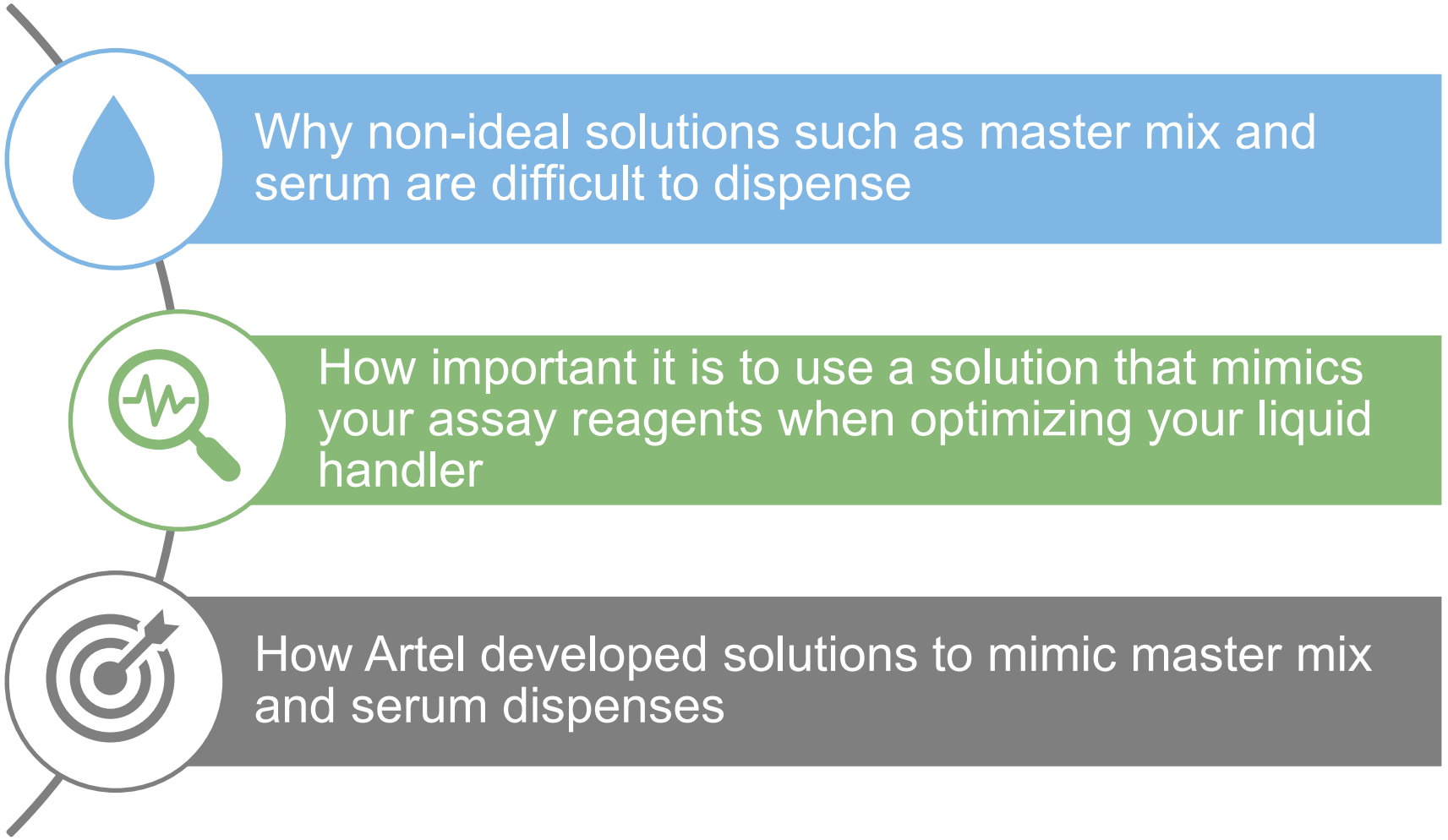
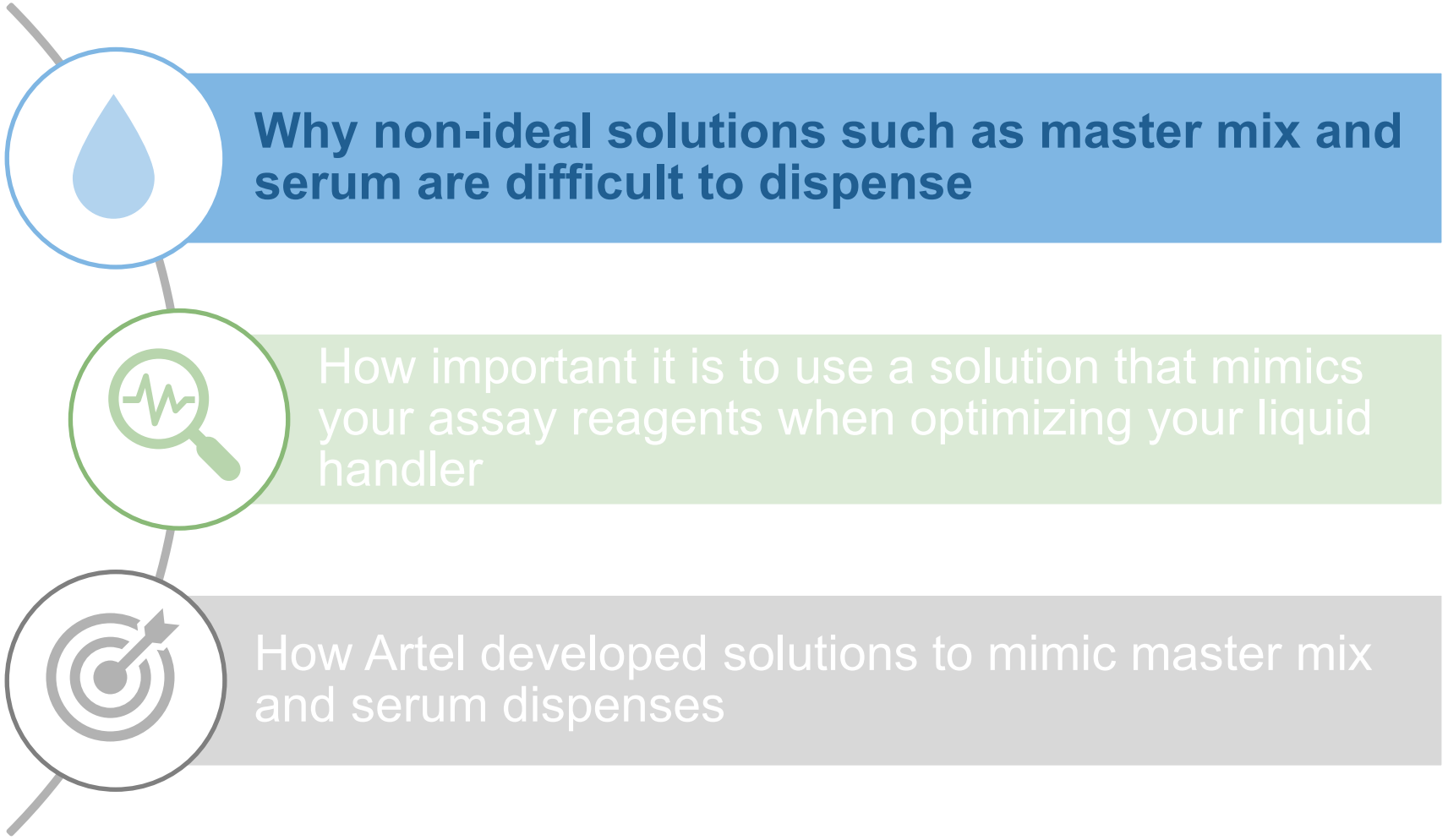
Improving Assay Automation Workflow with Artel PCRMix and SerumSub Solutions

