

# Rapid Testing For The Laboratory & Beyond



# Enemy = Time

- ▶ Time cannot be banked or stored
- ▶ Time can't be saved for later
- ▶ You can't buy more time
- ▶ Businesses that promise to save time, lie.
- ▶ All we can do is help to make things quicker or simpler
- ▶ We need to better use the time we have

## SmarTools

# The Enemy of Time

- ▶ Not enough hours in the day
- ▶ Time needed for finding/training of new staff
- ▶ Time it takes to switch methods
- ▶ Time to result
  - ▶ Production surfaces
  - ▶ Product release - Impact Shelf Life & Supply Chain
- ▶ Time to Analyses Results - Trend Analysis

# What is a Rapid Test?

- ▶ It is more than faster results
- ▶ Less Steps
- ▶ Simpler Methods
- ▶ Process Control Tools
- ▶ Saves time and money - maybe?

# Benefits of Rapid Tests

- ▶ Less Steps & Simpler Methods
  - ▶ Lower Labour Costs
  - ▶ Less Qualified Staff
  - ▶ Easier and Quicker Training

# Benefits of Rapid Tests

- ▶ Process Control Tools
  - ▶ Moves testing from the lab to the production floor
  - ▶ On demand testing
  - ▶ Identifies problems sooner
  - ▶ Tweak products / processes
  - ▶ Reduces laboratory hours
  - ▶ Peace of mind

# Disadvantages of Rapid Method

- ▶ May not be a reference method - unacceptable to clients
- ▶ Results maybe indicative
- ▶ May be less sensitive
  - ▶ Lower limit of detection
  - ▶ Not detect all organisms
  - ▶ False positives that need confirmation
- ▶ Come with some risks - less trained staff
- ▶ Can be more expensive than reference methods

# Examples of Rapid Tests

- ▶ Dry film media
- ▶ ATP swabs for cleaning validation
- ▶ Chromogenic Pathogen Swabs
- ▶ PCR for Pathogen Tests

# ATP Rapid Hygiene Testing

- ▶ Widely used for real time hygiene results
- ▶ ATP technology - Bioluminescent
- ▶ Clean vs Sterile
- ▶ Many can do multiple tests



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# Trend Analysis



SureTrend<sup>™</sup> by Hygiena

Logout Settings Help Feedback Shop

Dashboard Results Reports Instrument

Dashboard ATP - Fails By Location Period This Year From 1/1/2018, 12:00 AM To 7/17/2018, 11:59 PM

ATP - Fails By Location

Location	Number Of Fails
Cutter 2	1

Fails Caution Pass By Location: Cutter 2

Pass Caution Fail Period

Fails For Location: Cutter 2

Result Date	Rlu	Upper
05/16/2018 03:35:38 PM	223	60

Trend Analysis For: Cutter 2

SureTrend<sup>™</sup> by Hygiena

Dashboard Results Reports Instrument

Type ATP Period This Year

Drag a column header here to group by that column

Result State	Site Name	Is Retest	Result Date	Location Name	Unit No	Unit Name	Plan Name	Userna
Pass	Default Site		05/30/2018 2:06:20 PM	Quick Test Location	16012373	Johns Unit	Quick Test Plan	John
Pass	Default Site		05/29/2018 10:09:10 A	Quick Test Location	16012373	Johns Unit	Quick Test Plan	John
Pass	Default Site		05/29/2018 10:07:53 A	Quick Test Location	16012373	Johns Unit	Quick Test Plan	John
Pass	Default Site		05/29/2018 10:07:30 A	Quick Test Location	16012373	Johns Unit	Quick Test Plan	John
Pass	Default Site		05/22/2018 8:14:15 AM	Quick Test Location	16012373	Johns Unit	Quick Test Plan	John
Pass	Default Site		05/16/2018 11:16:27 A	Exit door knob	16012373	Johns Unit	Location Test Plan	
Fail	Default Site		05/16/2018 8:35:38 AM	Cutter 2	16012373	Johns Unit	Location Test Plan	
Pass	Default Site		05/16/2018 8:35:02 AM	Cutter 1	16012373	Johns Unit	Location Test Plan	
Pass	Default Site		05/15/2018 4:40:50 PM	Quick Test Location	16012373	Johns Unit	Quick Test Plan	

