# Building Rotavirus & Sapovirus Immunity in Sow Herds

Big Bug Day 2024

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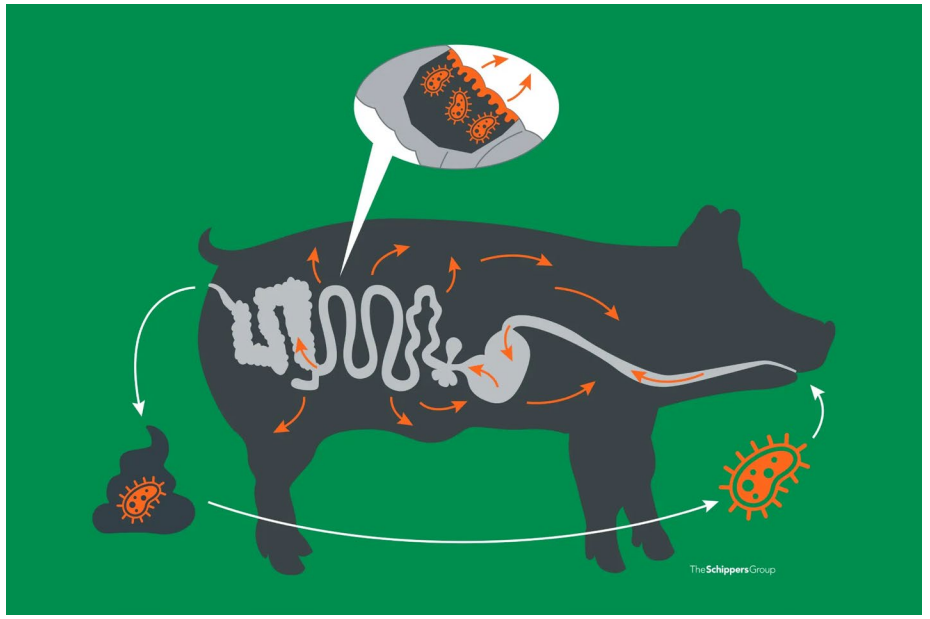
South West Vets

# Outline

- **What are rotavirus & sapovirus**?
  - Damage to the piglet
  - Production & economic impact
  - Recent changes & trends
- **Strategies to build piglet immunity** for rota & sapovirus
- **-New- farm specific ‘ice cube’ feedback** for rota & sapovirus
- **Benefits of controlling** these viruses on sow farm & downstream flows

# What is rotavirus?

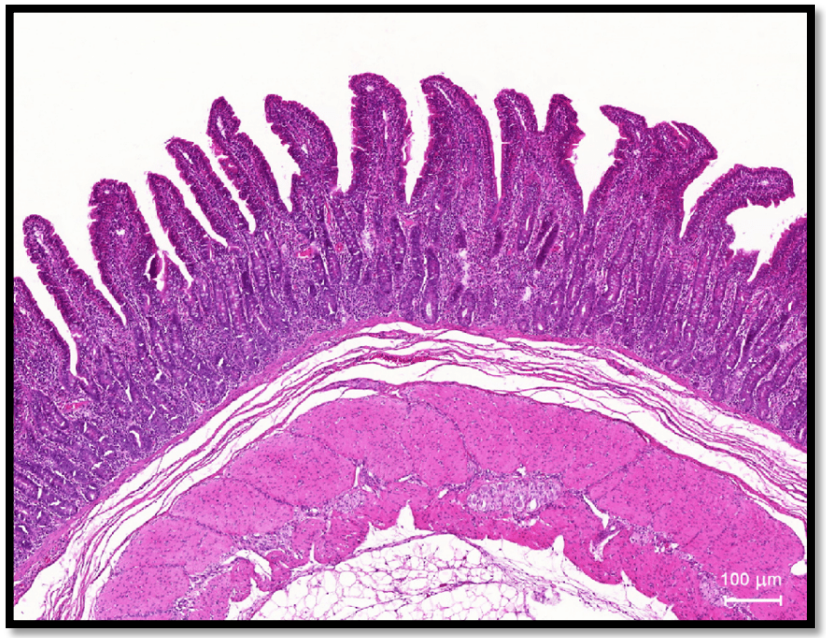
- Rotavirus groups **A, B and C** most common
  - Large genetic diversity, little cross-protection between and within groups
  - Rotavirus infection is **fecal-oral**
  - Rotavirus is **ENDEMIC** in swine populations. Different farms have different strains that may be more or less pathogenic!
    - Many rotavirus infections remain subclinical in pigs