Rachel Parshley, R&D Scientist II

rparshley@artel.co


Why non-ideal solutions such as master mix and serum are difficult to dispense
How important it is to use a solution that mimics your assay reagents when optimizing your liquid handler
How Artel developed solutions to mimic master mix and serum dispenses


Why non-ideal solutions such as master mix and serum are difficult to dispense
How important it is to use a solution that mimics your assay reagents when optimizing your liquid handler
How Artel developed solutions to mimic master mix and serum dispenses

Not all liquids behave the same

Many parameters affect pipettability

- Viscous
- Dense
- Vapor Pressure
- Volatile
- Detergent
- Volume dependent

Why are Complex Liquids Tricky to Pipette?

PCR Master Mix

- dH2O
- dNTP's (dGTP, dCTP, dATP, dTTP)
- MgCl2
- FWD/REV Primers
- DNA polymerase
- PCR Buffer
- Tris-HCl
- potassium chloride (KCl)
- EDTA
- Glycerol
- And other components

Serum

- Glucose
- Albumin
- Immunoglobulin
- Cholesterol
- Triglycerides

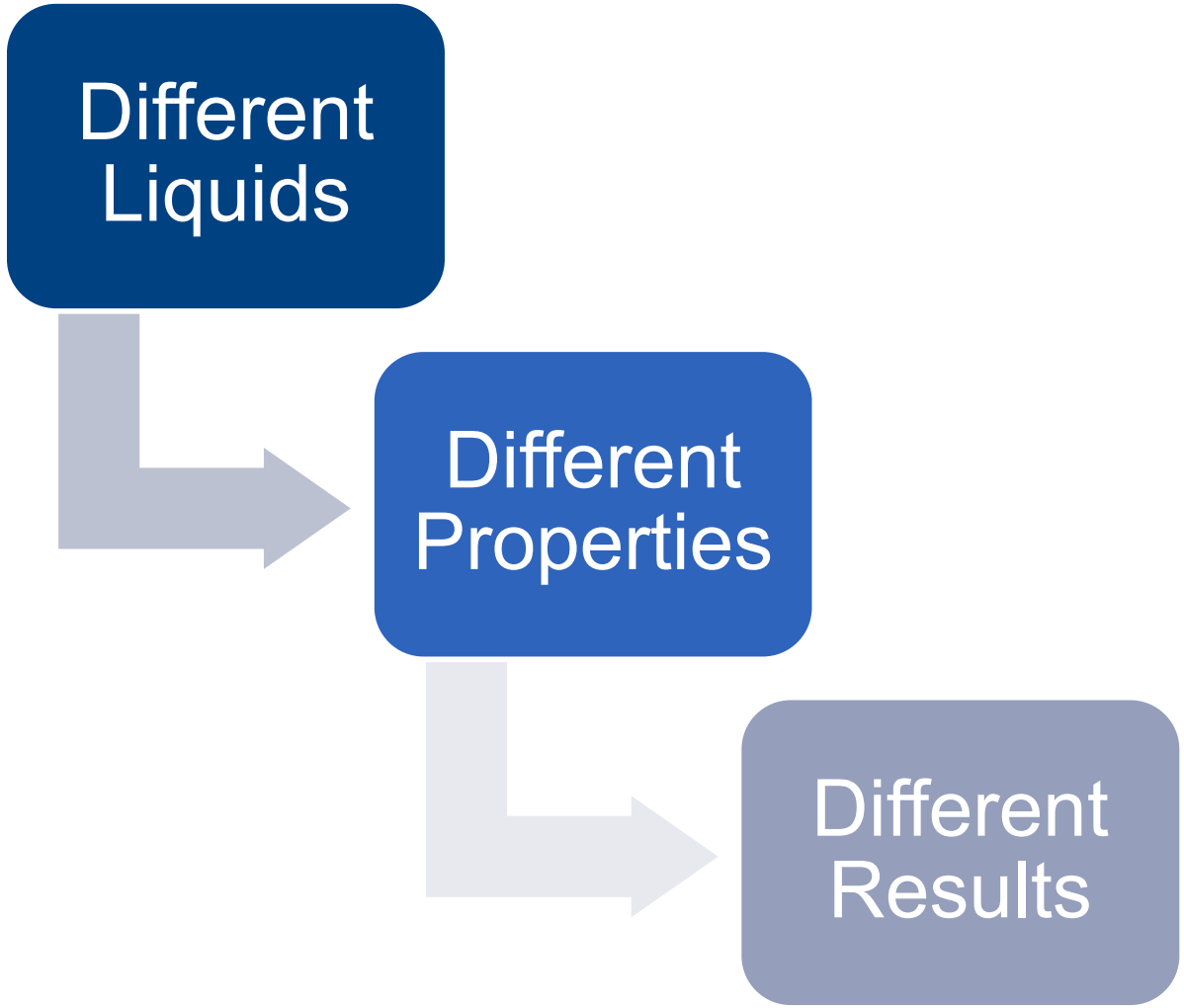
Rheology : the study of a fluid's flow characteristics under an external force.