# Trend Analysis

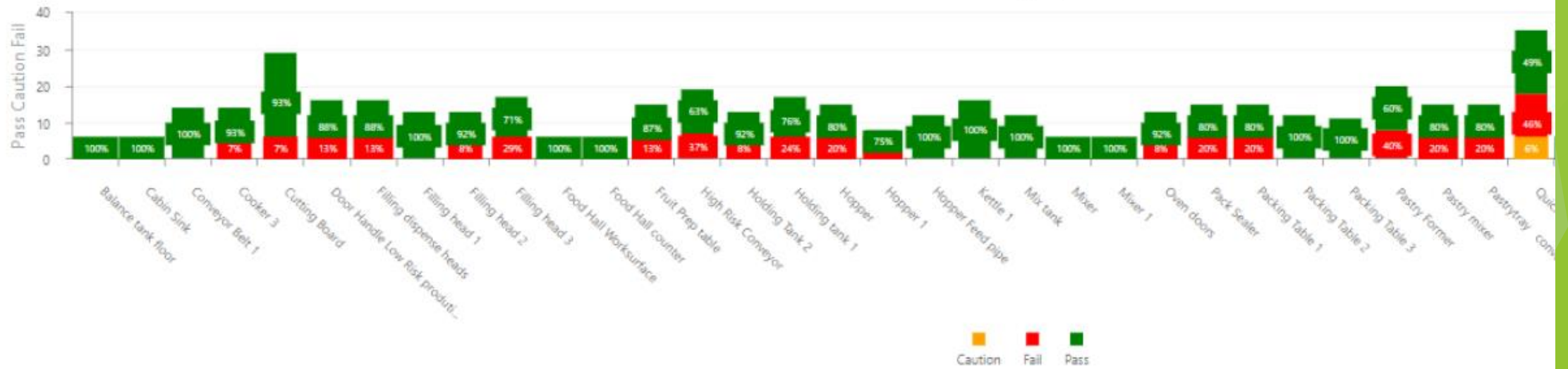
Filters Options

Chart type  Stacked Bar  Bar  Line



Start a capture

PCF Summary by Location



Balance tank floor	Cabin Sink	Conveyor Belt 1	Cooker 3	Cutting Board	Door Handle Low Risk product...	Filling dispense heads	Filling head 1	Filling head 2	Filling head 3	Food Hall Worksurface	Food Hall counter	Fruit Prep table	High Risk Conveyor	Holding Tank 2	Holding tank 1	Hopper	Hopper 1	Hopper Feed Pipe
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# Evolution of ATP Rapid Hygiene Testing

