

DAFTAR PUSTAKA

- Aboagla, E. M. E and T. Terada. 2004. Effects of egg yolk during the freezing step of cryopreservation on the viability of goat spermatozoa. *Theriogenology*, 62: 1160–1172.
- Adrial. 2010. Potensi sapi Pesisir dan upaya pengembangannya di Sumatera Barat. *Jurnal Penelitian dan Pengembangan Pertanian*, 29(2): 124–134.
- Afriani, T., M. Agusta., Yurnalis., F. Arlina dan D. Putra. 2019. Estimasi dinamika populasi dan pembibitan sapi potong di Kecamatan Bayang Kabupaten Pesisir Selatan. *Jurnal Peternakan Indonesia*, 21(2): 130.
- Agarwal, A., N. Parekh., M. K. Panner Selvam., R. Henkel., R. Shah., S. T. Homa., R. Ramasamy., K. Tremellen., S. Esteves., A. Majzoub and J. G. Alvarez. 2018. Male oxidative stress special interest group. *World Journal of Men's Health*, 37(3): 296–312.
- Agung, D., A. Marawali., K. Uly dan F. Telupere. 2023. Pengaruh penambahan beberapa level *Glutathione* dalam pengencer air kelapa kuning telur terhadap kualitas semen sapi Angus. *Jurnal Nukleus Peternakan*, 10(1): 27–37.
- Aitken, R. J and M. A. Baker. 2006. Oxidative stress, sperm survival and fertility Kontrol. *Molecular and Cellular Endocrinology*, 250(1–2): 66–69.
- Al-Nowainy, H. 2018. Relationship between the addition of *Glutathione* to sperm freezing medium and cryosurvival rate of sperm motility and viability in asthenozoospermic patients. *Kufa Journal for Nursing Sciences*, 7(2): 34–43.
- Amrozi., S. Y. Hayanti., M. M. Sholikin., B. P. Pardede., H. Herdis., J. A. Lase., Surya., D. A. Mahari., N. W. H. Widyasanti., P. I. Sitaresmi., S. A. Asmarasari., R. A. Prastiya., Y. Yusrani., E. Handiwirawan., S. Elieser., S. Said and A. Jayanegara. 2024. Antioxidant *Glutathione* supplementation in semen extenders and its effect on the quality of cryopreserved bull sperm: A meta-analysis. *Pakistan Veterinary Journal*, 44(4): 988–997.
- Ananda., H. Gusdinal., R. Ramadhan., A. A. Abimanyu., W. H. Ningsih and Jaswandi. 2025. Impacts of cryopreservation on semen quality and sperm protein profiles of Pesisir bulls. *Tropical Animal Science Journal*, 48(3): 189–198.
- Anisah., M. Riyadhhi dan M. Rizal. 2024. Kualitas spermatozoa kambing peranakan etawah pada kombinasi pengencer tris dan beberapa jenis kuning telur. *Jurnal Penelitian Peternakan Lahan Basah*, 4(1): 18–24.
- Apriyanti, C. 2012. Pengaruh waktu ekuilibrasi terhadap kualitas semen beku sapi Pesisir pre dan post thawing. Tesis. Universitas Andalas, Padang.

- Argiris, A., Y. S. Ondho., S. I. Santoso and Kurnianto, E. 2018. Effect of age and bulls on fresh semen quality and frozen semen production of Holstein bulls in Indonesia. IOP Conference Series: Earth and Environmental Science, 119: 1–10.
- Arifiantini, R.I. 2012. Teknik Koleksi dan Evaluasi Semen pada Hewan. IPB Press. Bogor.
- Badr, M. R., M. G. Abd El-Malak and T. A. Ghattas. 2012. Effect of *Glutathione* on the freezability and in vitro fertilizing potentials of bovine spermatozoa. Assiut Veterinary Medical Journal, 58(134): 118–124.
- Bansal, A. K and G. S. Bilaspuri. 2010. Impacts of oxidative stress and antioxidants on semen functions. Veterinary Medicine International, 2010: Article ID 686137.
- Batista, M., T. Niño., M. Santana., D. Alamo., N. Castro., R. Reyes., F. González., F. Cabrera and A. Gracia. 2011. Influence of the preservation temperature (37, 20, 4, –196°C) and the mixing of semen over sperm quality of Majorera bucks. Reproduction in Domestic Animals, 46(2): 281–288.
- Bearden, J. H and J. W. Fuquay. 1984. Applied Animal Reproduction. 2th Edition. Reston Publishing Company Inc. A Prentice Halls Company. Virginia, 341–345.