Why non-ideal solutions such as master mix and serum are difficult to dispense

How important it is to use a solution that mimics your assay reagents when optimizing your liquid handler

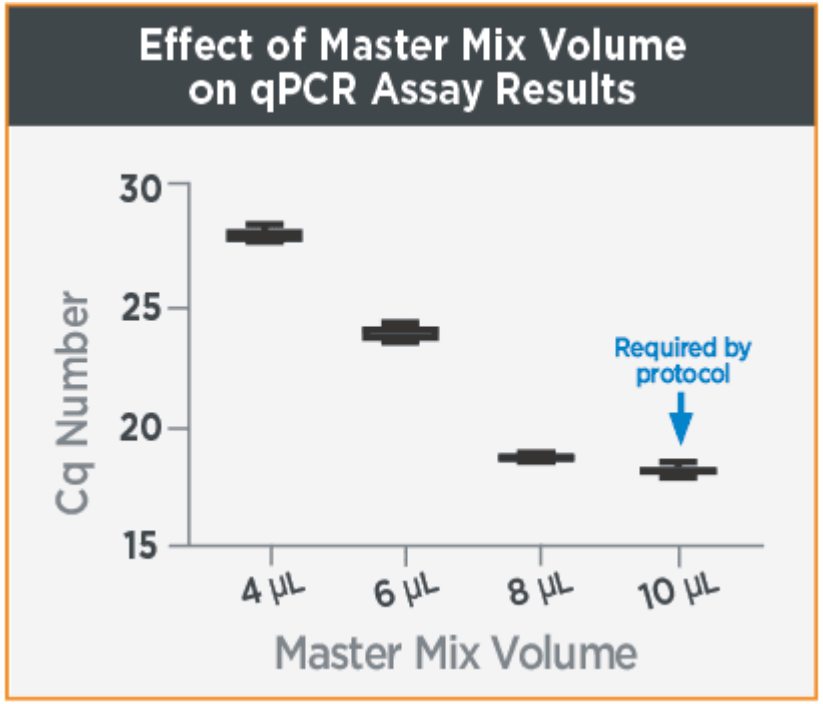
How Artel developed solutions to mimic master mix and serum dispenses

Poor Accuracy and Precision Impacts Assay Results



Correctly vs Incorrectly Dispensed Master Mix

Under-delivery of master mix by 40% significantly impacts Cq value.



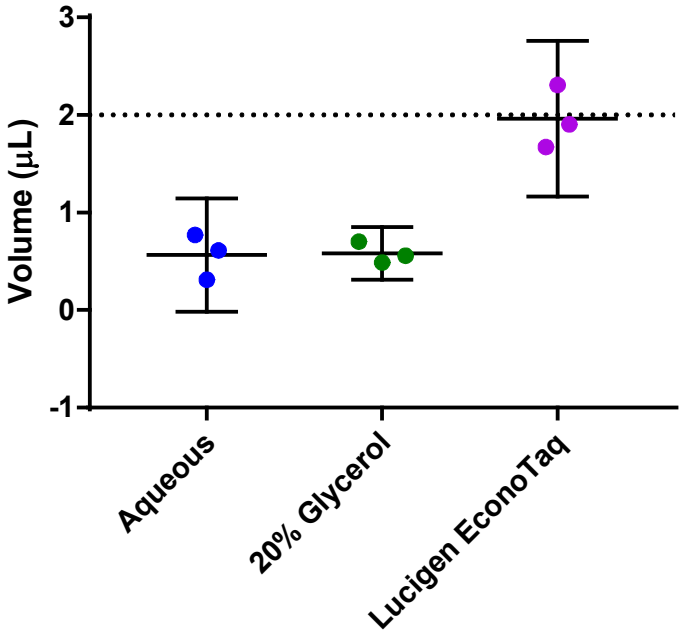
- The amount of master mix added to your reaction can directly affect a qPCR assay's Cq value

How do we optimize liquid classes for non-ideal solutions?

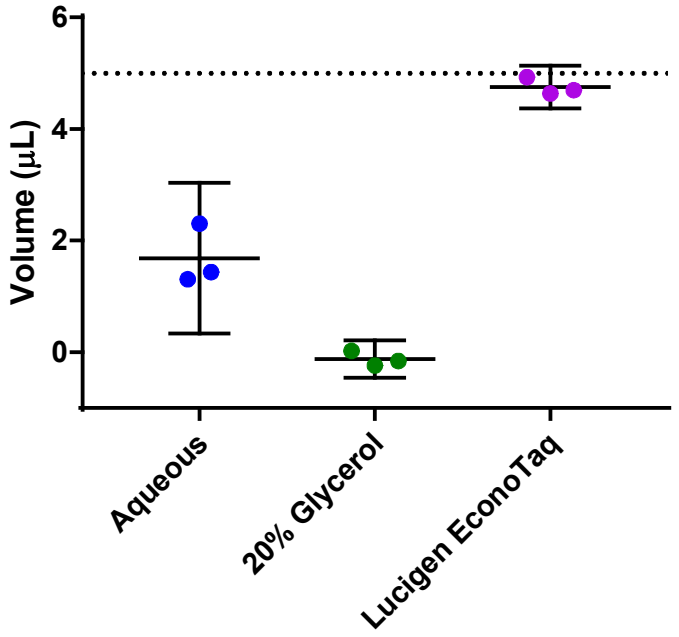
Historically, not well!

- Accept predefined liquid classes without further optimization
- Use gravimetry with actual test solutions
- Optimize with aqueous or 20% glycerol solution

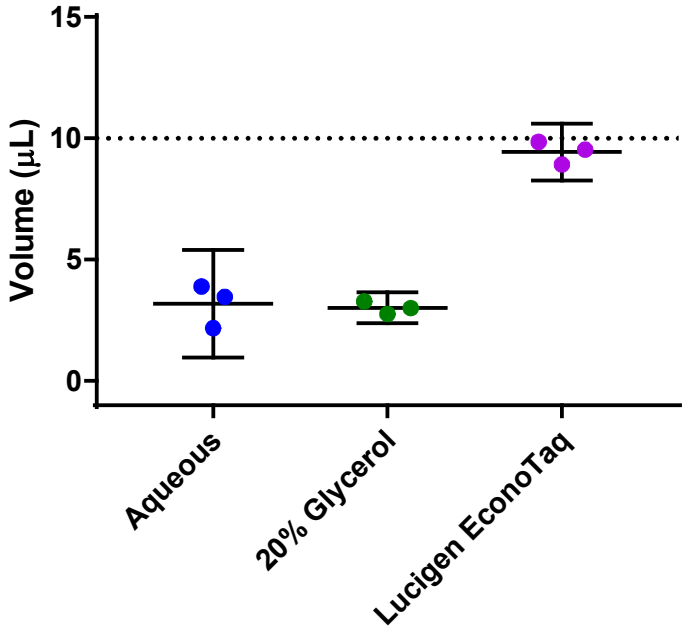
Aqueous and 20% Glycerol Solutions do not mimic Master Mix