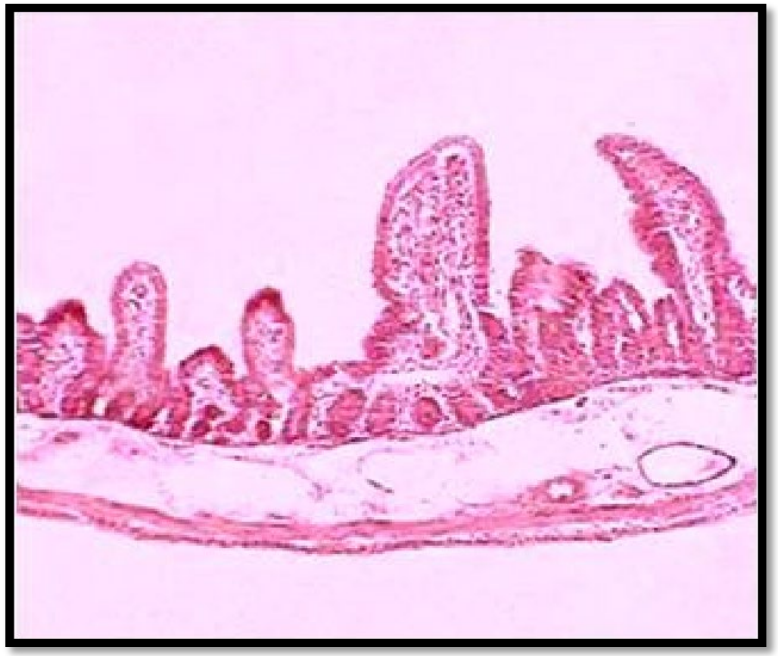
# Damage caused by Rotavirus

| | |
|---|---|
| **Rotavirus A (RVA) and C (RVA)** most commonly cause disease | Both can impact piglets 2 days and older (and into post-weaning phase) |
| Virus infects the cells of the **small intestine** causing damage that leads to malabsorption | Often considered the ‘flu’ of the gut |
| **Clinical signs** | Depression, vomiting, profuse diarrhea, deterioration of body condition |

# Rotaviral gut damage




A normal healthy section of piglet small intestine



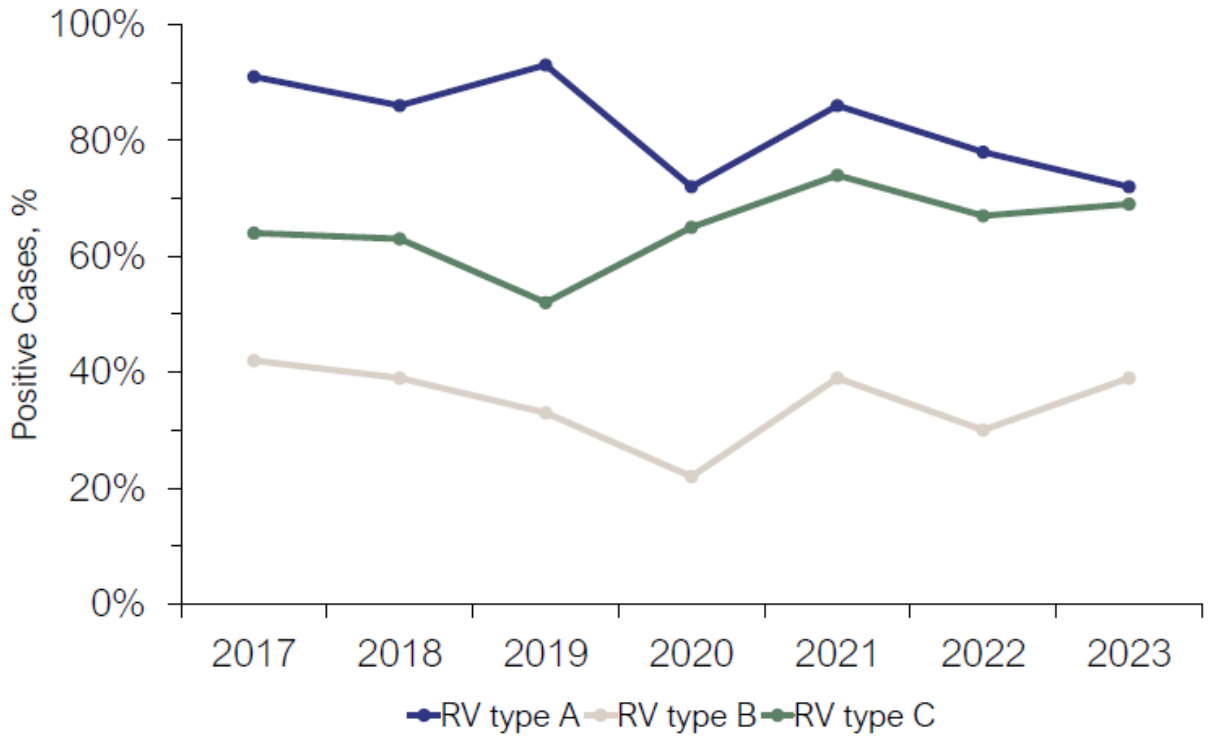
Small intestine of a piglet with rotavirus challenge

