

DAFTAR PUSTAKA

- Abraham M.C., H. Gustafsson., A. Ruete and Y. CB Brand. 2012. Breed influences on in vitro development of abattoir-derived bovine oocytes . *Acta Veterinaria Scandinavica* 2012, 54(36):1-6.
<https://actavetscand.biomedcentral.com/articles/10.1186/1751-0147-54-36>
- Accornero, P., Martignani, E., Miretti, S., Cucuzza, L. S., and Baratta, M. 2009. Epidermal growth factor and hepatocyte growth factor receptors collaborate to induce multiple biological responses in bovine mammary epithelial cells. *Journal of Dairy Science*, 92(8), 3667–3675.
<https://doi.org/10.3168/jds.2008-1835>
- Agarwal, A., Durairajanayagam, D., and du Plessis, S. S., 2014. Utility of antioxidants during assisted reproductive techniques: An evidence based review. *Reprod Biol Endocrinol*. 12(1), 1–19.
- Agarwal, A., Said, T. M., Bedaiwy, M. A., Banerjee, J., and Alvarez, J. G., 2006. Oxidative stress in an assisted reproductive techniques setting. *Fertility and Sterility*, 86:503–512. <https://doi.org/10.1016/j.fertnstert.2006.02.088>
- Ahmed, J. A., Dutta, D., and Nashiruddullah, N., 2015. Recovery of Different Cumulus Oocyte Complex (COC) Grades from Bovine Ovaries by Aspiration Method. *J Anim Res*. 5:631.
- Ahumada CJ, Salvador I, Cebrian-Serrano A, Lopera R, Silvestre MA. 2013. Effect of supplementation of different growth factors in embryo culture medium with a small number of bovine embryos on *in vitro* embryo development and quality. *Animal*. 7(3):455-462.
<https://doi.org/10.1017/S1751731112001991>
- Alfoteisy, B., Singh, J., and Anzar, M. 2020. Natural honey acts as a nonpermeating cryoprotectant for promoting bovine oocyte vitrification. *PLoS ONE*, 15(9 September 2020), 1–15.
<https://doi.org/10.1371/journal.pone.0238573>
- Arai M, Yoshioka S, Tasaki Y, Okuda K. 2013. Remodeling of bovine endometrium throughout the estrous cycle. *Anim Reprod Sci*. 142:1-9.
<https://doi.org/10.1016/j.anireprosci.2013.08.003>
- Arias, M. E., Sanchez, R., and Felmer, R., 2012. Evaluation of different culture systems with low oxygen tension on the development, quality and oxidative stress-related genes of bovine embryos produced *in vitro*. *Zygote*, 20:209–217. <https://doi.org/10.1017/S0967199411000025>
- Baco S, Yusuf M, Wello B, and Hatta M. 2013. Current status of reproductive management in bali cows in south sulawesi province, indonesia. *Open Journal of Forestry*, 03(04):4–6.
- Bakri, N. M., Ibrahim, S. F., Osman, N. A., Hasan, N., Jaffar, F. H. F., Rahman, Z. A., and Osman, K., 2016. Embryo apoptosis identification: Oocyte grade or cleavage stage? *Saudi J Biol Sci*. 23:S50–S55.
<https://doi.org/10.1016/j.sjbs.2015.10.023>
- Bansal, A. K., and Bilaspuri, G. S., 2011. Impacts of oxidative stress and

antioxidants on semen functions. *Vet Med Int*.

- Barros RG, Lima PF, Soares ACS, Sanches L, Price CA, Buratin J. 2019. Fibroblast growth factor 2 regulates cumulus differentiation under the control of the oocyte. *J Assist Reprod Genet*. 36:905–913. <https://doi.org/10.1007/s10815-019-01436-7>
- Berisha B, Sinowatz F, Schams D. 2004. Expression and localization of fibroblast growth factor (FGF) family members during the final growth of bovine ovarian follicles. *Mol. Reprod. Dev*. 67(2):162–171. <https://doi.org/10.1002/mrd.10386>
- BET-Cipelang. 2016. *Standar Operasional Prosedur (SOP) Seksi Produksi Dan Aplikasi (PA)*. Direktorat Jenderal Peternakan dan Kesehatan Hewan, Kementerian Pertanian
- Betts, D. H., and King, W. A. 2001. Genetic regulation of embryo death and senescence. *Theriogenology*, 55(1), 171–191. [https://doi.org/10.1016/S0093-691X\(00\)00453-2](https://doi.org/10.1016/S0093-691X(00)00453-2)
- Bó, G. A., and Mapletoft, R. J. 2013. Evaluation and classification of bovine embryos. *Anim. Reprod.*, 10(3), 344–348.
- Brad, A. M., Hendricks, K. E. M., and Hansen, P. J. 2007. The block to apoptosis in bovine two-cell embryos involves inhibition of caspase-9 activation and caspase-mediated DNA damage. *Reproduction*, 134(6), 789–797. <https://doi.org/10.1530/REP-07-0146>
- Burrue V, Klooster K, Barker CM, Pera RR, and Meyers S. 2014. Abnormal early cleavage events predict early embryo demise: Sperm oxidative stress and early abnormal cleavage. *Scientific Reports*, 4:1–10. DOI: <https://doi.org/10.1038/srep06598>
- Cañón-Beltrán, K., Cajas, Y. N., Pérez-Cerezales, S., Leal, C. L. V., Agirregoitia, E., Gutierrez-Adán, A., González, E. M., and Rizo, D. 2021. Nobiletin enhances the development and quality of bovine embryos *in vitro* during two key periods of embryonic genome activation. *Scientific Reports*, 11(1), 1–18. <https://doi.org/10.1038/s41598-021-91158-7>
- Cavallari, F. D. C., Leal, C. L. V., Zvi, R., and Hansen, P. J., 2019. Effects of melatonin on production of reactive oxygen species and developmental competence of bovine oocytes exposed to heat shock and oxidative stress during *in vitro* maturation. *Zygote*, 27:180–186.
- Cebrian-Serrano, A., Salvador, I., and Silvestre, M. A. 2013. Beneficial Effect of Two Culture Systems with Small Groups of Embryos on the Development and Quality of *In vitro*-Produced Bovine Embryos. *Journal of Veterinary Medicine Series C: Anatomia Histologia Embryologia*, 43(1), 22–30. <https://doi.org/10.1111/ahe.12043>
- Chang HM, Qiao J, Leung, PCK. 2016. Oocyte somatic cell interactions in the human ovary novel role of bone morphogenetic proteins and growth differentiation factors. *Hum Reprod Update*. 23(1):1–18. <https://doi.org/10.1093/humupd/dmw039>