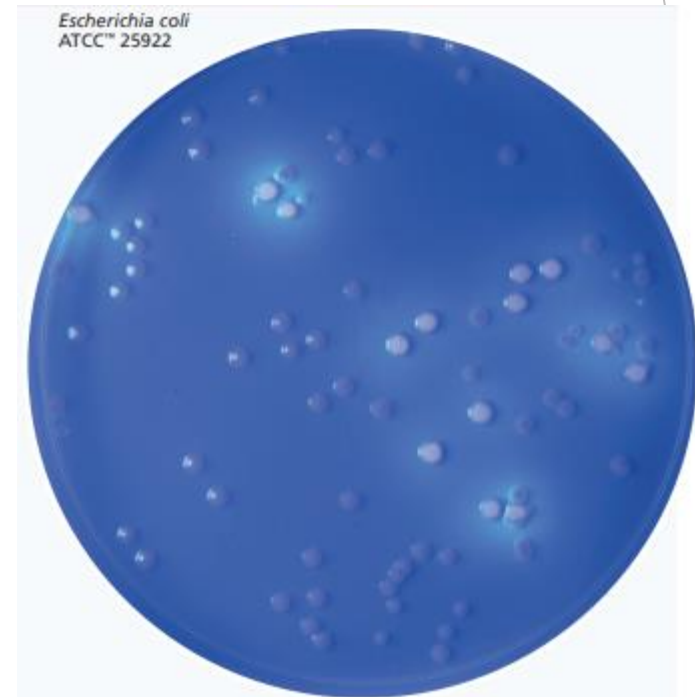
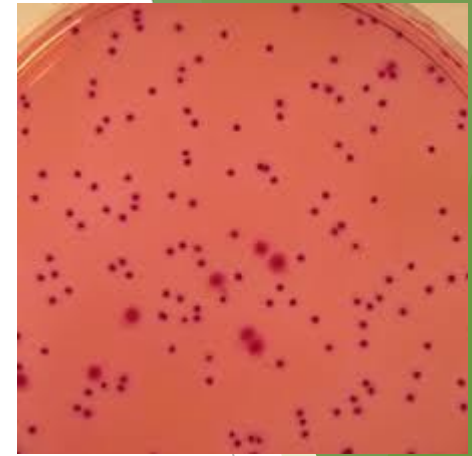
- ▶ Are all ATP systems made equal?
- ▶ Problems in comparing ATP systems
  - ▶ No Gold Standard
  - ▶ Different swab devices
  - ▶ Different reagent systems
  - ▶ Different detector technologies
  - ▶ Difficulty in standardising samples down to fmol concentrations
  - ▶ Marketing vs Science
- ▶ How do we sort the good from the bad?

# What Makes An Ideal ATP Swab System?

- ▶ AOAC accredited - independent proof of claims
- ▶ Premoistened swab - maximises ATP recovery
- ▶ Liquid Stable Reagents - removes rehydration variable
- ▶ Linear RLU vs ATP concentration relationship
- ▶ Low Limit of Detection
  - ▶ <1 fmol - Ideal
  - ▶ Around 3 fmol - OK
  - ▶ 10 fmol - Poor
- ▶ User Calibration Verification
- ▶ Repeatability at critical level - Pass Threshold
- ▶ Low background noise

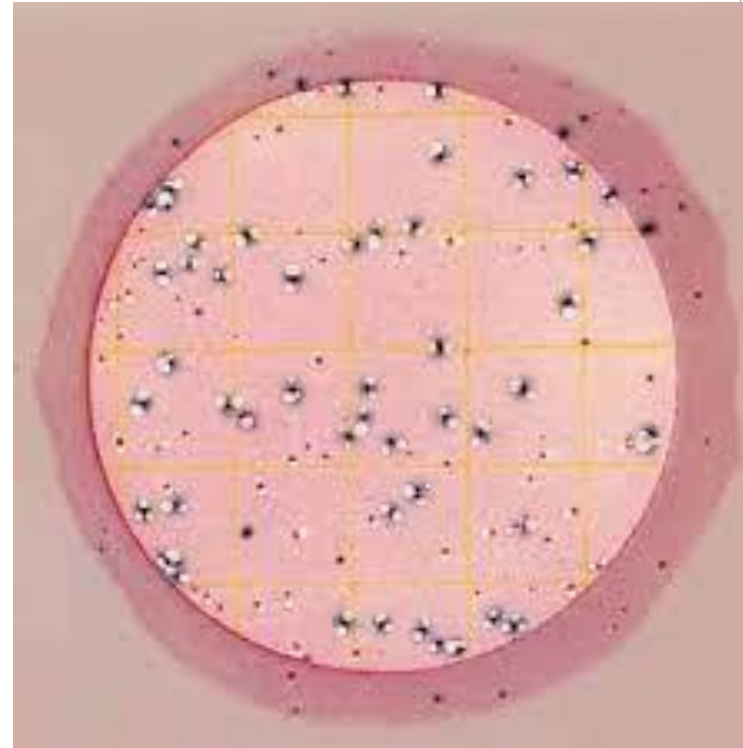
# Evolution of Rapid Methods Coliform / E. coli Testing

