AMERICAN CIDER ASSOCIATION

THE CIDER INSTITUTE OF NORTH AMERICA

Cool Climate Oenology & Viticulture Institute

Brock University

-2025-

CIDERCON CHICAGO

Lab Testing: Maximum Impact with Minimum Effort

PRESENTED BY:

Steven Trussler
strussler@brocku.ca

CIDER INSTITUTE OF NORTH AMERICA

Your go-to cider making resource

ciderinstitute.com

AGENDA

1. An approach (not the only approach)
2. No definite answers (no one size fits all)
3. Goals:
   - Feel more confident making decisions about chemical and microbiological testing
   - Concrete strategy for mapping testing onto your production process and costing out the options for testing
4. Watch till the end…and I'll tell you what to do

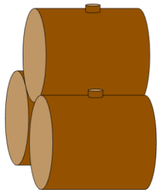
AGENDA

1. Why test your cider?
2. When should you test your cider?
3. What are your options for testing your cider?
4. How much does testing your cider cost?

AGENDA

How can you get the biggest



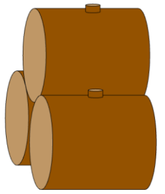




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging

Why test your cider

- Regulations

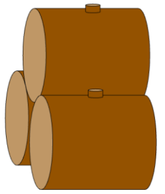



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol

REGULATION				

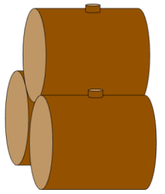



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity

REGULATION				

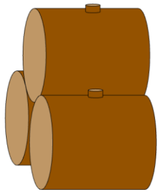



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity Sorbate

REGULATION				

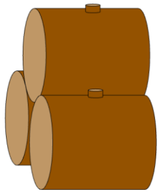



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity Sorbate SO2

REGULATION				

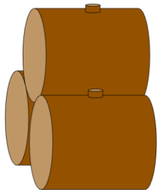



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity Sorbate SO2 Carbonation

REGULATION				




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity

REGULATION				

Why test your cider

- Regulations
- Quality Assurance

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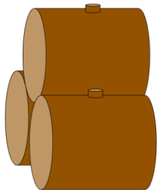
QUALITY ASSURANCE	QUALITY CONTROL
What are you testing that will have an actionable outcome to your production process? TEST ---> DECISION	
To have an actionable outcome, you need two things: Specifications and remedies.	
Example: pH of juice	

pH of Juice result:	Action:
Below 3.61	Proceed to next step of cidermaking
Between 3.61 and 3.80	Adjust cidermaking: • Increased hygiene protocols? • Increased SO2 addition to juice? • Cooler fermentation temperature? • Addition of lysozyme (USA only)?
Above 3.80	Bench trial malic acid addition to bring pH below 3.8
Above 3.80	Adjust cidermaking • Co-inoculate with Saccharomyces and Lactic Acid Bacteria? • Abandon keeving protocol and begin traditional fermentation?

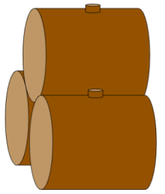



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch				

REGULATION	QUALITY ASSURANCE			

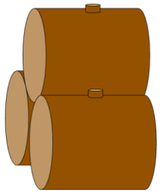



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density			

REGULATION	QUALITY ASSURANCE			

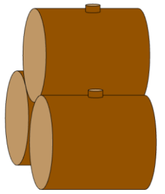



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density Non-soluble Solids			

REGULATION	QUALITY ASSURANCE			

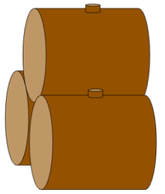



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density Titratable Acidity			

REGULATION	QUALITY ASSURANCE			

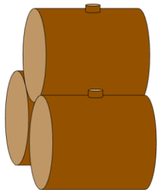



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density			

REGULATION	QUALITY ASSURANCE			

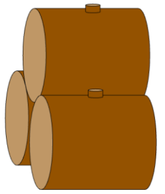



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density		

REGULATION	QUALITY ASSURANCE			

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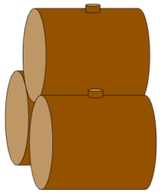
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density		

REGULATION	QUALITY ASSURANCE			

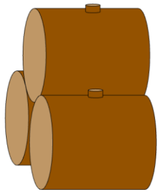



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	

REGULATION	QUALITY ASSURANCE			




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation

REGULATION	QUALITY ASSURANCE			

Why test your cider

- Regulations
- Quality Assurance
- Quality Control

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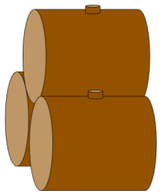
QUALITY ASSURANCE	QUALITY CONTROL
What are you testing that will have an actionable outcome to your production process? TEST ---> DECISION	What are your testing to make sure your production process has done what you wanted? DECISION ---> TEST
To have an actionable outcome, you need two things: Specifications and remedies.	QC analysis must be linked to a previous processing step
Example: pH of juice	Example: Microbiological testing of packaged cider – linked to pasteurization

Result of Microbiological Testing (Total Viable Cell Count of Packaged Product):	Conclusion about linked step (Pasteurization)
Less than 1 cfu per mL	Pasteurization protocol was successful
Between 1 and 10 cfu per mL	No residual sugar: Pasteurization was successful
	Contains residual sugar: Pasteurization was not successful
Above 10 cfu per mL	Pasteurization was not successful

Note that Quality Control testing can be co-ordinated with food safety plan.

