

## DAFTAR PUSTAKA

- Abdelazim, A.M., Saadeldin, I.M., Swelum, A.A.A., Afifi, M.M. and Alkaladi, A., 2018. Oxidative stress in the muscles of the fish Nile tilapia caused by zinc oxide nanoparticles and its modulation by vitamins C and E. *Oxidative medicine and cellular longevity*, 2018: 1-9
- Adhyatma, M., Nurul, I. and Nuryadi, N., 2013. Pengaruh bobot badan terhadap kualitas dan kuantitas semen sapi Simmental. *TERNAK TROPIKA Journal of Tropical Animal Production*. 14(2): 53-62.
- Aisah, S., Isnaini, N. and Wahyuningsih, S., 2017. Kualitas semen segar dan recovery rate sapi bali pada musim yang berbeda. *Jurnal Ilmu-Ilmu Peternakan (Indonesian Journal of Animal Science)*, 27(1): 63-79.
- Al-Amin, A.F., Hartono, M., dan Suharyati, S., 2017. Faktor-Faktor Yang Memengaruhi Calving Interval Sapi Perah Pada Peternakan Rakyat Di Beberapa Kabupaten/Kota Provinsi Lampung. *Jurnal Riset dan Inovasi Peternakan*, 1(1): 33-36
- Alevra, A.I., Exadactylos, A., Mente, E. and Papadopoulos, S., 2022. The Protective Role of Melatonin in Sperm Cryopreservation of Farm Animals and Human: Lessons for Male Fish Cryopreservation. *Animals*, 12(6): 791.
- Ali, M., M. Ahmad, S.T. Gul, M. Zubair, I. Ahmad, dan S. Ali 2017. Role of selenium and vitamin E in lactose-based extender on semen cryopreservation of buffalo bull (*bubalus bubalis*). *Pakistan Journal of Science*. 69(2).
- Ali, U., Bilal, A., Iqbal, A., Ansari, M.S., Rakha, B.A. and Akhter, S., 2022. Ascorbic Acid Effect on Frozen and Thawed on Sperm Motility, Plasma Membrane Integrity, Livability and Acrosome Integrity of Ring-Necked Pheasant (*Phasianus colchicus*) Semen. *Biology*. 17(1): 1-13.
- Alves, M.B.R., Celeghini, E.C.C. dan Belleannée, C., 2020. From sperm motility to sperm-borne microRNA signatures: new approaches to predict male fertility potential. *Frontiers in Cell and Developmental Biology*, 8: 791.
- Anwar, P., Ondho, Y.S. and Samsudewa, D., 2015. Kualitas Membran Plasma Utuh Dan Tudung Akrosom Utuh Spermatozoa Sapi Bali Dipreservasi Suhu 5 Oc Dalam Pengencer Ekstrak Air Tebu Dengan Penambahan Kuning Telur. *Agromedia: Berkala Ilmiah Ilmu-ilmu Pertanian*. 33(1).
- Arifiantini I, Yusuf TL, dan Graha N. 2005. Recovery rate dan longivitas pasca thawing semen beku sapi FH (Friesian Holstein) menggunakan berbagai bahan pengencer. *Buletin Peterernakan*. 29(2): 53-61.

- Arrigoni, O. and De Tullio, M.C., 2002. Ascorbic acid: much more than just an antioxidant. *Biochimica et Biophysica Acta (BBA)-General Subjects*. 1569(1-3): 1-9.
- Asmarawati, W., 2010. The effect of adding vitamin c and e in native chicken semen extender stored at temperature 4 oc on semen quality and egg fertility. In *International Seminar on Tropical Animal Production (ISTAP)*. 308-313
- Azawi, O.I. and Hussein, E.K., 2013. Effect of vitamins C or E supplementation to Tris diluent on the semen quality of Awassi rams preserved at 5 C. In *Veterinary Research Forum*. 4 (3):157
- Badgar, K. and Prokisch, J., 2021. A simple method for preparing elemental selenium nano-coating inside a silicone surface. *Acta Agraria Debreceniensis*. 1(1): 35-43.
- Bailey, J. L., Bilodeau, J. F. and Cormier, N. 2000. Semen cryopreservation in domestic animals; a damaging and capaciting phenomenon. *J. Androl*. 21: 1-7.
- Bailey, J., Morrier, A. and Cormier, N., 2003. Semen cryopreservation: Successes and persistent problems in farm species. *Canadian journal of animal science*, 83(3): 393-401.
- Bansal, A.K. and Bilaspuri, G.S., 2011. Impacts of oxidative stress and antioxidants on semen functions. *Veterinary medicine international*. 2011: 1-7
- Baust, J.G., Gao, D. and Baust, J.M., 2009. Cryopreservation: An emerging paradigm change. *Organogenesis*, 5(3): 90-96.
- Bebas, W. dan Gorda, W. 2016. Penambahan Astaxanthin pada Pengencer Kuning Telur Berbagai Jenis Ungga Dapat Memproteksi Semen Babi Selama Penyimpanan. *Jurnal Veteriner*. 17(4): 484-491.
- Bello, T.K., Ayo, J.O., Oyelowo, B.B., Khumran, A.M., Hassan, R., Oke-Ebgodo, B.E. and Idris, S.Y., 2019. Antioxidative Roles Of Ascorbic Acid and Tocopherol in Semen Preservation-A Review. *Journal of animal production research*. 31(2): 65-72.
- Bernecic, N.C., Donnellan, E., O'Callaghan, E., Kupisiewicz, K., O'Meara, C., Weldon, K., Lonergan, P., Kenny, D.A. and Fair, S., 2021. Comprehensive functional analysis reveals that acrosome integrity and viability are key variables distinguishing artificial insemination bulls of varying fertility. *Journal of Dairy Science*. 104(10): 11226-11241.
- Blakely, J dan D. H. Bade. 1985. Ilmu Peternakan Edisi IV. Penerjemah B. Srigandono. Penyunting Sudarsono. Gadjah Mada University Press. Yogyakarta

