rectal examination, fetal reflexes were absent, and fremitus was not detected; instead, a hard and compact immobile mass was palpable. The fetal head and limbs were discernible, with the uterus tightly contracted around the fetal mass. No fetal fluid was palpable, and placentomes were indistinct. Per-vaginal examination indicated complete closure of the cervix. Real-time B-mode Trans-rectal ultrasonography, with 5- 7.5 MHz frequency, revealed a uterus contracted around fetal limbs devoid of placental fluid and placentomes (Fig. 1). A corpus luteum was identified

**Fig. 1. B-mode real-time Ultrasound image depicting the uterus contracted around fetal limbs with the absence of placental fluid****Fig. 3. Female mummified fetus along with placenta**

on the right ovary. Based on the findings, the case was conclusively diagnosed as fetal mummification.

The cow underwent treatment for induction of parturition, receiving 500 µg of synthetic PGF2α analog (Pregma® by Intas Pharmaceuticals Ltd, Ahmedabad, India), 2 mg of estradiol (PREGHEAT® oestradiol benzoate by Virbac Animal Health India Pvt Ltd, Mumbai, Maharashtra, India), 2 mL of methylethergometrine maleate (Nexbolic™ by Intas Pharmaceutical Ltd., Ahmedabad, India) 1.1 mg/kg of flunixin meglumine (Meglugesic™ by Alembic Pharmaceuticals Ltd, Vadodara, Gujarat, India), and

**Table 2. Serum biochemical profile**

S. no.	Parameters	Result	Reference Range
1	SGPT	22.1 U/L	7-56 U/L
2	SGOT	<b>60.7 U/L (H)</b>	<b>5-40 U/L</b>
3	Phosphorous	2.79 mg/dL	4-8 mg/dL
4	Calcium	8.4 mg/dL	8.0-11.4 mg/dL
5	BUN	14 mg/dL	10-25 mg/dL
6	Creatinine	1.06 mg/dL	0.5-2.2 mg/dL
7	Glucose	<b>124.2 mg/dL (H)</b>	<b>40-100 mg/dL</b>
8	Cholesterol	121 mg/dL	50.3-361.9 mg/dL
9	Albumin	2.70 g/dL	2.5-3.8 g/dL
10	Total protein	6.79 g/dL	6.0-8.3 g/dL

**Table 3. Complete blood count**

S. no.	Parameters	Result	Reference Range
1.	Haemoglobin	10.1 g/dL	10.4-16.4 g/dL
2.	Packed cell volume	30%	24-46%
3.	RBCs	7.34 * 10 <sup>6</sup> /μL	5.0-7.5 * 10 <sup>6</sup> /μL
4.	Total leukocyte count	10,160/μL	5,000-11, 000/μL
5.	Differential Leukocyte Count		
a)	Neutrophils	<b>66%</b>	40-60%
b)	Lymphocytes	30%	20-30%
c)	Monocytes	1%	2-8%
d)	Eosinophils	3%	1-4%
e)	Basophils	0%	Up to 1%

cefquinome (C4ALL™ by Alembic Pharmaceuticals Ltd, Vadodara, Gujarat, India) at a dosage of 1.1 mg/kg intramuscularly. Approximately 48 hours after the treatment, fetal forelimbs visible in the vagina, prompting immediate reporting to the clinical complex. On examination, the fetus was presented in anterior longitudinal presentation with dorsosacral position, with the head resting on extended forelimbs. The mummified female fetus was delivered through gentle manipulation and coordinated forced traction, along with the placenta (Fig. 2; Fig. 3). Complete blood count (CBC) and serum biochemical analysis revealed no significant signs of infection (Table 2; Table 3)

