Jurnal Veteriner pISSN: 1411-8327; eISSN: 2477-5665
Terakreditasi Nasional Peringkat 2, Dirjen Riset dan Pengembangan,
Kemendiktisaintek RI SK No 10/C/C3/DT.05.00/2025, 21 Mar.2025

Juni 2026 Vol. 27 No. 2: 289-297
DOI: 10.19087/jveteriner.2026.27.2.289
online pada http://ejournal4.unud.ac.id/index.php/juvet

# Treatment of Fetal Maceration in Persian Cat with Ovariohysterectomy: A Case Report

## (PENANGANAN MASERASI FETUS PADA KUCING PERSIA DENGAN OVARIOHISTEREKTOMI: LAPORAN KASUS)

**Intan Firdha Olien Noor Al Ichsan[1], Erma Safitri[2*], Dina Desiani Guntaran[3], Auliyauna Miftahurrohmah[3]**

[1]Magister Program of Reproductive Biology,
Faculty of Veterinary Medicine, Universitas Airlangga
[2]Division of Veterinary Reproduction,
Departement of Veterinary Science,
Faculty of Veterinary Medicine,
Universitas Airlangga, Kampus C Unair,
Jl. Mulyorejo, Surabaya, East Java, Indonesia 60115
[3]Sidoarjo Pet Center Clinic,
Jl. Taman Pinang Indah No. D710,
Sidoarjo, East Jawa, 61213, Indonesia
Email: ermas@fkh.unair.ac.id

## ABSTRACT

Fetal maceration is a pregnancy complication characterized by intrauterine fetal death and retention of fetal tissue, resulting in autolysis and decay due to bacterial invasion. This case report was aimed to describe the diagnosis and management of fetal maceration in a 2-year-old female Persian cat who came to the Sidoarjo Pet Center Clinic with symptoms of weakness, abdominal distension and odorous mucopurulent discharge from the vulva. Physical examination showed fever, pale mucous membranes, and abdominal pain on palpation. Ultrasonography examination revealed a heterogeneous hyperechoic structure in the uterine lumen with visualization of the fetal head still visible, accompanied by fetal bone fragments and debris, indicating fetal maceration. Hematology examination showed leukocytosis, anemia and thrombocytopenia, while blood biochemistry results showed hypoalbuminemia, hypoproteinemia and hypocalcemia. This case was managed with an ovariohysterectomy procedure as definitive therapy to remove the infected uterus, followed by postoperative therapy with Marbofloxacyn 8 mg q24h for seven days, Meloxicam 0.4 mg q24h for five days, and Albumin q24h for seven days. Clinical improvement began to be seen on the 3$^{rd}$ postoperative day and the surgical wound showed good healing with the sutures draining on the 5$^{th}$ day. This case report emphasizes the importance of early detection of pregnancy complications in cats, especially in the Persian breed which has a higher risk of reproductive disorders, and emphasizes the role of ultrasonography and ovariohysterectomy as the primary diagnostic and therapeutic procedures in cases of fetal maceration.