# Economic losses due to rotavirus

- Prevalence of 10-90% litters affected, PWM increases of 3-20%
- 0.5-1.5 lbs of reduced weight gain (depending on severity) at weaning
- Treatment costs – antibiotics and supportive care
- Co-infections (ex. Coccidiosis) may worsen the outcome of primary rotavirus infections

# Rotavirus trends

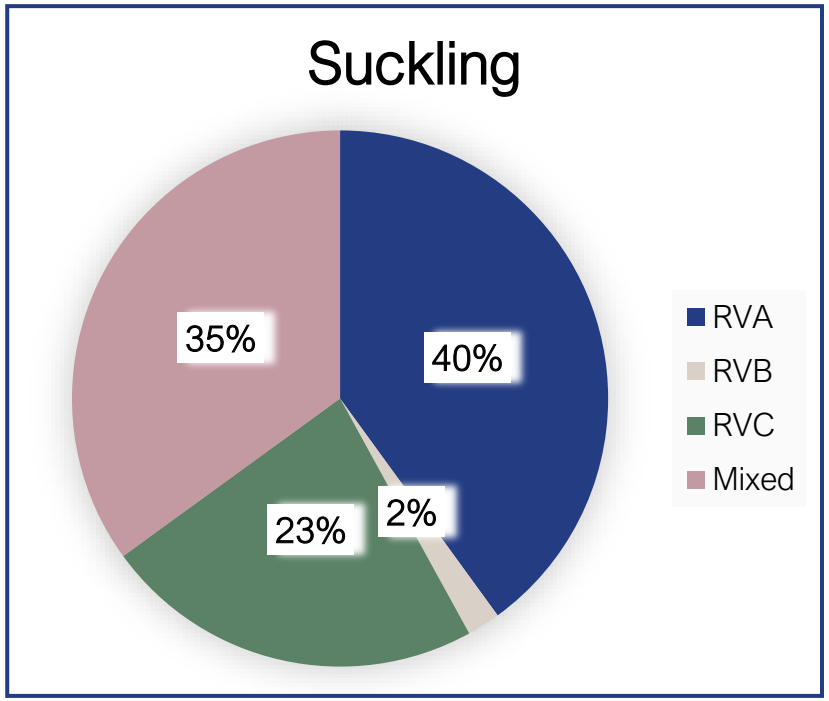
- North America 1995 – 89% of rotavirus cases = RVA
- Ontario 2017-2023 rotavirus trends

