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Transcriptional profile of bovine preimplantation development selected based on G6PDH activity

The oocyte is the female gamete that contributes not only half of the genetic material but also all of the cytoplasm to the zygote, supplying the transcripts, proteins, mitochondria and other components necessary for early embryonic development. The intrinsic oocyte quality is one of the main factors affecting the embryo yield, the implantation rate and the rate of healthy offspring. It is obvious that a fertilized oocyte must reach the blastocyst stage within 6–9 days in the proper culture conditions to have a significant chance of inducing a pregnancy and producing an offspring. The ability to sustain the first week of embryonic development is clearly influenced by the follicular status from which the oocyte is obtained indicating that this developmental potential is inherent within certain oocytes. Since most early embryos that do not reach the blastocyst stage are blocked at or close to the maternal to zygotic transition (MZT)-stage, which occurs at the eight-cell stage in cattle, one could speculate that incompetent oocytes fail to appropriately activate the embryonic genome. Oocyte selection based on glucose-6-phosphate dehydrogenase (G6PDH) activity has been successfully used to differentiate between competent and incompetent bovine oocytes. Recently, molecular regulation of genes regulating biological process of Brilliant Cresyl Blue staining (BCB) selected oocytes and embryos was investigated to explain their variation in quality and developmental potentiality. This short review will highlights some of these efforts that have been done in this interesting area of research.