Transnetyx Executive Summary: Automated Genotyping with Colony + AMI

presented by:

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Genotyping and Why It Matters.

Breeding and maintenance is a complex operation for research laboratories utilizing rodent models. It is highly time-consuming, expensive, and is conducted with variable efficiency from lab to lab, or even researcher to researcher, within the lab. The costs of inefficiencies are high to the lab in terms of dollars, time, and quality, impacting the reproducibility of research. There is also a higher cost to the research organization in terms of space needed to house animals, the 3R's of animal research, animal welfare, and the amount of research achieved in a limited amount of time and space.

Genotyping is a critical piece of the breeding process for genetically modified rodents. Most labs that are utilizing animal models have individuals performing genotyping within the lab. The process is labor-intensive, error-prone, and in the end, may not be completed in a timely and efficient manner.

By outsourcing to an automated method of genotyping with a guaranteed turnaround time and accuracy rate, it is possible to maximize the operational efficiency of breeding management. Researchers can reduce cage costs as well as costly errors while gaining a significant amount of resource time back to labs to accelerate discovery.

The Problem

Redundancy, Inefficiency, and Problems With Accuracy
Genotyping is necessary when breeding animals to get the right models for experiments. Much like doctors do not need to do blood work themselves to diagnose and treat patients, it does not add value for a lab to perform their own genotyping. However, labs have traditionally done their own genotyping as affordable and reliable outsourcing options have not been available.

There may be more than 100 labs performing genotyping at any given research institution, with multiple people per lab genotyping. Hundreds of researchers do the same redundant tasks of isolating DNA, performing PCR, running gel electrophoresis, and analyzing results. As much as 10% of these reactions fail and need to be repeated. This process takes anywhere from a half-day to multiple days per week. In addition to this, time is spent developing assays, troubleshooting poorly functioning assays, and training and managing people to perform the task.

Recognizing the redundancy of resources, many institutions have elected to establish cores for genotyping. Still, they are rarely successful at delivering acceptable turnaround times, accuracy, assay design expertise, and service required for labs to trust outsourcing as an option.

Inefficient Colony Management
Many labs do not keep all the animals they breed based on genotypes. When breeding mice, a breeding pair or trio (one male and two females) is set up and litters are born after 21 days gestation. Litters need to be weaned from their mother for most strains by 21 days due to size constraints in the cage. Males and females are separated into different cages with a capacity of five per cage. Typically, labs will collect a biopsy tissue at weaning. They then perform genotyping to determine which animal models to use for their experiments.

Genotyping is different from lab to lab, person to person and even strain to strain. The turnaround time is highly variable and unreliable as it is dependent on when the person can perform the genotyping and whether reactions are successful on the first attempt. Weeks can go by before genotyping occurs and action is taken on non-scientifically useful animals.

Non-scientifically useful animals can be euthanized once they are known. In some labs, these mice will be kept in a cage until the scientifically viable animals are needed, and they may then be euthanized.   If animals are euthanized on time, it opens up the opportunity to build out studies and put more experimental animals inside of the same cage footprint.

The Problem (continued)

Troubleshooting Delays and Breeding Too Many Animals

In some cases, delays in developing the original genotyping protocols for new strains can cause a lengthy process. When breeding animals without a working protocol, you cannot euthanize any animals because you do not know which are scientifically useful. This results in higher cage costs and delays to experiments. In the worst-case scenarios, it results in months of caring for animals that never end up being used for scientific purposes. All the while wasting the time of lab and animal care staff to troubleshoot the issue.

In addition, issues with genotyping have animal welfare consequences. An unsuccessful assay may require a second biopsy from animals under anesthesia to repeat the genotyping process. Mistakes in genotyping could lead to setting up the wrong breeder pairs. In these situations, offspring that do not have the needed genotypes are used for experiments, possibly resulting in multiple litters or generations of animals being bred without the needed genotypes.

The Opportunity

Eliminate the Bottleneck

The major bottleneck in efficiently managing genetically modified animals is obtaining and acting on genotyping results. A guaranteed turnaround of genotyping results can change the breeding process. Biopsying and IDing animals early and sending samples to Transnetyx will allow results to be posted online before weaning. Then decisions can be made, animals can be euthanized at weaning, and you can consolidate the remaining scientifically useful animals into cages. This allows labs to better adhere to the 3Rs and drives faster discovery/publication.

Responsible Science

The biggest obstacle to better science is "cost." By eliminating this obstacle, researchers can focus on scientifically valid animals, reducing cage overages and animal waste. Using Transnetyx, labs can utilize custom assay design, project management resources, and reliable genotyping services, which have a 99.97% accuracy rate on over 30 million samples. Enabling labs to promote better animal welfare, be more productive with their time, and advance responsible, reproducible research.

Use Transnety **Colony + AMI**

The decision for individual labs to use our FREE Colony management software is a huge step towards better colony management and reproducible results. Colony helps you access and enter your colony data whenever and wherever you're located. Plus the seamless integration with Transnetyx Automated Genotyping makes it easy to order, review, and assign genotype results directly in your software. And now with AMI, you can proactively monitor your colony goals and get breeding efficiency alerts to maximize the amount of scientifically viable animals in every cage.