- Boquest, L., R. Abeydeera., W. H. Wang and B. N. Day. 1999. Effect of adding reduced *Glutathione* during insemination on the development of porcine embryos in vitro. Theriogenology, 51: 1311–1319.
- [BSN] Badan Standardisasi Nasional. 2021. SNI 4869-1:2021 Semen Beku Bagian 1: Sapi. Jakarta: BSN.
- Bucak, M. N., P. B. Tuncer., S. Sariozkan., N. Baspinar., M. Taspinar., K. Cayan., A. Bilgili., P. P. Akalin., S. Buyukleblebici., A. Aydos., S. Ilgaz., A. Sunguroglu and D. Oztuna. 2010. Effects of antioxidants on post-thawed bovine sperm and oxidative stress parameters: Antioxidants protect DNA integrity against cryodamage. Cryobiology, 61(3): 248–253.
- Butar, E. 2009. Efektifitas frekuensi exercise terhadap peningkatan kualitas semen sapi Simmental. Skripsi. Fakultas Pertanian, Universitas Sumatera Utara. Medan.
- Cahyani, P., Y. S. Ondho dan D. Samsudewa. 2020. Pengaruh tarum (*Indigofera zollingeriana*) dalam pengencer semen terhadap viabilitas dan tudung akrosom utuh pada spermatozoa kambing Peranakan Ettawa. Jurnal Sain Peternakan Indonesia, 15(3): 259–264.
- Chatterjee, S and C. Gagnon. 2001. Production of reactive oxygen species by spermatozoa undergoing cooling, freezing, and thawing. Molecular Reproduction and Development, 59(4): 451–458.
- Chenoweth, P. J. 2005. Genetic sperm defects. Theriogenology, 64: 457–468.

- Da-Costa, N., T. Susilawati., N. Isnaini dan M. N. Ihsan. 2016. Kualitas semen sapi peranakan Ongole (PO) selama pendinginan menggunakan pengencer yang berbeda. *Jurnal Ilmu-Ilmu Peternakan*, 12(1): 53–62.
- Damrah, F. 2022. Profil hormon estrogen pada sapi Pesisir dan sapi Bali setelah inseminasi buatan (IB) di Kecamatan Bayangan Kabupaten Pesisir Selatan. Skripsi. Universitas Andalas. Padang.
- David, I., P. Kohnke., G. Lagriffoul., O. Praud., F. Plouarboué., P. Degond and X. Druart. 2015. Mass sperm motility is associated with fertility in sheep. *Animal Reproduction Science*, 161: 75–81.
- Davoodian, N., A. Kadivar., E. Ahmadi and A. Mohebbi. 2017. Effects of two amino acids on motion parameters and enzymatic antioxidant activity of freeze-thawed stallion spermatozoa. *Journal of Equine Veterinary Science*, 59: 49–56.
- Djanuar. 1985. *Fisiologi Reproduksi dan Inseminasi Buatan pada Sapi*. Gajah Mada University Press. Yogyakarta.
- Ertmer, F., H. Oldenhof., S. Schütze., K. Rohn., W. F. Wolkers and H. Sieme. (2017). Induced sub-lethal oxidative damage affects osmotic tolerance and cryosurvival of spermatozoa. *Reproduction, Fertility and Development*, 29(9): 1739–175.
- Feradis. 2007. Karakteristik sifat fisik semen domba St. Croix. *Jurnal Peternakan*, 4(1): 1–5.
- _____. 2010. *Bioteknologi Reproduksi pada Ternak*. Alfabeta. Bandung.
- Foote, R. H., C. C. Brockett and M. T. Kaproth. 2002. Motility and fertility of bull sperm in whole milk extender containing antioxidants. *Animal Reproduction Science*, 71(1–2): 13–23.
- Gadea, J., F. García-Vázquez., C. Matás., J. Gardón., S. Cánovas and D. Gumbao. 2005. Cooling and freezing of boar spermatozoa: supplementation of the freezing media with reduced *Glutathione* preserves sperm function. *Journal of Andrology*, 26(3): 396–404.
- Garner, D. L and E. S. E. Hafez. 2016. Spermatozoa and seminal plasma. In: *Reproduction in Farm Animals*. Lippincott Williams and Wilkins. Baltimore, Maryland, USA. Philadelphia, 96–110.