- Chang, H.Y. and Yang, X. 2000. Proteases for Cell Suicide: Functions and Regulation of Caspase. *Microbiol. Mol. Biol. Rev.* 64: 821-846.
- Charpigny, G, Marquant-Le Guienne B, Richard C, Adenot P, Dubois O, Gélín V, Peynot N, Daniel N, Brochard V, Nuttinck F. 2021. PGE2 supplementation of oocyte culture media improves the developmental and cryotolerance performance of bovine blastocysts derived from a serum-free *in vitro* production system, mirroring the inner cell mass transcriptome. *Front Cell Dev Biol.* 9:1-20. <https://doi.org/10.3389/fcell.2021.672948>
- Chen S, Lien Y, Chao K, Ho H, Yang Y and Lee T. 2003. Effects of cryopreservation on meiotic spindles of oocytes and its dynamics after thawing: clinical implications in oocyte freezing—a review article. *Mol Cell Endocrinol* 202:101–107.
- Chian, R. C., Wang, Y., and Li, Y. R. 2014. Oocyte vitrification: Advances, progress and future goals. *Journal of Assisted Reproduction and Genetics*, 31(4), 411–420. <https://doi.org/10.1007/s10815-014-0180-9>
- Chiumia, D., Schulke, K., Groebner, A. E., Waldschmitt, N., Reichenbach, H. D., Zakhartchenko, V., Bauersachs, S. and Ulbrich, S. E. 2020. Initiation of conceptus elongation coincides with an endometrium basic fibroblast growth factor (FGF2) protein increase in heifers. *International Journal of Molecular Sciences*, 21(5), 1–11. <https://doi.org/10.3390/ijms21051584>
- Consensus Group, C. 2020. 'There is only one thing that is truly important in an IVF laboratory: everything' Cairo Consensus Guidelines on IVF Culture Conditions. *Reprod Biomed Online.* 40: 33–60.
- Conti, M., Hsieh, M., Park, J. Y. and Su, Y.Q. 2006. Role of the epidermal growth factor network in ovarian follicles. *Molecular Endocrinology*, 20(4), 715–723.
- Cooke, F. N. T., Pennington, K. A., Yang, Q. and Ealy, A. D. 2009. Several fibroblast growth factors are expressed during pre-attachment bovine conceptus development and regulate interferon-tau expression from trophectoderm. *Reproduction*, 137(2), 259–269. <https://doi.org/10.1530/REP-08-0396>
- De Castro, L. S., De Assis, P. M., Siqueira, A. F. P., Hamilton, T. R. S., Mendes, C. M., Losano, J. D. A., Nichi, M., Visintin, J. A., and Assumpção, M. E. O. A., 2016. Sperm oxidative stress is detrimental to embryo development: A dose-dependent study model and a new and more sensitive oxidative status evaluation. *Oxid Med Cell Longev.* 2016.
- Dhali, A. V. M. Anchamparathy., S.P. Butler. I.K. Mullarky., R. E. Pearson and F. C. Gwazdauskas. 2011. Development and quality of bovine embryos produced in vitro using growth factor supplemented serum-free system. *Journal of Animal Sciences.* 1 (3): 97-105.
- Du Plessis, S. S., Agarwal, A., Halabi, J. and Tvrda, E., 2015. Contemporary evidence on the physiological role of reactive oxygen species in human sperm function. *Journal of Assisted Reproduction and Genetics*, 32:509–520. <https://doi.org/10.1007/s10815-014-0425-7>

- Dunning KR, Watson LN, Sharkey DJ, Brown HM, Norman RJ, Thompson JG. 2012. Molecular filtration properties of the mouse expanded cumulus matrix: controlled supply of metabolites and extracellular signals to cumulus cells and the oocyte. *Biol Reprod.* 87(4):89. <https://doi.org/10.1095/biolreprod.111.096271>
- El-Aziz AHA, Mahrous UE, Kamel HZ and Sabek AA. 2016. Factors influencing *in vitro* production of bovine embryos: a review. *Asian J Anim Vet Adv.* 11(12):737-756. <https://doi.org/10.3923/ajava.2016.737.756>
- Elnahas, A., Alcolak, E., Marar, E. A., Elnahas, T., Elnahas, K., Palapelas, V., Diedrich, K. and Al-Hasani, S. 2010. Vitrification of human oocytes and different development stages of embryos: An overview. *Middle East Fertility Society Journal*, 15(1), 2–9. <https://doi.org/10.1016/j.mefs.2010.03.013>
- Eriani K, Sunarti, Nasir M and Djuwita I. 2016. Effect of Serum Free Media Culture on Preimplantation Development of Mouse Embryos *in vitro*. *Jurnal Kedokteran Yarsi.* 16(1):028-032.
- Evron A, Blumenfeld Z and Adashi EY. 2015. The role of growth factors in ovarian function and development. *Glob libr women's med.* 1-34.
- Faizah, Z., Darsini, N., and Hinting, A. (2017). Fertilization of Bovine Oocytes Vitrified Pre- and Post *in vitro* Maturation. *Folia Medica Indonesiana*, 52(2), 104. <https://doi.org/10.20473/fmi.v52i2.5222>
- Feugang JM, Camargo-Rodríguez O and Memili E. 2009. Culture systems for bovine embryos. *Livestock Science* 121: 141–149.
- Fujihara, Y., Lu, Y., Noda, T., Oji, A., Larasati, T., Kojima-Kita, K., Yu, Z., Matzuk, R. M., Matzuk, M. M. and Ikawa, M. 2020. Spermatozoa lacking Fertilization Influencing Membrane Protein (FIMP) fail to fuse with oocytes in mice. *Proceedings of the National Academy of Sciences of the United States of America*, 117(17), 9393–9400. <https://doi.org/10.1073/pnas.1917060117>
- Galluzzi L, Vitale I, Aaronson SA, Abrams JM, Adam D, Agostinis P, Alnemri ES, Altucci L, Amelio I, Andrews DW, Annicchiarico-Petruzzelli M, Antonov AV, Arama E, Baehrecke EH, Barlev NA, Bazan NG, Bernassola F, Bertrand MJM, Bianchi K and Kroemer G. 2018. *Cell Death and Differentiation*, 25(3): 486–541. DOI: <https://doi.org/10.1038/s41418-017-0012-4>
- Garcia, S. M., Marinho, L. S. R., Lunardelli, P. A., Seneda, M. M., and Meirelles, F. V. 2015. Developmental block and programmed cell death in *bos indicus* embryos: Effects of protein supplementation source and developmental kinetics. *PLoS ONE*, 10(3), 1–16. <https://doi.org/10.1371/journal.pone.0119463>
- Giotto, A. B., Brum, D. D. S., Santos, F. W., Guimarães, A. C. G., Gonçalves, C. G. M., Pavin, C. I. U. M., Folchini, N. P., Moyses, A. B., Missio, D., and Leivas, F. G. 2015. Oxygen tension and oocyte density during *in vitro* maturation affect the *in vitro* fertilization of bovine oocytes. *Semin Agrar.* 36:4277–4287. <https://doi.org/10.5433/1679-0359.2015v36n6Supl2p4277>