- Bucak, M.N., Ateşşahin, A. and Yüce, A., 2008. Effect of anti-oxidants and oxidative stress parameters on ram semen after the freeze–thawing process. *Small ruminant research*. 75(2-3):128-134.
- Buranaamnuay, K., 2019. Comparison of different methods for sperm vitality assessment in frozen-thawed Holstein bull semen. *The Thai Journal of Veterinary Medicine*. 49(3): 249-255.
- Castellini, C., Lattaioli, P., Bernardini, M., & Dal Bosco, A. 2000. *Effect of dietary α-tocopheryl acetate and ascorbic acid on rabbit semen stored at 5 °C. Theriogenology*. 54(4), 523–533
- Cheema, R.S., Bansal, A.K. and Bilaspuri, G.S., 2009. Manganese provides antioxidant protection for sperm cryopreservation that may offer new consideration for clinical fertility. *Oxidative Medicine and Cellular Longevity*, 2(3): 152-159.
- Chinoy, N.J., Mehta, R.R., Seethalakshmi, L., Sharma, J.D. and Chinoy, M.R., 1986. Effects of vitamin C deficiency on physiology of male reproductive organs of guinea pigs. *International journal of fertility*, 31(3): 232-239.
- Clulow, J.R., Mansfield, L.J., Morris, L.H.A., Evans, G. and Maxwell, W.M.C., 2008. A comparison between freezing methods for the cryopreservation of stallion spermatozoa. *Animal Reproduction Science*, 108(3-4): 298-308.
- Diansyah, A.M., 2022. Characteristic and kinematics of bali-polled bull sperms. *Advances in Animal and Veterinary Sciences*.
- Dolnik, M. dan Mudronova, D., 2021. Effects of Selenium on Bull's Sperm Oxidative Stress and Viability Under Conditions. *Folia Veterinaria*. 65(1):19-28.
- Donnelly, E. T. 1999. The effect of ascorbate and alpha-tocopherol supplementation in vitro on DNA integrity and hydrogen peroxide-induced DNA damage in human spermatozoa. *Mutagenesis*. 14(5): 505–512.
- Dorostkar, K., Alavi-Shoushtari, S.M. and Mokarizadeh, A., 2012. Effects of in vitro selenium addition to the semen extender on the spermatozoa characteristics before and after freezing in water buffaloes (*Bubalus bubalis*). In *Veterinary research forum*. 3(4): 263
- Eisenberg, S., 2007. Relative stability of selenites and selenates in feed premixes as a function of water activity. *Journal of AOAC International*. 90(2): 349-353.
- Elsayed, D.H., Shamy, A.A., Abdelrazek, H.M.A., dan El-Badry, D.A. 2019. Effect of genistein on semen quality, antioxidant capacity, caspase-3 expression

and DNA integrity in cryopreserved ram spermatozoa. *Small Ruminant Research*. 177: 50-55

Estudillo, E., Jiménez, A., Bustamante-Nieves, P.E., Palacios-Reyes, C., Velasco, I. and López-Ornelas, A., 2021. Cryopreservation of Gametes and Embryos and Their Molecular Changes. *International Journal of Molecular Sciences*, 22(19): 10864.

Farid, M., Arif, M., Prihantoko, K.D., Kusumawati, A., Wijayanti, A.D. dan Setyawan, E.M.N., 2021. Supplement effects of vitamin c, vitamin e and the combinations in semen extenders of kub chicken quality. *Adv. Anim. Vet. Sci.* 9(7): 1034-1039.

Feradis, F. 2010. *Bioteknologi Reproduksi pada Ternak*. Bandung: Alfabeta.

Feradis, F., 2009. Peranan Antioksidan Dalam Pembekuan Semen. *Jurnal Peternakan*, 6(2): 63-70

Flieger, J., Flieger, W., Baj, J. and Maciejewski, R., 2021. Antioxidants: Classification, natural sources, activity/capacity measurements, and usefulness for the synthesis of nanoparticles. *Materials*, 14(15): 4135.

