

REFERENCES

- Agravat, A.H., Dhruva, G.A., Kakadiya, M.R., Pujara, K.M., and Gharia, A.A. 2014. Urine Analysis of Glycosuric Patients. *International Journal of Applied Science-Research and Review*, 1(3).
- Astuty, A.T.J.E., Tjahajati, I. and Nugroho, W.S. 2020. Detection of feline idiopathic cystitis as the cause of feline lower urinary tract disease in Sleman Regency, Indonesia. *June-2020*, 13(6), pp.1108–1112. DOI:10.14202/vetworld.2020.1108-1112
- Bailiff, N.L., Nelson, R.W., Feldman, E.C., Westropp, J.L., Ling, G.V., Jang, S.S., Kass, P.H. 2006. Frequency and risk factors for urinary tract infection in cats with diabetes mellitus. *Journal of Veterinary Internal Medicine*, 20(4), pp.850-5. DOI:10.1892/0891-6640(2006)20[850:farffu]2.0.co;2.
- Behzadi, P., Herney Andrés García-Perdomo, Maria, A., Pinheiro, M. and Sarshar, M. 2023. Editorial: Uropathogens, urinary tract infections, the host-pathogen interactions and treatment. *Frontiers in microbiology*, 14. DOI:<https://doi.org/10.3389/fmicb.2023.1183236>.
- Bhardwaj, P., Kaur, G. and Rampal, S. 2020. Impact of marbofloxacin administration on the emergence of marbofloxacin-resistant *E. coli* in faecal flora of goats and elucidation of molecular basis of resistance. *Journal of Global Antimicrobial Resistance*, 21, pp.116–123. DOI:<https://doi.org/10.1016/j.jgar.2020.03.019>
- Bhutia M.O., Thapa, N. and Tamang, J.P. (2021). Molecular Characterization of Bacteria, Detection of Enterotoxin Genes, and Screening of Antibiotic Susceptibility Patterns in Traditionally Processed Meat Products of Sikkim, India. *Frontiers in microbiology*, 11. DOI:<https://doi.org/10.3389/fmicb.2020.599606>.
- Boltshauser, E. and Weber, K.P. 2018. Laboratory investigations. *The Cerebellum: From Embryology to Diagnostic Investigations*, pp.287–298.

DOI:<https://doi.org/10.1016/b978-0-444-63956-1.00017-5>.

- Bono, M.J., Leslie, S.W. and Reygaert, W.C. 2023. Uncomplicated Urinary Tract Infections. *Nih.gov*. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK470195/> [Accessed 20 Jul. 2024].
- Brown, A. and Smith, H., 2015. *Benson's Microbiological Applications: Laboratory Manual in General Microbiology*. 13th ed. New York: McGraw-Hill US Higher Ed USE Legacy, pp.323-325.
- Bubenik, L.J., Hosgood, G.L., Waldron, D.R. and Snow, L.A. 2007. Frequency of urinary tract infection in catheterized dogs and comparison of bacterial culture and susceptibility testing results for catheterized and noncatheterized dogs with urinary tract infections. *Journal of the American Veterinary Medical Association*, 231(6), pp.893–899. DOI:<https://doi.org/10.2460/javma.231.6.893>.
- Cappuccino, J.G. and Welsh, C. 2018. *Microbiology: A Laboratory Manual*, 11th ed., Essex: United Kingdom Pearson Education Limited, pp.116-347.
- Caneschi, A., Bardhi, A., Barbarossa, A. and Zaghini, A. 2023. The Use of Antibiotics and Antimicrobial Resistance in Veterinary Medicine, a Complex Phenomenon: A Narrative Review. *Antibiotics*, 12(3), p.487. DOI:<https://doi.org/10.3390/antibiotics12030487>
- Cottam, Y.H., Hendriks, W.H., Caley, P. and Wamberg, S. 2002. Feline Reference Values for Urine Composition. *The Journal of Nutrition*, 132(6), pp.1754S1756S. DOI:10.1093/jn/132.6.1754S
- Diriba, K., Awulachew, E., and Bizuneh, B. 2023. Identification of Bacterial Uropathogen and Antimicrobial Resistance Patterns Among Patients with Diabetic and Hypertension Attending Dilla University General Hospital, Dilla, Ethiopia. *Infection and drug resistance*, 16, pp.4621–4633. DOI:<https://doi.org/10.2147/idr.s417033>.
- Dirisu, C.G., Egbule, O., Utuh, I.A. and Uzorka, B.A. 2016. Antibiotics Susceptibility of *Escherichia coli* Isolated from Female Students with Urinary Tract Infection. *American Journal of Microbiology and Immunology*, 1(2), pp.6-9.