- Gjørret, J. O., Knijn, H. M., Dieleman, S. J., Avery, B., Larsson, L. I., & Maddox-Hyttel, P. 2003. Chronology of apoptosis in bovine embryos produced in vivo and in vitro. *Biology of Reproduction*, 69(4), 1193–1200. <https://doi.org/10.1095/biolreprod.102.013243>
- Goovaerts, I. G. F., Leroy, J. L. M. R., Jorssen, E. P. A. and Bols, P. E. J. 2010. Noninvasive bovine oocyte quality assessment: Possibilities of a single oocyte culture. *Theriogenology*, 74(9), 1509–1520. <https://doi.org/10.1016/j.theriogenology.2010.06.022>
- Gordon I. 2003. Laboratory Production of Cattle Embryos. Ed ke-2. London: CABI Publishing.
- Gunawan, M., Pratiwi, P. A., Kaiin, E. M. and Sjahfirdi, L. 2021. The effect of addition glutathione antioxidant on vitrification medium to the viability of Garut sheep (*Ovis aries*) oocytes. *Journal of Physics: Conference Series*, 1725(1), 8–13. <https://doi.org/10.1088/1742-6596/1725/1/012049>
- Gupta S and Banerjee J, A. A. 2006. *The Impact of Reactive Oxygen Species on Early Human Embryos.*;1.2No Title. 1(2).
- Gustina, S., Karja, N. W. K., Hasbi, H., Setiadi, M. A. and Supriatna, I. 2019. Hydrogen peroxide concentration and DNA fragmentation of buffalo oocytes matured in sericin-supplemented maturation medium. *South African Journal of Animal Sciences*, 49(2), 228–234. <https://doi.org/10.4314/sajas.v49i2.3>
- Hadi, R. S. 2011. Mekanisme Apoptosis Pada Regresi Sel Luteal. *Majalah Kesehatan PharmaMedika*, 3(1), 246–254. <http://indonesia.digitaljournals.org/index.php/kespha/article/view/1084/1084>
- Hall, J. B., and Glaze, J. B., 2014. Review: System application of sexed semen in beef cattle. *Prof Anim Sci*. 30(3): 279–284. [https://doi.org/10.15232/S1080-7446\(15\)30118-2](https://doi.org/10.15232/S1080-7446(15)30118-2)
- Han, Y., and Chen, J. Z. 2013. Oxidative stress induces mitochondrial DNA damage and cytotoxicity through independent mechanisms in human cancer cells. *Biomed Res Int*. 2013. <https://doi.org/10.1155/2013/825065>
- Hansen, P. J. 2020. The incompletely fulfilled promise of embryo transfer in cattle-why aren't pregnancy rates greater and what can we do about it? *Journal of Animal Science*, 98(11), 1–20. <https://doi.org/10.1093/jas/skaa288>
- Hardy, M. L. M., Day, M. L., and Morris, M. B. 2021. Redox regulation and oxidative stress in mammalian oocytes and embryos developed in vivo and in vitro. *International Journal of Environmental Research and Public Health*, 18(21).
- Hardy, K., Stark, J., and Winston, R. M. L., 2003. Maintenance of the inner cell mass in human blastocysts from fragmented embryos. *Biol Reprod*. 68: 1165–1169. <https://doi.org/10.1095/biolreprod.102.010090>
- Hasbi H, Sonjaya H, and Gustina S. 2020. Cleavage ability of *in vitro* embryos of Bali cattle based on different reproductive status of ovary at 48 hours after

- fertilization process. *IOP Conf. Series: Earth and Environmental Science*. 492.
- Hasbi, H., Gustina, S., Karja, N. W. K., Supriatna, I. and Setiadi, M. A. 2017. Insulin-like growth factor-I concentration in the follicular fluid of Bali cattle and its role in the oocyte nuclear maturation and fertilization rate. *Media Peternakan*, 40(1), 7–13. <https://doi.org/10.5398/medpet.2017.40.1.7>
- Hasbi, H., Sonjaya, H. and Gustina, S. 2020. Cleavage ability of *in vitro* embryos of Bali cattle based on different reproductive status of ovary at 48 hours after fertilization process. *IOP Conference Series: Earth and Environmental Science*, 492(1). <https://doi.org/10.1088/1755-1315/492/1/012069>
- Hasbi, S. Gustina., N. W. K. Karja., I. Supriatna dan M. A. Setiadi. 2018. Efektivitas insulin-like growth factor-i (igf-i) dalam media maturasi *in vitro* pada pematangan inti dan fertilisasi oosit sapi Bali. *Acta Veterinaria Indonesiana*. 6 (1): 24-29.
- Hassa, H., Aydın, Y., and Taplamacıoğlu, F. 2014. The role of perivitelline space abnormalities of oocytes in the developmental potential of embryos. *Journal of the Turkish German Gynecology Association*, 15(3), 161–163.
- He M, Zhang T, Yang Y, Wang C. 2021. Mechanisms of oocyte maturation and related epigenetic regulation. *Front Cell Dev Biol*. 9:1-18.
- Hu, K. H., Li, W. X., Sun, M. Y., Zhang, S. B., Fan, C. X., Wu, Q., Zhu, W., and Xu, X. 2015. Cadmium induced apoptosis in MG63 cells by increasing ROS, activation of p38 MAPK and inhibition of ERK 1/2 pathways. *Cell Physiol Biochem*. 36: 642–654. <https://doi.org/10.1159/000430127>
- Jain, J. K., and Paulson, R. J. 2006. Oocyte cryopreservation. *Fertility and Sterility*, 86(4 SUPPL.), 1037–1046. <https://doi.org/10.1016/j.fertnstert.2006.07.1478>
- Jung, Y. J., and Cheon, Y.P. 2014. Improvement of the Vitrification Method Suppressing the Disturbance of Meiotic Spindle and Chromosome Systems in Mature Oocytes. *Development and Reproduction*, 18(2), 117–125. <https://doi.org/10.12717/dr.2014.18.2.117>
- Kakkassery MP, Vijayakumaran V, and Sreekumaran T. 2010. Effect of cumulus oocyte complex morphology on *in vitro* maturation of bovine oocytes. *Journal of Veterinary and Animal Sciences*, January.
- Karja, N. W. ., Aqshani, W. P., Kusumawati, Y. P., Pravitasari, V. G., Gustari, S., Fauna, J., and Yogyakarta, N. 2010. *Inti Oosit Kelinci Setelah Dimaturasi Secara In vitro*. 11(3), 173–178.
- Keefe, D. L., Franco, S., Liu, L., Trimarchi, J., Cao, B., Weitzen, S., Agarwal, S., and Blasco, M. A. 2005. Telomere length predicts embryo fragmentation after *in vitro* fertilization in women - Toward a telomere theory of reproductive aging in women. *American Journal of Obstetrics and Gynecology*, 192(4), 1256–1260. <https://doi.org/10.1016/j.ajog.2005.01.036>
- Khalili, M. A., Maione, M., Palmerini, M. G., Bianchi, S., Macchiarelli, G., and Nottola, S. A. 2012. Ultrastructure of human mature oocytes after