Gangwar, C., Saxena, A., Patel, A., Singh, S.P., Yadav, S., Kumar, R. and Singh, V., 2018. Effect of reduced glutathione supplementation on cryopreservation induced sperm cryoinjuries in Murrah bull semen. *Animal reproduction science*. 192: 71-178.

Garner, D. L., & Hafez, E. S. E. 2016. Spermatozoa and Seminal Plasma. In B. Hafez & E. S. E. Hafez (Eds.), *Reproduction in Farm Animals*. 96–109

Gaweł, S., Wardas, M., Niedworok, E. dan Wardas, P., 2004. Malondialdehyde (MDA) as a lipid peroxidation marker. *Wiadomosci lekarskie (Warsaw, Poland: 1960)*. 57(9-10): 453-455.

Ghafarizadeh, A.A., Vaezi, G., Shariatzadeh, M.A. and Malekirad, A.A., 2018. Effect of in vitro selenium supplementation on sperm quality in asthenoteratozoospermic men. *Andrologia*. 50(2): 12869.

Gliozzi, T. M., Zaniboni, L., & Cerolini, S. 2011. DNA fragmentation in chicken spermatozoa during cryopreservation. *Theriogenology*. 75(9): 1613–1622.

Goshme, S., Asfaw, T., Demiss, C. and Besufekad, S., 2021. Evaluation of motility and morphology of frozen bull semen under different thawing methods used for artificial insemination in North Shewa zone, Ethiopia. *Heliyon*. 7(10): 08183.

Gualtieri, R., Kalthur, G., Barbato, V., Longobardi, S., Di Rella, F., Adiga, S.K. and Talevi, R., 2021. Sperm oxidative stress during in vitro manipulation and its

effects on sperm function and embryo development. *Antioxidants*. 10(7): 1025.

Gungor, Ş., Ata, A., Inanc, M.E. and Kastelic, J.P., 2019. Effect of various antioxidants and their combinations on bull semen cryopreservation. *Turkish Journal of Veterinary & Animal Sciences*. 43(5): 590-595.

Hacisevki, A., 2009. An overview of ascorbic acid biochemistry. *Journal of Faculty of Pharmacy of Ankara University*. 38(3): 233-255.

Hafez, E.S.E. and Hafez, B. 2013. *Reproduction in farm animals*. USA: John Wiley & Sons.

Hartati, Sumadi, dan Tety Hartatik. 2009. Identifikasi Karakteristik Genetik Sapi Peranakan Ongole Di Peternakan Rakyat. *Buletin Peternakan*. 33(2): 64-73

Herdis, Surachman, M., Darmawan, I.W.A. and Afifah, 2019, July. The role of sucrose as extracellular cryoprotectant in maintaining the Garut rams' frozen semen quality. In *AIP Conference Proceedings*. 2120(1): 08-019

Hu, J.-H., Tian, W.-Q., Zhao, X.-L., Zan, L.-S., Wang, H., Li, Q.-W., & Xin, Y.-P. 2010. *The cryoprotective effects of ascorbic acid supplementation on bovine semen quality*. *Animal Reproduction Science*. 121(1-2): 72-77

Ina, A.T. dan Alexander K., 2020. Preservation of spermatozoa Sumba Ongole bulls using citrate yolk diluent with the addition of palmyra palm juice. *Jurnal Ternak*. 11(2): 86-90.

Ismaya. 2014. *Bioteknologi inseminasi buatan pada sapi dan kerbau*. Gajah Mada University Press. Yogyakarta

Jamali, N.U., Kaka, A., Khatri, P., Malhi, M., Naeem, M., Memon, A.A., Kaleri, R.R., Janyaro, H. and Kalhor, D.H., 2019. Effect of in vitro Selenium Addition to the Semen Extender on the Spermatozoa Characteristics before and after Freezing in Kundhi Buffalo Bull and in vivo Fertility Rate. *Pak. J. Zool*. 51(1): 317-323.

Jang, T.H., Park, S.C., Yang, J.H., Kim, J.Y., Seok, J.H., Park, U.S., Choi, C.W., Lee, S.R. and Han, J., 2017. Cryopreservation and its clinical applications. *Integrative medicine research*, 6(1): 12-18.

Jayendran, R.S., 1984. Development of an assay to assess the functional integrity of the human sperm membrane and its relationship to the other semen characteristics. *J Reprod Fertil*. 70: 219-228.