- Ghirardosi, M. S., M. L. Fischman, A. E. Jorge and D. C. H. Cisale. 2018. Relationship between morphological abnormalities in commercial bull frozen semen doses and conception rate. *Andrologia*, 50(3): 1–5.
- Gunawan, I., D. N. D. I. Laksmi dan I. G. N. B. Trilaksana. 2012. Efektivitas penambahan β -karoten dan *Glutathione* pada bahan pengencer terhadap motilitas dan daya hidup spermatozoa pada semen beku sapi. *Indonesia Medicus Veterinus*, 1(3): 385–393.

- Güngör, S., A. Ata and M. İnanç. 2018. Effects of trehalose and catalase on the viability and kinetic parameters of cryopreserved ram sperm. *Acta Scientiae Veterinariae*, 46(1): 1577.
- Hamilton, L., M. Zigo., J. Mao., W. Xu., P. Šutovský., C. O'Flaherty and R. Oko. 2019. Gsto2 isoforms participate in the oxidative regulation of the plasmalemma in eutherian spermatozoa during capacitation. *Antioxidants*, 8(12): 601.
- Hardyastuti, D. M., M. Sumaryadi., M. Y. Saleh., D. M. A. Setyaningrum dan A. Susanto. 2023. Kualitas semen cair dan semen beku kambing Peranakan Etawa (PE) pada berbagai jenis pengencer. In *Prosiding Seminar Nasional Pembangunan Dan Pendidikan Vokasi Pertanian*, 4(1):388-396.
- Hendri, Jaswandi., R. Indriastuti and Ananda. 2024. Sperm kinematics of Pesisir bull thawed at different temperatures and times. *Buletin Peternakan*, 48(4): 233–241.
- Hendrik, M. J. 1994. Pengamatan populasi dan ukuran fenotipik sapi bali dan sapi silangan bali di Sulawesi Utara. Tesis. Program *Pascasarjana* Institut Pertanian Bogor.
- Hidayat, B. 2025. Pengaruh waktu thawing terhadap kualitas semen beku sapi Pesisir. Skripsi. Universitas Andalas, Padang.
- Hoesni, F. 1997. Pengaruh kadar kuning telur dalam berbagai bahan pengencer terhadap kualitas spermatozoa domba *pasca* pembekuan. Program *Pasca Sarjana S2* Universitas Padjadjaran. Bandung.
- Holt, W. V. 2000. Fundamental aspects of sperm cryobiology: The importance of species and individual differences. *Theriogenology*, 53: 47–58.
- Hosen, N. 2006. Prospek pengembangan ternak sapi lokal di Sumatera Barat. Hlm. 197–204. *Prosiding Seminar Nasional Revitalisasi Potensi Lokal untuk Mewujudkan Swasembada Daging 2010 dalam Kerangka Pembangunan Peternakan Berkelanjutan dan Peningkatan Kesejahteraan Masyarakat*, Padang, 11–12 September 2006.
- Ismaya. 2014. *Bioteknologi Inseminasi Buatan pada Sapi dan Kerbau*. Gadjah Mada University Press. Yogyakarta.
- Kadirvel, G., S. Kumar and A. Kumaresan. 2012. Lipid peroxidation, mitochondrial membrane potential and DNA integrity of spermatozoa in relation to intracellular reactive oxygen species in liquid and frozen-thawed buffalo (*Bubalus bubalis*) semen. *Animal Reproduction Science*, 133(1–2): 11–18.
- Kang, S. S., U. H. Kim., M. S. Lee., S. D. Lee and S. R. Cho. 2020. Spermatozoa Motility, Viability, Acrosome Integrity, Mitochondrial Membrane Potential and Plasma Membrane Integrity in 0.25 mL and 0.5 mL Straw after Frozen Thawing in Hanwoo Bull. *J. Anim. Reprod. Biotechnol.* 35: 307–314.
- Khalil, W. A., M. A. El-Harairy., A. E. B. Zeidan., M. A. E. Hassan and O. Mohey-Elsaeed. 2018. Evaluation of bull spermatozoa during and after cryopreservation: Structural

- and ultrastructural insights. *International Journal of Veterinary Science and Medicine*, 6: 49–56.
- Kovacs, A. and R. H. Foote. 1992. Viability and akrosom staining of bull, boar and rabbit spermatozoa. *Biotech Histochem*, 67(3): 120–124.
- Kumar, D and K. Balagnur. 2019. Recent advances in cryopreservation of semen and artificial insemination in sheep: A review. *Indian Journal of Small Ruminants*, 25(2): 134–147.
