

Clean Label Alternatives for Fresh Meat Enhancement and Shelf Life Extension

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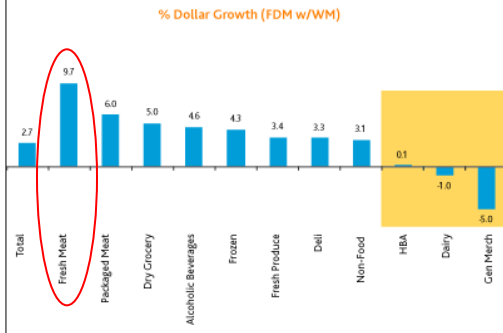
Outline

1. Market trends
2. Importance of shelf life extension
3. Antimicrobial solution to improve color retention and shelf life
4. Efficacy data
 1. Enhanced pork
 2. Enhanced beef
 3. Fresh sausage



Industry Growth in Tough Times

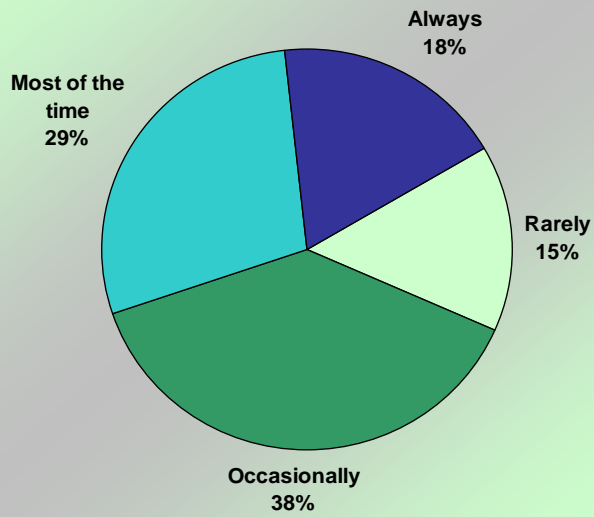
Edible Departments Driving Growth;
Less Growth in Discretionary & Dairy Dept



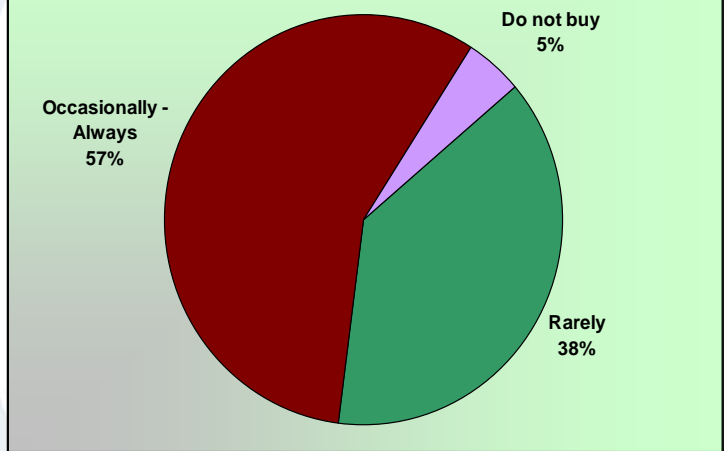
Source: Scantrack, a service of The Nielsen Company; (FDM w/ Walmart)
52 weeks ending 07/11/09 (versus prior year)



Question: On the nutritional label, how often do you look at the ingredients?



When selecting raw/pre-marinated meats, I read the nutritional label:



