Program-wide prevalence and distribution of murine kidney parvovirus (MKPV) over time

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Background

- Murine kidney parvovirus (MKPV), also known as murine chapparvovirus (MuCPV), was first identified in 2018
- Causes inclusion body nephropathy in mice
- Veterinary diagnostic labs estimate 10-15% global prevalence in lab mice
- Can infect both immunocompetent and immunocompromised strains
- MKPV sheds primarily in urine
- Can be detected serologically following a months-long latency period
- Ante-mortem clinical signs of kidney disease seen only in immunocompromised mice
- Alters kidney histology, other potential research impacts are being investigated

Methods

- In 2020 and 2021, the Rodent Health Monitoring Program at CU Anschutz relied on soiled bedding sentinels

  avg census ~23,000 mouse cages
- MKPV added to 6-month serology panels for mouse soiled bedding sentinels in 2020
- Serology tested by commercial diagnostic laboratory (IDEXX BioAnalytics)
  - Each sample represented up to 70 cages on a single IVC rack
  - Whole blood spot (OptiSpot) pooled from 2 cohoused, vendor-sourced, 8-10 mo CD1 female mice who had served as soiled bedding sentinels in facility for 6 months
- MKPV+ tracked by rack, room, and facility
- Standard mouse/cage handling, animal import, and transfer practices continued for animal care and research staff
- During this 2-year period, **no direct action was taken** to reduce or eliminate MKPV from mouse colonies on campus

Results

Figure 1: Number of IVC mouse racks with MKPV+ sentinels after 6 months of soiled bedding exposure, per vivarium and total number across all three facilities.

Figure 2: Percentage of racks with MKPV+ sentinels, per vivarium and overall. Number positive over total number of racks shown for each bar. Dotted lines show linear trend over the 2-year monitoring period.

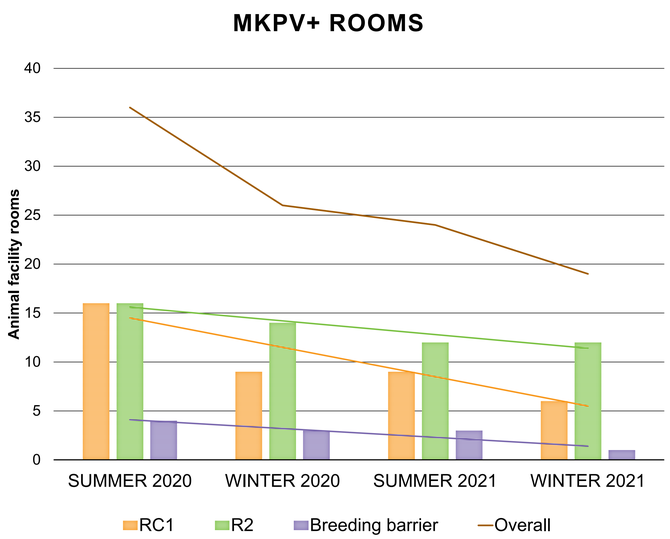

Figure 3: Number of mouse housing rooms with at least one rack MKPV+, per vivarium and total number across all three facilities.

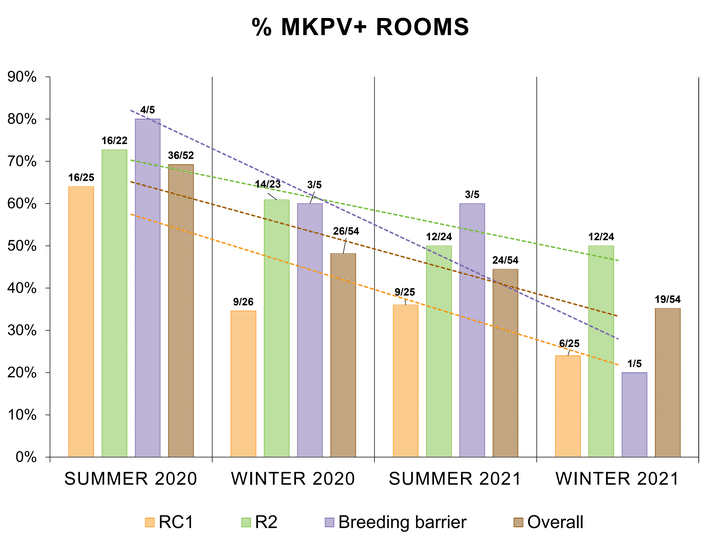

Figure 4: Percentage of mouse housing rooms with at least one MKPV+ rack. Number positive over total number of rooms shown for each bar. Dotted lines show linear trend over the 2-year monitoring period.

Results Summary

- Total number and percentage of MKPV+ racks and mouse rooms decreased over 2 years, without intervention
- Relatively high percentage of MKPV+ rooms reflects many rooms with a single positive rack

Discussion

- Vendor-sourced mice used as soiled bedding sentinels were assumed to be MKPV- on arrival, per vendor health reports
- No apparent spread of MKPV between racks or rooms
- Information about MKPV shared with campus research community via Town Hall Meeting and follow up emails to labs with mice on MKPV+ racks
  - 50 labs contacted individually
  - 6 labs responded and discussed the potential impact of MKPV on their work
  - 1 lab elected to do additional testing for specific animals in colony (all MKPV-)
  - No known lab-initiated changes to colony management following notification
- Overall reduction in MKPV prevalence may be secondary to research mouse vendors eliminating the virus from their colonies

Next Steps

- In 2022, the soiled bedding sentinel program was switched to environmental health monitoring, including PCR testing for MKPV
- Future work: Comparison of MKPV prevalence and distribution based on sentinel serology vs environmental PCR
- Continue investigating impacts on mouse research models, exclude MKPV-infected animals as merited