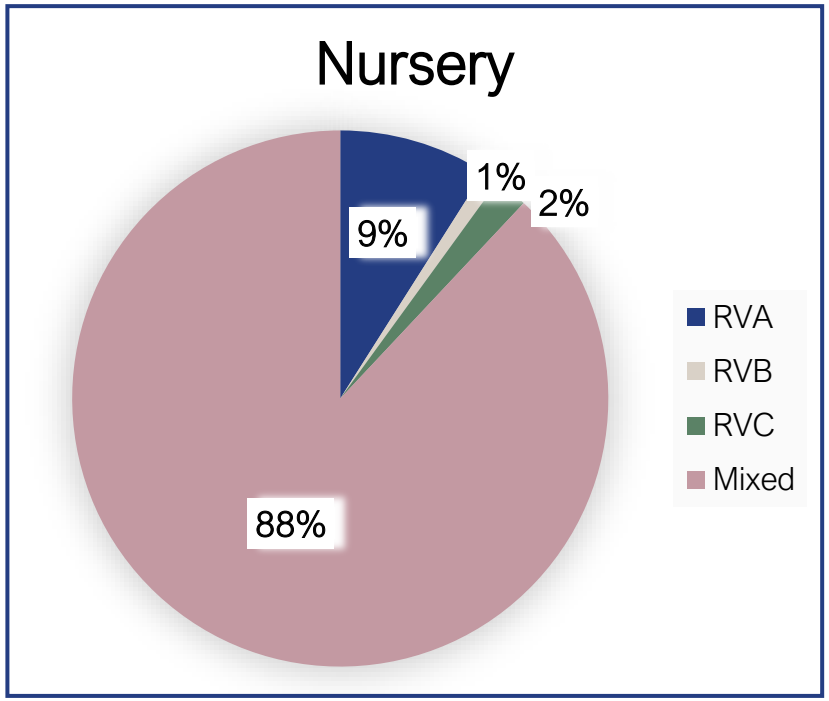



*Ontario data and graphs supplied by Dr. Buchan*

# Rotavirus trends

- Ontario 2017-2023 rotavirus trends

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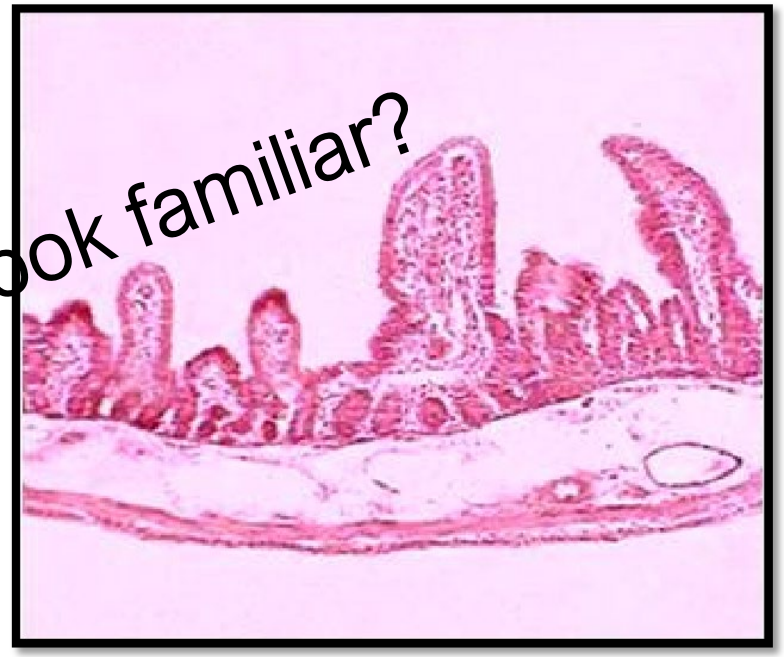
# Now, what about that sapovirus?

- Sapovirus was first genetically characterized and named in 1999, tests only came available in Ontario at AHL in Sept 2023
- Prevalence is high in samples tested but found in pigs with and without diarrhea – exact role in enteric disease still uncertain
- Co-infections with sapovirus and other enteric pathogens (mainly rotavirus) is common
- Has been detected in pigs of all age groups, most commonly in suckling and post-weaning pigs

# Sapovirus gut damage


A normal healthy section of piglet small intestine

Does this slide look familiar?



Small intestine of a piglet with sapovirus challenge

Damage to the gut caused by rotavirus and sapovirus are very similar and difficult to differentiate!

