Study Summary:
The presence of parasitic, bacterial and viral infections in mouse colonies has been detected by PCR in environmental samples such as exhaust air debris from individually ventilated caging (IVC) rack systems. Debris carried in exhaust air accumulates on inner surfaces of plenums or on filters placed within the path of exhaust air flow. For filtered systems like the Animal Care Systems racks, exhaust air is filtered at the cage level prior to exiting into the rack plenum. This collaborative study with IDEXX BioResearch was designed to test the optimal method of using exhaust air debris for monitoring the disease status of mice using Animal Care Systems technology.

Study Design:
An Optimice® IVC rack was used in an experimental design similar to that published by IDEXX BioResearch (Bauer et al., 2016). For 12 weeks, the rack was populated with cages of naturally infected and cages of uninfected mice (referred to as ‘colony’ mice) to emulate a rack with low to moderate disease prevalence with multiple pathogens: MNV, MHV, MPV, Helicobacter, Pasteurella pneumotropica, fur mites, enteric protozoa and pinworms. Over the course of 12 weeks, fecal samples and fur swabs from infected mouse cages were collected and tested using real-time PCR to monitor pathogen shedding over the course of the study. Dirty bedding from the colony mice was mixed and used to bed cages housing sentinel mice. Cage exhaust filters were collected at every two-week cage change interval. At study end, colony and sentinel mice were bled to screen for viral antibodies. Additionally, fur swabs and fecal samples from colony and sentinel mice were tested for bacterial and parasitic infections.
Conclusions:

- Testing of pooled sentinel cage exhaust filters collected at cage changes provides a reliable method for screening in many cases for bacteria, parasitic, and viral infections in colony mice.
- Cage exhaust filters detected infectious agents missed by dirty bedding sentinel testing.
- Cage exhaust filter testing is a valuable tool to include in your health monitoring program.

* Results were presented at AALAS 2016 (Charlotte, NC) and a manuscript will be submitted for peer review and publication.

Protocol:
To perform exhaust filter testing in ACS caging, transfer dirty bedding into a cage on a rack with animals. The dust containing infectious agents in that cage accumulate on the back cage filter as air is exhausted through it, regardless of whether the animals in that cage have picked up the infection or not. Remove the cage exhaust filter (refer to SOP on website) every two weeks at cage change and submit all filters at the end of each testing interval. Filter samples can be pooled and tested as one sample at the diagnostic laboratory.

Animals are required to agitate the bedding dust and the animals can be retired, aged, transgenic or surplus animals, or age/strain-appropriate sentinels. Since seroconversion has consistently been shown to better reliably detect low level or low shedding viral infections, sentinel animals can be optimally used for adjunct testing using the hybrid approach. If not using animals as sentinels, the same animals can be used over many testing intervals, resulting in a reduced number of animals.