Journal of Wildlife and Conservation Medicine
p-ISSN: 3090-5656
https://journal.ipb.ac.id/index.php/jwcm

Azzahra *et al.*
Vol 1 No 1, June 2025, Pp 1–5
DOI: 10.29244/jwcm.1.1.1

Case study **OPEN ACCESS**

Phallus prolapse in a sulcata tortoise (*Centrochelys sulcata*) at Batu Secret Zoo, East Java

Rifa Rahma Azzahra[1], Hana Mitsuki Putri[2], Prista Dwi Restanti[2], Reza Fahmiantika[2], Rizky Hardian[2], Kusdiantoro Mohamad[3]*

[1]Study Program of Veterinary Professional Education, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, Indonesia
[2]Batu Secret Zoo, Jatim Park 2, Batu, Jawa Timur
[3]Division of Anatomy Histology and Embryology, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, Indonesia

Abstract

Background In Sulcata tortoises (*Centrochelys sulcata*), the phallus naturally extends through the cloaca during mating. However, excessive and persistent phallus protrusion, often due to aggressive mating behavior, increases the risk of prolapse.

Objective This case report describes phallus prolapse in a Sulcata tortoise at Batu Secret Zoo, East Java, Indonesia.

Case A male Sulcata tortoise, over 15 years old and weighing 30 kg, exhibited frequent aggressive behavior during the mating season. On August 30, 2024, the keeper reported a tortoise's phallus protruding from the cloaca. Physical examination revealed a necrotic phallus surrounded by abscesses. A blood smear examination suggested anemia. The patient was diagnosed with phallus prolapse caused by mating-related trauma.

Treatment Minor surgical debridement was performed to remove necrotic tissue and abscesses associated with hyperkeratinization and inflammation. Postoperative care included a 7-day course of antibiotics, multivitamins, lactated Ringer's solution with glucose infusion, and haematodin.

Conclusion Minor surgery succeeded in repositioning the phallus within the cloaca, and the tortoise exhibited healthy clinical signs after seven days of postoperative care.

Keywords aggressive mating behavior | *Centrochelys sulcata* | hyperkeratinization | phallus prolapse | Sulcata tortoises

Introduction

The sulcata tortoise (*Centrochelys sulcata*), commonly known as the African spurred tortoise, originates from Africa's Sahel region and is one of the largest and most widely maintained reptile species. Tortoises possess a distinctive shell, with the carapace forming the dorsal portion and the plastron constituting the ventral side (Jain *et al.*, 2014). These highly active reptiles require a spacious enclosure to facilitate movement and exploration. An ideal tortoise enclosure should include a dry substrate with good drainage, such as a mixture of sand and soil. Males can be identified by their longer, thicker tails, and a more concave plastron compared to females.

Phallus prolapse in tortoises occurs when the penis protrudes from a cloacal opening. During mounting attempts, the phallus naturally extended from the cloaca. However, continuous exposure, particularly due to aggressive behavior, increases the risk of prolapse. Male tortoises frequently exhibit aggression, particularly during the breeding season.

***Corresponding author** Email: kusdiantoro@apps.ipb.ac.id

They display territorial aggression toward other males and direct forceful behavior toward females as part of their natural mating interactions (Mukherjee & Mukherjee, 2023). In addition to mating attempts, several factors, including constipation, neurological dysfunction, hypocalcemia, straining during urination or defecation, excessive libido, trauma, and obesity, can trigger prolapse (Mishra & Maiti, 2022). Among these, heightened aggression and excessive libido in males are the primary contributors to the increased incidence of phallus prolapse in tortoises.