2 µL

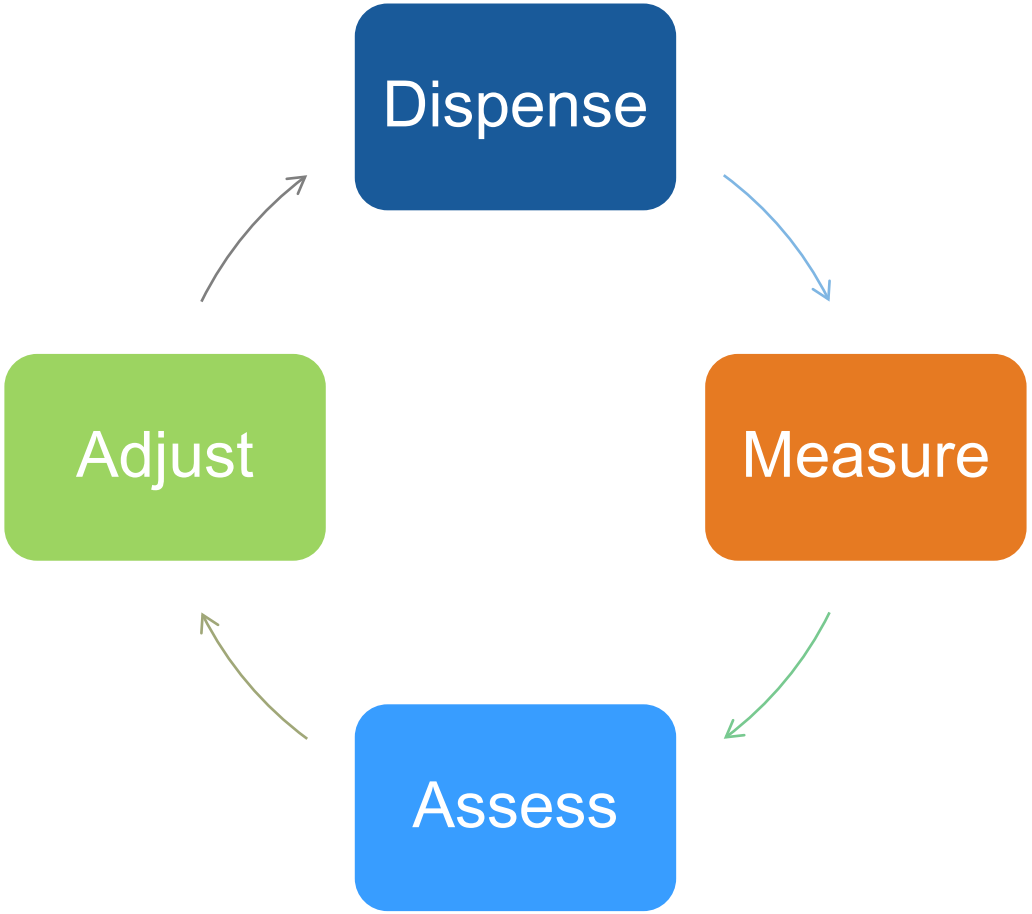


5 µL



10 µL

Liquid Class Optimization – Simplified



Liquid Class Optimization Parameters

Because not all liquids are created equal

- Adjustment of any parameters are intended to:
  - **increase** the accuracy and precision of liquid transfers
  - **decrease** variability of assay results and even false results.

Default Glycerol Liquid Class

Asp. Speed (mm/s)	Disp. Speed (mm/s)	Delay blow (ms)	Speed Blow (mm/s)	Movement Blow (%)
15.4	88	700	66	90

Solution Type	Test #	Asp. Speed (mm/s)	Disp. Speed (mm/s)	Delay blow (ms)	Speed Blow (mm/s)	Movement Blow (%)	Volume offset	Target Volume	Relative Inaccuracy	CV
PCRMix C	1	15.4	88	700	66	90	No	9.9uL	-6.86%	2.73%
PCRMix C	2	15.4	25	100	66	90	No	9.9uL	-8.47%	5.07%
PCRMix C	3	3	3	1000	66	0	No	9.9uL	-2.21%	4.68%
PCRMix C	4	3	3	3000	66	0	+0.5uL = 10.4uL total	9.9uL	4.40%	0.31%
PCRMix C	5	3	3	3000	66	0	+0.3uL = 10.2uL total	9.9uL	2.08%	0.61%
PCRMix C	6	3	3	3000	66	0	+0.1uL = 10.0uL total	9.9uL	0.82%	0.32%
PCRMix C	7	3	3	3000	66	0	+0.1uL = 10.0uL total	9.9uL	0.85%	0.29%
PCRMix C	**8**	**3**	**3**	**3000**	**66**	**0**	**+0.1uL = 10.0uL total**	**9.9uL**	**0.84%**	**0.25%**

Red = default liquid class settings

Bold = final optimized liquid class settings

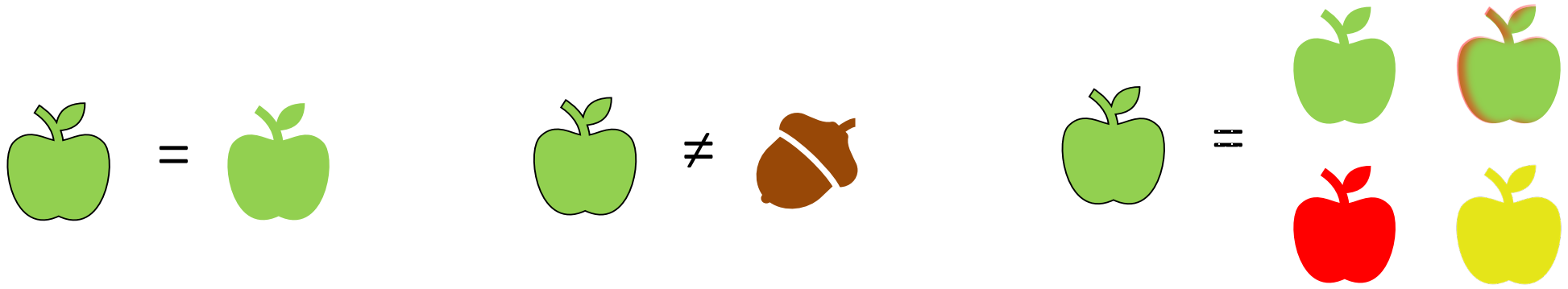
Why non-ideal solutions such as master mix and serum are difficult to dispense