- Dokuzeylül, B., Çelik, B., Siğirci, B.D., Kahraman, B.B., Saka, S.U., Kayar, A., Ak, S., and OR, M.E. 2019. Clinical efficacy of marbofloxacin in dogs and cats diagnosed with lower urinary tract disorders. *Medycyna Weterynaryjna*, 75(9), pp.549-552. DOI:[dx.doi.org/10.21521/mw.6269](https://doi.org/10.21521/mw.6269)
- Dokuzeylül, B., Kahraman, B.B., Bayrakal, A., Siğirci, B.D., Çelik, B., Ikiz, S., Kayar, A. and OR, M.E. 2015. Bacterial species isolated from cats with lower urinary tract infection and their susceptibilities to cefovecin. *Irish Veterinary Journal*, 68(1). DOI:[10.1186/s13620-015-0030-9](https://doi.org/10.1186/s13620-015-0030-9)
- Domili, W.M., Kadir, L., and Wiharsri. 2020. Description of Urine Nitrite Levels in Patients of Urinary Tract Infection (UTI) in Toto Kabila Hospital Bone Bolango Regency Gorontalo Provine. *Journal of Health, Technology and Science*, 1(2), pp.45-55.
- Dorsch, R., Teichmann-Knorrn, S. and Sjetne Lund, H. 2019. Urinary tract infection and subclinical bacteriuria in cats: A clinical update. *Journal of Feline Medicine and Surgery*, 21(11), pp.1023–1038. DOI:[10.1177/1098612X19880435](https://doi.org/10.1177/1098612X19880435)
- Dorsch, R., Clara von Vopelius-Feldt, Wolf, G., Mueller, R.S., Straubinger, R.K. and Hartmann, K. 2016. Urinary tract infections in cats. Prevalence of comorbidities and bacterial species, and determination of antimicrobial susceptibility to commonly used antimicrobial agents. *Tierarztl Prax Ausg K Kleintiere Heimtiere*, 44(04), pp.227–236. DOI:<https://doi.org/10.15654/tpk-150604>.
- Elbing, K.L. and Brent, R. 2018. Recipes and Tools for Culture of *Escherichia coli*. *Current Protocols in Molecular Biology*, 125(1), p.e83. DOI:[10.1002/cpmb.83](https://doi.org/10.1002/cpmb.83)
- Finco, D.R. 1980. Kidney Function. *Clinical Biochemistry of Domestic Animals*, pp.337–400. DOI:<https://doi.org/10.1016/b978-0-12-396350-5.50014-0>.
- Flores-Mireles, A.L., Walker, J.N., Caparon, M. and Hultgren, S.J. 2015. Urinary tract infections: epidemiology, mechanisms of infection and treatment options. *Nature reviews. Microbiology*, 13(5), pp.269–284. DOI:<https://doi.org/10.1038/nrmicro3432>.

- Fonseca, J.D., Mavrides, D.E., Graham, P.A. and McHugh, T.D. 2021. Results of urinary bacterial cultures and antibiotic susceptibility testing of dogs and cats in the UK. *Journal of Small Animal Practice*, 62(12), pp.1085–1091. DOI:10.1111/jsap.13406
- Freitag T, Squires RA, Schmid J, Elliott J, Rycroft AN. 2006. Antibiotic sensitivity profiles do not reliably distinguish relapsing or persisting infections from reinfections in cats with chronic renal failure and multiple diagnoses of *Escherichia coli* urinary tract infection. *Journal of Veterinary Internal Medicine*, 20(2), pp.245-9. DOI:10.1892/0891-6640(2006)20[245:aspdnr]2.0.co;2
- Graziani, M.S., Gambaro, G., Mantovani, L., Sorio, A., Yabarek, T., Abaterusso, C., Lupo, A. and Rizzotti, P. 2008. Diagnostic accuracy of a reagent strip for assessing urinary albumin excretion in the general population. *Nephrology Dialysis Transplantation*, 24(5), pp.1490–1494. DOI:<https://doi.org/10.1093/ndt/gfn639>.
- Hedderich, R., Müller, R., Greulich, Y., Bannert, N., Holland, G., Kaiser, P. and Reissbrodt, R. 2011. Mechanical damage to Gram-negative bacteria by surface plating with the Drigalski-spatula technique. *International Journal of Food Microbiology*, 146(1), pp.105–107. DOI:10.1016/j.ijfoodmicro.2011.02.005
- Hernando, E., Vila, A., D'Ippolito, P., Rico, A.J., Rodon, J. and Roura, X. 2021. Prevalence and Characterization of Urinary Tract Infection in Owned Dogs and Cats From Spain. *Topics in Companion Animal Medicine*, 43, p.100512. DOI:10.1016/j.tcam.2021.100512
- Heyns, C.F. Urinary tract infection associated with conditions causing urinary tract obstruction and stasis, excluding urolithiasis and neuropathic bladder. 2012. *World Journal of Urology*, 30, pp.77–83. DOI:<https://doi.org/10.1007/s00345-011-0725-9>
- Kahlmeter, G. 2017. EUCAST proposes to change the definition and usefulness of the susceptibility category 'Intermediate'. *Clinical microbiology and infection*, 23(12), pp.894–895.

