**What’s in a Cow?**

Have you ever wondered what makes a cow a cow? Chances are, you probably haven’t. Lucky for you, professor Darren E. Hagen of Oklahoma State University has. Dr. Hagen has dedicated his career to extensive genetic research and discoveries in epidemiology. As an accomplished geneticist, Dr. Hagen was among the first group of scientists to publish research on Parent-of-origin expression, discover the alternating sequence of RNA, and sequence the bovine genome through gene predictions.

In one of his most recent publications, *Global Assessment of Imprinted Gene Expression in the Bovine Conceptus by next Generation Sequencing,* Dr. Hagen and his team worked to discover the underlying cause of Large Offspring Syndrome, or LOS, in cattle. LOS is a genetic mutation in cattle that causes birth defects such as an enlarged tongue, rapid growth, and abnormal abdominal wall, such as umbilical hernias. In this publication, cows were impregnated through in vitro fertilization to induce LOS in the fetus. The scientists then worked to understand how these mutations occurred.

So why should those of us who aren’t well versed in genetics care about these cattle born with Large Offspring Syndrome? Well, it turns out that LOS in cattle appears to be epidemiologically similar to Beckwith-Wiedemann Syndrome in humans. It has been found that babies conceived via IVF, or in vitro fertilization, have about a 4% chance of being diagnosed with BWS. By using cows as a model, scientists are hopeful they’ll be able to determine the cause of these mutations and how to prevent them from happening.

In order to find out just how LOS occurs, Dr. Hagen and his team worked to identify which genes from each parent are expressed. Though this particular publication led to more questions than answers, Dr. Hagen is hopeful that the research carried out will continue to help us better understand genetic imprinting and congenital mutations. In fact, in his publication immediately following this one, he was able to conclude that differential gene expression could not be correlated with differential methylation, which they originally hypothesized was the cause of LOS in cattle and possibly BWS in humans.

Dr. Hagen has now shifted his focus to sequencing the genome of sheep in an effort to identify the mutation that causes dwarfism. It may be a different species, but he still hopes to continue the work he started with the cow.

“For everything we know about the genome, there is still about 99% of it we do not know. The wonderful thing about science is that we are always learning and evolving. Just because we don’t figure it out during one particular study doesn’t mean we aren’t setting it up for the next person that comes along to discover something great.” Well, I, for one, would like to thank Dr. Hagen for all of the hard work he has put forth to figure out that million-dollar question; what’s in a cow?

**References**

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