How important it is to use a solution that mimics your assay reagents when optimizing your liquid handler

How Artel developed solutions to mimic master mix and serum dispenses

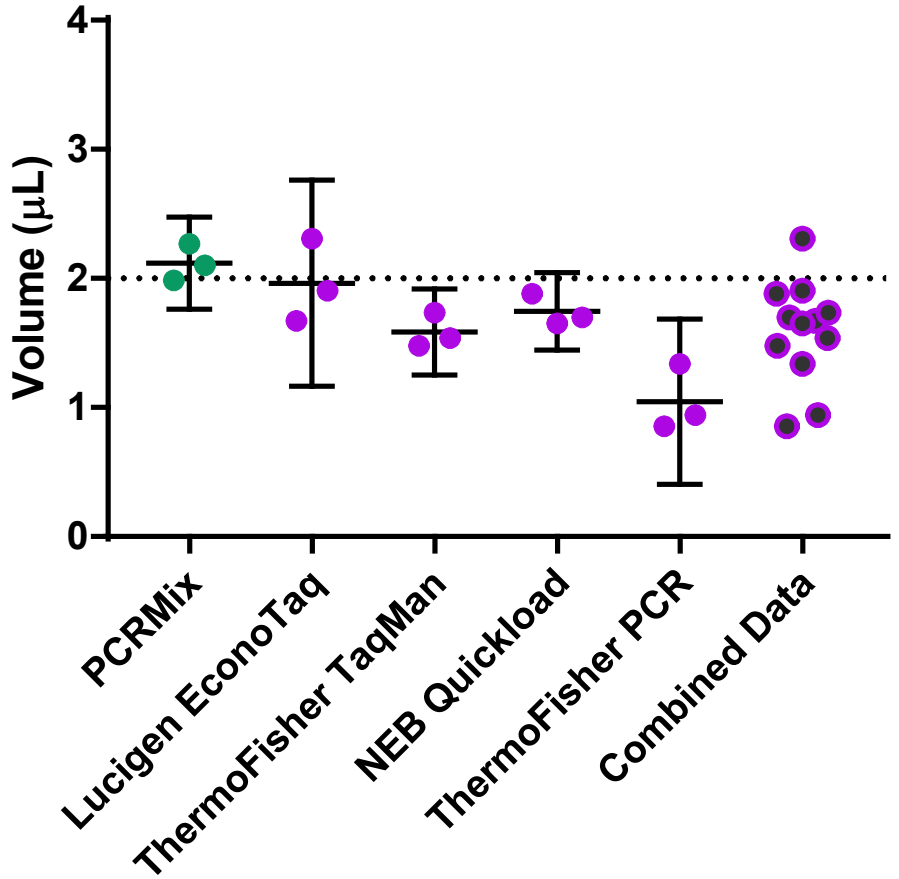
Equivalency Testing

A test to determine if one is like the other.



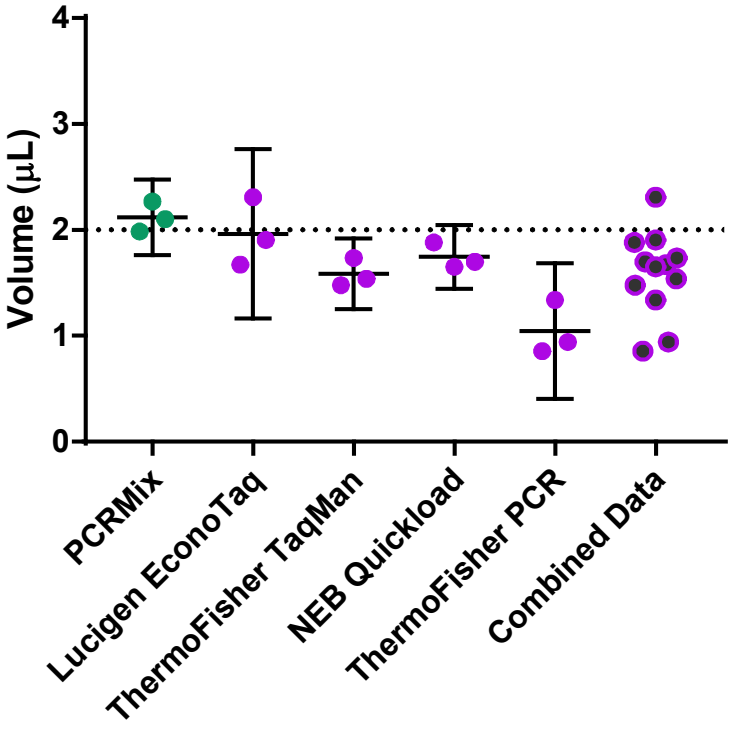
1. Identify different master mix to test.
2. Develop simple transfer method on an ALH.
3. Use gravimetry to measure and compare.