- Junaedi, Arifiantini, R.I., Sumantri, C., Gunawan, A. 2016. Penggunaan Dimethyl Sulfoxide Sebagai Krioprotektan dalam Pembekuan Semen Ayam Kampung. *Jurnal Veteriner*. 17(2): 300-308
- Kao, S.H., Chao, H.T., Chen, H.W., Hwang, T.I., Liao, T.L. and Wei, Y.H., 2008. Increase of oxidative stress in human sperm with lower motility. *Fertility and sterility*. 89(5): 1183-1190.
- Karabulut, S., Demiroğlu-Zergeroğlu, A., Yılmaz, E., Kutlu, P. and Keskin, İ., 2018. Effects of human sperm cryopreservation on apoptotic markers in normozoospermic and non-normozoospermic patients. *Zygote*. 26(4): 308-313.
- Keputusan Menteri Pertanian Nomor 2841/Kpts/LB.430/8/2012. 2012. Penetapan Rumpun Sapi Peranakan Ongole.
- Khalil, W.A., El-Hairiry, M.A., Zeidan, A.E. and Hassan, M.A., 2019. Impact of selenium nano-particles in semen extender on bull sperm quality after cryopreservation. *Theriogenology*, 126: 121-127.
- Khan, I.M., Cao, Z., Liu, H., Khan, A., Rahman, S.U., Khan, M.Z., Sathanawongs, A. and Zhang, Y., 2021. Impact of cryopreservation on spermatozoa freeze-thawed traits and relevance omics to assess sperm cryo-tolerance in farm animals. *Frontiers in Veterinary Science*, 8(6): 09-018
- Kielczykowska, M., Kocot, J., Paździor, M. and Musik, I., 2018. Selenium-a fascinating antioxidant of protective properties. *Adv Clin Exp Med*. 27(2):245-255.
- Kondaparthi, P., Flora, S.J.S. dan Naqvi, S., 2019. Selenium nanoparticles: An insight on its Pro-oxidant and antioxidant properties. *Front. Nanosci. Nanotechnol*. 6: 1-5.
- Kumar, A., Prasad, J.K., Srivastava, N. and Ghosh, S.K., 2019. Strategies to minimize various stress-related freeze-thaw damages during conventional cryopreservation of mammalian spermatozoa. *Biopreservation and biobanking*. 17(6): 603-612.
- Kumar, H. dan Mahmood, S., 2001. The use of fast acting antioxidants for the reduction of cow placental retention and subsequent endometritis. *The Indian Journal of Animal Sciences*, 71(7): 1-10
- Kumar, U., Gawande, A.P., Sahatpure, S.K., Patil, M.S., Lakde, C.K., Bonde, S.W., Borkar, P.L., Poharkar, A.J. and Ramteke, B.R., 2015. Assessment of semen quality in pure and crossbred Jersey bulls. *Veterinary World*, 8(10): 1266.



- Kusuma, S.B., Ngadiyono, N. and Sumadi, S., 2017. Estimasi dinamika populasi dan penampilan reproduksi sapi peranakan ongole di Kabupaten Kebumen Provinsi Jawa Tengah. *Buletin Peternakan*. 41(3): 230-242.
- Kuswahyuni, I.S. 2008. Lingkar Skrotum, Volume Testis, Volume Semen dan Konsentrasi Spermatozoa pada Beberapa Bangsa Sapi Potong. *Agromedia*. 26 (1): 20-26.
- Layek, S.S., Mohanty, T.K., Kumaresan, A. and Parks, J.E., 2016. Cryopreservation of bull semen: Evolution from egg yolk based to soybeanbased extenders. *Animal Reproduction Science*, 172: 1-9.
- Linster, C. L., dan Van Schaftingen, E. 2006. Vitamin C: Biosynthesis, recycling and degradation in mammals. *FEBS Journal*. 274(1): 1–22
- Lodu, A.U.J., Kaka, A. and Sirappa, I.P., 2021. Karakteristik dan kualitas semen sapi Sumba Ongole dalam pengencer BTS yang dimodifikasi dengan susu kedelai. *Jurnal Sains dan Teknologi Peternakan*. 2(2):64-73.
- Lukusa, K., 2019. *Dietary supplementation of selenium and addition of vitamin C and E in extender to enhance semen cryopreservation and reproductive performance of Saanen goats*. [Disertasi]. Cape Town: University of Pretoria.
- Magdanz, V., Boryshpolets S, Ridzewski C, Eckel B, Reinhardt K. 2019. The motility-based swim-up technique separates bull sperm based on differences in metabolic rates and tail length. *PLoS. ONE*, 14(10): e0223576.
- Mahendra, H.C., Samsudewa, D. and Ondho, Y.S., 2018. Evaluation of semen quality of buffalo frozen semen produced by Artificial Insemination Center. *J. Indones. Trop. Anim. Agric*. 43(60): 26-34.
- Malewa, A.D. dan Al Mu'min, N., 2021. PO Cattle Population Dynamics In Sigi: Dinamika Populasi Sapi PO di Kabupaten Sigi. *Jurnal Ilmiah AgriSains*. 22(3): 126-135.
- Mangoli, E., Talebi, A.R., Anvari, M., Taheri, F., Vatanparast, M., Rahiminia, T. and Hosseini, A., 2018. Vitamin C attenuates negative effects of vitrification on sperm parameters, chromatin quality, apoptosis and acrosome reaction in neat and prepared normozoospermic samples. *Taiwanese Journal of Obstetrics and Gynecology*, 57(2): 200-204.
- Marchiani, S., Tamburrino, L., Ricci, B., Nosi, D., Cambi, M., Piomboni, P., Belmonte, G., Forti, G., Muratori, M. and Baldi, E., 2014. SUMO1 in human sperm: new targets, role in motility and morphology and relationship with DNA damage. *Reproduction*. 148(5): 453-467.