- Kumar, P and J. Gaur. 2022. Antioxidants in semen biology: The good, the bad and the ugly. *Journal of Animal Reproduction and Biotechnology*, 37(2): 75–86.
- Lenzi, A., L. Gandini., F. Lombardo., M. Picardo., V. Maresca and F. Dondero. 2002. Polyunsaturated fatty acids of germ cell membranes, *Glutathione* and *Glutathione*-dependent enzyme-phgpx: From basic to clinic. *Contraception*, 65: 301–304.
- Li, S., B. Wang., W. Zhang., J. Ren., Y. Ma., L. Su., Y. Dai and G. Liu. 2023. *Glutathione* and selenium nanoparticles have a synergistic protective effect during cryopreservation of bull semen. *Frontiers in Veterinary Science*, 10: 1-10.
- Mardiyah, E. 2001. Teknik pengenceran pada pembuatan chiling semen sapi. Temu Teknis Non Peneliti. Badan Penelitian dan Pengembangan Departemen Pertanian. Bogor.
- Masoudi, R., M. Sharafi., A. Z. Shahneh and M. K. Motlagh. 2019. Effects of reduced *Glutathione* on the quality of rooster sperm during cryopreservation. *Theriogenology*, 128: 149–155.
- Masrizal., Z. Udin., Hendri., T. Afriani., Jaswandi and Ananda. 2025. Optimizing equilibration time for enhanced post-thaw quality of Pesisir bull frozen semen. *International Journal of Veterinary Science*, 14(2): 281–288.
- Meybodi, A., H. Mozdarani., S. Moradi and M. Akhoond. 2012. Importance of sperm *Glutathione* treatment in ART. *Journal of Assisted Reproduction and Genetics*, 29(7): 625–630.
- Montesqrit., Arfa'i dan Rusdimansyah. 2019. Pemberdayaan masyarakat dalam meningkatkan produktivitas sapi Pesisir di Nagari Taratak - Sutera Kabupaten Pesisir Selatan. *UNRI Conference Series Community Engagement*, 1: 518–526.
- Motemani, M., M. Chamani., M. Sharafi and R. Masoudi. 2017. Alpha tocopherol improves frozen-thawed sperm quality by reducing hydrogen peroxide during cryopreservation of bull semen. *Spanish Journal of Agricultural Research*, 15: 1–7.
- Ogata, K., A. Imai., S. Sato., K. Nishino., S. Watanabe., T. Somfai., E. Kobayashi and K. Takeda. 2022. Effects of reduced *Glutathione* supplementation in semen freezing extender on frozen-thawed bull semen and in vitro fertilization. *Journal of Reproduction and Development*, 68(1): 53–61.

- Parizi, F. C., V. B. Julio., K. Kulik., E. S. Vaz., F. A. S. Paes., L. M. Laskoski., M. V. Ferrari and F. A. Souza. 2023. Uso de glutathione e vitamina C na criopreservação seminal de touros Nelore. *Research, Society and Development*, 12(6)
- Perumal, P., S. Selvaraju., S. Selvakumar., A. K. Barik., D. N. Mohanty., S. Das., R. K. Das and P. C. Mishra. 2010. Effect of pre-freeze addition of cysteine hydrochloride and reduced *Glutathione* in semen of crossbred Jersey bulls on sperm parameters and conception rates. *Reproduction in Domestic Animals*, 46(4): 636–641.
- Pramono, E. dan T. R. Tagama. 2008. Pengaruh penambahan adenosine triphosphat ke dalam pengencer semen terhadap kualitas spermatozoa domba Ekor Gemuk. *Animal Production*, 10(3): 151–156.
- Priyanto, L., R. I. Arifiantini and T. L. Yusuf. 2015. Detection of sperm DNA damage in fresh and frozen semen using toluidine blue staining. *Jurnal Veteriner*, 16(1): 48–55
- Putra, D., S. Sumadi dan T. Hartatik. 2015. Estimasi output sapi potong di Kabupaten Pesisir Selatan Provinsi Sumatera Barat. *Jurnal Peternakan Indonesia*, 17(2): 105.
- _____, F. D. 2023. Pengaruh bahan pengencer semen dan waktu ekuilibrasi terhadap kualitas semen sapi Pesisir. Skripsi. Universitas Andalas. Padang.
- Putranti, O. D., Kustono dan Ismaya. 2010. Pengaruh penambahan crude tannin pada sperma cair kambing Peranakan Ettawa yang disimpan selama 14 hari terhadap viabilitas spermatozoa. *Buletin Peternakan*, 34(1): 1–7.
