Peach Postharvest Management and Consumer Satisfaction

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UF UNIVERSITY of FLORIDA IFAS

Increasing Consumption of Specialty Crops by Enhancing their Quality & Safety

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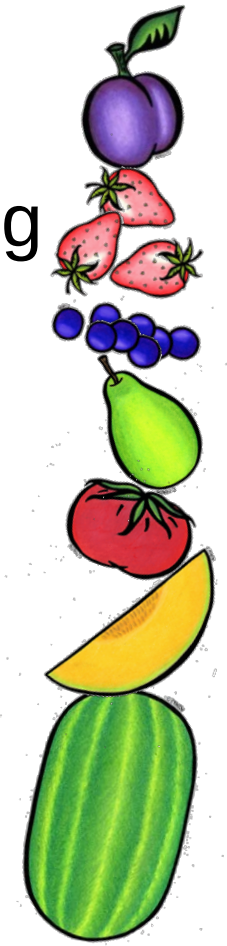
Goals of the Project

- Help producers remove postharvest handling impediments that keep consistently great tasting fruits and vegetables from being marketed
- Consumers increase consumption of fruits and vegetables
  - –increased sales
  - –increased economic viability of produce industry
  - –improved consumer health



Project Coordination

- Two project directors (California & Florida)
- Six objectives
- Each objective had one team leader from the University of California and one from the University of Florida
- Some PIs worked on multiple objectives
- Monthly team leader meetings
- Monthly objective teleconferences (some objectives)

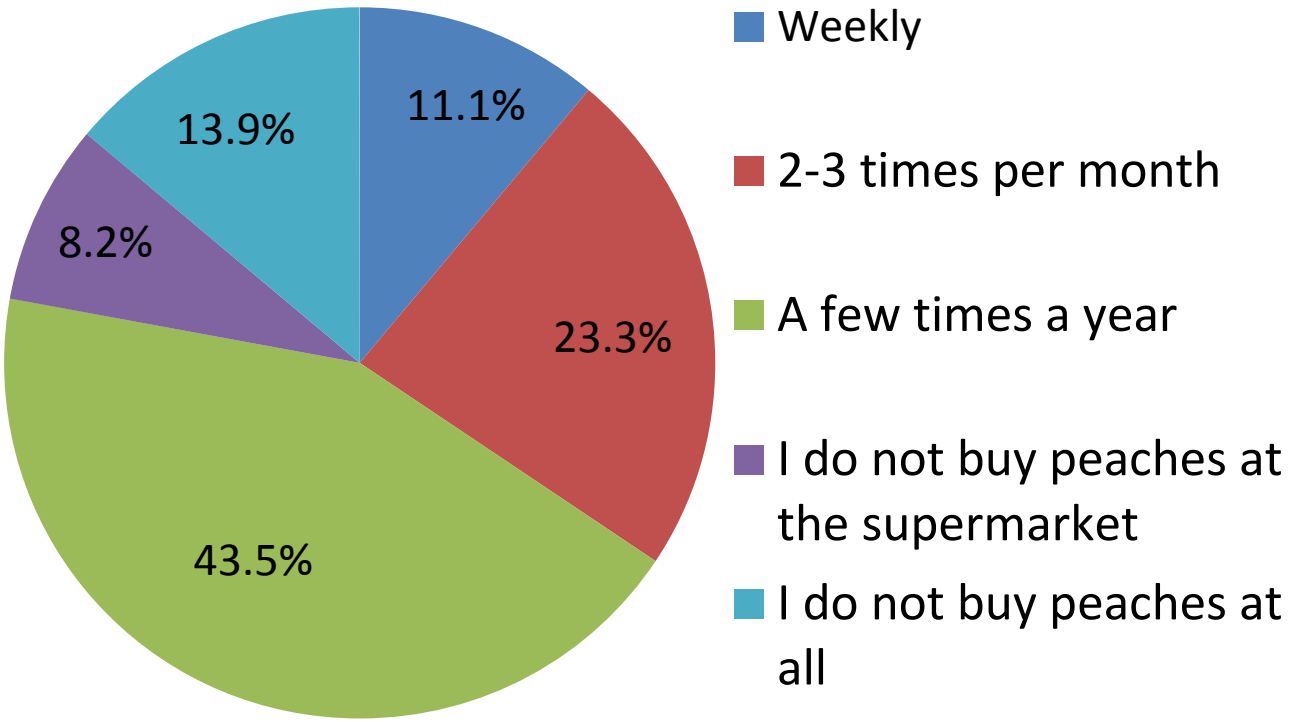
Fruits Studied

- Blueberries and strawberries
- Melons (mainly muskmelons)
- Pears
- Tomatoes
- Peaches