CCP	Hazard	Limit	Monitoring				Corrective Action	Validation
			What?	How?	When?	Who?		
CCP -1 Culling	Patulin	No more than 1% by weight visually damaged fruit after culling	Damaged apples	Visually	Twice per production run	Line Manager	Segregate and hold product for evaluation or destroy or divert to non-food use Retrain production employees (cullers) on inspection procedures	Review all records within one week of processing Sample for presence of patulin quarterly
CCP-2 Bottling	Metal inclusion	No pieces larger than 2 mm	Integrity of exclusion screen	Visual	Daily – before production begins	Line technician	Segregate previous day's product and reprocess to eliminate metal pieces or,	Review all records within one week of production

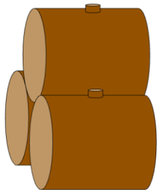



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Patulin testing – Fruit sorting (5% of juice lots)			

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

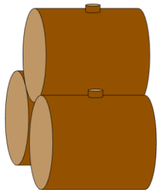



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
				Patulin testing – Patulin control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

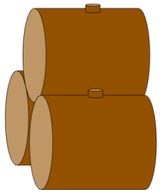



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing			Patulin testing – Patulin Control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

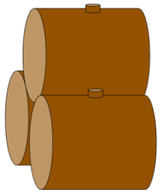



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing	Viable Yeast Count – Rehydration and inoculation of yeast		Patulin testing – Patulin Control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

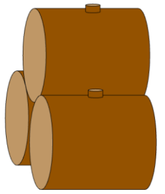



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing			Patulin testing – Patulin Control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

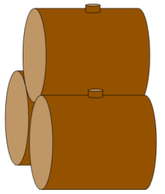



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing	Density – Complete fermentation		Patulin testing – Patulin Control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

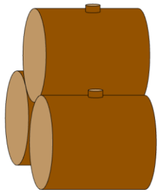



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing	Density – Complete fermentation	Visual tank inspection – microbial/oxygen control Volatile Acidity – microbial/oxygen control	Patulin testing – Patulin Control (5% of finished ciders)

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

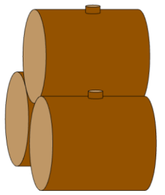



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity - Settling Volume - Pressing	Density – Complete fermentation	Visual tank inspection – microbial control Volatile Acidity – microbial/oxygen control	Patulin testing – Patulin Control (5% of finished ciders) Residual Sugar – Sugar Addition Titratable Acidity – Acid addition

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

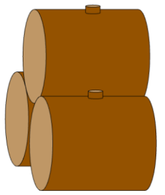



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation - Prepackaging
	Turbidity - Settling Volume - Pressing	Density – Complete fermentation	Visual tank inspection – microbial control Volatile Acidity – microbial/oxygen control	Patulin testing – Patulin Control (5% of finished ciders) Total Viable Cell Count – Microbial control Carbonation – Packaging process

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation -
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL		

Why test your cider

- Regulations
- Quality Assurance
- Quality Control
- Troubleshooting – ad hoc

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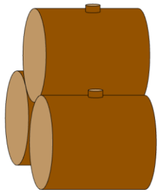
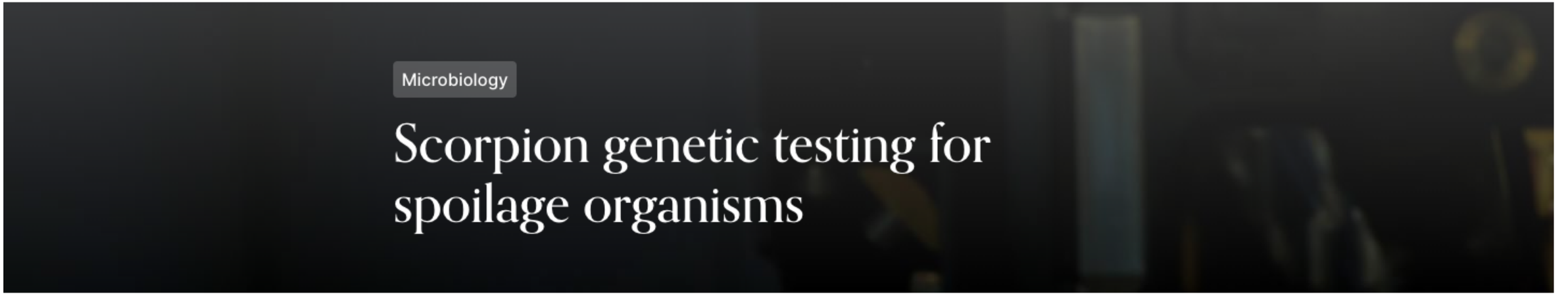



Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation
			ETS Scorpions Testing	

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	



Microbiology

Scorpion genetic testing for spoilage organisms

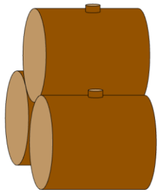
Scorpions rapid genetic detection goes "beyond Brett", giving winemakers insights into the full range of yeast and bacterial spoilage microbes in wine, so they can intervene early to prevent spoilage and preserve quality.

Spoilage organisms in wine

Despite the best practice of modern winemaking methods, microbial contamination often occurs during wine production. Spoilage microbes are capable of survival and growth in the wine, potentially producing off-flavors, off aromas, and turbidity. Microbiological contamination is often undetected until related problems in the wine become noticeable by sensory evaluation.

Scorpions™ assays, based on specific genetic targets, detect the full range of wine and juice




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation - Prepackaging
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation – Post packaging
		pH	Malic Acid	

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	

Why test your cider

- Regulations
- Quality Assurance
- Quality Control
- Troubleshooting – ad hoc
- Marketing

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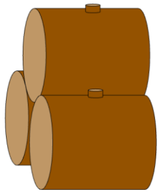


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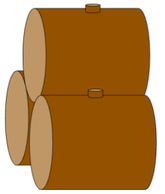
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation - Prepackaging
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation – Post packaging
		pH	Malic Acid	
				Residual Sugar Titratable Acidity

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	MARKETING




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
HIGHEST PRIORITY				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation - Prepackaging
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation – Post packaging
		pH	Malic Acid	
LOWEST PRIORITY				Residual Sugar Titratable Acidity

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	MARKETING

AGENDA

1. ~~Why test your cider?~~
2. ~~When should you test your cider?~~
3. What are your options for testing your cider?
4. How much does testing your cider cost?
5. Putting it all together:

AGENDA

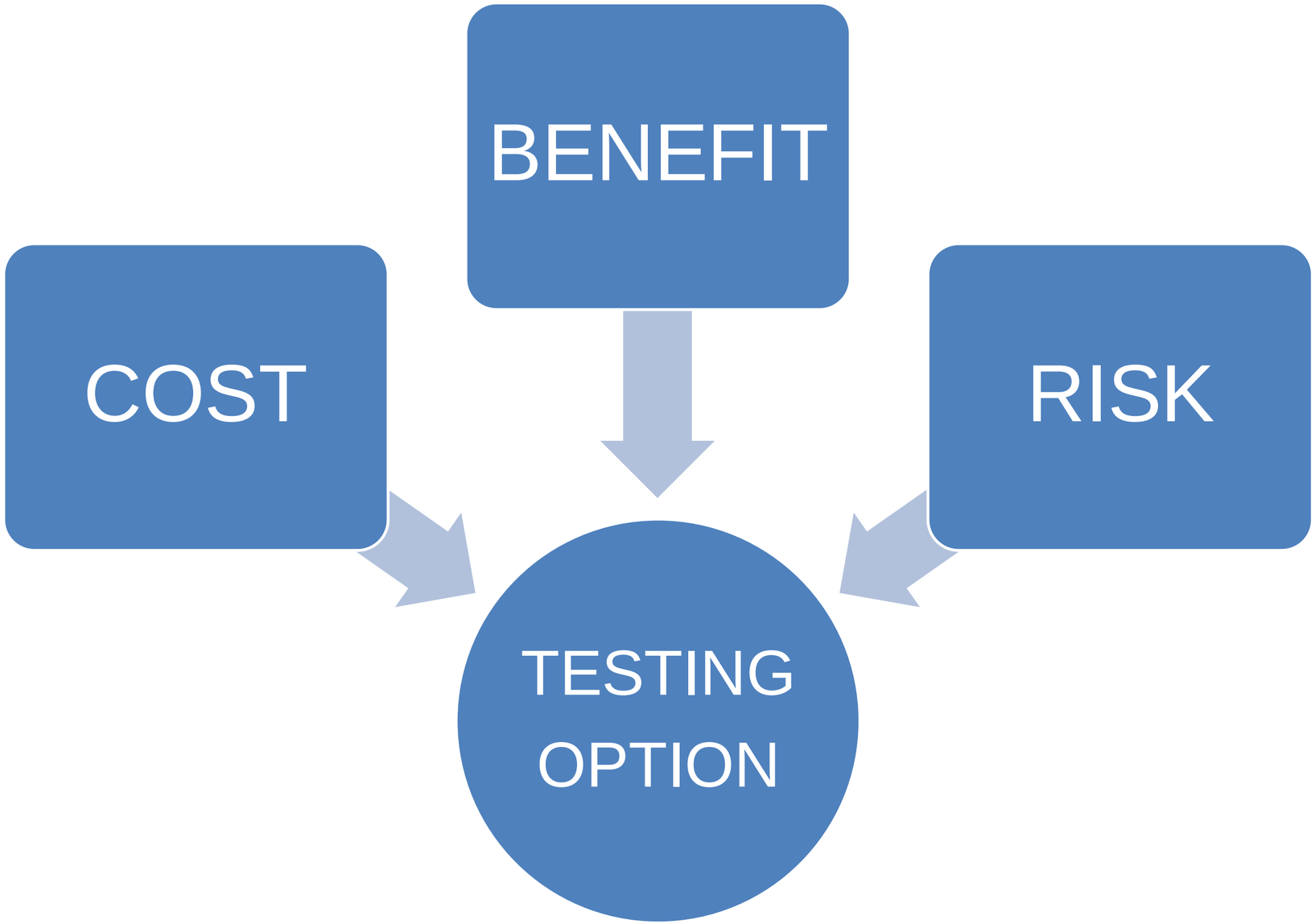
3 What are your options for testing your cider?