DOI:<https://doi.org/10.1016/j.cmi.2017.08.015>.

- Karah, N., Rafei, R., Elamin, W., Ghazy, A., Abbara, A., Hamze, M. and Uhlin, B.E. 2020. Guideline for Urine Culture and Biochemical Identification of Bacterial Urinary Pathogens in Low-Resource Settings. *Diagnostics*, 10(10), p.832. DOI:[10.3390/diagnostics10100832](https://doi.org/10.3390/diagnostics10100832)
- Kidsley, A.K., O'Dea, M., Ebrahimie, E., Mohammadi-Dehcheshmeh, M., Saputra, S., Jordan, D., Johnson, J.R., Gordon, D., Turni, C., Djordjevic, S.P., Abraham, S. and Trott, D.J. 2020. Genomic analysis of fluoroquinolone-susceptible phylogenetic group B2 extraintestinal pathogenic *Escherichia coli* causing infections in cats. *Veterinary Microbiology*, 245, p.108685. DOI:<https://doi.org/10.1016/j.vetmic.2020.108685>
- Kim, Y., Carrai, M., Leung, M. H. Y., Chin, J., Li, J., Lee, P. K. H., Beatty, J. A., Pfeiffer, D. U., & Barrs, V. R. 2021. Dysbiosis of the Urinary Bladder Microbiome in Cats with Chronic Kidney Disease. *mSystems*, 6(4). DOI:<https://doi.org/10.1128/mSystems.00510-21>
- Kovarikova, S., Simerdova, V., Bilek, M., Honzak, D., Palus, V. and Marsalek, P. 2020. Clinicopathological characteristics of cats with signs of feline lower urinary tract disease in the Czech Republic. *Veterinárni medicína*, 65(3), pp.123–133. DOI:<https://doi.org/10.17221/146/2019-vetmed>.
- Lai, H.-C., Chang, S.-N., Lin, H.-C., Hsu, Y.-L., Wei, H.-M., Kuo, C.-C., Hwang, K.-P. and Chiang, H.-Y. 2021. Association between urine pH and common uropathogens in children with urinary tract infections. *Journal of microbiology, immunology and infection*, 54(2), pp.290–298. DOI:<https://doi.org/10.1016/j.jmii.2019.08.002>.
- Lei, Z., Liu, Q., Xiong, J., Yang, B., Yang, S., Zhu, Q., Li, K., Zhang, S., Cao, J. and He, Q. 2017. Pharmacokinetic and Pharmacodynamic Evaluation of Marbofloxacin and PK/PD Modeling against *Escherichia coli* in Pigs. *Frontiers in Pharmacology*, 8. DOI:<https://doi.org/10.3389/fphar.2017.00542>
- Liu, S., Chen, L., Wang, L., Zhou, B., Ye, D., Zheng, X., Lin, Y., Zeng, W., Zhou, T. and Ye, J. 2022. Cluster Differences in Antibiotic Resistance, Biofilm

Formation, Mobility, and Virulence of Clinical *Enterobacter cloacae* Complex. *Frontiers in microbiology*, 13.
DOI:<https://doi.org/10.3389/fmicb.2022.814831>.