- ▶ Violet Red Bile Agar - reference method - Results 24hrs
- ▶ Violet Red Bile Agar + MUG
  - ▶ Differentiates E. coli by fluorescence
  - ▶ Some strains a negative
  - ▶ Expensive



# Evolution of Rapid Methods Coliform / E. coli Testing

- ▶ Petrifilm EC
  - ▶ No media preparation
  - ▶ Differentiates E. coli - chromogen
  - ▶ Results in 48 hrs
  - ▶ AOAC method
  - ▶ Easier to read than MUG
  - ▶ Saves incubator space
  - ▶ More expensive



# Evolution of Rapid Methods Coliform / E. coli Testing

- ▶ Compact Dry EC
  - ▶ No media preparation
  - ▶ Uses 2 Chromogens
    - ▶ B-Galactosidase - Coliforms
    - ▶ B-Glucuronidase - E coli
  - ▶ Results in 24 hrs
  - ▶ AOAC method
  - ▶ Room Temperature Storage
  - ▶ Incubator space considerations
  - ▶ Lower Cost than Petrifilm
  - ▶ More plastic waste

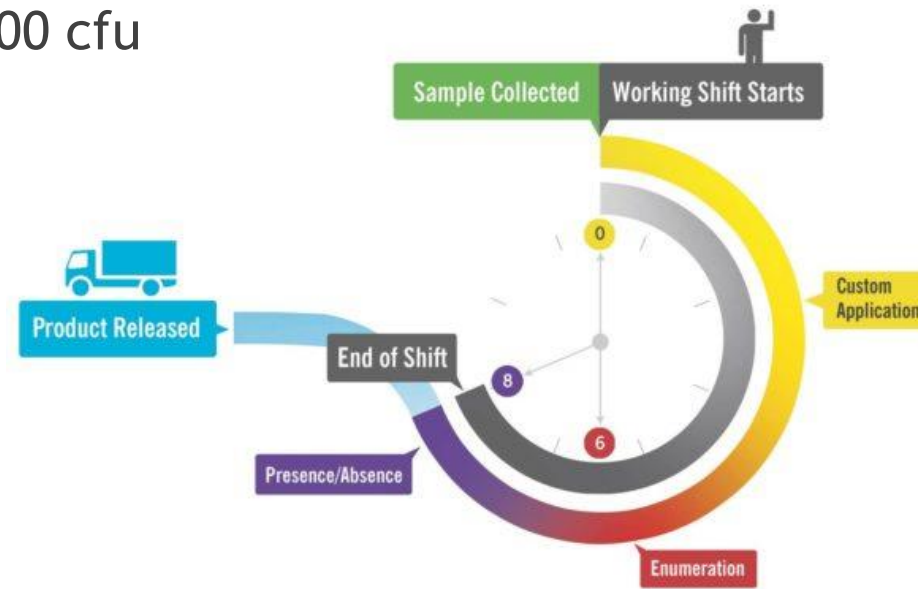


# Evolution of Rapid Methods Coliform / E. coli Testing



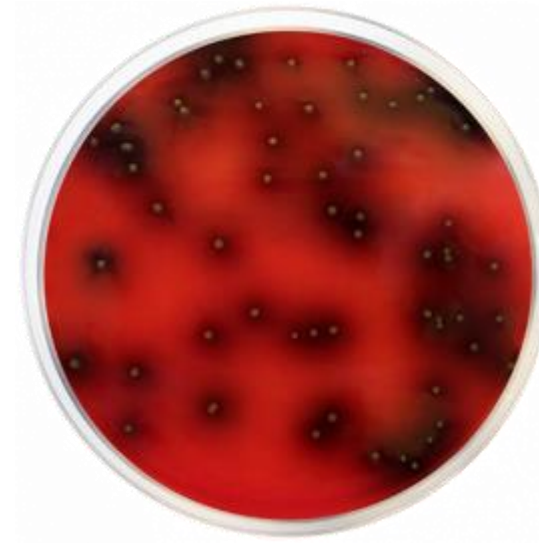
## ▶ MicroSnap Coliform / E.coli

- ▶ No media preparation
- ▶ Same Shift Results
  - ▶ Quantitative 6hrs - 10-10,000 cfu
  - ▶ Presence/Absence - 8 hrs
- ▶ Uses ATP Technology
- ▶ AOAC Approved Method
- ▶ Highest Cost
- ▶ Requires instrumentation