# Sapovirus trends in Ontario

- SW lab samples – testing since Sept 2023, 215 samples tested
  - 47% sapovirus positive
  - Of those tested positive – **86% also positive** for either rotavirus A, B or C

| Disease agent(s) | Positive samples (out of 215) |
|---|---|
| Only sapovirus | 14% |
| Sapovirus + rotavirus A | 55% |
| Sapovirus + rotavirus B | 4% |
| Sapovirus + rotavirus C | 47% |

- Guelph AHL – 60% of samples that are sapovirus positive, are also positive for rotavirus

# Sapovirus trends in Ontario

- Anecdotally observed trends
  - In cases where I have found lots of sapovirus in scouring piglets - usually a couple days into the scour
  - A shift in sampling to the more acute outbreak of scour will usually find lots of rotavirus
  - Interpretation - sapovirus is likely behaving as a pathogen when we find high levels of the virus in the gut and clinical disease. However, it is not commonly the first insult to the piglet in herds with a high viral scour challenge.

# Control strategies for rotavirus & sapovirus

Most if not all sows are positive for rotavirus and sapovirus antibodies – they will transfer a variable amount to their piglets via colostrum and milk.

How do we make this transfer as optimal as possible?

1. Pre-farrow feedback (piglet scour material and intestines, sow manure).
2. Vaccination of pre-farrow animals

# Downfalls with traditional pre-farrow feedback

## 1. Risk of not knowing what pathogens are in the material!

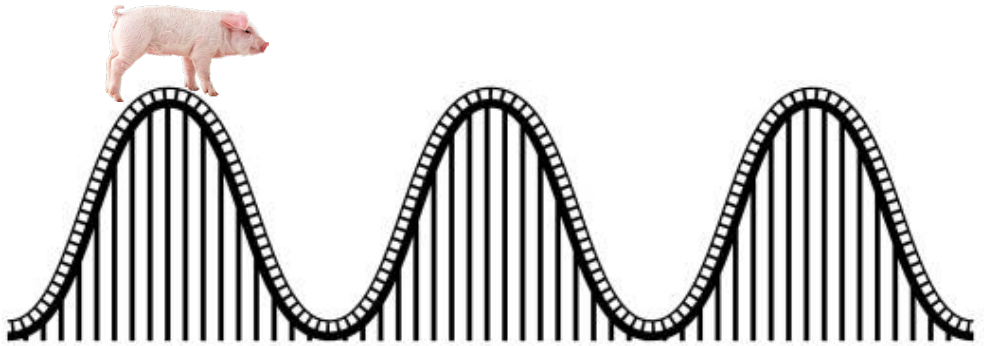
- Study in 2012 tested feedback material on 20 commercial breeding farms in US

| Disease agent | Positive samples (out of 20) |
|---|---|
| PRRSV | 35% (7) |
| PCV2 | 40% (8) |
| Clostridium difficiles | 40% (8) |
| Salmonella | 30% (6) |
| Rotavirus | 25% (5) |

# Downfalls with traditional pre-farrow feedback

## 2. Rollercoaster effect

- When you have good piglet diarrhea material to expose sows, they pass good immunity to their piglets but when those piglets don't experience diarrhea, there is not good material to 'feedback' to the next batch



# Pre-farrow rota & sapovirus vaccination

- Currently only one federally licensed commercial vaccine for rotavirus A – **ProSystem RCE**
  - Covers for 2 subtypes
- For any other rotavirus groups (B or C) or sapovirus, the only option is production of a farm specific vaccine → **Merck Sequivity mRNA vaccine**
  - Pros: provides good coverage for farm specific strains
  - Cons: long timeline for manufacturing and updating farm strains, complicated storage
    - Recall on this product in 2023


# Creating farm specific feedback ‘ice cubes’

- The concept of developing a technique for exposure to sows that is consistent batch to batch is not new
- With the loss of Sequivity platforms last year, we needed a way to more consistently control rotavirus and potentially sapovirus as well!
- A **‘5 step program’** to produce intensive, ice cube feedback on herds that are challenged with rotavirus and/or sapovirus was developed
  - A huge thank you to Dr.s Law, MacDougald and Charbonneau who shared protocols!