Fetal mummification is an infrequent occurrence in domestic animals. When confronted with persistent corpus luteum, the primary objective of treatment is to induce luteolysis followed by expulsion of the mummified fetus. The preferred therapeutic approach typically involves the administration of prostaglandins or their analogs (PGF<sub>2</sub>α). PGF<sub>2</sub>α, known for its potent vasoconstrictive properties, diminishes the blood supply to the corpus luteum, prompting regression (Lefebvre, 2015). Furthermore, it activates oxytocin receptors, facilitating fetal expulsion by augmenting

uterine contractions (McCracken et al., 1999). Some studies advocate the combined use of estradiol with PGF<sub>2</sub>α, as estradiol aids in myometrial contraction and cervical relaxation, promoting mummified fetus expulsion in animals (Plumb, 2018). Nonetheless, estradiol's residual effects may contribute to prolonged infertility (Lefebvre et al., 2009). In the present case, we administered methyl ergometrine malate, an ergot alkaloid, along with prostaglandin, which induces smooth muscle contraction, facilitating fetal expulsion (Wenkoff & Manns, 1977). NSAIDs, such as flunixin meglumine, was also administered to alleviate pain and inflammation during uterine contractions. Administration of antibiotics is generally not recommended for fetal mummification (Plumb, 2018). However, to mitigate the risk of inevitable uterine infection, cefquinome, a fourth-generation cephalosporin, was administered for three days. The prognosis for future fertility in affected animals is typically good to fair, with most animals conceiving within the first or second estrous cycle following expulsion (Roberts, 1986). Surgical intervention via hysterotomy may be considered in cases unresponsive to PGF<sub>2</sub>α treatment. However, this option entails a lengthy recovery period and carries a risk of infection, potentially affecting subsequent conception.

**Conflict of interest:** The authors have no conflict of interest.

**Author's contribution:** SC, CP, VG, DA, MC: Carried out the diagnosis, treatment, and post-operative care; CP: Outlined the draft manuscript; SC, VG, DA, MC: Involved in the revision of the manuscript.

**Data availability statement:** All relevant data have been presented within the manuscript. The corresponding author is willing to provide the raw data upon reasonable request.

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## REFERENCES

- Azizunnesa, M., Sutradhar, B. C., Das, B. C., Hossain, M. F., & Faruk, M. O. (2009). A case study on mummified foetus in a heifer. *University Journal of Zoology, Rajshahi University*, 28, 61-63. <https://doi.org/10.3329/ujzru.v28i0.5289>
- Barth, A. D. (1986). Induced abortion in cattle. In: D. A. Morrow (Eds.), *Current Therapy in Theriogenology* (1st ed.), 205. W. B. Saunders, Philadelphia.
- Kennedy, P. C., & Miller, R. B. (1993). The female genital system. In: K. V. F. Jubb, P. C. Kennedy, & N. Palmer (Eds.), *Pathology of Domestic Animals*, (4th ed.), 3, 349-454. Academic Press, San Diego.
- Kumar, S., Kumar, S., Sharma, U., & Soodan, J. S. (2013). Induced vaginal delivery of mummified fetus in a pleuriparous crossbred cow. *The Indian Veterinary Journal*, 90(12), 66-67.
- Lefebvre, R. C. (2015). Fetal mummification in the major domestic species: current perspectives on causes and management. *Veterinary Medicine (Auckland, N.Z.)*, 6, 233-244. <https://doi.org/10.2147/VMRR.S59520>
- Lefebvre, R. C., Saint-Hilaire, É., Morin, I., Couto, G. B., Francoz, D., & Babkine, M. (2009). Retrospective case study of fetal mummification in cows that did not respond to prostaglandin F2 $\alpha$  treatment. *The Canadian Veterinary Journal*, 50(1), 71-76.
- McCracken, J. A., Custer, E. E., & Lamsa, J. C. (1999). Luteolysis: a neuroendocrine-mediated event. *Physiological Reviews*, 79(2), 263-323. <https://doi.org/10.1152/physrev.1999.79.2.263>
- Noakes, D. E., Parkinson, T. J., & England, G. C. (2018). *Arthur's Veterinary Reproduction and Obstetrics* (10th ed.), pp 291-314. Elsevier Health Sciences.
- Plumb, D. C. (2018). *Plumb's Veterinary Drug Handbook: desk*, pp 220-221. John Wiley & Sons.
- Roberts, S. J. (2004). *Veterinary Obstetrics and Genital Diseases*. pp 213-233. CBS Publishers & Distributors Pvt. Limited.
- Wenkoff, M. S., & Manns, J. G. (1977). Prostaglandin-induced expulsion of bovine fetal mummies. *The Canadian Veterinary Journal*, 18(2), 44-45.