- In House
- External Lab

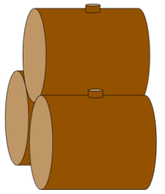
AGENDA

4 How much does testing your cider cost?

IN HOUSE		EXTERNAL LAB	
Chemicals	$20	Sample container	$2
Glassware	$15	Shipping	$60
Time	$20	Cost of test	$20
Total	$55	Total	$82


BENEFIT
COST
RISK
TESTING
OPTION

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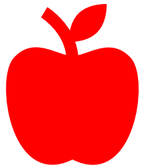
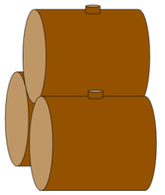
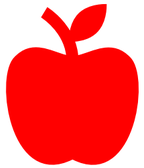
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation – Post packaging
		pH	Malic Acid	
				Residual Sugar Titratable Acidity

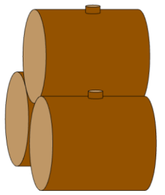
REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	MARKETING



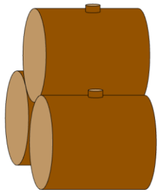

Starch				
pH (2)				
Turbidity				
Volume				
Temperature				
Density (14)				
Free SO2 (6)				
Visual tank inspection				
Volatile Acidity				
Malic Acid				
Alcohol				
Volatile Acidity				
Carbonation (2)				
Patulin testing				
Total Viable Cell Count				
Residual Sugar				
Titratable Acidity				




Starch	Negligible Cost			
pH (2)				
Turbidity	Negligible Costs			
Volume	Negligible Costs			
Temperature	Negligible Costs			
Density (14)	Negligible Costs			
Free SO2 (6)				
Visual tank inspection	Negligible Costs			
Volatile Acidity				
Malic Acid				
Alcohol				
Volatile Acidity				
Carbonation (2)	Negligible Costs			
Patulin testing	Can’t test in house			
Total Viable Cell Count				
Residual Sugar				
Titratable Acidity				




pH (2)				
Free SO2 (6)				
Volatile Acidity				
Malic Acid				
Alcohol				
Volatile Acidity				
Patulin testing				
Total Viable Cell Count				
Residual Sugar				
Titratable Acidity				

IN HOUSE COSTS

Test	Number of batches per year requiring this test	Tests per batch	Total tests per year	Total tests over lifespan	Equipment	Time***	Reagents (per test)	Cost per test	Cost per year	Cost of Expertise	Grand total per year
pH	4	2	8	40	$12.50	$15	$3	$27.50	$220.00		
Free SO2	4	6	24	120	$0.21	$30	$1	$30.21	$725.00		
Volatile Acidity	4	2	8	40	$37.50	$60	$0	$97.50	$780.00		
Malic Acid	4	1	4	20	$1.00	$60	$10	$61.00	$244.00		
Alcohol	4	1	4	20	$50.00	$60	$0	$110.00	$440.00		
Patulin testing	1	1	1	n/a	n/a	n/A	n/a	$120.00	$120.00		
Total Viable Cell Count	4	3	12	60	$5.00	$60	$21	$85.83	$1,030.00		
Residual Sugar	4	1	4	20	$15.00	$30	$15	$45.00	$180.00		
Titratable Acidity	4	1	4	20	$1.25	$15	$8	$16.25	$65.00		
Totals									$3,804.00	$5,000	$8,804.00