# ‘Ice cube production’ – the 5-step program

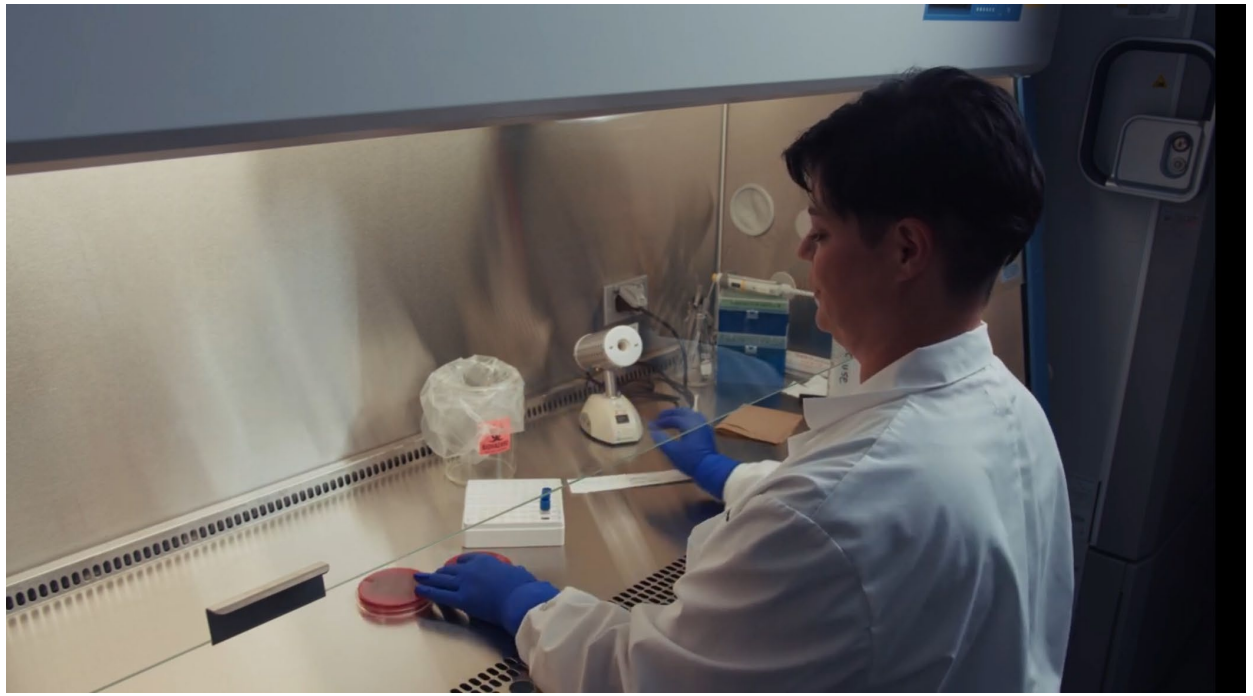
## STEP 1

- Collecting viral material on-farm
- **The most important step**! Sets the stage for the entire program

# ‘Ice cube production’ – the 5-step program

STEP 2

- Testing of swabs off-farm



# ‘Ice cube production’ – the 5-step program

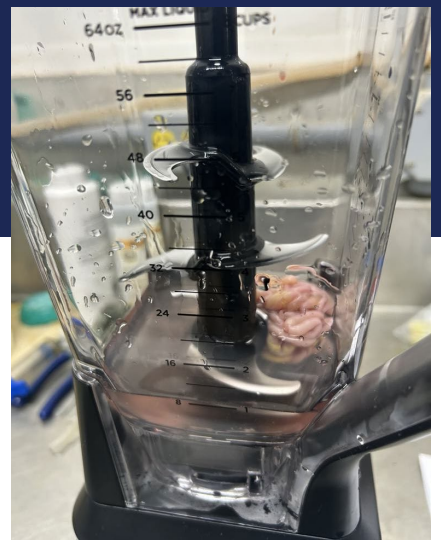
STEP 3

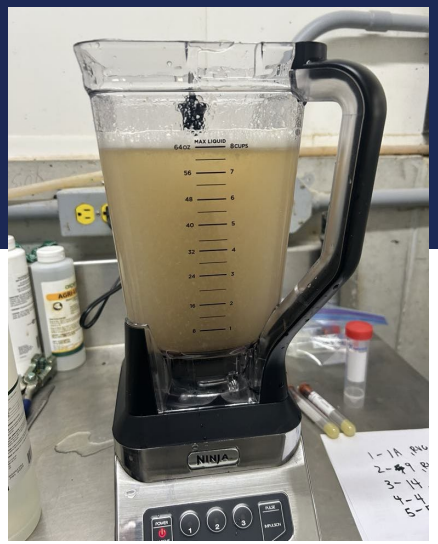
- Multiplication of rotavirus/sapovirus material on-farm