# Evolution of Environmental Listeria Testing

- ▶ Traditional Microbiology
  - ▶ Slow
  - ▶ Requires an enrichment step
  - ▶ Requires greater expertise
  - ▶ Cross contamination risks



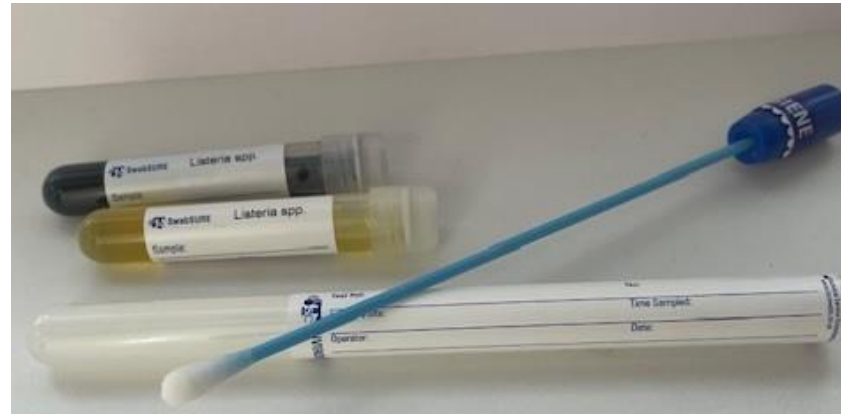
# Evolution of Environmental Listeria Testing

- ▶ Immunoassay ELISA
  - ▶ Requires an enrichment step - 1-2 days
  - ▶ Results in 1-2 hrs
  - ▶ Cross contamination risks
  - ▶ Requires confirmation testing
- ▶ Immunoassay Lateral Flow
  - ▶ Requires an enrichment step
  - ▶ Results in 10-15 min
  - ▶ Subjective



# Evolution of Environmental Listeria Testing

- ▶ Chromogenic Swabs
  - ▶ Enrichment media is the detection system
  - ▶ InSite, TranSwab, SwabSURE
  - ▶ Detect Listeria species
  - ▶ Sanitiser neutralising swabs
  - ▶ Positive results as soon as 24 hrs
  - ▶ Negative - 48 hrs
  - ▶ Safe, contained
  - ▶ External confirmation testing
  - ▶ Fills the gap between inhouse pathogen lab and outsourcing



# Evolution of Environmental Listeria Testing

## ▶ InSite Listeria

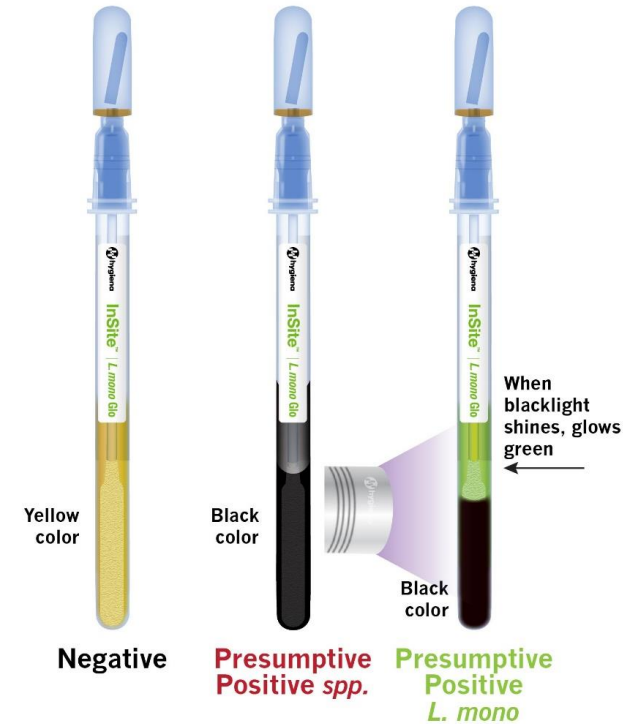
- ▶ Chromogenic substrate
- ▶ 1-10 cfu Listeria species
- ▶ Positive in as little as 18-24 hrs
- ▶ AOAC