		Equipment costs (intial)	Reagents per year			
					For 50 000L	$0.18 per Liter
Ph	(Ph Meter)	$500	$20			
SO2	(Ripper)**	$25	$30			
Volatile Acidity	Cash Still	$1,500	$0			
Malic Acid	Paper Chromatc	$20	$40			
Alcohol	Distillation/Hyd	$1,000	$0			
Patulin		N/A	n/a			
Total Viable Cell count	Sterile plating	$300	$250			
Residual sugar	Reblein	$300	$60			
TA	Titration**	25	$30			

*Cost spread over 4 batches per year for 5 years, total of 50 000 L each year

**use same equipment as used in other tests costs spread equaly

***assume $30 per hour

IN HOUSE WET CHEMISTRY

- Previous
- Next

HI901W Automatic Potentiometric Titrator For Wine

$5,308.00

SKU: HI901W-01

In stock

1 Add to cart

All-In-One Titration Solution Made For Wine.

The Wine Titrator is perfect for winemakers who need accurate results, ease-of-use, and the ability to expand the system as their analytical needs grow. It comes preloaded with methods for wine analysis, and with Hanna, you get the support you need to run them perfectly in your lab.

Get The Most Out Of One Device.

Titrate for a variety of measurements including pH, Total Acidity, Free & Total Sulfur Dioxide, Formol Number, Volatile Acids, Reducing Sugars, and many more.

Hanna's Wine Titrator comes preloaded with methods for wine analysis, and with Hanna, you get the support you need to run them perfectly in your lab.

Test	Number of batches per year requiring this test	Tests per batch	Total tests per year	Total tests over lifespan	Equipment	Time***	Reagents (per year)	Cost per test	Cost per year	Cost of Expertise	Grand total per year		
pH	4	2	8	40	$20.83	$15	$13	$48.33	$386.60				
Free SO2	4	6	24	120	$6.94	$15	$4	$26.11	$626.60				
Volatile Acidity	4	2	8	40	$20.83	$15	$13	$48.33	$386.60				
Malic Acid	4	1	4	20	$1.00	$60	$10	$71.00	$284.00				
Alcohol	4	1	4	20	$50.00	$15	$0	$65.00	$260.00				
Patulin testing	1	1	1	N/A	N/A	N/A	N/A	$120.00	$120.00				
Total Viable Cell Count	4	3	12	60	$5.00	$60	$21	$85.83	$1,030.00				
Residual Sugar	4	1	4	20	$41.65	$15	$25	$81.65	$326.60				
Titratable Acidity	4	1	4	20	$41.65	$15	$25	$81.65	$326.60				
Totals									$3,747.00		$3,747.00		

		Equipment costs initial investment		Reagent costs per year									
											For 50 000L	$0.07	per Liter
Ph**	Microlab	$833	($5000/6)	$100									
SO2**	Microlab	$833		$100									
Volatile Acidity**	Microlab	$833		$100									
Malic Acid	Paper Chromatc	$20		$40									
Alcohol	Distillation/Hyd	$1,000		$0									
Patulin		N/A		n/a									
Total Viable Cell count	Sterile plating	$300		$250									
Residual sugar**	Microlab	$833		$100									
TA**	Microlab	$833		$100									

*Cost spread over 4 batches per year for 5 years, total of 50 000 L each year

**use same equipment as used in other tests costs spread equaly

***assume $30 per hour

IN HOUSE MICROLAB

Why choose our Megazyme range?

- Tailored resources to simplify analysis
- Internationally validated methods
- Expedited delivery as standard
- Excellent technical support

Wine Analyzer Instrument

Test	Number of batches per year requiring this test	Tests per batch	Total tests per year	Total tests over lifespan	Equipment	Time***	Reagents (per year)	Cost per test	Cost per year	Cost of Expertise	Grand total per year		
pH	4	2	8	40	$17.85	$15	$13	$45.35	$362.80				
Free SO2	4	6	24	120	$5.95	$15	$4	$25.12	$602.80				
Volatile Acidity	4	2	8	40	$17.85	$15	$13	$45.35	$362.80				
Malic Acid	4	1	4	20	$1.00	$60	$10	$71.00	$284.00				
Alcohol	4	1	4	20	$50.00	$15	$0	$65.00	$260.00				
Patulin testing	1	1	1	N/A	N/A	N/A	N/A	$120.00	$120.00				
Total Viable Cell Count	4	3	12	60	$5.00	$60	$21	$85.83	$1,030.00				
Residual Sugar	4	1	4	20	$35.70	$15	$25	$75.70	$302.80				
Titratable Acidity	4	1	4	20	$35.70	$15	$25	$75.70	$302.80				
Totals									$3,628.00	$5,000	$8,628.00		