If untreated, the prolapsed organs can desiccate and become necrotic, requiring immediate evaluation to determine organ functionality. Dogu *et al.* (2015) reported a case in which a male Euphrates soft-shelled turtle developed necrotic phallus, necessitating amputation. Clinicians must appropriately manage necrotic phalluses with nonfunctional tissues to prevent further complications. In phallus prolapse, necrotic tissue can exacerbate wounds or delay wound healing. Observers can identify necrotic tissue around the phallus by the presence of non-viable tissue debris. This case report documents phallus prolapse in a sulcata tortoise at Batu Secret Zoo, East Java, detailing clinical symptoms, diagnostic examinations, treatment, and therapeutic interventions.

Case

Signalment and anamnesis

This case involved a male sulcata tortoise (*Centrochelys sulcata*), approximately 15 years old and weighing 30 kg, housed with two other males and three females in the garden area of the Batu Secret Zoo. According to reports and observations from zookeepers, the tortoise exhibited aggressive behavior during the breeding season, frequently chasing females. On August 30, 2024, the keeper observed the tortoise's penis prolapse extending from the cloaca. This case marks the first documented occurrence of phallus prolapse at the Batu Secret Zoo.

Physical and diagnostic examination

Physical examination confirmed the presence of a prolapsed penis (**Figure 1**). The tortoise appeared lethargic, likely because of movement difficulties and blood loss. A detailed assessment revealed necrotic connective tissue covering the phallus and abscess formation around the affected area.

Figure 1 Condition of the tortoise penis before treatment. K: keratinization of the phallus.

A qualitative blood smear was prepared using blood collected from the subcarapacial plexus for hematological evaluation. Microscopic examination of the smear revealed that the reptilian erythrocytes had an ellipsoid shape with rounded ends, nucleated structures, and densely packed purple chromatin. Variations in red blood cell size were detected, suggesting anisocytosis (**Figure 2**).

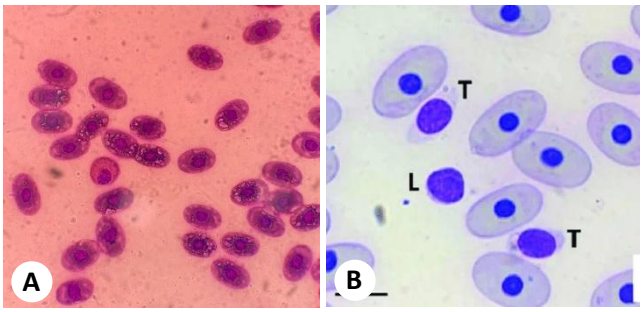

Figure 2 RBCs of the tortoise: (A) Blood smear of a *Sulcata tortoise* stained with Giemsa at 100× objective magnification. (B) Reference image of normal RBCs from a Galápagos tortoise stained with modified Wright-Giemsa. L: Lymphocyte; T: Thrombocyte (Nieto-Claudín *et al.* 2021).

Diagnosis and prognosis

Based on the history, physical examination, and hematology examination, the tortoise was diagnosed as a phallus prolapse caused by trauma associated with aggressive behavior during the breeding season. This condition led to the development of necrotic connective tissue and abscess formation. With prompt treatment, the patient's prognosis remained *fausta*.

Differential diagnosis

Differential diagnoses included cloacal prolapse (Fauzan & Satriawan, 2023) and paraphimosis (Innis & Boyer, 2015). Phallus prolapse in chelonians manifests as extrusion of a dark purple or black elongated structure from the vent (Nisbet *et al.*, 2011). Notably, the chelonian phallus has no urinary function; thus, phallus prolapse does not directly affect the excretory system. In contrast, cloacal prolapse involves eversion of the cloacal tissue, potentially including portions of the colon or urinary bladder. The prolapsed tissue typically appears pink to red and may exhibit tubular or fleshy morphology (Hedley & Eatwell, 2014). Depending on the underlying cause, cloacal prolapse may involve additional abdominal organs, such as the colon.