PCRMix QualAssure vs Commercial Master Mix

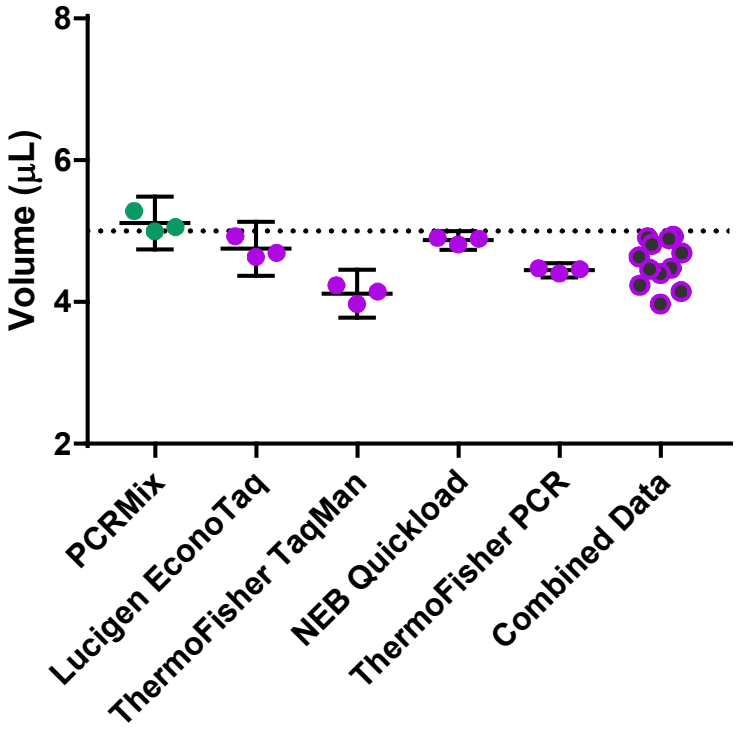


2 µL

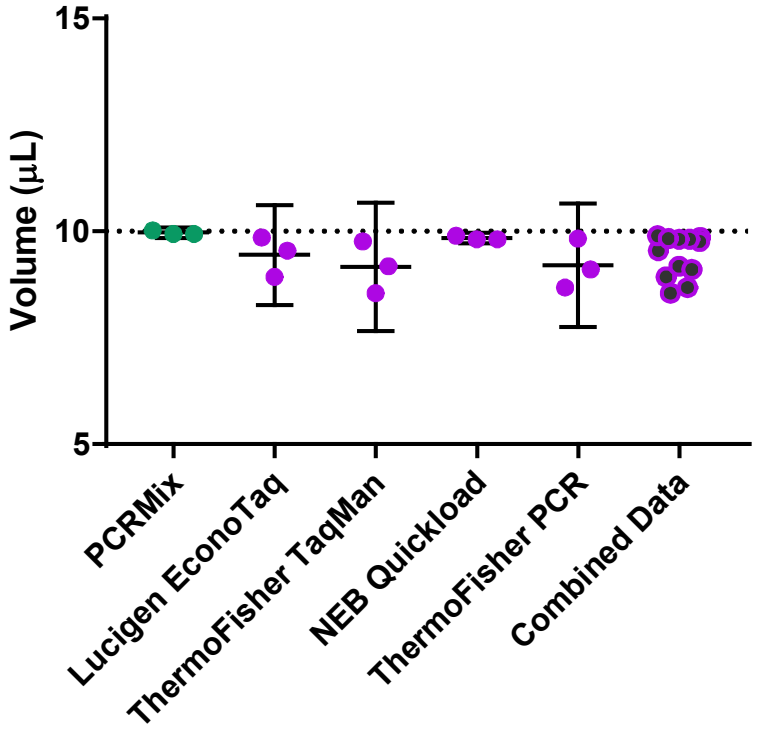
- PCRMix mimics master mix in its dispensing performance.
- Allows users to simulate and optimize dispensing steps without wasting expensive reagents.