- vitrification. *European Journal of Histochemistry*, 56(3), 236–242. <https://doi.org/10.4081/ejh.2012.e38>
- Kharche SD, Goel P, Jha BK, Goel AK, and Jindal SK. 2011. Factors influencing in-vitro embryo production efficiency of caprine oocytes: A review. *Indian Journal of Animal Sciences*, 81(4): 344–361.
- Koutlaki-Kourti, N., Schoepper, B., Maroulis, G., Diedrich, K. and Al-Hasani, S. 2006. Human oocyte cryopreservation: Past, present and future. *Reproductive BioMedicine Online*, 13(3), 427–436. [https://doi.org/10.1016/s1472-6483\(10\)61449-6](https://doi.org/10.1016/s1472-6483(10)61449-6)
- Krisher, R. L., 2004. The effect of oocyte quality on development. *J Anim Sci*. 82 *E-Suppl*:14–23. https://doi.org/10.2527/2004.8213_supplE14x
- Krishnaswamy N, Lacroix-Pepin N, Chapdelaine P, Taniguchi H, Kauffenstein G, Chakravarti A, Danyod G and Fortier MA. 2010. Epidermal growth factor receptor is an obligatory intermediate for oxytocin induced cyclooxygenase 2 expression and prostaglandin F2alpha production in bovine endometrial epithelial cells. *Endocrinology*. 151:1367-1374.
- Kumar S, Singla SK, Manik R, Palta P and Chauhan MS. 2020. Effect of basic fibroblast growth factor (FGF2) on cumulus cell expansion, *in vitro* embryo production and gene expression in buffalo (*Bubalus bubalis*). *Reprod Bio*. 1-12. <https://doi.org/10.1016/j.repbio.2020.08.003>
- Kurowska P, Mlyczyńska E, Dupont J and Rak A. 2020. Novel insights on the corpus luteum function: Role of vaspin on porcine luteal cell angiogenesis, proliferation and apoptosis by activation of GRP78 receptor and MAP3/1 kinase pathways. *Int. J. Mol. Sci.* 21(18):1-17. <https://doi.org/10.3390/ijms21186823>
- Lee, M. J., Lee, R. K. K., Lin, M. H., and Hwu, Y. M., 2012. Cleavage speed and implantation potential of early-cleavage embryos in IVF or ICSI cycles. *J Assist Reprod Genet.* 29:745–750. <https://doi.org/10.1007/s10815-012-9777-z>
- Leidenfrost, S., Boelhaue, M., Reichenbach, M., Güngör, T., Reichenbach, H. D., Sinowatz, F., Wolf, E. and Habermann, F. A. 2011. Cell arrest and cell death in mammalian preimplantation development: Lessons from the bovine model. *PLoS ONE*, 6(7). <https://doi.org/10.1371/journal.pone.0022121>
- Li, X. H., Chen, S. U., Zhang, X., Tang, M., Kui, Y. R., Wu, X., Wang, S., and Guo, Y. L. 2005. Cryopreserved oocytes of infertile couples undergoing assisted reproductive technology could be an important source of oocyte donation: A clinical report of successful pregnancies. *Human Reproduction*, 20(12), 3390–3394. <https://doi.org/10.1093/humrep/dei262>
- Lim W, Bae H, Bazer FW and Song FW. 2018. Fibroblast growth factor 2 induces proliferation and distribution of G2/M phase of bovine endometrial cells involving activation of PI3K/AKT and MAPK cell signaling and prevention of effects of ER stress. *J Cell Physiol*. 233:3295–3305.
- Lin, J., and Wang, L. 2021. Oxidative Stress in Oocytes and Embryo

Development: Implications for *in vitro* Systems. *Antioxidants Redox Signal.*, 34:1394–1406. <https://doi.org/10.1089/ars.2020.8209>

- Lo NW, Intawicha P, Chiu YT, Lee KH, Lu HC, Chen CH, Chang YH, Chen CD, Ju JC. 2015. Leukemia inhibitory factor and fibroblast growth factor 2 critically and mutually sustain pluripotency of rabbit embryonic stem cells. *Cell Transplant.* 24. 319–338. <https://doi.org/10.3727/096368915X686832>
- Lonergan, P., Pedersen, H. G., Rizos, D., Greve, T., Thomsen, P. D., Fair, T., Evans, A., and Boland, M. P. 2004. Effect of the post-fertilization culture environment on the incidence of chromosome aberrations in bovine blastocysts. *Biology of Reproduction*, 71(4), 1096–1100.
- Loo, D. T. 2011. In situ detection of apoptosis by the TUNEL assay: an overview of techniques. In *DNA Damage Detection In Situ, Ex Vivo, and In Vivo*. Humana Press, Totowa, NJ, 682, 3–13. <https://doi.org/10.1007/978-1-60327-409-8>
- Loren, P., Sánchez, R., Arias, M. E., Felmer, R., Risopatrón, J., and Cheuquemán, C., 2017. Melatonin scavenger properties against oxidative and nitrosative stress: Impact on gamete handling and *in vitro* embryo production in humans and other mammals. *Int J Mol Sci.* 18:1–17. <https://doi.org/10.3390/ijms18061119>
- Luo Y, Zhang R, Gao J, Wang Y, Zhang W, Qing S. 2020. The localization and expression of epidermal growth factor and epidermal growth factor receptor in bovine ovary during oestrous cycle. In *Reproduction in Domestic Animals*. 55(7). <https://doi.org/10.1111/rda.13690>
- Lv, L., Yue, W., Liu, W., Ren, Y., Li, F., Lee, K. B., and Smith, G. W. 2010. Effect of oocyte selection, estradiol and antioxidant treatment on *in vitro* maturation of oocytes collected from prepubertal Boer goats. *Italian Journal of Animal Science*, 9(1), 50–54. <https://doi.org/10.4081/ijas.2010.e11>
- MacHado, S. A., Reichenbach, H. D., Weppert, M., Wolf, E., and Gonçalves, P. B. D. 2006. The variability of ovum pick-up response and *in vitro* embryo production from monozygotic twin cows. *Theriogenology*, 65(3), 573–583. <https://doi.org/10.1016/j.theriogenology.2005.04.032>
- Malenko, G.P., E. V. Kornienko., I. I. Nesterov, G. Y. Kosovsky. 2017. A new simple and reable vitrification device based on hollow fiber Vitrification (HFV) method evaluated using IVP bovine embryos. *Animal Reproduction*. 14 (2): 392-399.
- Mani AM, Fenwick MA, Cheng Z, Sharma MK, Singh D and Wathes DC. 2010. IGF1 induces up-regulation of steroidogenic and apoptotic regulatory genes via activation of phosphatidylinositoldependent kinase/AKT in bovine granulosa cells. *Reproduction* 139:139-151
- Manjunatha, B. M., J. P. Ravindra., P. S. P. Gupta., M. Devaraj., T. G. Honnappa and A. Krishnaswamy. 2009. Post-thaw development of *in vitro* produced buffalo embryos cryopreserved by cytoskeletal stabilization and vitrification. *J. Vet. Sci.* 10(2): 153-156.

- Marsico, T. V., de Camargo, J., Valente, R. S. and Sudano, M. J. 2019. Embryo competence and cryosurvival: Molecular and cellular features. *Animal Reproduction*, 16(3), 423–439. <https://doi.org/10.21451/1984-3143-AR2019-0072>
- Martins, T., Sponchiado, M., Ojeda-Rojas, O. A., Gonella-Diaza, A. M., Batista, E. O. S., Cardoso, B. O., Rocha, C. C., Basso, A. C., and Binelli, M., 2018. Exacerbated conceptus signaling does not favor establishment of pregnancy in beef cattle. *J Anim Sci Biotechnol.* 9:1–12. <https://doi.org/10.1186/s40104-018-0302-9>
- Mata-Campuzano, M., Álvarez-Rodríguez, M., del Olmo, E., Fernández-Santos, M. R., Garde, J. J., and Martínez-Pastor, F. 2012. Quality, oxidative markers and DNA damage (DNA) fragmentation of red deer thawed spermatozoa after incubation at 37 °C in presence of several antioxidants. *Theriogenology*, 78:1005–1019. <https://doi.org/10.1016/j.theriogenology.2011.12.018>
- Matwee, C., Betts, D. H. and King, W. A. 2000. Apoptosis in the early bovine embryo. *Zygote*, 8(1), 57–68. <https://doi.org/10.1017/S0967199400000836>
- Medina, V.A, Butler, W.R. and Gilbert., R.O. 2014. Preimplantation embryo metabolism and culture systems: experience from domestic animals and clinical implications. *J. Assist. Reprod. Genet.* 31:393–409.
- Méo, S.C., Yamazaki, W., Leal, C.L.V., De Oliveira, J.A. and Garcia, J.M. 2005. Use of strontium for bovine oocyte activation. *Theriogenology*, 63: 2089-2102. <https://doi.org/10.1016/j.theriogenology.2004.08.012>
- Merton, J. S., de Roos, A. P. W., Koenen, E. P. C., Roelen, B. A. J., Vos, P. L. A. M., Mullaart, E. and Knijn, H. M. 2012. Bovine OPU-Derived Oocytes can be Matured *In vitro* for 16-28h with Similar Developmental Capacity. *Reproduction in Domestic Animals*, 47(6), 1037–1042.
- Michael DD, Alvarez IM, Ocon OM, Powell AM, Talbot NC, Johnson SE, Ealy AD. 2006. Fibroblast growth factor-2 is expressed by the bovine uterus and stimulates interferon-t production in bovine trophectoderm. *Endocrinology*. 147.3571–3579. <https://doi.org/10.1210/en.2006-0234>
- Milazzotto, M. P., de Lima, C. B., da Fonseca, A. M., dos Santos, E. C., and Ispada, J. 2020. Erasing gametes to write blastocysts: Metabolism as the new player in epigenetic reprogramming. *Anim Reprod.* 17:1–23. <https://doi.org/10.1590/1984-3143-AR2020-0015>
- Milewski, R., Szpila, M. and Ajduk, A., 2018. Dynamics of cytoplasm and cleavage divisions correlates with preimplantation embryo development. *Reproduction.* 155:1–14. <https://rep.bioscientifica.com/view/journals/rep/155/1/REP-17-0230.xml>
- Mishra SR, Thakur N, Somal A, Parmar, MS, Reshma R and Rajesh G. 2016. Expression and localization of fibroblast growth factor (FGF) family in buffalo ovarian follicle during different stages of development and modulatory role of FGF2 on steroidogenesis and survival of cultured buffalo granulosa cells. *Res Vet Sci.* 108:98–111. <https://doi.org/10.1016/j.rvsc.2016.08.012>