		Equipment costs initial investment		Reagent costs per year									
											For 50 000L	$0.17	per Liter
Ph**	Microlab	$714	($5000/7)	$100									
SO2**	Microlab	$714		$100									
Volatile Acidity**	Microlab	$714		$100									
Malic Acid	Paper Chromatc	$20		$40									
Alcohol	Distillation/Hyd	$1,000		$0									
Patulin		N/A		n/a									
Total Viable Cell count	Sterile plating	$300		$250									
Residual sugar**	Microlab	$714		$100									
TA**	Microlab	$714		$100									

*Cost spread over 4 batches per year for 5 years, total of 50 000 L each year

**use same equipment as used in other tests costs spread equaly

***assume $30 per hour

IN HOUSE SPECTROPHOTOMETER

EXTERNAL LABS

Many other alcohol beverage testing centers out there
Don't forget about regular food and beverage labs

USA

ETS Labs – California
Cornell Agri-Tech – New York
Michigan State University – Michigan
Advanced Analytical Research Lab – Wisconsin
Texas A&M Agrilife Extension – Texas
Grape and Wine Institute University of Missouri - Missouri

Canada

BCBTAC (BC Beverage Technology Access Center – Penticton
Brock University – Ontario
Acadia Laboratory for Agri-Food and Beverage - Nova Scotia

Test	Number of batches per year requiring this test	Tests per batch	Total tests per year	Total tests over lifespan	Shipping	Exterenal cost per test	Shipping + cost of test	Cost per year	Cost of Expertise	Grand total per year
pH	4	2	8	40	$30.00	$5	$35.00	$280.00		
Free SO2	4	6	24	120	$30.00	$40	$70.00	$1,680.00		
Volatile Acidity	4	2	8	40	$30.00	$33	$63.00	$504.00		
Malic Acid	4	1	4	20	$30.00	$30	$60.00	$240.00		
Alcohol	4	1	4	20	$30.00	$36	$66.00	$264.00		
Patulin testing	1	1	1	5	$30.00	$120	$150.00	$150.00		
Total Viable Cell Count	4	3	12	60	$30.00	$75	$105.00	$1,260.00		
Residual Sugar	4	1	4	20	$30.00	$30	$60.00	$240.00		
Titratable Acidity	4	1	4	20	$30.00	$22	$52.00	$208.00		
Totals								$4,826.00		$4,826.00

		Test Costs										
											For 50 000L	$0.10 per Liter
Ph	External	5										
SO2	External	40										
Volatile Acidity	External	33										
Malic Acid	External	30										
Alcohol	External	36										
Patulin	External	120										
Total Viable Cell count	External	75										
Residual sugar	External	30										
TA	External	22										

*Cost spread over 4 batches per year for 5 years, total of 50 000 L each year

**use same equipment as used in other tests costs spread equaly

***assume $30 per hour

EXTERNAL

Test	Number of batches per year requiring this test	Tests per batch	Total tests per year	Total tests over lifespan	Shipping	Exterenal cost per test	Shipping + cost of test	Cost per year	Cost of Expertise	Grand total per year
pH	4	2	8	40	$100.00	$5	$105.00	$840.00		
Free SO2	4	6	24	120	$100.00	$40	$140.00	$3,360.00		
Volatile Acidity	4	2	8	40	$100.00	$33	$133.00	$1,064.00		
Malic Acid	4	1	4	20	$100.00	$30	$130.00	$520.00		
Alcohol	4	1	4	20	$100.00	$36	$136.00	$544.00		
Patulin testing	1	1	1	5	$100.00	$120	$220.00	$220.00		
Total Viable Cell Count	4	3	12	60	$100.00	$75	$175.00	$2,100.00		
Residual Sugar	4	1	4	20	$100.00	$30	$130.00	$520.00		
Titratable Acidity	4	1	4	20	$100.00	$22	$122.00	$488.00		
Totals								$9,656.00		$9,656.00

		Test Costs			
Ph	External	5		For 50 000L	$0.19 per Liter
SO2	External	40			
Volatile Acidity	External	33			
Malic Acid	External	30			
Alcohol	External	36			
Patulin	External	120			
Total Viable Cell count	External	75			
Residual sugar	External	30			
TA	External	22			