Lungu, I.-A., Moldovan, O.-L., Biriş, V. and Rusu, A. 2022. Fluoroquinolones Hybrid Molecules as Promising Antibacterial Agents in the Fight against Antibacterial Resistance. *Pharmaceutics*, 14(8), p.1749.
DOI:10.3390/pharmaceutics14081749

MacWilliams, M.P. 2009. Citrate Test Protocol. *American Society for Microbiology*.

MacWilliams, M.P. 2009. Indole Test Protocol. *American Society for Microbiology*.

Martinez-Ruzafa, I. 2016. Clinical features and risk factors for development of urinary tract infections in cats - Ivan Martinez-Ruzafa, John M Kruger, RoseAnn Miller, Cheryl L Swenson, Carole A Bolin, John B Kaneene, 2012. *Journal of Feline Medicine and Surgery*. DOI: <https://doi.org/10.1177/1098612X12451372>.

McDevitt, S. 2009. Methyl Red and Voges-Proskauer Test Protocols. *American Society for Microbiology*.

Minarini, L.A.R. and Darini, A.L.C. 2012. Mutations in the quinolone resistance-determining regions of *gyrA* and *parC* in Enterobacteriaceae isolates from Brazil. *Brazilian journal of microbiology : [publication of the Brazilian Society for Microbiology]*, 43(4), pp.1309–14.
DOI:<https://doi.org/10.1590%2FS1517-838220120004000010>

Mishra, P., Singh, U., Pandey, C., Mishra, P. and Pandey, G. 2019. Application of student's t-test, analysis of variance, and covariance. *Annals of Cardiac Anaesthesia*, 22(4), p.407. DOI:https://doi.org/10.4103%2Faca.ACA_94_19

Nururrozi, A., Yanuartono, Y., Sivananthan, P. and Indarjulianto, S. 2020. Evaluation of lower urinary tract disease in the Yogyakarta cat population, Indonesia. *June-2020*, 13(6), pp.1182–1186.
DOI:<https://doi.org/10.14202/vetworld.2020.1182-1186>

Onwuchekwa, E.C., Anaele, C.C., Emeonye, O.P., Felix, C.J.,

- Ikechukwu-Okoreizi, J., Kanu, S.A.J., Ubaji, U. and Chinyere, M.Q. 2021 Microbial load of healthcare wastes in Aba Metropolis, Abia State. *International Journal of Health, Medicine and Nursing Practice*, 3(1), pp.17–23. DOI:<https://doi.org/10.47941/ijhmn.557>
- Orole, O.O., Gambo, S.M. and Fadayomi, V.S. 2022. Characteristics of Virulence Factors and Prevalence of Virulence Markers in Resistant *Escherichia coli* from Patients with Gut and Urinary Infections in Lafia, Nigeria. *Microbiology Insights*, 15, p.117863612211069. DOI:10.1177/11786361221106993
- Papich, M.G. 2013. Antimicrobial Drugs. *Canine and Feline Gastroenterology*, pp.471–476. DOI:<https://orcid.org/0000-0002-7591-7898>
- Paudel, S., John, P.P., Poorbaghi, S.L., Randis, T.M. and Kulkarni, R. 2022. Systematic Review of Literature Examining Bacterial Urinary Tract Infections in Diabetes. *Journal of Diabetes Research*, 2022, pp.1–20. DOI:<https://doi.org/10.1155/2022/3588297>.
- Okafor, C.C., Pearl, D.L., Blois, S.L., Lefebvre, S.L., Yang, M., Lund, E.M. and Dewey, C.E. 2018. Factors associated with hematuric struvite crystalluria in cats. *Journal of feline medicine and surgery*, 21(10), pp.922–930. DOI:<https://doi.org/10.1177/1098612x18809176>.
- Perry, S.M. and Mitchell, M.A. 2019. Antibiotic Therapy. *Mader's Reptile and Amphibian Medicine and Surgery*, pp.1139-1154.e2.
- Piyarungsri, K., Tangtrongsup, S., Thitaram, N., Lekklar, P. and Kittinuntasilp, A. 2020. Prevalence and risk factors of feline lower urinary tract disease in Chiang Mai, Thailand. *Scientific Reports*, 10(1). DOI:10.1038/s41598-019-56968-w
- Quimby, J.M., Gowland, S., Carney, H.C., DePorter, T., Plummer, P. and Westropp, J.L. 2021. 2021 AAHA/AAFP Feline Life Stage Guidelines. 23(3), pp.211–233. DOI:<https://doi.org/10.1177/1098612x21993657>.
- Rampacci, E., Bottinelli, M., Stefanetti, V., Hyatt, D.R., Sgariglia, E., Coletti, M. and Passamonti, F. 2018. Antimicrobial susceptibility survey on bacterial agents of canine and feline urinary tract infections: Weight of the empirical

treatment. *Journal of Global Antimicrobial Resistance*, 13, pp.192–196.