Treatment

Minor surgical intervention was performed to treat the prolapsed phallus (**Figure 3**). The tortoise was anesthetized using intramuscular injections of ketamine (8 mg/kg BW) and medetomidine (0.08 mg/kg BW) in the foreleg region. After positioning the tortoise in ventral recumbency, blood was collected preoperatively via the subcarapacial plexus. Following the procedure, atipamezole (five times the medetomidine dose) was administered subcutaneously in the foreleg region as an antidote. The prolapsed phallus was cleaned and necrotic connective tissue was debrided. The pus from the ab-

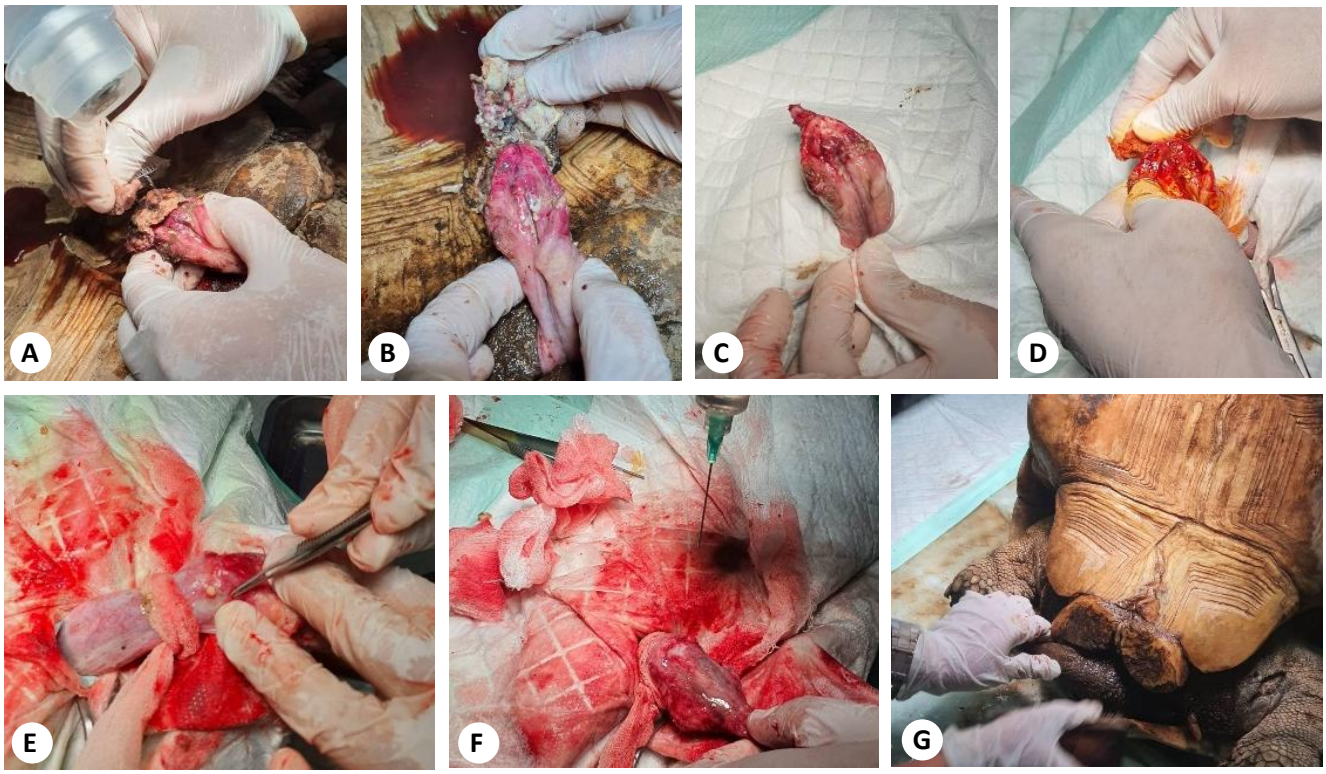

Figure 3 Procedure for invasive treatment in a Sulcata tortoise. (A) Cleaning the phallus with physiological saline to maintain moisture. (B) Removal of necrotic tissue manually. (C) Observation of phallus inflammation and hyperkeratinization. (D) Application of iodine as an antibacterial agent. (E) Debridement of abscesses and connective tissue using a blade and forceps. (F) Topical administration of diluted penicillin with normal saline. (G) Repositioning of the phallus to its cranial base at the tail using manual manipulation, followed by placing the tortoise in dorsal recumbency and cleansing the cloacal area with chlorhexidine and water.