## ▶ InSite L mono Glo

- ▶ Same reaction for Listeria species
- ▶ Fluorogen for *L. monocytogenes*
- ▶ AOAC



## InSite: Interpreting Results



# Evolution of Environmental Listeria Testing

- ▶ Polymerase Chain Reaction - PCR
  - ▶ Enrichment step
  - ▶ Detects a molecular fingerprint
  - ▶ High specificity
  - ▶ Requires higher level of expertise
  - ▶ Gold standard of rapid pathogen methods
  - ▶ Hygiena, bioMérieux, Bio-Rad, 3M, Merck
    - ▶ Price per test
    - ▶ Instrumentation
    - ▶ Dedicated lab area



# Is a Rapid Test a better solution?

- ▶ Depends on many factors
  - ▶ Does a faster result give benefits?
    - ▶ Avoids packaging a poor quality product
    - ▶ Faster release - longer shelf life
    - ▶ Production priorities
  - ▶ Does it save you money?
    - ▶ Cost is not just consumables but the net saving to the business
  - ▶ Does it give you better control of your processes?

# Is a Rapid Test a better solution?

## ▶ Case Study

- ▶ Small dairy processor needed a rapid E.coli surface swab result
- ▶ Interested in MicroSnap E. coli - results in 6 hours
- ▶ Only ran a single shift per day
- ▶ MicroSnap result only available at the end of the shift
- ▶ Unable to action the problem until the next day
- ▶ MicroSnap = \$9/test
- ▶ Compact Dry = \$2.30/test - gave next day results
- ▶ No real benefit

# Is a Rapid Test a better solution?

## ▶ Case Study

- ▶ Large dairy processor needed a rapid coliform result
- ▶ Testing starter cultures for cheese production
- ▶ Interested in MicroSnap Coliform - results in 6 hours
- ▶ Were outsourcing - results 2-3 days
- ▶ Contaminated starter cultures = contaminated end product
- ▶ Lowered production failures

# Is a Rapid Test a better solution?

## ▶ Case Study

- ▶ Dairy processor outsourced environmental Listeria test once per fortnight
- ▶ Their budget impacted the number of tests done
- ▶ Results took a minimum of 2 days but often took up to 5 days
- ▶ Introduced SwabSURE Listeria
- ▶ Positive results available 24 hrs
- ▶ Introduced daily testing
- ▶ Doubled surveillance whilst saving money
- ▶ Could still use an external lab for confirmations

# Conclusion

- ▶ There is no such thing as a perfect rapid method
- ▶ The latest technology is not always the best solution for all businesses
- ▶ Fast is only a benefit if it is actioned sooner
- ▶ Rapid methods do allow you to respond faster to problems
- ▶ They can give a higher quality result
  - ▶ Great confidence
  - ▶ Market this to customers
- ▶ Rapid methods can save money through
  - ▶ Less labour or less skilled labour
  - ▶ Bring testing in-house
  - ▶ Detecting problems sooner

# Conclusion

- ▶ Rapid methods may be more expensive
  - ▶ More costly per test
  - ▶ Require higher expertise
  - ▶ Investment in equipment
  - ▶ But may be cheaper than a product recall
- ▶ The choice in rapid methods is a balance of your Pro's and Con's
- ▶ Do your own research as there are few unbiased resources out there
- ▶ Don't be frightened to try new ideas
- ▶ Companies produce rapid methods because there is a need

# Thank you