DOI:10.1016/j.jgar.2018.01.011

Raffaele Scarpellini, Massimo Giunti, Pontiero, A., Savini, F., Esposito, E. and Piva, S. 2023. Two cases of bloodstream infections associated with opportunistic bacterial species (*Enterococcus hirae* and *Enterobacter xiangfangensis*) in companion animals. *BMC veterinary research*, 19(1). DOI:<https://doi.org/10.1186/s12917-023-03615-2>.

Sabir, N., Ikram, A., Zaman, G., Satti, L., Adeel Gardezi, Ahmed, A. and Ahmed, P. (2017). Bacterial biofilm-based catheter-associated urinary tract infections: Causative pathogens and antibiotic resistance. *American journal of infection control*, 45(10), pp.1101–1105. DOI:<https://doi.org/10.1016/j.ajic.2017.05.009>.

Shamsuddeen, U. and Bilkisu, A. 2017. Bacteriological assesment of drinking water from different sources in Kofar Yandaka Katsina, Katsina State. *Bayero Journal of Pure and Applied Sciences*, 10(1), pp.444–447. DOI:<https://doi.org/10.4314/bajopas.v10i1..>

Suma, P., Swetha, C.S., Sudhanthiramani, Goud, S.S., Supriya, A., and Jagadeesh A.B. 2016. A Study on the Antibiotic Resistance Patterns of *Staphylooccus aureus* Isolated from Market Milk in and Around Tirupati, Andhra Pradesh. *International Journal of Recent Scientific Research Research*, 9(4), pp.10429-10435.

Thompson, M.F., Litster, A.L., Platell, J.L. and Trott, D.J. (2011). Canine bacterial urinary tract infections: New developments in old pathogens. *The Veterinary Journal*, 190(1), pp.22–27. DOI:<https://doi.org/10.1016/j.tvjl.2010.11.013>.

Thornton, L.A., Burchell, R.K., Burton, S.E., Lopez-Villalobos, N., Pereira, D., MacEwan, I., Fang, C., Hatmodjo, A.C., Nelson, M.A., Grinberg, A., Velathanthiri, N. and Gal, A. 2018. The Effect of Urine Concentration and pH on the Growth of *Escherichia Coli* in Canine Urine In Vitro. *Journal of Veterinary Internal Medicine*, 32(2), pp.752–756. DOI:10.1111/jvim.15045

U.S. Food and Drug Administration. 2023. *BAM Appendix 2: Most Probable Number from Serial Dilutions* | FDA. [ONLINE] Available at:

[https://www.fda.gov/food/laboratory-methods-food/bam-appendix-2-most-pr
obable-number-serial-dilutions](https://www.fda.gov/food/laboratory-methods-food/bam-appendix-2-most-pr
obable-number-serial-dilutions)

- Wanger, A., Chavez, V., Huang, R.S.P., Wahed, A., Actor, J.K. and Dasgupta, A. 2017. Media for the Clinical Microbiology Laboratory. *Microbiology and Molecular Diagnosis in Pathology*, pp.51–60.
- Weese, J.S., Blondeau, J.M., Boothe, D., Breitschwerdt, E.B., Guardabassi, L., Hillier, A., Lloyd, D.H., Papich, M.G., Rankin, S.C., Turnidge, J.D. and Sykes, J.E. 2011. Antimicrobial Use Guidelines for Treatment of Urinary Tract Disease in Dogs and Cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases. *Veterinary Medicine International*, 2011, pp.1–9. DOI: 10.4061/2011/263768
- White, J.D., Cave, N.J., Grinberg, A., Thomas, D.G. and Heuer, C. (2016). Subclinical Bacteriuria in Older Cats and its Association with Survival. *Journal of Veterinary Internal Medicine*, 30(6), pp.1824–1829. DOI:<https://doi.org/10.1111/jvim.14598>.