scess was removed, and the abscess cavity was irrigated with penicillin diluted in physiological saline.

Postoperative care was continued for seven days, during which the tortoise received supportive therapy. The treatment regimen included meloxicam (0.2 mg/kg BW) as an analgesic, enrofloxacin (5 mg/kg BW) as an antibiotic, and Viamin® (0.2 ml/kg BW) as a multivitamin, all administered via intramuscular injection. Additionally, the tortoise received lactated Ringer's solution and glucose infusion through the intracoelomic route, each at 250 ml, totaling 500 ml, to meet the fluid therapy requirement of 25 ml/kg BW. On the third day, Hematodin (0.1 mg/kg BW) was administered intramuscularly to address anemia detected in the blood smear examination.

Discussion

Male tortoises possess a single penis (phallus) without a lumen. Similar to the hemipenes in lizards and snakes, the tortoise phallus functions exclusively as a copulatory organ and does not participate in urination (Kirchgessner & Mitchell, 2008). Phallus prolapse occurs when the penis protrudes from the cloacal opening owing to factors such as constipation, neurological dysfunction, low blood calcium, straining during urination or defecation, excessive libido, trauma, and obesity (Mishra & Maiti, 2022). Without immediate treatment, a prolapsed phallus can become necrotic, requiring amputation and resulting in a poor prognosis.

This case marked the first documented occurrence of phallus prolapse in a tortoise at the Batu Secret Zoo. According to the keepers, the tortoise exhibited aggressive behavior during the breeding season, frequently mounting, biting, and ramming females. Sacchi *et al.* (2013) described these behaviors as typical during the breeding season in tortoises. Repeated mounting attempts and prolonged phallic erections are likely to cause trauma to the phallus, leading to irritation and infection. Chronic irritation of the phallus can induce hyperkeratinization, a condition characterized by excessive keratin buildup due to high epithelial cell proliferation (Deo & Deshmukh, 2018). As hyperkeratinization often develops as a secondary response to chronic irritation or infection, the presence of this condition suggests that phallus prolapse may have occurred before it was reported.

Invasive surgery was performed to debride the necrotic tissue caused by hyperkeratinization and to assess the inflamed phallus. The tortoise was anesthetized using a combination of ketamine and medetomidine, as previously reported by Lutvikadic & Maksimović (2024). Ketamine (8 mg/kg BW) remains a widely used anesthetic in reptiles because of its broad safety margin and versatile administration routes. However, reptiles typically experience prolonged recovery from ketamine. Medetomidine (0.08 mg/kg BW), an adrenergic α-2 receptor agonist, provides sedation and analgesia but can also cause severe cardiopulmonary depression in chelonians. The combination of ketamine and medetomidine helps balance these effects, as ketamine enhances sympathetic activity and improve cardiac output, blood pressure, and heart rate, thereby counteracting depresive effects of medetomidine.

Necrotic tissue and abscesses were carefully debrided, while the phallus was kept moist with physiological saline

throughout the procedure (Nisbet *et al.*, 2011). After debridement, the phallus was reassessed to determine the extent of tissue viability. In cases of necrosis, amputation is recommended (Nisbet *et al.*, 2011). However, amputation was unnecessary in this case because the phallus remained viable without signs of extensive necrosis.