- Mizobe, Y., Tokunaga, M., Oya, N., Iwakiri, R., Yoshida, N., Sato, Y., Onoue, N., and Ezono, Y., 2018. Synchrony of the first division as an index of the blastocyst formation rate during embryonic development. *Reprod Med Biol.* 17: 64–70. <https://doi.org/10.1002/rmb2.12070>
- Monzo, C., Haouzi, D., Roman, K., Assou, S., Dechaud, H., & Hamamah, S. (2012). Slow freezing and vitrification differentially modify the gene expression profile of human metaphase II oocytes. *Human Reproduction*, 27(7), 2160–2168. <https://doi.org/10.1093/humrep/des153>
- Morris SA, Teo RTY, Li H, Robson P, Glover DM, and Zernicka-Goetz M. 2010. Origin and formation of the first two distinct cell types of the inner cell mass in the mouse embryo. *Proceedings of the National Academy of Sciences of the United States of America*, 107(14): 6364–6369.
- Nandi A, Yan LJ, Jana CK, and Das N. 2019. Role of catalase in oxidative stress- and age-associated degenerative diseases. *Oxidative medicine and cellular longevity*. *Oxidative Medicine and Cellular Longevity*, 1–19.
- Nissanka, N. and Moraes, C.T., 2018. Mitochondrial DNA damage and reactive oxygen species in neuro degenerative disease. *FEBS Letters*. 592:28–742. <https://febs.onlinelibrary.wiley.com/doi/10.1002/1873-3468.12956>
- Noverina R, Widowati W, Ayuningtyas W, Kurniawan D, Afifah E, Laksmiawati DR, Rinendyaputri R, Rilianawati R, Faried A, Bachtia I, Wirakusumah FF. 2019. Growth factors profile in conditioned medium human adipose tissue-derived mesenchymal stem cells (CM-hATMSCs). *Clin Nutr Exp*. 24: 34-44. <https://doi.org/10.1016/j.yclnex.2019.01.002>
- Noyes, N., Knopman, J., Labella, P., McCaffrey, C., Clark-Williams, M., and Grifo, J. 2010. Oocyte cryopreservation outcomes including pre-cryopreservation and post-thaw meiotic spindle evaluation following slow cooling and vitrification of human oocytes. *Fertility and Sterility*, 94(6), 2078–2082. <https://doi.org/10.1016/j.fertnstert.2010.01.019>
- Ocon-Grove OM, Cooke FN, Alvarez IM, Johnson SE, Ott TL, Ealy AD. 2008. Ovine endometrial expression of fibroblast growth factor (FGF) 2 and conceptus expression of FGF receptors during early pregnancy. *Dom Anim Endoc.* 34. 135–145. <https://doi.org/10.1016/j.domaniend.2006.12.002>
- Oliveira, C. S., de Barros, B. A. F., Monteiro, C. A. S., Rosa, P. M. S., Leal, G. R., Serapião, R. V. and Camargo, L. S. A. 2019. Individual assessment of bovine embryo development using a homemade chamber reveals kinetic patterns of success and failure to reach blastocyst stage. *Systems Biology in Reproductive Medicine*, 65(4), 301–311.
- Parmegiani, L., Tatone, C., Cognigni, G. E., Bernardi, S., Troilo, E., Arnone, A., Maccarini, A. M., Di Emidio, G., Vitti, M. and Filicori, M. 2014. Rapid warming increases survival of slow-frozen sibling oocytes: A step towards a single warming procedure irrespective of the freezing protocol? *Reproductive BioMedicine Online*, 28(5), 614–623. <https://doi.org/10.1016/j.rbmo.2014.01.015>

- Pascarelli S, Merzhakupova D, Uechi GI and Laurino P. 2021. Binding of single-mutant epidermal growth factor (EGF) ligands alters the stability of the EGF receptor dimer and promotes growth signaling. *J Biol Chem.* 297(1):1-14. <https://doi.org/10.1016/j.jbc.2021.100872>
- Perkins, A. T., Das, T. M., Panzera, L. C., and Bickel, S. E., 2016. Oxidative stress in oocytes during midprophase induces premature loss of cohesion and chromosome segregation errors. *Proc Natl Acad Sci U S A.* 113:E6823–E6830. <https://doi.org/10.1073/pnas.1612047113>.
- Pohland R and Tiemann U. 1994. Immunohistochemical localization of the epidermal growth factor and its binding sites in the bovine female reproductive tract. *J Reprod Fertil. Abstract Series 14:* abstract 56.
- Porcu, E., Tranquillo, M. L., Notarangelo, L., Ciotti, P. M., Calza, N., Zuffa, S., Mori, L., Nardi, E., Dirodi, M., Cipriani, L., Labriola, F. S. and Damiano, G. 2021. High-security closed devices are efficient and safe to protect human oocytes from potential risk of viral contamination during vitrification and storage especially in the COVID-19 pandemic. *Journal of Assisted Reproduction and Genetics*, 38(3), 681–688. <https://doi.org/10.1007/s10815-021-02062-y>
- Porcu, E., Venturoli, S., Damiano, G., Ciotti, P. M., Notarangelo, L., Paradisi, R., Moscarin, M. and Ambrosini, G. 2008. Healthy twins delivered after oocyte cryopreservation and bilateral ovariectomy for ovarian cancer. *Reproductive BioMedicine Online*, 17(2), 265–267. [https://doi.org/10.1016/S1472-6483\(10\)60204-0](https://doi.org/10.1016/S1472-6483(10)60204-0)
- Prasad S, Prakash C, Rohit K, Karunakaran M, Santra A and Subrata KD. 2018. Development of cattle embryo through *in vitro* technique using epidermal growth factor as a media supplement. *Int J Bio-resource Stress Mana.* 9(6):69-694. <https://doi.org/10.23910/ijbsm/2018.9.6.1923>
- Putra TD, Bintara S, Widayati DT, Panjono and Baliarti E. 2019. Physiological conditions of Bali cattle based on daily temperature-humidity index (THI) in oil palm plantation. *IOP Conference Series: Earth and Environmental Science*, 387(1). <https://doi.org/10.1088/1755-1315/387/1/012125>
- Qian, D., Li, Z., Zhang, Y., Huang, Y., Wu, Q., Ru, G., Chen, M. and Wang, B., 2016. Response of Mouse Zygotes Treated with Mild Hydrogen Peroxide as a Model to Reveal Novel Mechanisms of Oxidative Stress-Induced Injury in Early Embryos. *Oxid Med Cell Longev.* 2016.
- Rahman, M. B., Vandaele, L., Rijsselaere, T., Zhandi, M., Maes, D., Shamsuddin, M., and Van Soom, A., 2012. Oocyte quality determines bovine embryo development after fertilisation with hydrogen peroxide-stressed spermatozoa. *Reprod Fertil Dev*, 24: 608–618.
- Ramos-Ibeas, P., Gimeno, I., Cañón-Beltrán, K., Gutiérrez-Adán, A., Rizos, D., & Gómez, E. (2020). Senescence and Apoptosis During *in vitro* Embryo Development in a Bovine Model. *Frontiers in Cell and Developmental Biology*, 8(December), 1–18. <https://doi.org/10.3389/fcell.2020.619902>