- Marco-Jimenez, F. and Akdemir, H. 2016. *Cryopreservation in eukaryotes*. Kroasia: BoD–Books on Demand.
- Medeiros CM, Forell F, Oliveira AT, Rodrigues JL. 2002. Current status of sperm cryopreservation: Why isn't it better? *Theriogenology*. 57:327–344
- Mottola, F., Iovine, C., Carannante, M., Santonastaso, M. and Rocco, L., 2022. In Vitro Combination of Ascorbic and Ellagic Acids in Sperm Oxidative Damage Inhibition. *International Journal of Molecular Sciences*. 23(23): 14751.
- Muthiapriani, L., Herwijanti, E., Novianti, I., Furqon, A., Septian, W.A. and Suyadi, S., 2019. The estimation of semen production based on body weight and scrotal circumference on PO Bull at Singosari National Artificial Insemination Center. *Jurnal Ilmu-Ilmu Peternakan (Indonesian Journal of Animal Science)*. 29(1):75-82.
- Njus, D., Kelley, P.M., Tu, Y.J. and Schlegel, H.B., 2020. Ascorbic acid: The chemistry underlying its antioxidant properties. *Free Radical Biology and Medicine*. 159:37-43.
- Nurcholis, N., Furqon, A., Arifiantini, R.I. and Salamony, S.M., 2021. Supplementation of Pandanus conoideus Oil in Cryopreservation Diluents for Maintaining the Semen Quality of Ongole Grade Bull. *Tropical Animal Science Journal*. 44(2):146-151.
- Ouyang, Y., Peng, Y., Li, J., Holmgren, A., & Lu, J. 2018. Modulation of thiol-dependent redox system by metal ions via thioredoxin and glutaredoxin systems. *Metallomics*. 10(2), 218–228.
- Paasch, U., Sharma, R.K., Gupta, A.K., Grunewald, S., Mascha, E.J., Thomas Jr, A.J., Glander, H.J. and Agarwal, A., 2004. Cryopreservation and thawing is associated with varying extent of activation of apoptotic machinery in subsets of ejaculated human spermatozoa. *Biology of reproduction*, 71(6): 1828-1837.
- Packer, L., Weber, S.U. dan Rimbach, G., 2001. Molecular aspects of  $\alpha$ -tocotrienol antioxidant action and cell signalling. *The Journal of nutrition*. 131(2): 369-373.
- Padayatty, S.J., Katz, A., Wang, Y., Eck, P., Kwon, O., Lee, J.H., Chen, S., Corpe, C., Dutta, A., Dutta, S.K. and Levine, M., 2003. Vitamin C as an antioxidant: evaluation of its role in disease prevention. *Journal of the American college of Nutrition*, 22(1): 8-35.



- Page, R. dan Rosenkrans Jr, C., 2019. Bovine Sperm Motility as Affected by Alpha Tocopherol and Ascorbic Acid during Storage. *Advances in Reproductive Sciences*. 7(2): 39-49.
- Pahune, P.P., Choudhari, A.R. dan Muley, P.A., 2013. The total antioxidant power of semen and its correlation with the fertility potential of human male subjects. *Journal of clinical and diagnostic research: JCDR*. 7(6): 991-995.
- Pardede, B.P., Supriatna, I., Yudi, Y. and Agil, M., 2020. Decreased bull fertility: Age-related changes in sperm motility and DNA fragmentation. In *E3S Web of Conferences*. 151: 01-010
- Pavlovic, V., Cekic, S., Rankovic, G. and Stoiljkovic, N., 2005. Antioxidant and pro-oxidant effect of ascorbic acid. *Acta Medica Medianae*. 44(1): 65-68.
- Pehlivan, F.E., 2017. Vitamin C: An antioxidant agent. *Vitamin C*. 2:23-35.
- Peña Jr, S.T., Gummow, B., Parker, A.J. and Paris, D.B., 2019. Antioxidant supplementation mitigates DNA damage in boar (*Sus scrofa domestica*) spermatozoa induced by tropical summer. *PLoS One*. 14(4): 0216143.
- Peris-Frau, P., Soler, A.J., Iniesta-Cuerda, M., Martín-Maestro, A., Sánchez-Ajofrín, I., Medina-Chávez, D.A., Fernández-Santos, M.R., García-Álvarez, O., Maroto-Morales, A., Montoro, V. and Garde, J.J., 2020. Sperm cryodamage in ruminants: understanding the molecular changes induced by the cryopreservation process to optimize sperm quality. *International journal of molecular sciences*, 21(8): 2781.
- Peyroche, G., Saveanu, C., Dauplais, M., Lazard, M., Beuneu, F., Decourty, L., Malabat, C., Jacquier, A., Blanquet, S. and Plateau, P. 2012. Sodium selenide toxicity is mediated by O<sub>2</sub>-dependent DNA breaks. *PloS one*. 7(5): 36343.
- Prihantoko, K.D., Arif, M., Kusumawati, A., Widayati, D.T. and Budiyanto, A., 2022. Evaluation of sperm DNA fragmentation using TUNEL assay in different animal species. *Adv. Anim. Vet. Sci*. 10(1): 14-19.
- Prihantoko, K.D., Yuliasuti, F., Haniarti, H., Kusumawati, A., Widayati, D.T. dan Budiyanto, A. 2020. The Acrosome Integrity Examination of Post-thawed Spermatozoa of Several Ongole Grade Bull in Indonesia Using Giemsa Staining Method. In *IOP Conference Series: Earth and Environmental Science*. 478(1): 1-9
- Prihantoko, K.D., Yuliasuti, F., Haniarti, H., Kusumawati, A., Widayati, D.T. and Budiyanto, A., 2020, March. The Effect of Genistein on the Plasma Membrane Integrity of Frozen Ongole Grade Bull Semen Based on Skim