Control Measures for Shelf Life Extension

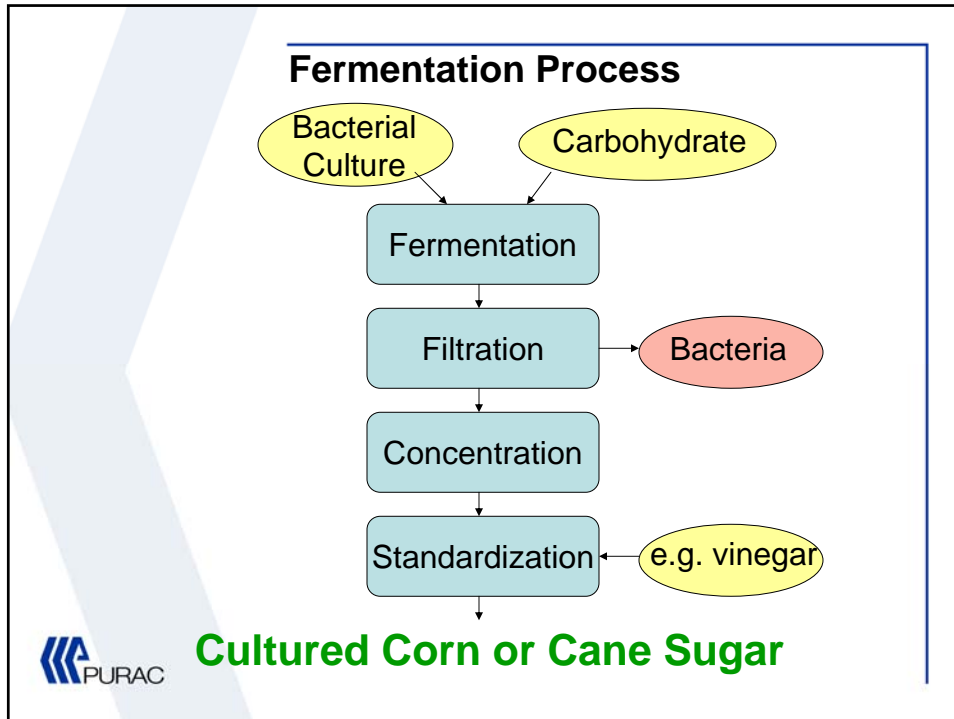
1. Temperature control
2. Light exposure
3. Minimized handling
4. Packaging improvements
5. Intervention technology



Cost Savings Example

Enhanced Beef	Estimated Volume	Total Markdown Volume	Markdown Price	Estimated Markdown	Cost of Markdown	Intervention	Estimated Price
	lbs/year	(%)	(%)	(mln lbs)	(mln US\$)	(mln lbs)	(mln US\$)
Total estimated volume	15,000,000	5.0%	30%	750,000	\$675,000	288,000	\$ 224,640
					Cost reduction	\$ (450,360)	





Usage Requirements

As defined in FSIS Directive 7120.1 Amendment 18:

Product to be labeled as either cultured sugar or cultured corn sugar depending on the starting carbohydrate source.

Maximum Level = 4.8% total solids

The PURAC logo is in the bottom left corner.

Government Regulations

Natural Labeling Requirements:

1. The product does not contain any artificial flavor or flavoring, coloring ingredient, or chemical preservative (as defined in 21 CFR 101.22), or any other artificial or synthetic ingredient.
2. The product and its ingredients are not more than minimally processed.
 - Minimal processing may include: Those traditional processes used to make food edible or to preserve it or to make it safe for human consumption.

Note on Natural Labeling:

- USDA does not differentiate between a natural antimicrobial and a chemical preservative.
- Hence, natural antimicrobials are not allowed for use in natural meat and poultry products.
- Exceptions exist for ingredients that are used as a flavor but have a dual role as an antimicrobial.



Efficacy studies

Product Type:

- Enhanced Pork Loin
- Enhanced Beef
- Fresh Sausage

Testing Procedures:

- Microbial Shelf Life
- Color
- Sensory Analysis



Efficacy of Cultured Sugar in Enhanced Pork

Pork loins were injected and tumbled with a 12% solution

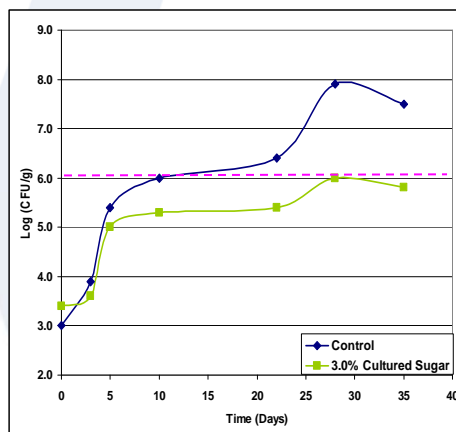
- 0.3% salt
- 0.3% phosphate
- 3% cultured sugar

Loins were cut into ½ inch pieces, vacuum packed and stored at 4°C.