The abscesses were debrided, forming an immune response to bacterial infection. Abscess formation occurs when the immune system accumulates white blood cells, dead tissue, and bacteria, leading to pus production (Kobayashi *et al.*, 2015). Several bacterial species commonly colonize abscesses in tortoises, including *Proteus mirabilis, Klebsiella pneumoniae, Escherichia coli*, and *Aeromonas hydrophila* (Wang et al., 2022). The phallus can be irrigated with diluted penicillin to minimize the risk of secondary infections (Falagas & Vergidis, 2005).

Following this procedure, the phallus was successfully retracted into the cloaca. To reverse the effects of the α-2 adrenergic agonist and restore cardiovascular and respiratory functions, atipamezole was administered at five times the dose of medetomidine. Within an hour of administration, the tortoise regained its dorsal reflexes and showed satisfactory recovery indicators. Postoperative analgesia and anti-inflammatory treatment were provided using Melovem (meloxicam, 0.2 mg/kg BW). As a non-steroidal anti-inflammatory drug (NSAID) and opioid, meloxicam inhibits COX-2 enzymes, preventing the conversion of arachidonic acid into inflammatory mediators, thereby reducing pain and inflammation (Ting *et al.*, 2022).

Qualitative hematology analysis was performed using a blood smear to assess the hematological status of the tortoise. Blood collection via the subcarapacial venous plexus (SVP) is a widely used technique in tortoises because it is minimally invasive nature and effective in uncooperative animals (Eshar *et al.*, 2016). Microscopic blood smear analysis revealed signs of hypochromic anemia (**Figure 2**). The presence of anisocytosis, characterized by variations in erythrocyte size from small to large cells, suggests a regenerative anemic response (Campbell & Grant, 2022; Joseph, 2015). Additionally, the pale color of the erythrocytes compared to the normal values indicated hypochromic anemia. While mild anisocytosis is considered normal in reptiles, moderate-to-marked anisocytosis suggests a regenerative response (Cital & Goodnight, 2016). Similar to mammals, hypochromic normocytic anemia commonly signals regenerative anemia in reptiles. To support red blood cell regeneration and growth, Hematodin (0.1 mg/kg BW), which contains multivitamins and hematopoietin was administered (Prudenta *et al.*, 2021).

By the first day after treatment, the phallus had successfully retracted into the cloaca without any signs of abnormal prolapse. This improvement remained consistent throughout the seven-day postoperative observation period. To prevent secondary infections, the tortoise received a seven-day course of antibiotic therapy. Baytril® (5 mg/kg BW), which contains enrofloxacin, was administered because of its broad-spectrum antibacterial activity. As a fluoroquinolone antibiotic, enrofloxacin inhibits bacterial DNA enzymes, thereby preventing bacterial replication (De Vito *et al.*, 2015). At low concentrations, enrofloxacin exerts bacteriostatic effects, whereas at higher concentrations, it becomes bactericidal. The use of broad-spectrum antibiotics is necessary because abscesses in tortoises often harbor multiple bacterial species. Wang *et al.* (2022) identified 65 bacterial species in abscesses collected from captive tortoises, underscoring the need for effective antimicrobial coverage.

In addition to antibiotic therapy, supportive treatment included a supplement containing vitamins, minerals, and amino acids. This supplement helped prevent electrolyte imbalance, mitigate postoperative fatigue, and reduce the risk of bleeding and dehydration. To address potential dehydration, fluid therapy was administered to restore normal tissue perfusion and electrolyte balance. In reptiles, fluid therapy can be delivered via the subcutaneous, intravenous, or intracoelomic routes. Martinez-Jimenez & Hernandez-Divers (2007) recommended the use of 2.5% dextrose in 0.45% saline (280 mOsm/L) in reptiles. In this case, the tortoise received a combination of lactated Ringer's solution and 5% dextrose, with 250 ml of each solution totaling 500 ml. The combination was made to reach a half-final concentration that ensured its suitability for reptilian physiology.

