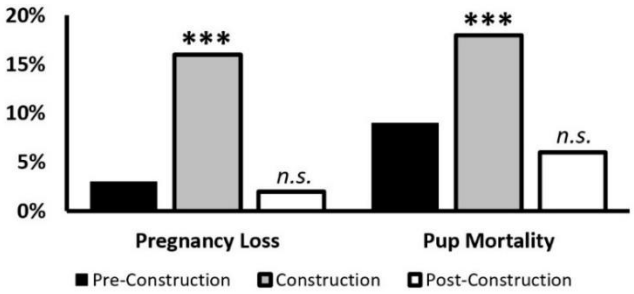
Vanderbilt Genome Editing Resource

Return to normal post-construction and post-COVID-19 shutdown

We previously reported that the construction project near the MCN-III vivarium caused high rates of pregnancy loss and pup mortality, which impaired our ability to operate efficiently. We are now pleased to report that our pregnancy loss and pup mortality rates have returned to their historical baselines, as shown to the right.



Pregnancy loss and pup mortality rates increased during construction period. Pre-construction = 2/1/2018 to 3/11/2019. n = 365 implantations (I), n = 1102 pups born (PB). Construction = 3/18/19 to 11/19/2019. n = 221 I, n = 366 PB. Post-construction = 11/26/19 to 3/31/20. n = 143 I, n = 350 PB. Statistical data comparison to Pre-construction. ***, P < 0.0002. *n.s.*, not significant. 2 x 2 contingency table, Fisher's exact test, 2 tailed.

Due to the nature of our work, during most of the recent COVID-19 shutdown, we were permitted to continue pushing projects forward until May, when we took a short pause. We have now resumed performing all microinjection and cryopreservation services and are accepting new projects. Despite these challenges, we produced twenty-seven new mouse models for sixteen VU/VUMC investigators between January 2019 and May 2020.

VGER CRISPR gene editing: lessons learned

Since mid-2017, we have provided a full-service approach to CRISPR gene editing, enabling us to refine and optimize genome editing technologies and improve overall project outcomes. Of the 46 projects designed, we have a 93% success rate of producing the desired mutation and 89% of the time it was in a live mouse. The 4% difference is due to unanticipated embryonic lethality which occurred in two projects.

We have undertaken and successfully completed a wide range of different genome editing projects, the more complicated of which have often utilized long single stranded DNA templates to drive homology directed repair. Using this approach, seven mice containing either conditional or fluorescent reporter alleles have been generated, with the longest insertion or exchange being 1.5 kb in length. While the majority of projects we design are successful, we have learned that certain types of gene editing designs are unlikely to succeed using this strategy, particularly conditional inversion alleles. After three unsuccessful attempts to knock-in inverted exons using single stranded DNA templates, we recommend a conventional gene targeting approach for these models.

As always, we look forward to assisting with your next mouse or cell line genome editing project. Contact either Leesa Sampson at leesa.sampson@vanderbilt.edu or Jennifer Skelton at jennifer.skelton@vanderbilt.edu for an advisory meeting or to initiate a project.

For additional information, including current pricing and a list of all services offered to support your mouse research, please visit our website at https://labnodes.vanderbilt.edu/vger.

Stay safe and healthy,

Leesa Sampson
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