Milk–Soy Lecithin Extender. In *IOP Conference Series: Earth and Environmental Science*. 465(1): 1-11

Prochowska, S., Nizański, W. and Fontbonne, A., 2022. Hypo-Osmotic Swelling Test (HOST) for feline spermatozoa: The simplified procedure and the aspect of sperm morphology. *Animals*. 12(7): 903.

Pubchem. 2022. *Ascorbic Acid (Compound)*. [Online]. Tersedia: <https://pubchem.ncbi.nlm.nih.gov/compound/Ascorbic-Acid#section=2D-Structure>. Diakses pada 17 November 2022 pukul 13.48 WIB

Pubchem. 2022. *Sodium selenite (Compound)*. [Online]. Tersedia: <https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-selenite#section=2D-Structure>. Diakses pada 17 November 2022 pukul 13.50 WIB

Rachmawati, A., Widyobroto, B.P., Bintara, S. and Susilawati, T. 2020. Effect of Different Bovine Serum Albumin (BSA) Levels on the Sperm Viability of Ongole Cross Bred Bull during 5° C Storage. In *IOP Conference Series: Earth and Environmental Science*. 478(1): 012068

Rachmawati, A., Widyobroto, B.P., Bintara, S. and Susilawati, T., 2021. Addition of bovine serum albumin (BSA) in cauda epididymal plasma-2 (CEP-2) extender to Ongole grade bull sperm motility and membrane integrity during the freezing process. In *IOP Conference Series: Earth and Environmental Science*. 788(1): 012-032

Rezaeian, Z., Yazdekhashti, H., Nasri, S., Rajabi, Z., Fallahi, P. dan Amidi, F., 2016. Effect of selenium on human sperm parameters after freezing and thawing procedures. *Asian Pacific Journal of Reproduction*. 5(6): 462-466.

Risher, J., 2011. *Toxicological profile for selenium (Update)*. DIANE Publishing:Georgia

Said, S., Agung, P.P., Putra, W.P.B., Anwar, S., Wulandari, A.S., and Sudiro, A. 2016. Selection of Sumba Ongole (SO) Cattle based on Breeding value and Performance Test. *Journal of the Indonesian Tropical Animal Agriculture*. 41(4): 175-187.

Sandoval-Vargas, L., Silva Jimenez, M., Risopatron Gonzalez, J., Villalobos, E.F., Cabrita, E. and Valdebenito Isler, I., 2021. Oxidative stress and use of antioxidants in fish semen cryopreservation. *Reviews in Aquaculture*. 13(1): 365-387.

Sanocka, D. and Kurpisz, M., 2004. Reactive oxygen species and sperm cells. *Reproductive biology and endocrinology*. 2(1): 1-7.