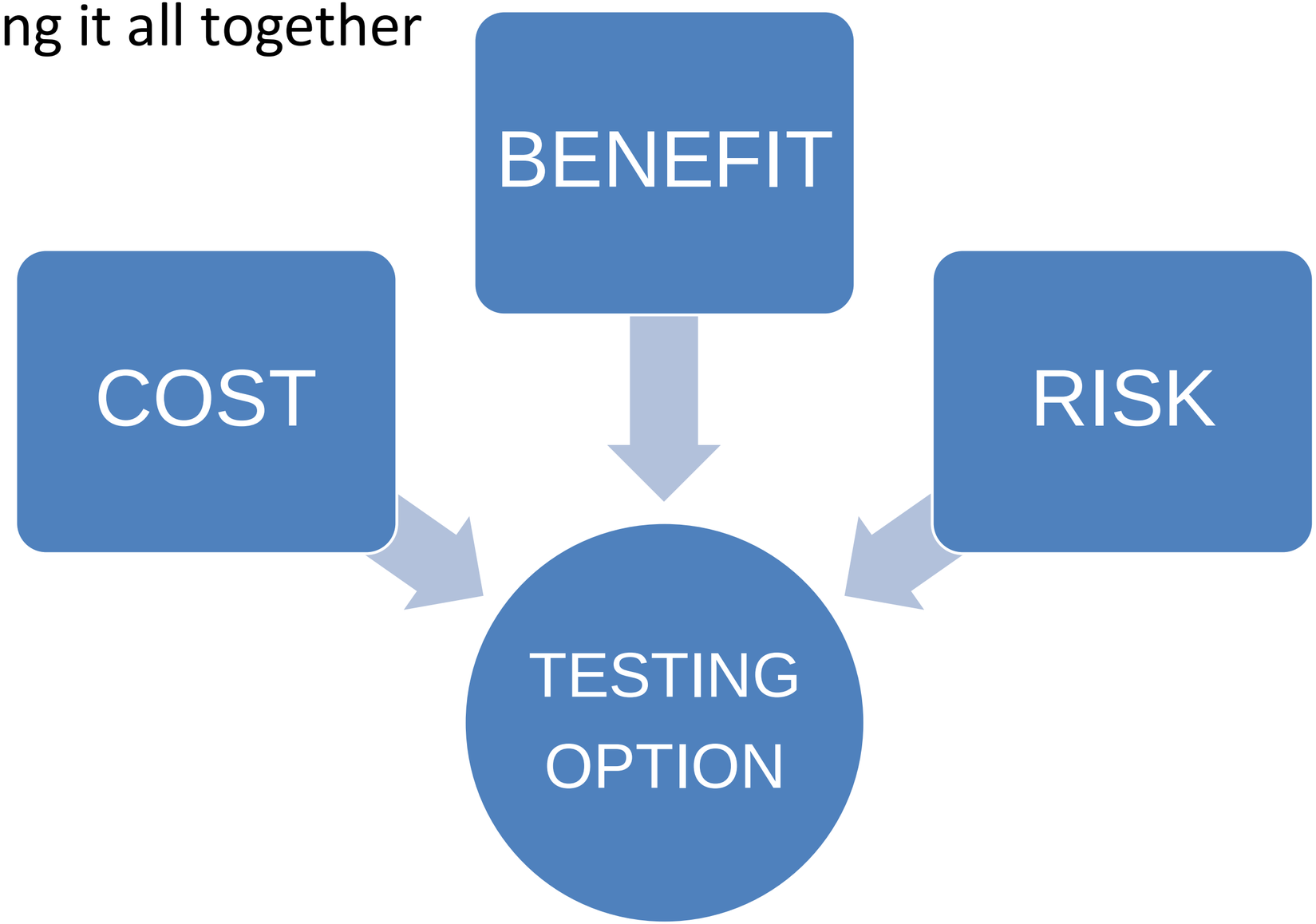
*Cost spread over 4 batches per year for 5 years, total of 50 000 L each year

**use same equipment as used in other tests costs spread equaly

***assume $30 per hour

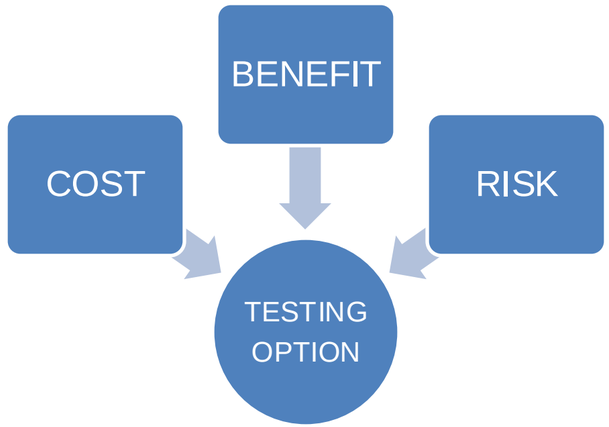
EXTERNAL

Putting it all together



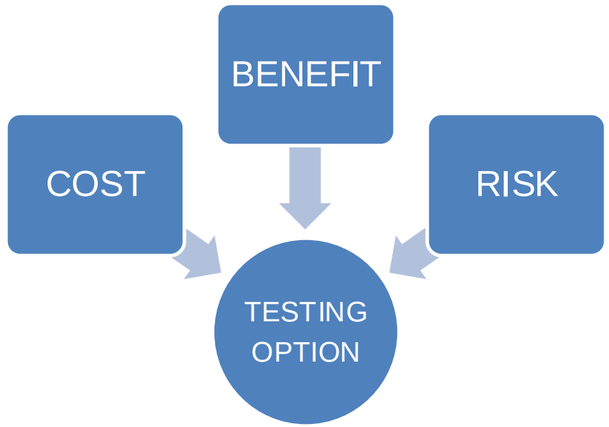
Putting it all together

Option	Cost	Expertise Required	Risk
In House – Wet Chemistry			
In House - Microlab			
In House - Spec.			
External – $30 shipping			
External - $100 shipping			

