Public Abstract
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Gene edited pigs serve as excellent models for biomedicine and agriculture. Currently, the most efficient way to make a reliably-edited transgenic animal is through somatic cell nuclear transfer (SCNT) also known as cloning. This process involves using cells from a donor (which may have been gene edited) that are typically grown in culture and using their nuclear content to reconstruct a new zygote. To do this, the cell may be placed in the perivitelline space of an enucleated oocyte and activated artificially by a calcium-containing media and electrical pulse waves. While it is remarkable that this process works, it is highly inefficient. In pigs the success of transferred embryos becoming live born piglets is only 1-3%. The creation of more cloned pigs enables further study for the benefit of both A) biomedicine in the development of prognosis and treatments and B) agriculture, whether it be for disease resistance, feed efficiency, gas emissions, etc. Two decades of research has not drastically improved the cloning efficiency of most mammals. One of the main impediments to successful cloning is thought to be due to inefficient nuclear reprogramming and remodeling of the donor cell nucleus. In the following chapters we detail our efforts to improve nuclear reprogramming of porcine fetal fibroblasts by altering the metabolism to be more blastomere-like in nature. We used two methods to alter metabolism 1) pharmaceutical agents and 2) hypoxia. After treating donor cells both methods were used in nuclear transfer. Pharmaceutical agents did not improve in vitro development of gestational survival of clones. Hypoxia did improve in vitro development and we are currently awaiting results of gestation.