2 µL

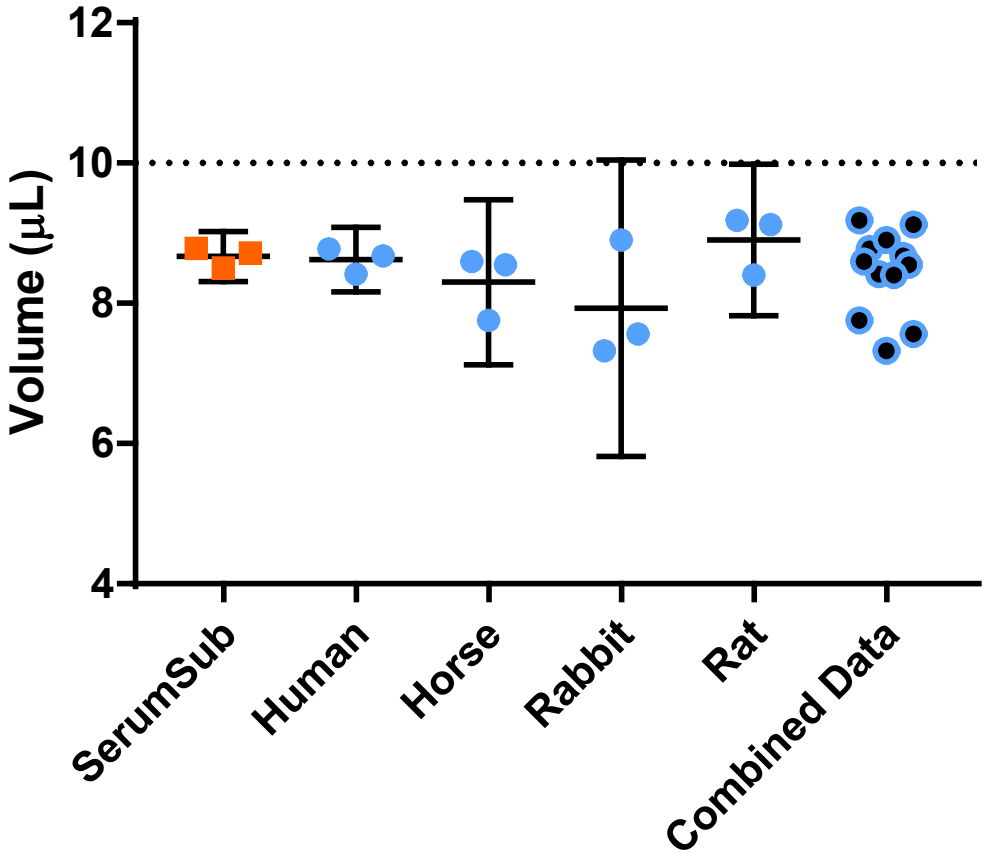


5 µL

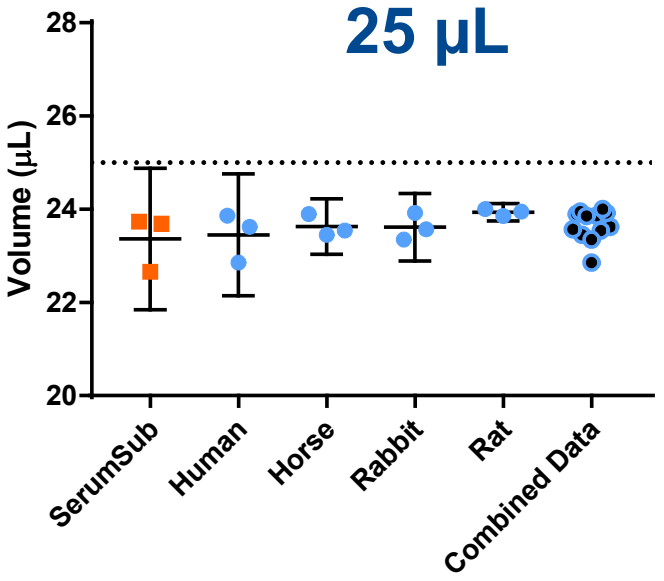


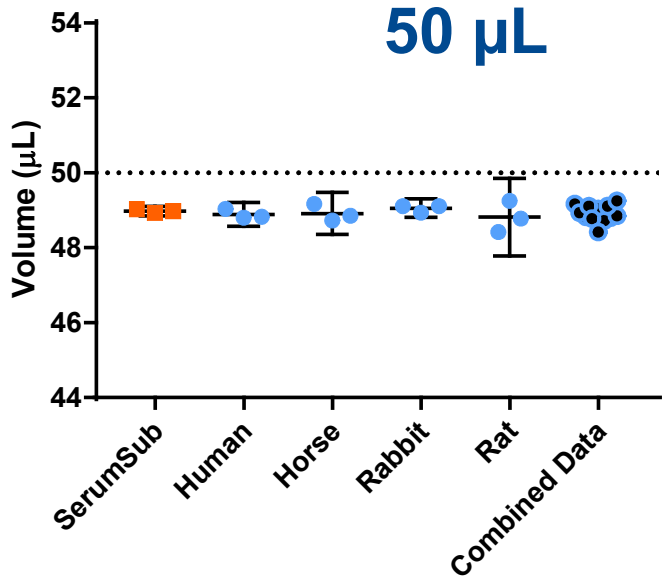
10 µL

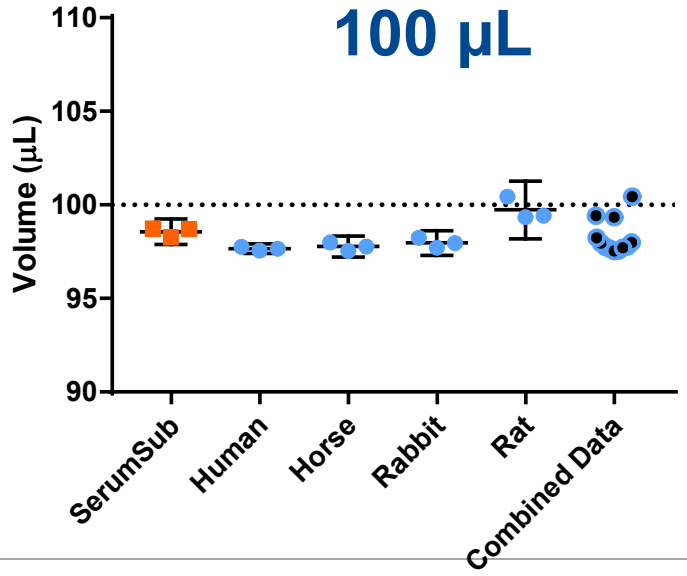
SerumSub QualAssure vs Common Sera

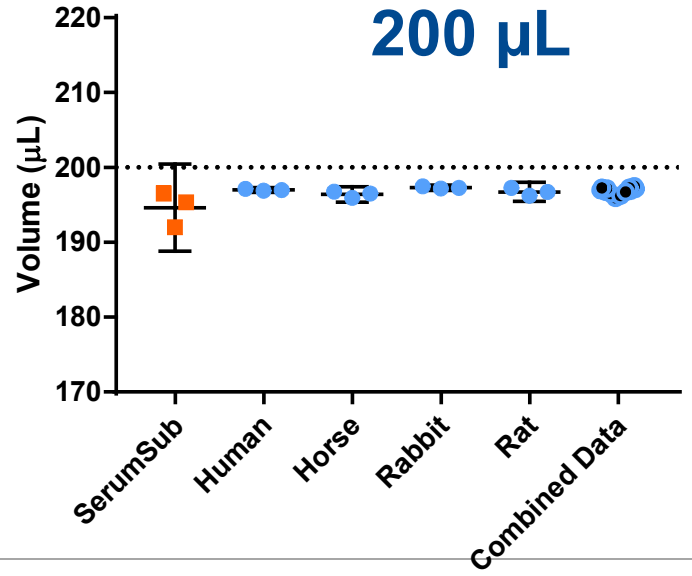


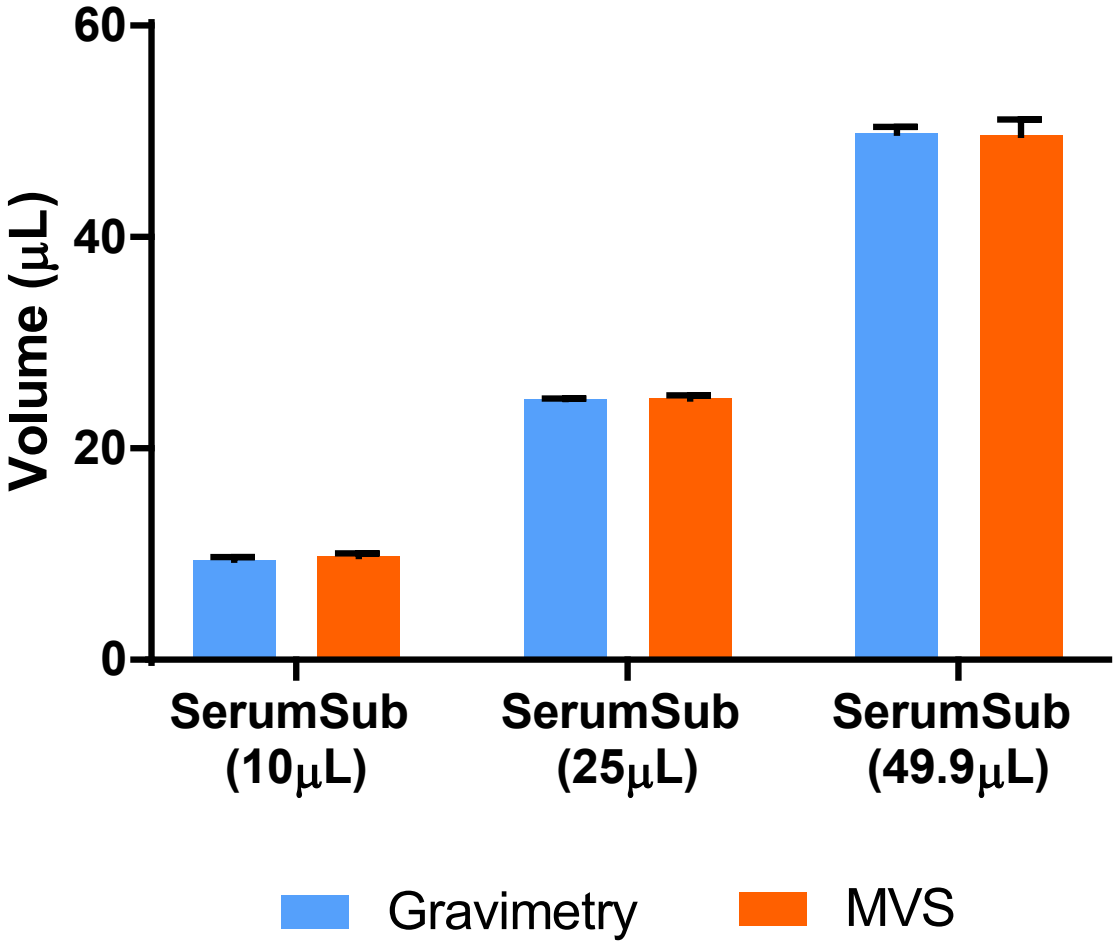
10 µL


25 µL
Volume (µL)
28
26
24
22
20
SerumSub
Human
Horse
Rabbit
Rat
Combined Data


50 µL
Volume (µL)
54
52
50
48
46
44
SerumSub
Human
Horse
Rabbit
Rat