Keywords: Persian cat; fetal maceration; pregnancy; ovariohysterectomy

## ABSTRAK

Maserasi janis atau fetus merupakan komplikasi kebuntingan yang ditandai dengan kematian janin di dalam rahim (intrauterin) dan retensi jaringan janin, tertahan (retensi) di dalamnya sehingga terjadi sehingga terjadi autolisis dan pembusukan akibat invasi bakteri. Laporan kasus ini bertujuan untuk mendeskripsikan diagnosis dan penatalaksanaan maserasi janin pada kucing persia betina berusia dua tahun yang datang ke Klinik Pet Center Sidoarjo, Jawa Timur dengan gejala lemas, perut kembung dan keluarnya cairan mukopurulen berbau busuk dari vulva. Pemeriksaan fisik menunjukkan kucing dalam keadaan demam, selaput lendir pucat dan ada nyeri perut saat dipalpasi. Pemeriksaan ultrasonografi menunjukkan struktur hiperekoik heterogen di lumen uterus dengan visualisasi kepala janin masih terlihat, disertai fragmen tulang dan reruntuhan janin (*debris fetus*), yang menunjukkan maserasi janin. Pemeriksaan hematologi menunjukkan leukositosis, anemia, dan trombositopenia, sedangkan hasil pemeriksaan biokimia darah menunjukkan hipoalbuminemia, hipoproteinemia, dan hipokalsemia. Kasus ini ditangani dengan prosedur ovariohisterektomi sebagai terapi definitif untuk mengangkat rahim yang terinfeksi, diikuti dengan terapi pascaoperasi dengan Marbofloxacyn 8 mg q24h selama tujuh hari, Meloxicam 0,4 mg q24h selama lima hari, dan Albumin q24h selama tujuh hari Perbaikan klinis mulai terlihat pada hari ke-3 pascaoperasi dan luka operasi menunjukkan penyembuhan yang baik dengan jahitan yang mengering pada hari ke-5. Laporan kasus ini menekankan pentingnya deteksi dini adanya komplikasi kebuntingan pada kucing, terutama pada kucing ras persia yang memiliki risiko gangguan reproduksi lebih tinggi, dan menekankan peran ultrasonografi dan ovariohisterektomi sebagai prosedur diagnostik dan terapi utama dalam kasus maserasi janin.


Kata-kata kunci: kucing persia; maserasi janin; kebuntingan; ovariohisterektomi

## INTRODUCTION

Fetal maceration is a pathological condition in which a fetus that dies intrauterinely remains retained in the uterus and undergoes decomposition by tissue autolysis and microbial invasion, resulting in the fetus becoming soft and smelly, and at risk of causing severe uterine infection in the mother if not treated promptly (Alcantara *et al*., 2021). Fetal maceration is more common in cats than dogs, characterized by irregular contraceptive use, which causes disruptive degenerative changes in the fetus (Suresh *et al*., 2023).

Intrauterine death leading to maceration in cats can be caused by various factors such as intrauterine infection, fetal hypoxia due to impaired perfusion or dystocia, congenital fetal abnormalities or hormonal disorders that affect the labor process and cervical softening. These factors determine whether the fetus will be absorbed, mummified, or macerated if not expelled (Rizal *et al*., 2023). Clinically, maceration is usually suspected in cats that show signs of a failed pregnancy or the appearance of an abnormal vaginal discharge with an odor, as well as a decline in the general condition of the mother. Supportive examinations such as transabdominal ultrasonography provide information on fetal viability and the presence of abnormal fetal fluid or tissue in the uterine cavity (Hatta, 2022).

Management of fetal maceration in cats often requires aggressive therapy, including stabilization of the newborn kittens, systemic antibiotics as indicated and surgical intervention (ovariohysterectomy or uterine exploration) in cases of severe infection, retained fetal tissue, or threat to the survival of the cat fetuses in uterus. The treatment decision depends on the fetuses' hemodynamic status, the presence of systemic signs and supporting findings (Islam *et al*., 2025). Although case reports of fetal maceration in cats indicate similar

clinical presentations and management across breeds, population studies suggest that pedigree cats have a different incidence of dystocia and neonatal mortality than non pedigree cats, and there fore purebred cats, including Persians cat may require special reproductive attention to prevent complications such as intrauterine fetal death (Černa *et al*., 2024). Specifically for Persian cats, the literature on fetal maceration is limited; several reports of abortions and pregnancy complications in Persian cats underscore the need for close antenatal monitoring and prompt obstetric intervention if signs of pregnancy compromise appear (Dheya and Agustina, 2025). This case report was aimed to describe the diagnosis and management of fetal maceration in the queen of Persian cats.

## RESEARCH METHODS

### Case Report

**Signalment and Anamnesis.** A 2-year-old Persian cat named Milli was brought to the Sidoarjo Pet Center Clinic in August 2025. Milli is a female Persian cat weighing 3.7 kg. The cat presented with lethargy, an enlarged abdomen, a white discharge mixed with blood coming out from her vagina and signs of abdominal pain. According to the owner, the cat had just given birth to one kitten about two weeks prior to her arrival at the clinic and the queen had not been spayed.