- Santoso, S., Herdis, H., Arifiantini, R.I., Gunawan, A. and Sumantri, C., 2021. Characteristics and potential production of frozen semen of Pasundan bull. *Tropical Animal Science Journal*. 44(1): 24-31.
- Saputra, D.J., Ihsan, M.N. and Isnaini, N., 2017. Korelasi antara lingkaran skrotum dengan volume semen, konsentrasi dan motilitas spermatozoa pejantan sapi Bali. *TERNAK TROPIKA Journal of Tropical Animal Production*. 18(2): 59-68.
- Satrio, F.A., Karja, N.W.K., Setiadi, M.A., Kaiin, E.M., Kurnia, A. dan Purwantara, B., 2022. Productivity And Fresh Semen Characteristics of Simmental Bull Different Ages. *Jurnal Kedokteran Hewan-Indonesian Journal of Veterinary Sciences*. 16(1): 23-28.
- Setyawan, E.E., Cooper, T.G., Widiasih, D.A., Junaidi, A. dan Yeung, C.H., 2009. Effects of cryoprotectant treatments on bovine sperm function and osmolyte content. *Asian journal of andrology*. 11(5): 571.
- Setyawan, E.M.N., Kim, M.J., Oh, H.J., Kim, G.A., Jo, Y.K., Lee, S.H., Choi, Y.B. dan Lee, B.C., 2015. Maintaining canine sperm function and osmolyte content with multistep freezing protocol and different cryoprotective agents. *Cryobiology*. 71(2): 344-349.
- Setyawan, E.M.N., Kim, M.J., Oh, H.J., Kim, G.A., Jo, Y.K., Lee, S.H., Choi, Y.B. and Lee, B.C., 2016. Spermine reduces reactive oxygen species levels and decreases cryocapacitation in canine sperm cryopreservation. *Biochemical and biophysical research communications*. 479(4): 927-932.
- Shahin, M.A., Khalil, W.A., Saadeldin, I.M., Swelum, A.A.A. and El-Harairy, M.A., 2020. Comparison between the effects of adding vitamins, trace elements, and nanoparticles to shotor extender on the cryopreservation of dromedary camel epididymal spermatozoa. *Animals*, 10(1): 8.
- Shukla, M.K., 2020. *Applied veterinary andrology and frozen semen technology*. New India Publishing Agency: India.
- Singh, A.K., Singh, V.K., Narwade, B.M., Mohanty, T.K. and Atreja, S.K., 2012. Comparative Quality Assessment of Buffalo (*Bubalus bubalis*) Semen Chilled (5 C) in Egg Yolk-and Soya Milk–Based Extenders. *Reproduction in domestic animals*, 47(4): 596-600.
- Singh, P., Agarwal, S., Singh, H., Singh, S., Verma, P.K., Butt, M.S. and Sharma, U., 2020. Effects of Ascorbic acid as antioxidant semen additive in cryopreservation of cross-bred cattle bull semen. *Int. J. Curr. Microbiol. App. Sci*. 9(7):3089-3099.

- Slaweta, R., Wařowicz, W., dan Laskowska, T. 1988. Selenium Content, Glutathione Peroxidase Activity, and Lipid Peroxide Level in Fresh Bull Semen and its Relationship to Motility of Spermatozoa After Freezing - Thawing. *Journal of Veterinary Medicine Series A*. 35(1-10):455–460.
- Srivastava, S., Singh, B., Alam, K., Kumar, R., Kumar, R. and Sharma, P., 2021. Testicular biometry, body-weight, seminal attributes and their correlations in Murrah bulls. *Indian Journal of Veterinary Sciences & Biotechnology*. 17(4): 26-30.
- Suherlan, N.E., 2015. Pengaruh penambahan berbagai tingkat DMF (dimethylformamide) sebagai agen krioprotektan terhadap keutuhan membran plasma dan recovery rate semen beku domba lokal. *Students e-Journal*. 4(4).
- Sulistiyowati, D., Faris, M.A., Yekti, A.P.A., Wahjuningsih, S. and Susilawati, T., 2018. Kualitas semen cair sapi Peranakan Ongole pada pengencer tris aminomethan kuning telur tanpa raffinosa yang disimpan pada media yang berbeda suhu. *Ternak Tropika Journal of Tropical Animal Production*, 19(1): 38-45.
- Sun, W., Jiang, S., Su, J., Zhang, J., Bao, X., Ding, R., Shi, P., Li, S., Wu, C., Zhao, G. and Cao, G., 2021. The effects of cryopreservation on the acrosome structure, enzyme activity, motility, and fertility of bovine, ovine, and goat sperm. *Animal Reproduction*. 17(4): 1-10
- Sunami, S., Isnaini, N. and Wahjuningsih, S., 2017. Kualitas semen segar dan recovery rate (RR) sapi Limousin pada musim yang berbeda. *Ternak Tropika Journal of Tropical Animal Production*. 18(1): 36-50.
- Suretno, N.D., Supriyatna, I., Purwanto, B. and Priyanto, R., 2018. Reproductive performance of peranakan ongole (PO) bull at different altitudes areas in Lampung province. In *IOP Conference Series: Earth and Environmental Science*. 102(1):012-020
- Susanti, Y., Priyarsono, D.S. and Mulatsih, S., 2014. Pengembangan peternakan sapi potong untuk peningkatan perekonomian provinsi Jawa Tengah: suatu pendekatan perencanaan wilayah. *Jurnal Agribisnis Indonesia (Journal of Indonesian Agribusiness)*. 2(2): 177-190
- Susilawati, T., 2011. *Spermatologi*. Malang: UB Press
- Takeda, K., Uchiyama, K., Kinukawa, M., Tagami, T., Kaneda, M. and Watanabe, S., 2015. Evaluation of sperm DNA damage in bulls by TUNEL assay as a parameter of semen quality. *Journal of Reproduction and Development*. 61(3): 185-190.