- Reineri PS, Coria MS, Barrionuevo MG, Hernández O, Callejas S, Palma GA. 2018. Gene expression of growth factor BMP15, GDF9, FGF2 and their receptors in bovine follicular cells. *Rev MVZ Córdoba*. 23(3):6778-6787. <https://doi.org/10.21897/rmvz.1367>
- Richani D and Gilchrist RB. 2018. The epidermal growth factor network: Role in oocyte growth, maturation and developmental competence. *Hum Reprod Update*. 24(1):1-14. <https://doi.org/10.1093/humupd/dmx029>
- Rizos, Ward F, Duffy P, Boland MP and Lonergan P. 2002. Consequences of bovine oocyte maturation, fertilization or early embryo development in vitro versus in vivo: implications for blastocyst yield and blastocyst quality. *Mol Reprod Dev* 61: 234–248.
- Rodríguez, A., Diez, C., Ikeda, S., Royo, L. J., Caamaño, J. N., Alonso-Montes, C., Goyache, F., Alvarez, I., Facal, N. and Gomez, E. 2006. Retinoids during the *in vitro* transition from bovine morula to blastocyst. *Human Reproduction*, 21(8), 2149–2157. <https://doi.org/10.1093/humrep/del099>
- Sagirkaya H, Misirlioglu M, Kaya A, First NL, Parrish JJ and Memili E. 2006. Developmental and molecular correlates of bovine preimplantation embryos. *Reprod*. 131. 895–904. <https://doi.org/10.1530/rep.1.01021>
- Sakagami N, Umeki H, Nishino O, Uchiyama H, Ichikawa K, Takeshita K, Kaneko E, Kobayashi S, Tamada H and Akiyama K. 2012. Normal calves produced after transfer of embryos cultured in a chemically defined medium supplemented with epidermal growth factor and insulin-like growth factor i following ovum pick up and *in vitro* fertilization in japanese black cows. *J Reprod Dev*. 58(1):140-146. <https://doi.org/10.1262/jrd.11-050M>
- Saragusty, J. and A. Arav. 2011. Current progress in oocyte and embryo cryopreservation by slow freezing and vitrification. *Reproduction*, vol. 141, no. 1, pp. 1–19.
- Schams D, Steinberg V, Steffl M, Meyer HHD and Berisha B. 2009. Expression and possible role of fibroblast growth factor family members in porcine antral follicles during final maturation. *Reprod*. 138(1):141–149. <https://doi.org/10.1530/REP-09-0033>
- Sharma P, Jha A B, Dubey R S and Pessarakli M. 2012. Reactive oxygen species, oxidative damage, and antioxidative defense mechanism in plants under stressful conditions. *Journal of Botany*. 217037. 1-12.
- Shi J, Chen Q, Li X, Zheng X, Zhang Y, Qiao J, Tang F, Tao Y, Zhou Q, and Duan E. 2015. Dynamic transcriptional symmetry-breaking in pre-implantation mammalian embryo development revealed by single-cell rna-seq. *Development (Cambridge)*, 142(20): 3468–3477.
- Shimada, M., Umehara, T. and Hoshino, Y. 2016. Roles of epidermal growth factor (EGF)-like factor in the ovulation process. *Reproductive Medicine and Biology*, 15(4), 201–216. <https://doi.org/10.1007/s12522-016-0236-x>
- Sies, H., and Jones, D. P., 2020. Reactive oxygen species (ROS) as pleiotropic

physiological signalling agents *Nat Rev Mol Cell Biol.* 21: 363–383.
<https://doi.org/10.1038/s41580-020-0230-3>

- Smith GD, Takayama S, and Swain JE. 2012. Rethinking in vitro embryo culture: New developments in culture platforms and potential to improve assisted reproductive technologies. *Biology of Reproduction*, 86(3):1–10. DOI: <https://doi.org/10.1095/biolreprod.111.095778>
- Somfai, T., Inaba, Y., Aikawa, Y., Ohtake, M., Kobayashi, S., Konishi, K. and Imai, K. 2010. Relationship between the length of cell cycles, cleavage pattern and developmental competence in bovine embryos generated by *in vitro* fertilization or parthenogenesis. *Journal of Reproduction and Development*, 56(2), 200–207. <https://doi.org/10.1262/jrd.09-097A>
- Sonjaya, H. and Hasbi, H. 2019. Potential of embryo production techniques in vitro for improving Bali cattle seedstock. *IOP Conference Series: Earth and Environmental Science*, 247(1). <https://doi.org/10.1088/1755-1315/247/1/012001>
- Sopiyana, S., S. Iskandar dan D. Yogaswara. 2006. Pengaruh Krioprotektan DMA, DMF dan Gliserol pada proses pembekuan semen ayam kampung. Seminar Nasional Teknologi Peternakan dan veteriner. 702-708.
- Spanos S, Becker DL, Winston RML and Hardy K. 2000. Anti-apoptotic action of insulin-like growth factor I during human preimplantation embryo development. *Biology of Reproduction* 63:1413-1420
- Sugawara K, Kizaki K, Herath CB, Hasegawa Y and Hashizume K. 2010. Transforming growth factor beta family expression at the bovine fetomaternal interface. *Reproductive Biology and Endocrinology*. 8(120):1-12. <https://doi.org/10.1186/1477-7827-8-120>
- Sugiura K, Su YQ, Diaz FJ, Pangas SA, Sharma S and Wigglesworth K. 2017. Oocyte-derived BMP15 and FGFs cooperate to promote glycolysis in cumulus cells. *Development*. 134: 2593-2603. <https://doi.org/10.1242/dev.020024>
- Suthar, V.S. and R. G. Shah. 2009. Bovine in vitro embryo production : an overview. *Veterinary World*. 2 (12) :478-479.
- Suzuki K, Eriksson B, Shimizu H, Nagai T and Rodrigues-Martines H. 2000. Effect of hyaluronan on monospermic penetration of porcine oocytes fertilized *in vitro*. *Int J Androl*. 23:13-21. [https://doi.org/10.1016/s0093-691x\(99\)91892-7](https://doi.org/10.1016/s0093-691x(99)91892-7)
- Swain, J. E., and Pool, T. B. 2008. ART failure: Oocyte contributions to unsuccessful fertilization. *Human Reproduction Update*, 14(5), 431–446. <https://doi.org/10.1093/humupd/dmn025>
- Syafruddin, ., Sayuti, A., Sumardi, R. A. and Panjaitan, B. 2018. Gambaran histologi ovarium sapi aceh pascavitrifikasi menggunakan dimetyl sulfoksida dengan konsentrasi berbeda. *ARSHI Veterinary Letters*, 2(4), 77–78. <https://doi.org/10.29244/avl.2.4.77-78>