**Physical Examination and Clinical Symptoms.** A general examination revealed a cat weighing 3.7 kg, a respiratory rate of 42 breaths/minute, a body temperature of 39.8°C, and a pulse rate of 136 beats/minute. Auscultation of the heart rate and intestinal peristalsis were normal. The capillary refill time (CRT) was more than two seconds and the mucous membranes were pale, and the cat appeared weak and in pain condition. Abdominal palpation in the hypogastrium showed a painful response and uterine dis tension was palpable. Examination of the vulva revealed mucopurulent discharge.

### Supporting Examination

Ultrasound examination using ultrasound examination apparatus (Scanner Diagnostic System Digital Instrument Portable B Ultrasound Machine P20®, Mianyang Xianfeng Medical Instrument Co.,Ltd, ,Sichuan, China) was performed at the Sidoarjo Pet Center Clinic in Sidoarjo, East Java, Indonesia. The abdomen was shaved before the ultrasound. A sufficient amount of ultrasonic gel was applied to the shaved skin. The probe was placed on the abdomen and slowly moved to observe the organs in the hypogastric region. The ultrasound results in Figure 1 show a fetal sac in the uterus with a heart that has stopped beating. The fetal head is still identified as a hyperechoic structure with iregular boundaries. The skull appears echogenic with an acoustic shadow behind it, indicating partially intact bone tissue. The head size appears smaller or does not correspond to gestational age, indicating that tissue degradation has occurred.


Figure 1. Ultrasonography examination of the uterus of a Persian cat. Yellow circle for the head, wide blue line for the head, red line for the spine

**Blood Test.** Blood collection uses aseptic techniques using a tuberculin syringe/1 mL which was previously shaved on the hand to facilitate access to the antebrachial cephalica vein, after which 70% alcohol was sprayed as an antiseptic in the area to be punctured, after which blood was

Tabel 1. Results of complete blood count and blood chemistry examination

| Parameter | Result | Normal Value | Note |
|---|---|---|---|
| Leukocytes | 19.6 | 5.5 – 19.5 $10^3$ /uL | High |
| Lymphocytes | 7.4 | 0.83 - 7 $10^3$ /uL | High |
| Monocytes | 1.4 | 0 – 1.9 $10^3$ /uL | Normal |
| Granulocytes | 10.1 | 2.1 - 15 $10^3$ /uL | Normal |
| Erythrocytes | 4.0 | 4.6 – 10 $10^6$ /uL | Low |
| Hemoglobin | 7.8 | 9.3 – 15.3 g/dL | Low |
| Hematocrit | 22.9 | 28 – 49 % | Low |
| MCV | 45.5 | 39 – 52 fL | Normal |
| MCH | 15.4 | 13 – 21 pg | Normal |
| MCHC | 34.0 | 30 - 38 g/dL | Normal |
| Platelets | 92 | 100 – 514 $10^3$ /uL | Low |
| **Blood Chemistry:** | | | |
| Albumin | 18 | 22 – 44 g/L | Low |
| Total Protein | 48 | 57 – 89 g/L | Low |
| Globulin | 30 | 23 – 52 g/L | Normal |
| Total Bilirubin | 0.3 | 0 – 15 umol/L | Normal |
| AST | 25 | 0 – 48 U/L | Normal |
| ALT | 32 | 5 – 130 U/L | Normal |
| Amilase | 718 | 500 – 1500 U/L | Normal |
| Creatinin | 58.6 | 44 – 212 umol/L | Normal |
| BUN | 1.66 | 4 – 12.9 mmol/L | Low |
| Glucose | 6.25 | 4.11 – 8.83 mmol/L | Normal |
| Triglycerides | 1.07 | 0 – 1.13 mmol/L | Normal |
| Calsium | 1.78 | 1.95 – 2.83 mmol/L | Low |
| Phosphorus | 1.06 | 1 – 2.42 mmol/L | Normal |
| BUN/Crea | 28.3 | 27 – 182 | Normal |

Note: MCV : *Mean Corpucle Volume*; MCH : *Mean Corpuscular Hemoglobin*; MCHC : *Mean Corpuscular Hemoglobin Concetration*, AST : Aspartate Aminotransferase; ALT : Alanine Aminotransferase, BUN : Blood Urea nitrogen.

drawn using a 22-25G needle. After the blood collection was obtained, it was put into an ethylene diamine tetraacetic acid (EDTA tube for complete blood count and heparin for biochemical blood tests. Routine hematology examination (Licare Hematology Analyzer®, Country Garden Wisdom Garden, Hunan, China) showed leukocytosis, anemia and thrombocytopenia. Meanwhile, blood chemistry (SMT-120 Chemistry Analyzer®, Seamaty Technology Co., Ltd., Chengdu, China) results showed hypoalbuminemia, hypoproteinemia, low Blood Urea Nitrogen (BUN), hypocalcemia (Table 1).