- Ramadhan, R. 2024. Kinematika spermatozoa pada semen segar dan semen beku sapi Pesisir. Skripsi. Universitas Andalas, Padang.
- Rensburg, S. V and N. Starke. 1949. The examination of bull semen. *Journal of the South African Veterinary Association*, 20: 70–79.
- Rizal dan Herdis. 2010. Peranan antioksidan dalam meningkatkan kualitas semen beku. *Wartazoa*, 20(3): 139–145.
- Rusdin dan K. Juma'at. 2000. Motilitas dan recovery sperma domba dalam berbagai pengencer selama penyimpanan pada suhu 5°C. Laporan Penelitian. Fakultas Pertanian. Universitas Tadulako. Palu.
- Safitri, A., T. Sardjito., P. Wibawati., I. Mustofa., A. Saputro dan R. Prastiya. 2018. Kualitas semen segar sapi Rambon Banyuwangi dalam pengencer tris kuning telur dan susu skim kuning telur. *Jurnal Medik Veteriner*, 1(3): 62-67.
- Saladin, R. 1983. Penampilan sifat-sifat produksi dan reproduksi sapi lokal Pesisir Selatan di Provinsi Sumatera Barat. Disertasi. Fakultas Pascasarjana Institut Pertanian Bogor.
- Salisbury, G. W and N. L. VanDemark. 1999. Physiology of reproduction and artificial insemination of cattle. New York: W. H. Freeman and Company.

- Salamon, S and W. M. C. Maxwell. 2000. Storage of ram semen. *Animal Reproduction Science*, 62(1–3): 77–111.
- Sarbaini. 2004. Kajian keragaman karakter eksternal dan DNA mikrosatelit sapi Pesisir di Sumatera Barat. Disertasi. Sekolah Pascasarjana Institut Pertanian Bogor. Bogor.
- _____, R. Angraini, R. Suhati, dan A. Husni. 2007. Profil populasi sapi Pesisir di Kabupaten Pesisir Selatan Sumatera Barat. *Jurnal Peternakan Indonesia*, 12(3): 206–212.
- Sarwono, B. 1995. Pengawetan dan Pemanfaatan Telur. PT Penebar Swadaya. Jakarta.
- Sengupta, P., S. Dutta and A. T. Alahmar. 2022. Reductive Stress and Male Infertility. In *Advances in Experimental Medicine and Biology* 1391: 311–321.
- Sherwood, L. 2001. Fisiologi Manusia dari Sel ke Sistem. EGC, Jakarta.
- Shi, X., H. Hu., G. Ji., R. Liu., J. Zhang., H. Zhang., P. Wang., B. Qin., B. Li and M. Li. 2020. Effects of MTG and GSH on human sperm motility and DNA integrity during vitrification in the presence of trehalose. *Advances in Reproductive Sciences*, 8(1): 71–81.
- Sikka, S. C. 1996. Oxidative stress and role of antioxidants in normal and abnormal sperm function. *Frontiers in Bioscience*, 1: 78–86.
- Silva, N. C., K. M. Leão., J. T. Pádua., T. C. Marques., F. R. A. Neto., M. A. N. Dode, and A. T. M. Cunha. 2021. Effect of different cryopreservation extenders added with antioxidants on semen quality and in vitro embryo production efficiency in cattle. *Anais Da Academia Brasileira De Ciências*, 93(3): 1–14.
- Sitepu, S and J. Marisa. 2025. The effect of curcuma extract on the membrane and akrosom integrity of spermatozoa in buck fresh semen. *IOP Conference Series Earth and Environmental Science*, 1476(1): 1–5.
- Spalekov, E and A. V. Makarevich. 2012. Effect of *Glutathione* on selected motion parameters of ram cooling-stored spermatozoa. *Mendelnet*, 19: 1022–1029.
- Steinbach, J and R. H. Foote. 1967. Osmotic pressure and pH effects on survival of frozen or liquid spermatozoa. *Journal of Dairy Science*, 50: 205.
- Sugiarti, T., E. Triwulanningsih., P. Situmorang., R. G. Sianturi dan D. Kusumaningrum. 2004. Penggunaan katalase dalam produksi semen dingin sapi. *Seminar Nasional Teknologi Peternakan dan Veteriner*, 215–220.
- Sujoko, H., M. A. Setiadi dan A. Boediono. 2009. Seleksi spermatozoa domba Garut dengan metode sentrifugasi gradient densitas Percoll. *Jurnal Veteriner*, 10(3): 125–132.

