Environmental Health Monitoring
Making the Transition

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The Centre for Phenogenomics
TCP Facility

- Centralized research facility
- Mouse models of human disease
- Model Production, Phenotyping, Imaging & Pathology
- Purpose built in 2007; 120,000 ft²
- Collaboration between 2 Toronto hospitals
TCP Animal Resources

- Spread over 2 floors
- ~13,000 cages of SPF mice
- ~300 racks, single and double
- 9 racks per room
- Tecniplast GM500 IVCs
- Centralized ventilation
Evolution of the TCP HM Program

- **2007**: SBS shipped to lab for testing
- **2008**: Added fecal PCR for select agents
- **2016**: SBS serology + direct colony sampling (DCS)
- **2017**: Exhaust dust testing (EDT) trials
- **2018**: Transition to EDT in select rooms
- **2022-23**: Transition remaining SBS to SFSB
Challenges with our HM Program

• Centralized ventilation system that requires a custom plenum attachment for EDT ($200,000); will take time to procure and implement facility wide

• Despite addition of EDT in select rooms, continue to use about 500 sentinels per year

• Several functional areas with unique requirements for HM
Needed a solution to eliminate sentinels while transitioning the facility to EDT.
Sentinel Free Soiled Bedding Methods

- Increasing number of publications with good evidence supporting these methods
- Soiled bedding from each cage on a rack is collected and exposed to media (swabs or filters) which is submitted for PCR testing

O'Connell et al, 2021

Hanson et al., 2021
Change Management - Making the Switch

• Buy in from Senior Leadership

• Training materials
  - NA3RsC website
  - Develop new SOPs & revise existing

• Map out the process
  - Cold Turkey! No pilots
  - Start in General Housing area
  - Establish a SFSB cage when live sentinels due to be replaced
  - Timeline to switch ~ 1 year
Change Management - Making the Switch

• Engage staff
  - Animal care attendants changing cages and seeding SFSB cages
  - Dedicated Veterinary Technician exposing media and doing submissions

• Communicate with research staff

• Relay results, challenges and successes

• Gradually expand program to other areas of TCP
How to do SFSB testing

• NA3RsC website

• Read the papers

• Pick a method that works for your facility

• Talk to your diagnostic lab

• Be willing to change if needed
What we decided to do at TCP (so far)

- Regular IVC cages as SFSB cages
- 1 SFSB cage per single rack
- Soiled bedding transfer similar process to SBS cages (ACAs)
- Dedicated VT to perform media exposure and submissions
- Media provided by diagnostic lab
- Single exposure of media quarterly using the dredge method
- Pool 2 media in 1 submission
- Combination of small and large PCR panels
- Each rack tested 4 x per year
# Tools – Excel Spreadsheets & OneDrive

<table>
<thead>
<tr>
<th>Room 2-103</th>
<th>Rack 1</th>
<th>1st Quarter</th>
<th>Taylor</th>
<th>FEBRUARY</th>
<th>TCP2</th>
<th>T</th>
<th>AUGUST</th>
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<tbody>
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<td>Rack 2</td>
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**New**
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**SOPs** > SOPs Under ARC Review - General > HM SOPs

- **Archived HM SOPs Copies only do not edit**
  - Modified: June 2, 2022
  - AH002 Health Monitoring - General Housing 22-09-14.docx
  - Modified: October 28, 2022
  - AH002 Health Monitoring - General Housing NEW 23-01-19.docx
  - Modified: January 19
  - AH004 Health Monitoring - Soiled Bedding Transfer to Sentinel Cages 051617p.docx
  - Modified: January 20
  - AH013 Excluded Murine Pathogen List 21-12-10.docx
  - Modified: May 25, 2022
Challenges

• Lots of documentation and training – takes time
• Switching from serology ($) to PCR ($$$) required pooling of submissions
• Aligning testing & pooling schedules for 200 racks
Challenges (and more questions we need to work through)

- For each SFSB cage, should we keep back up media for potential re-testing of positive results?
- What to do if SFSB cages become too full of bedding?
- Bedding from cages that may have chemical hazards?
Successes

• Eliminating live sentinels
  - No need to procure live sentinels and manage those cages

• Saved valuable technician time ($$)
  - No need to collect blood for serology

• New methods to expose media were not difficult to learn/perform

• So far, no unexpected findings in results (but early days)

• Hybrid approach (EDT + SFSB) is working well and gives us flexibility
## Cost Benefit Analysis (in progress)

<table>
<thead>
<tr>
<th>A</th>
<th>B Current F1</th>
<th>C Proposed F1</th>
<th>D Current F2</th>
<th>E Proposed F2</th>
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<tr>
<td><strong>Summary</strong></td>
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<td>Total Animals</td>
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<td>Total Diagnostic Testing</td>
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<td>Technician Time Savings/(Increase)</td>
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<td><strong>Increased Cost Compared to Current Method</strong></td>
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Future

• Transition other areas at TCP (TG Core) to EHM methods

• Continue to evaluate SFSB methodology based on new literature and publications: type of media, single exposure v indwelling media, dredge method

• Goal is to eventually transition to EDT throughout facility