Hypothesis (H0): Increasing hutch space allowance or group housing will not affect a calf’s respiratory and peripheral immune function when stimulated by an ovalbumin aerosol challenge.

Under Dr. Frank Mitloehner’s laboratory (UC Davis Department of Animal Sciences), 120 dairy bull calves from a calf ranch in Tulare, California were raised in the bio bubbles at the UC Davis feedlot facility to control for environmental factors. Upon arrival they were randomly assigned to a conventional size, medium size, or large size wooden hutch, or to a group of 3 in a large size wooden hutch. The calves were castrated, dehorned, and weaned according to industry standards. They were sensitized systemically to ovalbumin with a subcutaneous injection at 39 and 60 days of age, and a subset of animals from each housing type was administered 1% ovalbumin with a nebulizer at 76±1 days of age.

At 80±1 days of age, bronchoalveolar lavage was performed by nasotracheal insertion of a sterile foal stomach tube with a fluoropolymer inner tube attached to a 3-way stopcock. 120 mls HBSS were gently instilled and drawn back. The animals sampled, conventional (n=6), medium (n=8), large (n=7), group (n=7), were lavaged over 2 blocks. Blood was also taken at the time of the procedure.

The lavage fluid was analyzed for cell viability, leukocyte count, cell differential, total protein and LDH concentration, TNF-α, OVA-specific total IgG, IgG1, IgA and IgE. Blood was measured for hematocrit, leukocyte count and differential, TNF-α, and OVA-specific total IgG, IgG1, and IgE.

The data indicated no significant differences between treatment groups (conventional, medium, large, group) in the majority of the parameters used to assess respiratory and peripheral immune function and response to the ovalbumin challenge. There appeared to be a block effect between the animals sampled on the first day and the second day, potentially due to the stress of handling and more difficulty performing the procedure. The only significant difference was that group and medium hutch calves had lower OVA-specific IgE in their bronchoalveolar lavage fluid (BALF) than conventional hutch calves, suggesting a predominantly Th1 driven immune response in the respiratory tract. However, more measurements would be necessary to determine the relationship between BALF OVA-IgE, the inflammatory response, and respiratory function.

Ideally and for future consideration, more animals would have been challenged and lavaged, along with an aerosol saline control, and in a more consistent manner that would hopefully prevent the variation in procedure over sampling periods. Although the lavage was a one-time test, blood was taken from the animals when they arrived, and before and after certain events such as castration, weaning, and the ovalbumin injections. Given more time, baseline levels of OVA-specific immunoglobulin from after the first and second ovalbumin injections would have been determined for comparison. Blood cortisol levels were also measured post-experiment, and could be incorporated into the assessment.