**Diagnosis and Prognosis**

Based on the anamnesis obtained, physical examination, clinical symptoms and supporting examinations, the female cat was diagnosed with fetal maceration with a favorable prognosis.

**Surgical Procedures**

**Pre-operative Procedure.** Before the surgical procedure, the patient is fasted for about 8-12 hours and fasted from drinking for about 4-6 hours. The patient was given an IV infusion using 0.9% NaCl fluid and is injected with anesthesia in the form of Acepromazine (Castran®, Interchemie, Venray, Netherlands) at a dose of 0.5mg/kg BW intramuscularly (IM), Ketamine (Ket A -100®, Pharmadix Co.,Lima, Peru) injection at a dose of 10 mg/kg BW intravenously (IV), and Propofol (Propofol®, PT. Dankos Farma, Jakarta , Indonesia) at a dose of 4 mg/kg BW IV. After the patient unconscious, the patient was positioned on the operating table in a dorsal recumbent position and all four extremities are tied. The surgical area was sterilized using povidone iodine (Povidone Iodine®, PT. Kimia Farma, Jombang, Indonesia) in a circular manner from the inside out and a sterile drape was applied. The drape was fixed to the skin using a clamp to prevent it from coming loose during the surgical procedure.

**Operation.** The operation begins with an incision in the ventral abdomen from the umbilicus caudally for approximately 5 cm to penetrate the subcutaneous layer. Blunt scissors are then used to expose the underlying fatty tissue, exposing the *linea alba*. The incision was continued along the *linea alba*, the external rectus abdominis muscle, and the internal rectus abdominis muscle. The incision can be extended using blunt scissors. Once the peritoneum is visible, it was gently incised to avoid touching the internal abdominal organs. The abdominal contents are explored to locate the uterus. The uterus is then removed from the abdomen (Figure 2). An ovariohysterectomy (OH) procedure is performed by ligating the suspensory ligament to remove the ovary and ligating the *corpus uterus* below the uterine biforcation. After ligation, the ovaries and uterus were cut and lifted. A thorough examination of the ligation was performed to ensure there was no bleeding and any remaining blood was cleaned around the abdomen. During organ exploration, the abdominal cavity was moistened with physiological NaCl. The omentum was then repositioned to cover the abdominal surface. Next, the incision wound in the abdominal cavity was closed.

Figure 2. Expulsion of the uterus containing fetal maceration.

Figure 3. On H+1, the wound in the cat's case was seen to have started to close and no seroma had formed.

The abdominal muscles were sutured using simple interrupted sutures, the fat tissue was sutured using simple continuous sutures, while the subcutaneous layer and skin were closed using subcuticular sutures (Figure 3).

## RESULTS AND DISCUSSION

Fetal maceration is characterized by fetal death and incomplete abortion that occurs as a result of uterine inertia and intrauterine infection. The most common cause is infection when bacteria enter the uterus through the cervix of uterine after fetal death, causing decay and autolysis of soft tissue, leaving fetal bones in the uterus. Following bacterial contamination, fetal emphysema begins within 24–48 hours, and maceration occurs within 3–4 days. The fetus or fetuses undergo decay and autolysis at varying rates depending on the pathogenicity of the bacteria. If maceration occurs after bone formation, autolysis may continue until all fetal soft tissue is autolyzed, leaving only bone remaining (Opaluwa Kuzayed *et al*., 2024). The diagnosis of fetal maceration in cats, including the Persian, requires a combined clinical and supportive approach, including a thorough history of pregnancy, a physical examination to detect abnormal abdominal distension and behavioral changes or systemic deterioration (Devarajan *et al*., 2023).