Samples were tested for color, bacterial levels, and flavor.



Aerobic Bacteria Inhibition using Cultured Sugar in Enhanced Pork



Microbial Results:

- Compared to the control Cultured Sugar extended the shelf life from 10 days to 28 days.



Color Retention with the Addition of Cultured Sugar to Enhanced Pork

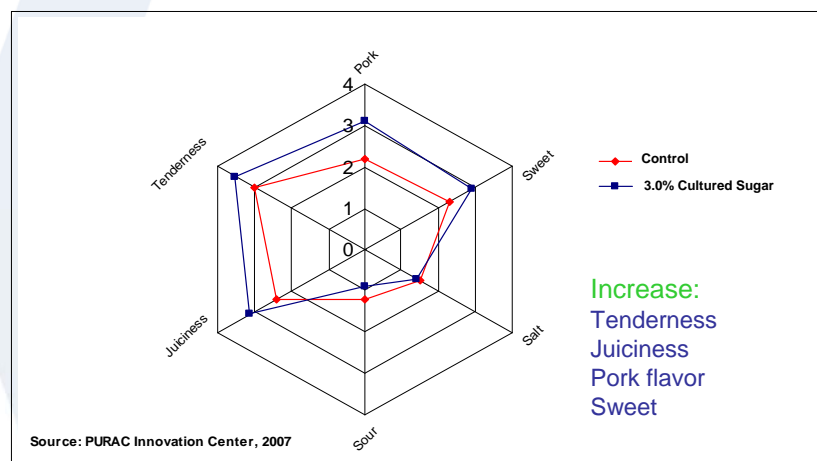
Day	0	5	7	14	22	28	35
Control	Pale white/ Light pink	Pale white/ Light pink	Pale white/ Light pink	¾ Light brown			
				¼ Pink			
Cultured Sugar	Pale white/ Light pink	Pale white/ Light pink	Pale white/ Light pink	Pale white/ Light pink	Light pink / Light brown	Light brown	Light brown

Color Results:

- Cultured Sugar increased color stability by 15 days



Flavor Improvements of Enhanced Pork with Cultured Sugar



Increase:
Tenderness
Juiciness
Pork flavor
Sweet



Efficacy of Cultured Corn Sugar with and without Vinegar on Enhanced Beef

Beef loins were injected with a 10% solution

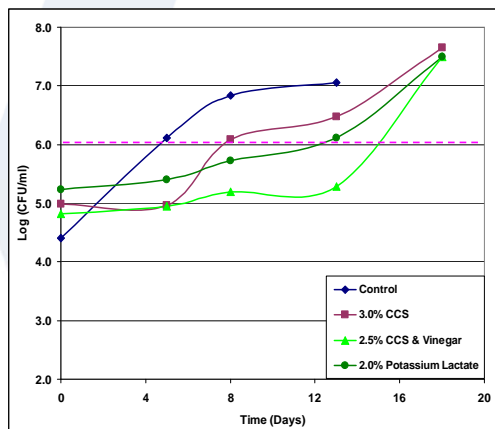
- 0.3% salt
- 0.3% phosphate
- 0.075% rosemary
- 3.0% cultured corn sugar (CCS)
- 2.5% cultured corn sugar + vinegar (CCS+V)

Loins were cut into 1 inch pieces, MAP packed (80/20), and stored at 4°C.

Samples were tested for color, bacterial levels, and flavor.



