

Hyaluronic acid in the female reproductive tract of the pig

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Early embryo development requires a dynamic and active uterine environment tailored to the requirements of each embryonic stage. The development of asynchrony between the embryo and uterine environment during embryo transfer has been directly linked with both embryonic loss and abnormal development. Hyaluronic Acid (HA), has been implicated as an important factor in porcine embryo development in vitro, but little data exists on the concentrations of this glycoaminoglycan in the porcine female reproductive tract and its potential application in embryo transfer procedures.

Uterine and oviductal samples were collected from twenty two primiparous sows on their second estrus following weaning. Based on the timing of ovulation determined by real-time ultrasound, samples were collected from a minimum of three sows whose temporal reproductive status corresponded to the germinal vesicle (GV) and metaphase two (MII) stages of oocyte maturation, and the 2-cell, 4-cell, early morula (8- to 16-cell), morula and blastocyst stages of embryonic development. Each uterine horn was divided into three equal length sections by ligature to represent the lower- (cervical), mid- and upper (oviductal) sections of the horn. Warm PBS was then used to flush each oviduct (5ml) and each section of the uterine horns (20 ml). Hyaluronic acid concentrations in flushings were determined using an HA specific ELISA (Hyaluronan Duo Set, R&D systems) and the volume of each flush was used to estimate total HA content (ng per flush). No differences ($P>0.05$) in HA content were found between uterine sections at any stage of gestation. HA content of uterine flushings decreased ($P<0.0001$) between the GV and 2-cell stages, and then steadily increased ($P<0.001-0.01$) through the morula and blastocyst stages of development.

Implications: A lack of variation between the uterine segments suggests that regardless of position, HA levels will be sufficient in the recipient sow. Temporal variation in uterine HA content appears to be one reason why lack of synchrony between donor embryos and uterine secretions in recipient females is detrimental to embryonic survival after transfer.