A physical examination of the cat in question showed clinical symptoms of a white, bloody discharge from the vagina. Microorganisms can enter the uterus through the cervix. The most common pathogens found in this case are opportunistic vaginal infections, such as *Escherichia coli*, *Staphylococcus* sp., and *Streptococcus* sp. These microorganisms trigger decomposition, which begins with the liquefaction and softening of fetal tissue, followed by the formation of foul smelling purulent exudate (Widyatuti *et al*., 2023).

Abdominal radiography reveals iregular radioopaque structures resembling fetal bone fragments without clear soft tissue boundaries, while ultrasound reveals absent fetal cardiac activity and increased echogenic debris in the uterine lumen. This finding is consistent with fetal maceration compared to mummification, where mummification does not show signs of infection or intrauterine gas (Hatta, 2022; Alcantara *et al*., 2021). This condition indicates that fetal tissue degradation is caused by the invasion of bacteria that produce proteolytic enzymes, such as *E. coli* and *Clostridium* spp., which break down soft tissue and produce gas in the uterus (Kremer *et al*., 2017). This process also causes the release of endotoxins that stimulate the release of proinflammatory cytokines (Interleukin 1 [IL-1], IL-6, Tumor Necrosis Factor alpha [TNF-α]), thereby exacerbating systemic symptoms and increasing the risk of sepsis (Alves *et al.*, 2022).

Hematology examination revealed an increase in leukocyte counts, indicating an infectious process in the animal's body, or a response to disease caused by bacteria, viruses, or fungi, or inflammation (tissue necrosis, infarction, burns, and arthritis). Meanwhile, an increase in lymphocytes (lymphocytosis) can occur due to viral infections, bacterial diseases and hormonal disorders. Lymphocytes play a crucial role in the body's immune response to fight infection and can distinguish foreign objects from its own tissue due to their receptors on the cell surface (Putri *et al*., 2023). Furthermore, the cat in question experienced anemia, as indicated by below normal erythrocyte, hemoglobin, and hematocrit examination results. Blood chemistry results revealed hypoalbuminemia, hypoproteinemia, low BUN, and hypocalcemia. Hypoalbuminemia can be caused by various factors, such as decreased albumin synthesis, increased albumin loss in the body, redistribution of albumin outside the intravascular space, or dilution of albumin within the intravascular space. Hypoalbuminemia in animals is often multifactorial (Jayanti *et al*., 2019). Hypocalcemia develops when there is

decreased bone calcium mobilization, increased calcium loss through urine or milk, decreased gastrointestinal calcium absorption and intracellular calcium translocation (Holst, 2022).

Acepromazine at a dose of 0.5 mg/kg BW is administered IM as premedication. The recommended dose of acepromazine in cats ranges from 0.01-0.05 mg/kg BW, and its mechanism of action is to inhibit central dopaminergic receptors to produce sedation and tranquilization. Acepromazine also has antimuscarinic effects and blocks norepinephrine at adrenergic receptors (e.g., alpha receptors). Due to alpha receptor blockade in vascular smooth muscle, acepromazine also causes vasodilation (Papich, 2021).

Ketamine is administered at a dose of 10 mg/kg BW IM. The recommended dose of ketamine in cats is 2-25 mg/kg BW. Ketamine is often combined with other anesthetics and sedatives, such as benzodiazepines (diazepam) or alpha2 agonists (medetomidine, dexmedetomidine and xylazine), to deliver low doses of anesthetic (Papich, 2021).

Propofol was given at a dose of 4 mg/kg BW IV. The recommended dose of propofol for cats is 7 mg/kg BW. Propofol's mechanism of action produces short acting anesthesia (10 minutes), followed by rapid and uneventful recovery. Its mechanism of action is not fully understood but is thought to involve modulation of the inhibitory activity of Gamma Amino Butyric Acid (GABA) at Gamma Amino Butyric Acid Type A (GABAA) receptors (Ramsey, 2017).

The proposed therapy for fetal maceration in cats is ovariohysterectomy. Ovariohysterectomy is a surgical sterilization method that reduces the risk of pyometra, cystic endometrial hyperplasia, pseudopregnancy and other uterine pathological conditions. There are two approaches to ovario hysterectomy: flank surgery and ventral or caudal midline surgery (Prayoga *et al*., 2021).

