Natasha Martin 3MT Transcript | University of Guelph Campus Final 2020

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Title: Junk DNA: A Possible Indicator for Bovine Fertility

Transcript: I'm sure everyone here knows what DNA is. It is the complex polymers that makes us each unique and define who we are. What if I told you that, until recently, scientists believed that over 60% of our genome was just junk; DNA that served no purpose whatsoever. Would you believe me? Well, within this "junk" they found stretches of DNA called "transposable elements" or TEs for short. Only in the past 30 years or so, have scientists discovered that these TEs may have a much larger impact on overall genetic diversity, evolution and my field of interest, fertility. One unique and defining feature of TEs is that they can actually jump around the genome, copy and insert themselves into different regions of the DNA. By doing this they can often leave significant damage in their wake, including DNA mutations where these sequence of genes is changed.

Recently, studies have found that environmental stressors can impact the expression of TEs and increase how much they can "jump around". Embryo development is a very sensitive time-point where TEs may have a much larger impact on the genome as a whole. This is why, for my Master's thesis, I decided to evaluate some effects that the environment has on TE expression levels during embryo development. To do this I chose cattle and more specifically, their eggs, for my experimental model.

Cattle are exposed to heat stress in southern climates, and more recently here in Ontario due to increasing summer temperatures. Their internal body temperatures can reach up to 41 degrees Celsius during these time points. This heat stress in cattle has been shown to alter their reproductive hormones as well as decrease their overall fertility. Importantly, cattle are also an excellent translational model for many other mammals including us humans. Therefore, my project aims to see if this decrease in fertility might be partially attributed to the TE expression levels that are altered during heat stress.

To get my data I collect, culture, then fertilize cow oocytes in media in an incubator, I then collect them at different stages of development. For my heat stressed group I do the same but also heat them at 41 degrees Celsius after initial collection. After I collect them, I look at their expression levels and see if they are different between the heated and non-heated groups. Surprisingly, after just one hour of heat, differences are apparent. As seen on the top diagram, specific transposon expression levels are different between groups, indicating that heat may be

altering these levels. Furthermore, the graph below shows a significant decrease in cleavage rates, one key indicator of fertility, in the heated group. There is still much to learn, but my research may be a stepping stone in improving fertility in cattle and also help people who may be struggling with fertility issues. At the very least, the research I am doing may prove that junk DNA is not junk at all. Thank you.

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