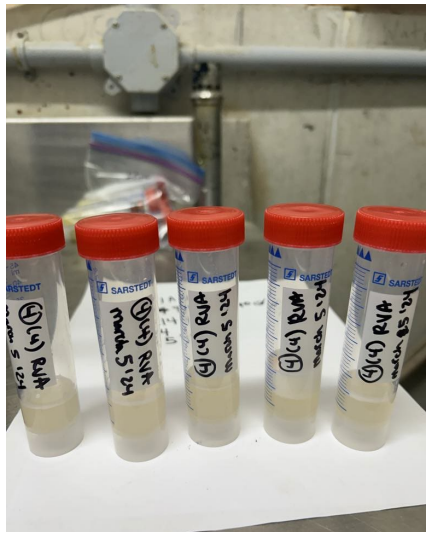
# ‘Ice cube production’ – the 5-step program

STEP 3 continued

- Euthanize piglets after 24 hours and remove small intestine ONLY
- Mix all piglets harvested together and divvy into 50 mL aliquots for feedback use to gilts/sows



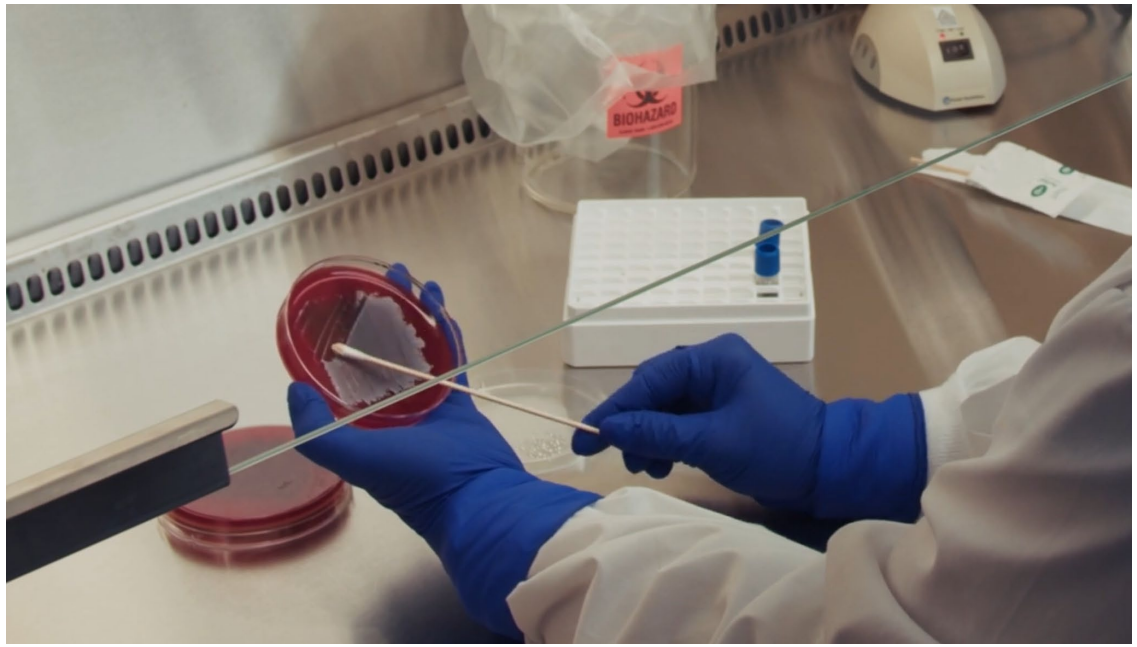




# ‘Ice cube production’ – the 5-step program

## STEP 4

- Testing of prepared material off-farm
- Samples of harvested piglet guts + sterile water should be tested for desired rotavirus and/or sapovirus
- At minimum – samples should also be tested for PRRSv and a bacterial culture performed