In this case, surgery was performed ventral midline. The incision was identified by visualizing an equilateral triangle at the greater trochanter, the illium, and the mid point of the incision. The incision was made from dorsal to ventral through the skin, subcutaneous tissue, external aponeurosis, internal oblique abdominal muscle, and transverse abdominal muscle to enter the peritoneal cavity. Suturing was performed using absorbable monofilament suture (Advacryl® Advanced MedTech Solutions Pvt. Ltd. Vadodara, Gujarat, India) 3/0. Absorbable synthetic thread for suturing soft tissue which has a chemical composition of 90% Glycolide and 10% L-lactide (Rickyawan *et al*., 2022). After suturing the wound, the suture site is covered with Prodermis ointment containing 0.025% fluocinolone acetonide and 0.1% neomycin sulfate. Fluocinolone works by inhibiting the production of compounds that cause inflammation and constricting blood vessels to reduce swelling. Neomycin, meanwhile, inhibits the growth of infection causing bacteria.

Post operatively, the cat was given treatment in the form of Marbofloxacyn 8 mg, q24h, for seven days, Meloxicam 0.4 mg, q24h, for five days, and Albumin q24h, for seven days. Marbofloxacyn is a fluroquinolone antibiotic whose mechanism of action is a broad-spectrum bactericide that inhibits bacterial DNA gyrase. Its bactericidal effect depends on concentration, especially against Gram negative bacteria (Ramsey, 2017). Meloxicam is a nonsteroidal antiinflammatory drug (NSAID). Like other drugs in this class, meloxicam has analgesic and antiinflammatory effects by inhibiting prostaglandin synthesis. The enzyme inhibited by NSAIDs is the cyclooxygenase (COX) enzyme. The COX enzyme exists in two isoforms: COX-1 and COX-2. The COX-1 enzyme is primarily responsible for prostaglandin synthesis, which is important for maintaining gastrointestinal health, kidney function, platelet function and other normal functions. The COX-2 is induced and is responsible for the synthesis of

prostaglandins which are important mediators of pain, inflammation and fever (Papich, 2021).

Albumin is the most abundant protein in plasma, reaching 6.22% and synergizing with the mineral Zinc (Zn) which is needed for cell development and the formation of new cell tissue such as due to wounds and wound healing due to surgery (Fitrianti *et al*., 2023). Surgical wounds show a good healing process with stitches starting to dry on the 5$^{th}$ day without any infection or complications. Wounds that begin to dry due to the formation of tissue granulation that occurs in the proliferation phase, namely fibroblasts assisted by macrophage cells stimulate to form new blood vessels or form new tissue. Macrophages also stimulate endothelial cells to form a matrix or new tissue bonds. The mild granulation tissue that forms is due to the large number of inflammatory cells, fibroblasts and collagen in the wound area, forming reddish tissue with a smooth, protruding surface called granulation tissue (Imas *et al*., 2015).

## CONCLUSION

The cat was diagnosed with fetal maceration and underwent an ovariohysthyrectomy. The cat showed good recovery post operatively, characterized by increased activity, improved appetite and reduced pain. The surgical wound showed good healing, with sutures beginning to drain on day 5.

## SUGGESTION

Animal surgical wounds need to be kept clean to prevent complications, and post operative medication should be given regularly according to recommendations.

## ACKNOWLEDGEMENT

The authors would like to thank all the staff of the Sidoarjo Pet Center Clinic who have facilitated, guided, and supported the authors until this case report could be completed well.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest

## REFERENCES

Alcantara MR, Santos MWC, Lopes JM, Menezes AA, Ferras PA, Junior DCG, Rodrigues AS. 2021. Fetal Maceration in a Cat: Case report. *Research, Society and Development* 10(4): 1–7. https://doi.org/10.33448/rsdv10i4.13422

Alves LM, Rodrigues TC, Pereira RF. 2022. Inflammatory Response and Bacterial Pathogenesis in Feline Uterine Infections: An Updated Review. *Frontiers in Veterinary Science* 9: 1034–*1045*. https://doi.org/10.3389/fvets.2022.986412