At the time of this paper's final revision, the tortoise remained in a stable condition with no recurrence of phallus prolapse approximately six months after treatment. This case suggests that prompt surgical intervention combined with comprehensive postoperative care may successfully resolve phallus prolapse in *Centrochelys sulcata* without recurrence.

Conclusion

A male sulcata tortoise (Centrochelys sulcata) was diagnosed with phallus prolapse, accompanied by necrotic connective tissue overgrowth. Surgical debridement and a seven-day postoperative regimen resulted in the successful resolution of the condition. Blood smear analysis indicated hypochromic anemia that was managed with supportive therapy. No recurrence of phallus prolapse was observed six months post-treatment, highlighting the effectiveness of early intervention and comprehensive postoperative care in reptile medicine.

Acknowledgments The authors would like to thank Mr. Fandy, Mr. Har, Mr. Inu, and all the keepers at Batu Secret Zoo for their invaluable assistance during animal examination, treatment, and care.

Funding Not applicable

Conflict of interest All authors declare no conflict of interest in this research

Author contribution RRA: Data curation, writing – original draft; HMP: Project administration; PDR: Supervision; RF: Investigation; RH: Investigation; KM: Supervision, writing – original draft, writing – review & editing.

Availability of data and materials All data are available in the manuscript.

Received 12 February 2025 | **Revised** 21 March 2025
Accepted 25 March 2025 | **Published online** 27 June 2025

References

Campbell TW, Grant KR. 2022. Exotic animal hematology and cytology. Inc. New Jersey (US): John Wiley & Sons.

Cital S, Goodnight A. 2016. Reptile and amphibian transfusion medicine. *In*: Yagi K & Holowaychuk M (eds). Manual of veterinary transfusion medicine and blood banking. New Jersey (US): Willey Blackwell. Pp 358–365.

De Vito V, Salvadori M, Owen H, Giorgi M. 2015. Pharmacokinetic profile of enrofloxacin and the metabolite ciprofloxacin after intracoelomic administration in tortoises (*Testudo hermanni*). *Journal of Veterinary Pharmacology and Therapeutics*, 38(s1): 97. DOI: 10.1111/jvp.12247.

Deo PN, Deshmukh R. 2018. Pathophysiology of keratinization. *Journal of Oral and Maxillofacial Pathology*, 22(1): 86–91. DOI: 10.4103/jomfp.JOMFP_195_16.

Dogu Z, Arak F, Sahinoz E, Taskavak E. 2015. Penile prolapse in Euphrates soft-shelled turtle (*Rafetus euphraticus* Daudin, 1802). *Su Ürünleri Dergisi*, 32(3): 169–172. DOI: 10.12714/egejfas.2015.32.3.08.

Eshar D, Gancz AY, Magen-Avni N, Wagshal E, Pohlman L, Mitchell MA. 2016. Selected plasma biochemistry analytes of healthy captive sulcata (African spurred) tortoise (*Centrochelys sulcata*). *Journal of Zoo and Wildlife Medicine*, 47(4): 993–999. https://doi.org/10.1638/2016-0051.1.

Falagas MEZ, Vergidis PI. 2005. Irrigation with antibiotic-containing solutions for the prevention and treatment of infections. *Clinical Microbiology and Infection*, 11(11): 862–867. DOI: 10.1111/j.1469-0691.2005.01201.x.

Fauzan H, Satriawan A. 2023. Laporan kasus: prolaps kloaka pada kura-kura sulcata (*Geochelone sulcata*). *VITEK-Bidang Kedokteran Hewan*, 13(2): 82–87. DOI: 10.30742/jv.v13i2.247.

Hedley J, Eatwell K. 2014. Cloacal prolapses in reptiles: a retrospective study of 56 cases. *The Journal of Small Animal Practice*, 55(5): 265–268. DOI: 10.1111/jsap.12199.