Combined Data


100 µL
Volume (µL)
110
105
100
95
90
SerumSub
Human
Horse
Rabbit
Rat
Combined Data


200 µL
Volume (µL)
220
210
200
190
180
170
SerumSub
Human
Horse
Rabbit
Rat
Combined Data


60
40
20
0
Volume (µL)
SerumSub (10µL)
SerumSub (25µL)
SerumSub (49.9µL)
Gravimetry
MVS

PCRMix

Available now

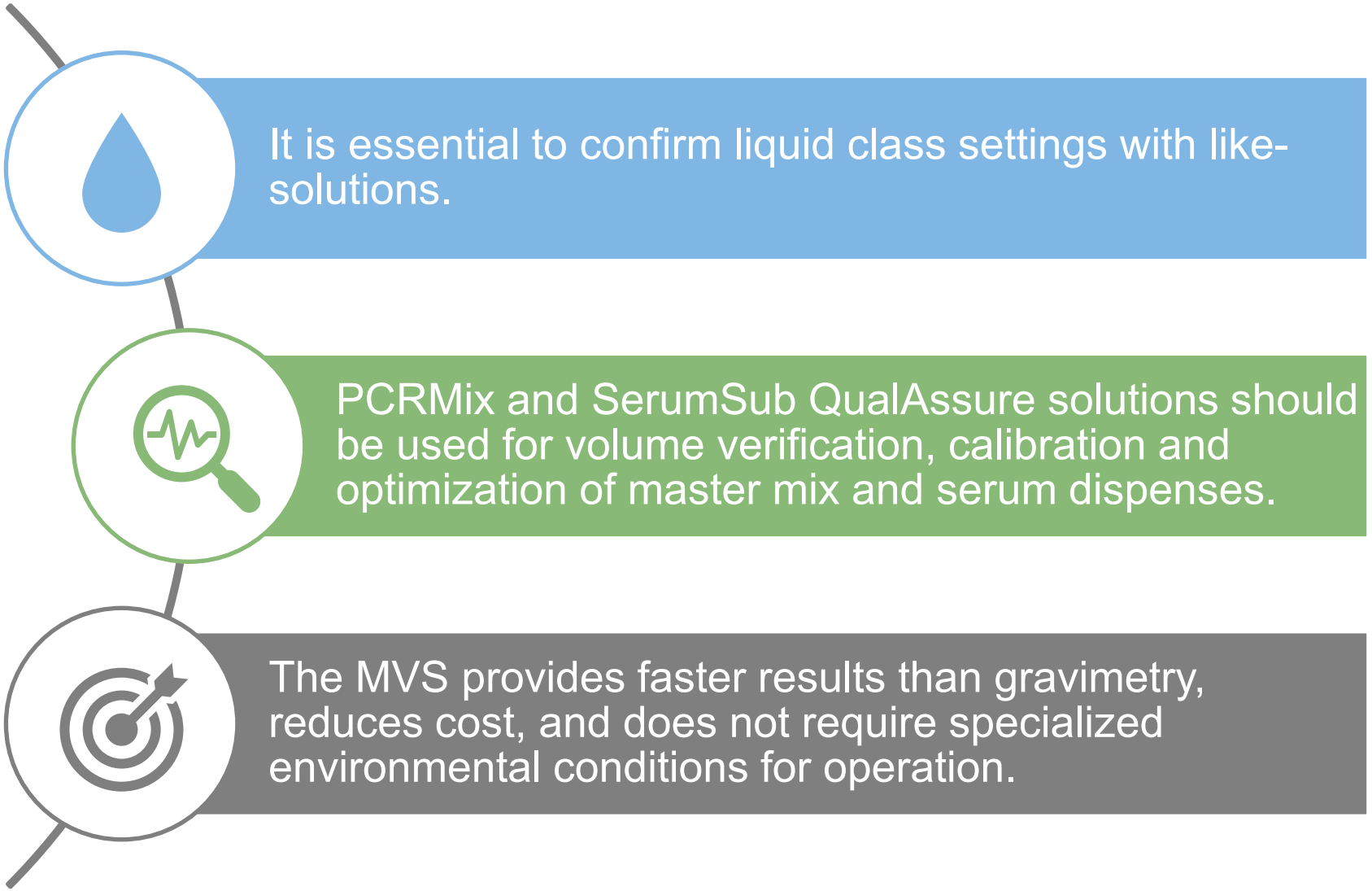
2 to 49.99 µL in 96-well plates

SerumSub

10 to 200 µL in 96-well plates

Coming soon!

Summary



Please visit us at booth 2018!