Černa P, Pugalendhi SJ, Shaw DJ, Gunn Moore DA. 2024. Feline Dystocia and Kitten Mortality up to 12 Weeks in Pedigree Cats. *Journal of Feline Medicine and Surgery* 10: 26(12): 1098612X241284766. doi: 10.1177/1098612X241284766

Devarajan S, Lim AM, Chong WL. 2023. Systemic inflammatory profiles in septic cats: A clinical correlation with uterine infections. *Veterinary Clinical Pathology* 52(1): 55–64. https: //doi.org/10.1111/vcp.13245

Dheya NT, Agustina GC. 2025. Procedures for Handling Abortion Cases in Persian Cats at Karlos Satwa Medika Malang. *Jurnal Veteriner dan Biomedis* 3(2):85-93.

Fitrianti E, Zulkarnain, Nurmayanti. 2023. The Effectiveness of Albumin Extract from Snakehead Fish (*Channa striata*) on Postoperative Wound Healing in Domestic Cats at Regional Technical Implementation Unit, Makassar Veterinary Centre. *Filogeni Jurnal Mahasiswa Biologi*

3(2).

Hatta AIM. 2022.. Fetal maceration in cats at the Educational Veterinary Clinic (*Tesis*). Makassar. Universitas Hasanuddin. https://repository.unhas.ac.id

Holst BS. 2022. Feline Breeding and Pregnancy Management: What is Normal and When to Intervene. *Journal of Feline Medicine and Surgery* 24(3): 221-231. doi: 10.1177/1098612X22-1079708.

Imas SH, Saputro SH, Wibowo NA. 2015. The Effect of Betel Leaves on Accelerating the Healing Process of Incision Wounds. *The Sun* 2(4): 13-14.

Islam MR, Mostasin R, Obaid MSI, Munif MR. 2025. Surgical Management of Foetal Maceration in a Domestic Shorthair Queen. *Veterinary Medicine and Science* 18;11(5):e70616. doi: 10.1002/vms3.70616

Jayanti PD, Merthayasa JD, Indrajulianto S, Sari AN, Setiawan DCB, Wijayanti AD. 2019. Transfusion Reactions in Hypoalbuminemic Cats Infused with 20% Human Serum Albumin. *Acta Veterinaria Indonesia* 7(1): 11-16.

Kremer KM, McDonald ME, Goodheart MJ. 2017. Uterine *Clostridium perfringens* Infection Related to Gynecologic Malignancy. *Gynecologic Oncology Reports* 22: 55-57.

Opaluwa Kuzayed IG, Kalang JJ, Bakari M, Sambo IP, Jemimah G, Ayinlah J. 2024. Surgical management of foetal maceration in a 1 $^{1/2}$ year old Dwarf Russian shepherd Bitch. *Jorunal of Research in Veterinary Sciences* 4(1):20-24.

Papich MG. 2021. *Veterrinary Drugs*. Missouri: Elsevier.

Prayoga SF, Megawati NI, Arifin EMZ, Nangoi L. 2021. Ovariohysterecomy in a Stray Cat, *Ovozoa*, 10(3):98-104

Putri CEA, Safitri E, Syafitri, W. 2023. Ovariohysterectomy in Cat as An Alternative Handling of Fetus Mummification Cases. *Media Kedokteran Hewan* 36(1): 50-67

Ramsey I. 2017. *Small Animal Formulary 9$^{th}$ Part A: Canine and Feline*. Quedgeley: British Small Animal Veterinary Association (BSAVA).

Rickyawan N, Virgiantari CW, Lesmana MA, Vidiastuti, D. 2022. Surgical Procedures for the Treatment of Pyometra and Mammary Tumors in Pitbull Dogs.. *Jurnal Medik Veteriner* 5(1): 109-118.

Rizal GN, Mihardi AP, Tampubolon DSB, Sovinar M. 2023. In Uterine Feotal Death in a Mixed Breed cat. *Jurnal Kedokteran Hewan* 7(3).

Widyastuti R, Setiawan R, Ulum MF. 2023. Partial Fetal Maceration in Etawa Crossbred Goats. *Asosiasi Rumah Sakit Hewan Indonesia Veterinaty Lettwe* 7(1): 13-14.