Inhibition of Aerobic Bacteria on Enhanced Beef using Cultured Corn Sugar with and without Vinegar

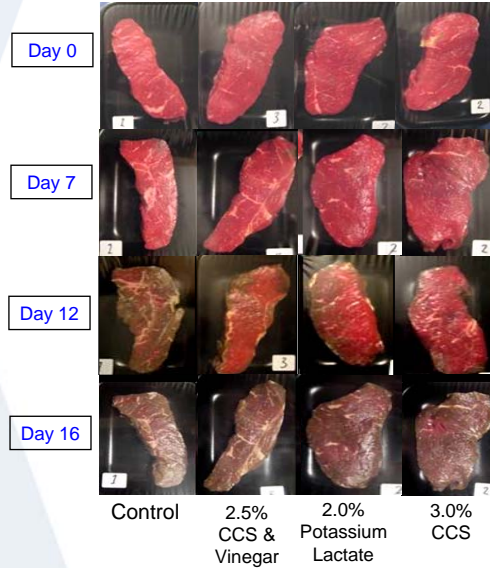


Microbial Results:

	Shelf Life	Increase
	(6 log CFU/ml)	(compared to control)
Control	5	0
3.0% CCS	8	+3
2.0% Potassium Lactate	13	+8
2.5% CCS & Vinegar	15	+10



Color Retention of Enhanced Beef with Cultured Corn Sugar with and without Vinegar

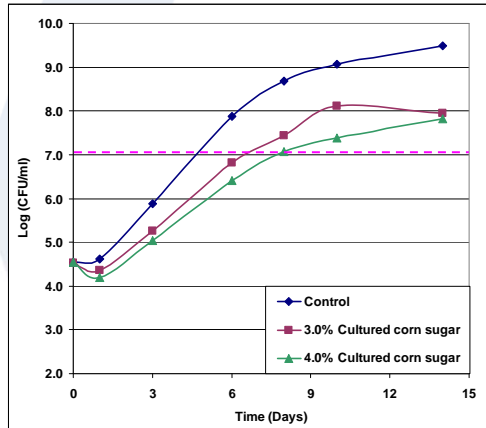


Efficacy of Cultured Corn Sugar on the Shelf Life of Fresh Sausage

Fresh Sausage Formulations			
	Control	3.0% CCS	4.0% CCS
Pork shoulder	76.50%	76.50%	76.50%
Pork belly	8.50%	8.50%	8.50%
Total meat	85.00%	85.00%	85.00%
Ice	12.30%	9.30%	8.30%
Cultured corn sugar (CCS)	0.00%	3.00%	4.00%
Salt	1.30%	1.30%	1.30%
Sucrose	0.70%	0.70%	0.70%
Sodium phosphate	0.30%	0.30%	0.30%
Monosodium glutamate	0.05%	0.05%	0.05%
Sodium ascorbate	0.05%	0.05%	0.05%
Citric cid	0.05%	0.05%	0.05%
Seasonings	0.25%	0.25%	0.25%
Total	100.00%	100.00%	100.00%



Efficacy of Cultured Corn Sugar on Aerobic Bacteria found in Fresh Sausage



Microbial Results:

- 3.0% CCS resulted in a 40% increase in shelf life
- 4.0% CCS resulted in a 60% increase in shelf life



Conclusion

- Clean label
- Accommodates market trends
- Effective broad spectrum antimicrobial
 - Not species specific
- Positive flavor impact
- Improved color retention



Summary

	PuraQ Verdad NV 10	PuraQ Verdad NV15	PuraQ Verdad NV55
FSIS-USDA Labeling Requirements	Cultured corn sugar	Cultured corn sugar and vinegar	Cultured sugar and vinegar
Country of Origin	USA - Blair, NE	USA - Blair, NE	Spain - Montmelo
Suggested Use	Shelf life extension in fresh and RTE meat	Shelf life extension in fresh meat & Listeria control in cured RTE meat	Listeria control in uncured RTE meat
Usage Levels	2.5% to 3.5%	2.0% to 4.0%	3.0% to 4.0%



For more information please visit our booth (S4006) or our website www.purac.com