Innis CJ, Boyer TH. 2002. Chelonian reproductive disorders. *The Veterinary Clinics of North America: Exotic Animal Practice*, 5(3): 555–578. DOI: 10.1016/s1094-9194(02)00013-0.

Jain R, Jain R, Verma SK. 2014. Management of colon and cloacal prolapse in turtle: a report of five clinical cases. *The Indian Journal of Field Veterinarians*, 10(1): 90–92.

Joseph V. 2015. Reptile clinical pathology. Proceedings of the association of reptilian and amphibian veterinarians pre-conference program. Roseville, CA (US): Bird & Pet Clinic of Roseville. Pp 155–162.

Kirchgessner M, Mitchell MA. 2008. Chelonians. *In*: Mitchell MA, Tully Jr TN (eds). Manual of exotic pet practice. 1st ed. Missouri (US): Saunders. Pp 207–249.

Kobayashi SD, Malachowa N, DeLeo FR. 2015. Pathogenesis of *Staphylococcus aureus* abscesses. *The American Journal of Pathology*, 185(6): 1518–1527. DOI: 10.1016/j.ajpath.2014.11.030.

Lutvikadic I, Maksimović A. 2024. A comparison of anesthesia induction by two different administration routes and doses of ketamine and medetomidine in red-eared sliders (*Trachemys scripta elegans*). *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 71(2): 231–237. DOI: 10.33988/auvfd.1145264.

Martinez-Jimenez D, Hernandez-Divers SJ. 2007. Emergency care of reptiles. *The Veterinary Clinics of North America: Exotic Animal Practice*, 10(2): 557–585. DOI: 10.1016/j.cvex.2007.02.003.

Mishra M, Maiti SK. 2022. Surgical management of phallus prolapse in an Indian star tortoise (*Geochelone elegans*). *MOJ Biology and Medicine*, 7(1): 17-18. DOI: 10.15406/mojbm.2022.07.00159.

Mukherjee S, Mukherjee A. 2023. Care of sulcata tortoise (*Centrochelys sulcata*) in captivity in India. *Journal of Science, Humanities and Arts*, 10(3): 1–11. DOI: 10.17160/josha.10.3.909.

Nieto-Claudín A, Palmer JL, Esperón F, Deem SL. 2021. Haematology and plasma biochemistry reference intervals for the critically endangered western Santa Cruz Galapagos tortoise (*C helonoidis porteri*). *Conservation Physiology*, 9(1): coab019. DOI: 10.1093/conphys/coab019.

Nisbet HO, Yardimci C, Ozak A, Sirin YS. 2011. Penile prolapse in a red eared slider (*Trachemys scripta elegans*). *Kafkas Universitesi Veteriner Fakultesi* Dergisi, 17(1): 151–153.

Prudenta O, Mardasella A, Sahmiranda D, Ardianto Y, Aeka A, Brawijaya M. 2021. Gagal ginjal kronis pada kucing domestik rambut pendek. *Media Kedokteran Hewan*, 32(1): 29–39. DOI: 10.20473/mkh.v32i1.2021.29-39.

Sacchi R, Pellitteri-Rosa D, Marchesi M, Galeotti P, Fasola M. 2013. A comparison among sexual signals in courtship of European tortoises. *Journal of Herpetology*, 47(2): 215–221. DOI: 10.1670/10-198.

Ting AK, Tay VS, Chng HT, Xie S. 2022. A critical review on the pharmacodynamics and pharmacokinetics of non-steroidal anti-inflammatory drugs and opioid drugs used in reptiles. *Veterinary and Animal Science*, 17: 100267. DOI: 10.1016/j.vas.2022.100267.

Wang YW, Lin HY, Yu JF, Wang LC. 2022. Bacterial identification and antibiotic sensitivity from the abscesses of captive tortoises-clinical antibiotic recommendations. *Journal of Zoo and Wildlife Medicine*, 53(2): 424–432. DOI: 10.1638/2021-0093.