- Takahashi, M. 2012. Oxidative stress and redox regulation on *in vitro* development of mammalian embryos. *Reprod. Dev.* 58:1–9. <https://doi.org/10.1262/jrd.11-138N>
- Takatsu K, Kuse M, Yoshioka S, Acosta TJ. 2015. Expression of epidermal growth factor (EGF) and its receptor in bovine endometrium throughout the luteal phase: effects of EGF on prostaglandin production in endometrial cell. *Anim Reprod Belo Horizonte.* 12(2):328-335.
- Talreja, D., Gupta, C., Pai, H. and Palshetkar, N. 2020. Oocyte Vitrification: A Comparative Analysis Between Fresh and Cryopreserved Oocytes in an Oocyte Donation Program. *Fertility & Reproduction*, 02(01), 9–13. <https://doi.org/10.1142/s2661318220500024>
- Tamura, H., Takasaki, A., Taketani, T., Tanabe, M., Kizuka, F., Lee, L., Tamura, I., Maekawa, R., Aasada, H., Yamagata, Y. and Sugino, N. 2012. The role of melatonin as an antioxidant in the follicle. *J. Ovarian Res.* 5: 5. <https://doi.org/10.1186/1757-2215-5-5>
- Tang, D., Kang, R., Berghe, T. Vanden, Vandenabeele, P. and Kroemer, G. 2019. The molecular machinery of regulated cell death. *Cell Research*, 29(5), 347–364. <https://doi.org/10.1038/s41422-019-0164-5>
- Tao, T. and Del Valle, A. 2008. Human oocyte and ovarian tissue cryopreservation and its application. *Journal of Assisted Reproduction and Genetics*, 25(7), 287–296. <https://doi.org/10.1007/s10815-008-9236-z>
- Tatemoto, H., Sakurai, N. and Muto, N., 2000. Protection of porcine oocytes against apoptotic cell death caused by oxidative stress during *in vitro* maturation: Role of cumulus cells. *Bio. Reprod.* 63:805–810. <https://doi.org/10.1095/biolreprod63.3.805>
- Tatone, C., Di Emidio, G., Barbaro, R., Vento, M., Ciriminna, R. and Artini, P. G. 2011. Effects of reproductive aging and postovulatory aging on the maintenance of biological competence after oocyte vitrification: Insights from the mouse model. *Theriogenology*, 76(5), 864–873. <https://doi.org/10.1016/j.theriogenology.2011.04.017>
- Tian, X., Wang, F., Zhang, L., Ji, P., Wang, J., Lv, D., Li, G., Chai, M., Lian, Z., and Liu, G., 2017. Melatonin promotes the *in vitro* development of microinjected pronuclear mouse embryos via its anti-oxidative and anti-apoptotic effects. *Int. J. Mol. Sci.* 18(5). <https://doi.org/10.3390/ijms18050988>
- Torres-Osorio, V., Urrego, R., Echeverri-Zuluaga, J. J., and López-Herrera, A., 2019. Oxidative stress and antioxidant use during *in vitro* mammal embryo production. Review. *Rev. Mex. Ciencias Pecu.* 10:433–459. <https://doi.org/10.22319/rmcp.v10i2.4652>
- Tripathi, A., Khatun, S., Pandey, A. N., Mishra, S. K., Chaube, R., Shrivastav, T. G. and Chaube, S. K. 2009. Intracellular levels of hydrogen peroxide and nitric oxide in oocytes at various stages of meiotic cell cycle and apoptosis. *Free Radic. Res.*, 43(3):287–294.

- Turathum B, Gao EM and Chian, RC. 2021. The function of cumulus cells in oocyte growth and maturation and in subsequent ovulation and fertilization. *Cells*. 10(9):1–18. <https://doi.org/10.3390/cells10092292>
- Vandaele, L., Thys, M., Bijttebier, J., Van Langendonck, A., Donnay, I., Maes, D., Meyer, E., and Van Soom, A., 2010., Short-term exposure to hydrogen peroxide during oocyte maturation improves bovine embryo development. *Reproduction*, 139:505–511. <https://doi.org/10.1530/REP-09-0430>
- Velker, B. A. M., Denomme, M. M. and Mann, M. R. W. 2012. Loss of genomic imprinting in mouse embryos with fast rates of preimplantation development in culture. *Biology of Reproduction*, 86(5), 1–16.
- Voss, A. K. and Strasser, A. 2020. The essentials of developmental apoptosis. *F1000Research*, 9, 1–12. <https://doi.org/10.12688/f1000research.21571.1>
- Wahjuningsih, S. R. I. 2008. *Pengaruh konsentrasi etilen glikol dan lama paparan pada vitrifikasi terhadap morfologi dan viabilitas oosit sapi immatarae*.
- Wahjuningsih, S., and Djati, S. 2013. Ultrastruktur Oosit Kambing Pasca Kriopreservasi Dengan Metode Vitrifikasi. *Jurnal Kedokteran Hewan - Indonesian Journal of Veterinary Sciences*, 7(2). <https://doi.org/10.21157/j.ked.hewan.v7i2.915>
- Wheeler, M. B., Rutledge, J. J., Fischer-Brown, A., VanEtten, T., Malusky, S. and Beebe, D. J. 2006. Application of sexed semen technology to *in vitro* embryo production in cattle. *Theriogenology*, 65(1), 219–227. <https://doi.org/10.1016/j.theriogenology.2005.09.032>
- Widowati W, Murti H, Jasaputra DK, Sumitro SB, Widodo MA and Fauziah N. 2017. Selective cytotoxic potential of IFN-g and TNF-a on breast cancer cell lines (T47D and MCF7). *Asian J Cell Biol*.11:1e12. <https://doi.org/10.3923/ajcb.2016.1.12>
- Winangun, K., Widyastuti, R. and Adipurna Syamsunarno, M.R.A. 2017. Perbandingan Viabilitas Oosit Domba Pasca Vitrifikasi dengan Menggunakan HemiStraw dan Cryotop. *Jurnal Agripet*, 17(2), 75–80. <https://doi.org/10.17969/agripet.v17i2.8131>
- Xiao, J., Liu, Y., Li, Z., Zhou, Y., Lin, H., Wu, X., Chen, M., and Xiao, W., 2012. Effects of the insemination of hydrogen peroxide-treated epididymal mouse spermatozoa on γ H2AX repair and embryo development. *PLoS ONE*, 7:1–8. <https://doi.org/10.1371/journal.pone.0038742>
- Xie Y, Su N, Yang J, Tan Q, Huang S, Jin M, Ni Z, Zhang, B, Zhang D, Luo F, Chen H, Sun X, Feng JQ, Qi H, Chen L. 2020. FGF/FGFR signaling in health and disease. *Signal Transduct Target Ther*. 5(1):1-38. <https://doi.org/10.1038/srep20764>
- Xie, H. L., Wang, Y. B., Jiao, G. Z., Kong, D. L., Li, Q., Li, H., Zheng, L. L., and Tan, J. H. 2016., Effects of glucose metabolism during *in vitro* maturation on cytoplasmic maturation of mouse oocytes. *Sci. Rep*. 6:1–11.
- Yang, S. G., Park, H. J., Kim, J. W., Jung, J. M., Kim, M. J., Jegal, H. G., Kim, I. S., Kang, M. J., Wee, G., Yang, H. Y., Lee, Y. H., Seo, J. H., Kim, S. U., and