# ‘Ice cube production’ – the 5-step program

STEP 5

- Exposure of pre-farrow sows and gilts on farm
- One 50 mL ‘ice cube’ feeds back to ~ 20 gilts/sows
    - Desired dose per animal = 2 mL
- Feed to sows 3x pre-farrow (5-, 4-, and 3-weeks pre-farrow)

# Strategies to accomplish step 5: pre-farrow feedback

- Pre-farrow sows may be housed and fed different ways across Ontario
- Some different systems we have adapted feedback ‘ice cubes’ for:
  - Traditional gestation stalls
  - Liquid fed
  - ESF loose sow housed – the most challenging!
  - Floor fed

# Timeline for production of ‘ice cubes’

The most effective ‘ice cubes’ will contain ALL strains found on farm. To increase likelihood of capturing this, sampling should be done over a minimum of **3 weeks** prior to making ‘ice cubes’

ANY scour outbreak that occurs once ‘ice cubes’ are in play should be sampled immediately – this is more than likely a strain that wasn’t included in ice cubes

If new strain is uncovered – process of making another batch of ‘ice cubes’ to include this strain is fast, will have to feed 2 ‘ice cube’ types coincidingly

# Lessons learned during the 5 phases

- Ideally all samples stored in deep freeze
- Individually housing piglets IS important when making material!
  - Often 1 strain most aggressive
- Have fed colostrum deprived piglets sapovirus on and caused a clinical scour and detected high sapovirus only – evidence of pathogenicity?


# What is the potential benefit of ‘ice cubes’?

## How much does a rotavirus scour typically impact sow barn & nursery performance?

- Litters that had pre-weaning rotavirus diarrhea are more likely to experience post-weaning diarrhea, skin, respiratory problems and reduced weight gain
- Found a 4% decrease in preweaning mortality and a 1.5 lb increase in weaning weights in litters from gilts exposed to ‘ice cube’ feedback

# Benefits of ‘ice cubes’ in the sow barn

- Sow farm with **significant challenge** (1 RVA strain, 2 RVC strains & sapovirus) implemented ‘ice cube’ protocol early 2024
- Weaning weights have improved dramatically
  - 2023 – average consistently < 6 kg
  - 2024 – average consistently 6 kg +
- In times of high scour pressure – PWM rises to 15-20%
  - In 2024 highest peak was 13%

| Parameters (averages) | October – Dec 2023 | May – July 2024 |
|---|---|---|
| Pigs weaned | 4573 | 4593 |
| Pigs weaned/sow | 11.89 | 12.13 |
| PWM (%) | 13.76 | 11.24 |

*Additionally - piglets require much less antibiotics and supportive care to achieve better performance.

# Benefit of ‘ice cubes’ to nursery performance

- Sow farm with **significant challenge** (1 RVA strain, 2 RVC & Sapovirus) implemented ‘ice cube’ protocol early 2024
- Nursery close outs have improved performance wise
  - Significantly fewer scouring pigs in nursery
  - Reduction in antibiotic use for scour
  - Close-outs prior to 2023 mortality ranging from 5-10% depending on scour pressure
  - Closeouts post June 2024 mortality ~2% **consistently**
- Finisher performance is also trending to improvement – but not enough data just yet to report on (stay tuned!)

# Takeaways

- Finding more **rotavirus C** in herds than in past years
- Sapovirus is being detected mainly in herds with significant rotavirus pressure – likely **playing a role in viral scour disease process** and worth controlling!

# Takeaways

- Traditional feedback methods and commercial vaccines are often **not sufficient** for herds dealing with high rotavirus & sapovirus challenges
- Intensified ‘ice cube’ feedback protocols are a **good option** for high challenge herds – improves performance in sow barn, nursery & potentially finisher !
    - Sequivity remains another option for these herds as well – but is slower to obtain product in hand and storage of product can be complex!

# Thank you!

Thank you to **vets & SW staff**!

A special thank you to the **farms** who were among the first to go on the ‘ice cube’ journey and share farm data here today, we appreciate you!

Thank you to **big bug day organizers** and for **your** attendance and attention!

# References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# Questions?

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