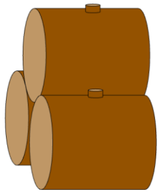


Putting it all together

Option	Cost	Expertise Required	Risk
In House – Wet Chemistry	$0.18/L	High	
In House - Microlab	$0.07/L	Low	
In House - Spec.	$0.17/L	High	
External – $30 shipping	$0.10/L	Low	
External - $100 shipping	$0.19/L	Low	





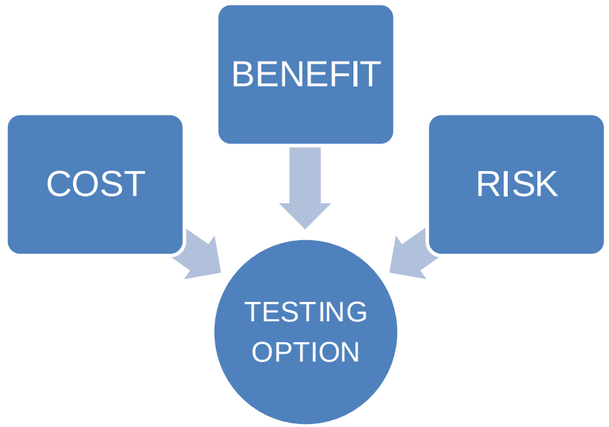




Fruit	Juice	Fermentation	Maturation/Bulk Storage	Finishing/Packaging
HIGHEST PRIORITY				Alcohol Volatile Acidity
Starch	pH Density	Temperature Density	Free SO2 (monthly)	Free SO2 Carbonation - Prepackaging
	Turbidity Volume	Density	Visual tank inspection Volatile Acidity	Patulin testing (5% of finished ciders) Total Viable Cell Count Carbonation – Post packaging
		pH	Malic Acid	
LOWEST PRIORITY				Residual Sugar Titratable Acidity

REGULATION	QUALITY ASSURANCE	QUALITY CONTROL	TROUBLE SHOOTING	MARKETING

Putting it all together

Option	Cost	Expertise Required	Risk
In House – Wet Chemistry	$0.18/L	High	Medium
In House - Microlab	$0.07/L	Low	High
In House - Spec.	$0.17/L	High	Low
External – $30 shipping	$0.10/L	Low	Low
External - $100 shipping	$0.19/L	Low	Low



Considerations:

Volume and size of portfolio.

Change the dynamic of what tests you need/risk.

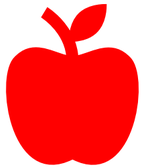
Time.

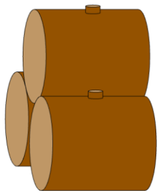
How tight is your production schedule?

Can you wait a day for results?

Your production approach.

Engineer versus intuition.




FINALLY…the slide you have been waiting for:

VERY generally, the best combination for small to small/medium sized producers is:

Something that I'll never take responsibility for:

You are all witnesses, that I never said this is the right choice:

But VERY generally…

The best bang for your buck comes from…

In House:

pH
SO_2

External:

Absolutely everything else

Recommendation:

$0.07 to $0.10 per L

Option	Cost	Risk	Expertise Required
In House – Wet Chemistry	$0.18/L	Medium	High
In House - Microlab	$0.07/L	High	Low
In House - Spec.	$0.17/L	Low	High
External – $30 shipping	$0.10/L	Low	None
External - $100 shipping	$0.19/L	Low	None

In House:

pH
SO_2

External:

Absolutely everything else

Recommendation:

No more than
$0.10 per L

Option	Cost	Risk	Expertise Required
In House – Wet Chemistry	$0.16/L	Medium	High
In House - Microlab	$0.07/L	High	Low
In House - Spec.	$0.15/L	Low	High
External – $30 shipping	$0.10/L	Low	None
External - $100 shipping	$0.15/L	Low	None

In House:

pH
SO_2

External:

Absolutely everything else

Recommendation:

No more than
$0.10 per L

Option	Cost	Risk	Expertise Required
pH and SO2 plus External	$0.08/L	Medium	Low
In House – Wet Chemistry	$0.16/L	Medium	High
In House - Microlab	$0.07/L	High	Low
In House - Spec.	$0.15/L	Low	High
External – $30 shipping	$0.10/L	Low	None
External - $100 shipping	$0.15/L	Low	None