- Koo, D. B. 2018. Mito-TEMPO improves development competence by reducing superoxide in preimplantation porcine embryos. *Sci. Rep.*8:1–10. <https://doi.org/10.1038/s41598-018-28497-5>
- Yoshida Y, Miyamura M, Hamano S, Yoshida M. 1988. Expression of growth factor ligand and their receptor mRNAs in bovine ova during *in vitro* maturation and after fertilization *in vitro*. *J Vet Med Sci.* 60: 549–554. <https://doi.org/10.1292/jvms.60.549>
- Yuan Y, Spate LD, Redel BK, Tian Y, Zhou J, Prather RS. 2017. Quadrupling efficiency in production of genetically modified pigs through improved oocyte maturation. *Proc Natl Acad Sci.* 114(29): E5796–E804. <https://doi.org/10.1073/pnas.1703998114>
- Zafar, M. I., Lu, S., and Li, H. 2021. Sperm-oocyte interplay: an overview of spermatozoon's role in oocyte activation and current perspectives in diagnosis and fertility treatment. *Cell and Bioscience*, 11(1), 1–15. <https://doi.org/10.1186/s13578-020-00520-1>
- Zahmatkesh A, Roudbar MA and Joupari MD. 2013. A comparative study of EGF effects on *in vitro* bovine embryo development in monoculture and sequential media. *Turk J Biol.* 37: 670-674. <https://doi.org/10.3906/biy-1302-74>
- Zeiss, C.J. 2003. The Apoptosis-Necrosis Continuum : Insight from Genetically Altered Mice. *Vet.Pathol.*40 :481-495.
- Zhang K, Hansen PJ and Ealy AD. 2010. Fibroblast growth factor 10 enhances bovine oocyte maturation and developmental competence *in vitro*. *Reprod.* 140: 815-826. <https://doi.org/10.1530/REP-10-0190>
- Zhou, Y., Fu, X., Zhou, G., Jia, B., Fang, Y., Hou, Y. and Zhu, S. 2014. An efficient method for the sanitary vitrification of bovine oocytes in *Straws*. *Journal of Animal Science and Biotechnology*, 5(1), 1–7. <https://doi.org/10.1186/2049-1891-5-19>

CURICULUM VITAE

A. Identitas Diri

1	Nama Lengkap	Erni Damayanti
2	Jenis Kelamin	Perempuan
3	Agama	Islam
4	Tempat dan Tanggal Lahir	Letta Tanah, 20 Desember 1996
5	Alamat	Bone
6	E-mail	damayantierni11@gmail.com
7	Nomor Telepon	+6281240503407

B. Riwayat Pendidikan

No	Strata	Institusi	Fakultas/Jurusan	Tahun Lulus	Judul Penelitian
1	SMA	SMA Negeri 2 Watampone	IPA	2014	-
2	S1	Universitas Hasanuddin	Peternakan	2018	Pengaruh substitusi lemak nabati terhadap kualitas fisik eskrim labu kuning
3	S2	Universitas Hasanuddin	Sistem-sistem Pertanian	2019	Kajian kualitas embrio sapi bali secara in vitro untuk menghasilkan embrio yang layak transfer
4	S3	Universitas Hasanuddin	Ilmu Pertanian	2022	Kajian kualitas embrio sapi bali secara in vitro untuk menghasilkan embrio yang layak transfer

C. Pengalaman Penelitian dalam 5 tahun terakhir

No	Tahun	Judul Penelitian	Pendanaan	
			Sumber	Jumlah
1	2019	Peningkatan kualitas embrio sapi Bali in vitro dalam menunjang keberhasilan transfer embrio	Hibah PMDSU-Dikti	Rp 60.000.000
2	2020	Peningkatan kualitas embrio sapi Bali in vitro dalam menunjang keberhasilan transfer embrio yang layak transfer	Hibah PMDSU-Dikti	Rp 60.000.000
3	2021	Peningkatan kualitas embrio sapi Bali in vitro dalam menunjang keberhasilan transfer embrio	Hibah PMDSU-Dikti	Rp 60.000.000
4	2021	Peningkatan kualitas embrio sapi Bali secara in vitro untuk menghasilkan embrio yang layak transfer	PKPI	Rp. 42.000.000
5	2022	Semen beku (<i>Straw</i>) hasil seleksi pejantan sapi Bali tidak bertanduk (<i>polled</i>) unggul	DIKTI	Rp. 25.000.000
6	2022	Prototipe: Semen Beku (<i>Straw</i>) Hasil Seleksi Pejantan Sapi Bali tidak bertanduk (<i>polled</i>) Unggul.	DIKTI	Rp. 25.000.000

D. Internasional Conference

No	Nama Kegiatan	Penyelenggara	Tahun	Judul artikel	Sebagai
1	The 2 rd International Conference of Animal Science and Technology (ICAST)	Fakultas Peternakan Universitas Hasanuddin	2019	Strategies to increase growth early embryo stages of bovine in achieving blastocysts in vitro	Oral Presentation
2	The 3 th International Conference of Animal Science and Technology (ICAST)	Fakultas Peternakan Universitas Hasanuddin	2020	The Role Of Antioxidants In Improving The Quality Of Bovine Embryos Produced In Vitro,	Oral Presentation

3	The 4 nd International Conference of Animal Science and Technology (ICAST)	Fakultas Peternakan Universitas Hasanuddin	2021	Potential of Bali Cattle Oocytes from Ovaries of Slaughterhouses in Makassar	Oral Presentation
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E. Publikasi artikel ilmiah dalam 5 tahun terakhir

No	Tahun	Judul Artikel	Volume/Nomor>Nama Jurnal	Keterangan
1	2020	Strategies to increase growth early embryo stages of bovine in achieving blastocysts in vitro: A Review.	IOP Conf. Series: Earth and Environmental Science 492:IOP PUBLISHING.	First Author
2	2022	Developmental Ability and Concentration of Hydrogen Peroxide in Bali Cattle Embryos Cultured In Vitro	Pakistan Journal of Zoology, Scopus: First online	First Author
3	2022	The Role Of Antioxidants In Improving The Quality Of Bovine Embryos Produced In Vitro	Online Journal of animal and Feed Research, Scopus: Publish	First Author
4	2022	Apoptosis in Bali Cattle Embryo Cells Produced In Vitro	World's Veterinary Journal , Scopus: in Press	First Author
5	2022	Epidermal Growth Factor (EGF) and Basic Fibroblast Growth Factor (FGF2) Profiles in Follicular Fluid, Maturation Media and Embryo Culture of Bali Cattle	Advances in Animal and Veterinary Sciences, Scopus, Under Review	First Author

Semua data yang saya isikan dan tercantum dalam biodata ini adalah benar dan dapat dipertanggungjawabkan secara hukum. Apabila dikemudian hari ternyata dijumpai ketidaksesuaian dengan kenyataan, saya sanggup menerima sanksi.

Makassar, 22 Desember 2022



Erni Damayanti