- Sulin, I. 2008. Identifikasi performa produksi dan service period sapi Pesisir dan hasil persilangan inseminasi buatan di Kabupaten Pesisir Selatan Sumatera Barat. *Jurnal Embrio*, 1: 29–34.
- Sundari, A. P. 2022. Pengaruh penambahan *Glutathione* dalam pengencer terhadap kualitas semen ayam KUB-1 *pasca* ekuilibrisasi. Disertasi. Universitas Andalas. Padang.
- Suretno, N. D., I. Supriyatna., B. Purwanto and R. Priyanto. 2018. Reproductive performance of Peranakan Ongole (PO) bull at different altitude areas in Lampung Province. *IOP Conference Series: Earth and Environmental Science*, 102(1): 1–8.
- Suryohudoyo, P. 2000. Oksidan, antioksidan, dan radikal bebas. Dalam: *Kapita Selekta Ilmu Kedokteran Molekuler*. CV Sagung Seto. Jakarta, 31–47.
- Susilawati, T. 2011. *Spermatology*. Universitas Brawijaya. Malang.
- Syamsu, A. J., L.A. Sofyan., K. Mudikdjo dan G. Said. 2003. Daya dukung limbah pertanian sebagai sumber pakan ternak ruminansia di Indonesia. *Wartazoa*, 13(1): 30–37.
- Takeo, T and N. Nakagata. 2011. Reduced *Glutathione* enhances fertility of frozen/thawed C57BL/6 mouse sperm after exposure to methyl-beta-cyclodextrin. *Biology of Reproduction*, 85(5): 1066–1072.
- Thundathil, J. C., A. L. Dance and J. P. Kastelic. 2014. Bovine sperm abnormalities: Prevalence, etiology and mechanisms leading to infertility. *Clinical Theriogenology*, 4(6): 525–532.
- Til, D., V. Amaral., R. Salvador., A. Senn and T. Paula. 2016. The effects of storing and transporting cryopreserved semen samples on dry ice. *JBRA Assisted Reproduction*, 20(4): 217–221.
- Toelihere, M. R. 1993. *Inseminasi Buatan pada Ternak*. Angkasa. Bandung.
- Tuminah, S. 2000. Radikal bebas dan antioksidan: Kaitannya dengan nutrisi dan penyakit. *Cermin Dunia Kedokteran*, 128: 49–50.
- Upadhyay, V. R., V. Ramesh., R. K. Dewry., D. K. Yadav and P. Ponraj. 2022. Bimodal interplay of reactive oxygen and nitrogen species in physiology and pathophysiology of bovine sperm function. *Theriogenology*, 187: 82–94.
- Vijayalakshmy, K., M. Virmani, D. Kumar, P. Kumar, and H. Rahman. 2018. Different methods of assessing semen quality. *Indian Farmer*, 5(12): 1383–1387.
- Wahyuni, R dan R. A. Dewi. 2018. Teknologi tepat guna mendukung pengembangan sapi lokal Pesisir Sumatera Barat. *Jurnal Penelitian dan Pertanian*, 37(2): 49–58.
- Wahyuningsih, A., D. M. Saleh dan Sugiyanto. 2013. Pengaruh umur pejantan dan frekuensi penampungan terhadap volume dan motilitas semen segar sapi Simmental di Balai Inseminasi Buatan Lembang. *Jurnal Ilmiah Peternakan*, 1(3): 947–953.

- Waluyo, T. S. 2019. Reproduksi Aplikatif dalam Budi Daya Sapi. PT Sewu. Bandung.
- Yitnosumarto, S. 1993. Percobaan, Perancangan, Analisis dan Interpretasinya. PT Gramedia Pustaka Utama. Jakarta.
- Zou, J., L. Wei., D. Li., Y. Zhang., G. Wang., L. Zhang., P. Cao., S. Yang and G. Li. 2021. Effect of *Glutathione* on sperm quality in Guanzhong dairy goat sperm during cryopreservation. *Frontiers in Veterinary Science*, 8: 1-6.
- Zuraida, Lestari, S. W., M. Pangestu., A. Hestiantoro and K. Kusmardi. 2024. Effect of *Glutathione* supplementation in cryoprotectant modification on tyrosine phosphorylation, acrosin expression and acrosome reaction of post-thawing spermatozoa quality. *Pharmacognosy Journal*, 16(3): 554–562.