- Ugur, M.R., Saber Abdelrahman, A., Evans, H.C., Gilmore, A.A., Hitit, M., Arifiantini, R.I., Purwantara, B., Kaya, A. and Memili, E., 2019. Advances in cryopreservation of bull sperm. *Frontiers in veterinary science*. 6: 268.
- Vatannejad, A., Tavalani, H., Sadeghi, M.R., Karimi, M., Lakpour, N., Amanpour, S., Shabani Nashtaei, M. and Doosti, M., 2019. Evaluation of the NOX5 protein expression and oxidative stress in sperm from asthenozoospermic men compared to normozoospermic men. *Journal of Endocrinological Investigation*. 42(10): 1181-1189.
- Watson, P.F., 1975. Use of a Giemsa stain to detect changes in acrosomes of frozen ram spermatozoa. *The Veterinary Record*. 97(1): 12-15.
- Watson, P.F., 2000. The causes of reduced fertility with cryopreserved semen. *Animal reproduction science*. 60: 481-492.
- Whaley, D., Damyar, K., Witek, R.P., Mendoza, A., Alexander, M. and Lakey, J.R., 2021. Cryopreservation: An overview of principles and cell-specific considerations. *Cell Transplantation*. 30: 1-12
- Wolkers, W.F. dan Harlette O. 2021. *Cryopreservation and freeze-drying protocols*. USA: Humana Press
- Wyrobek, A.J., Eskenazi, B., Young, S., Arnheim, N., Tiemann-Boege, I., Jabs, E.W., Glaser, R.L., Pearson, F.S. and Evenson, D., 2006. Advancing age has differential effects on DNA damage, chromatin integrity, gene mutations, and aneuploidies in sperm. *Proceedings of the National Academy of Sciences*, 103(25): 9601-9606.
- Yahaq, M.A., Ondho, Y.S. and Sutyono, B., 2019. Pengaruh Penambahan Vitamin C dalam Pengencer Semen Sapi Limousin yang Dibekukan Terhadap Kualitas Post Thawing. *Jurnal Sain Peternakan Indonesia*, 14(4): 380-386.
- Yunusov, K.E., Sarymsakov, A.A., Turakulov, F.M., Rashidova, S.S., Yurkshtovich, T.L., Kokhan, A.V., Yurkshtovich, N.K., Alinovskaya, V.A., Bychkovskii, P.M., Golub, N.V. and Solomevich, S.O., 2021. Synthesis of Selenium Nanoparticles Stabilized with Sodium Carboxymethylcellulose for Preparation of a Long-Acting Form of Prospidine. *Russian Journal of Applied Chemistry*. 94:1259-1266.
- Zaenab, S. 2001. *Motilitas Spermatozoa Sapi Limousin dalam Berbagai Pengencer dan Krioprotektan pada Proses Kriopreservasi*. [Tesis]. Surabaya: Universitas Airlangga
- Zambonino, M.C., Quizhpe, E.M., Mouheb, L., Rahman, A., Agathos, S.N. and Dahoumane, S.A., 2023. Biogenic Selenium Nanoparticles in Biomedical

Sciences: Properties, Current Trends, Novel Opportunities and Emerging Challenges in Theranostic Nanomedicine. *Nanomaterials*, 13(3): 424.

Zarczynska, K., Sobiech, P., Radwinska, J. and Rekawek, W., 2013. Effects of selenium on animal health. *Journal of Elemenlogy*, 18(2): 329-340

Zhang, J., Wang, H., Bao, Y. and Zhang, L., 2004. Nano red elemental selenium has no size effect in the induction of seleno-enzymes in both cultured cells and mice. *Life sciences*. 75(2): 237-244.

Zhao, X.L., Li, Y.K., Cao, S.J., Hu, J.H., Wang, W.H., Hao, R.J., Gui, L.S. and Zan, L.S., 2015. Protective effects of ascorbic acid and vitamin E on antioxidant enzyme activity of freeze-thawed semen of Qinchuan bulls. *Genetics and Molecular Research*. 14(1): 2572-2581.

Zubair, M. Ali, M., Ahmad, M., Sajid, S. M., Ahmad, I., Gul, S. T., 2014: Effect of selenium and vitamin E on cryopreservation of semen and reproductive performance of animals (A review). *J. Entomol. Zool. Stud.* 1(3): 82-86.

Zubkova, E.V. and Robaire, B., 2006. Effects of ageing on spermatozoal chromatin and its sensitivity to in vivo and in vitro oxidative challenge in the Brown Norway rat. *Human Reproduction*. 21(11): 2901-290