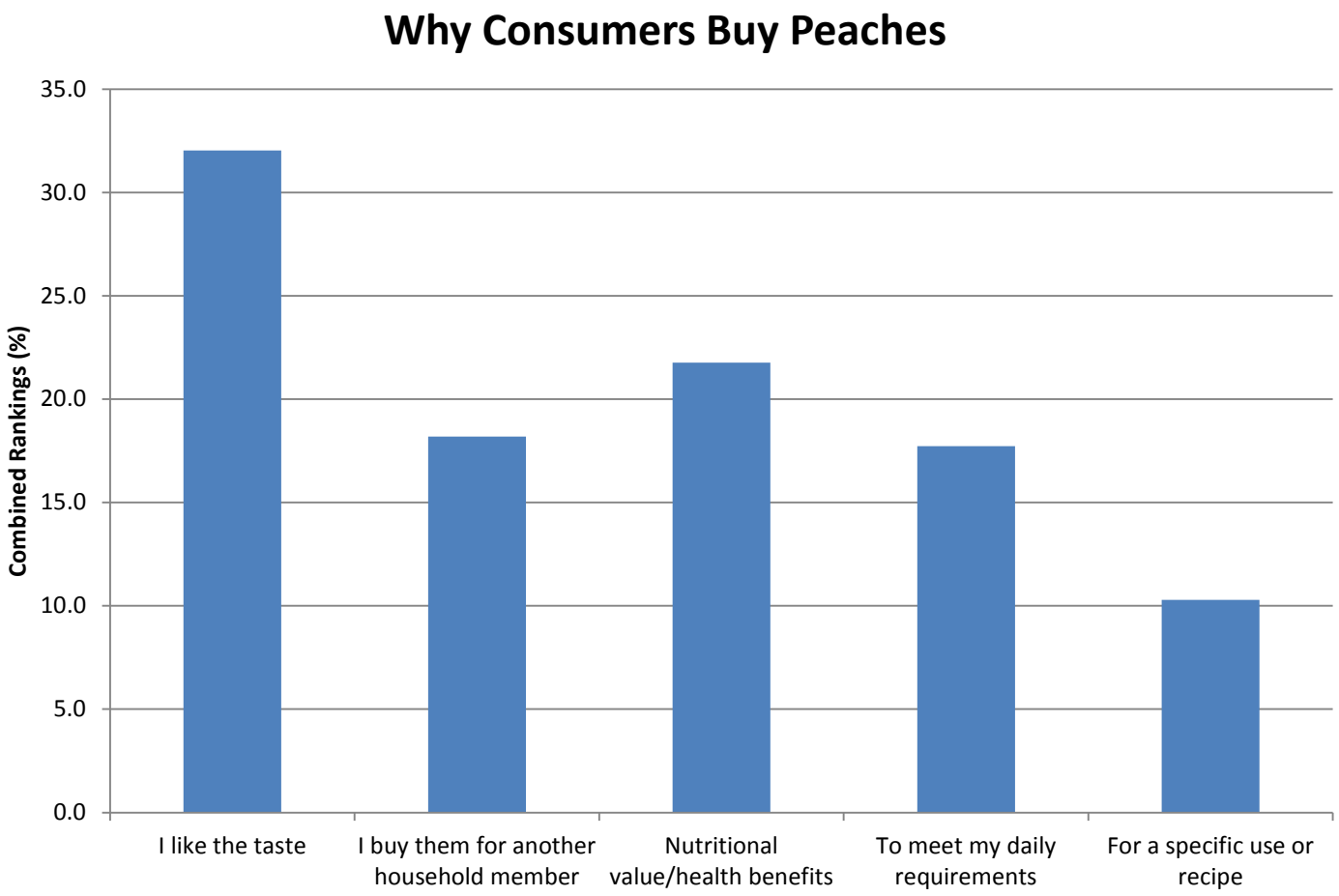
Consumer Behavior and Attitudes

- How does flavor, as affected by harvest and postharvest practices, influence consumer behavior and attitudes regarding fruit consumption?

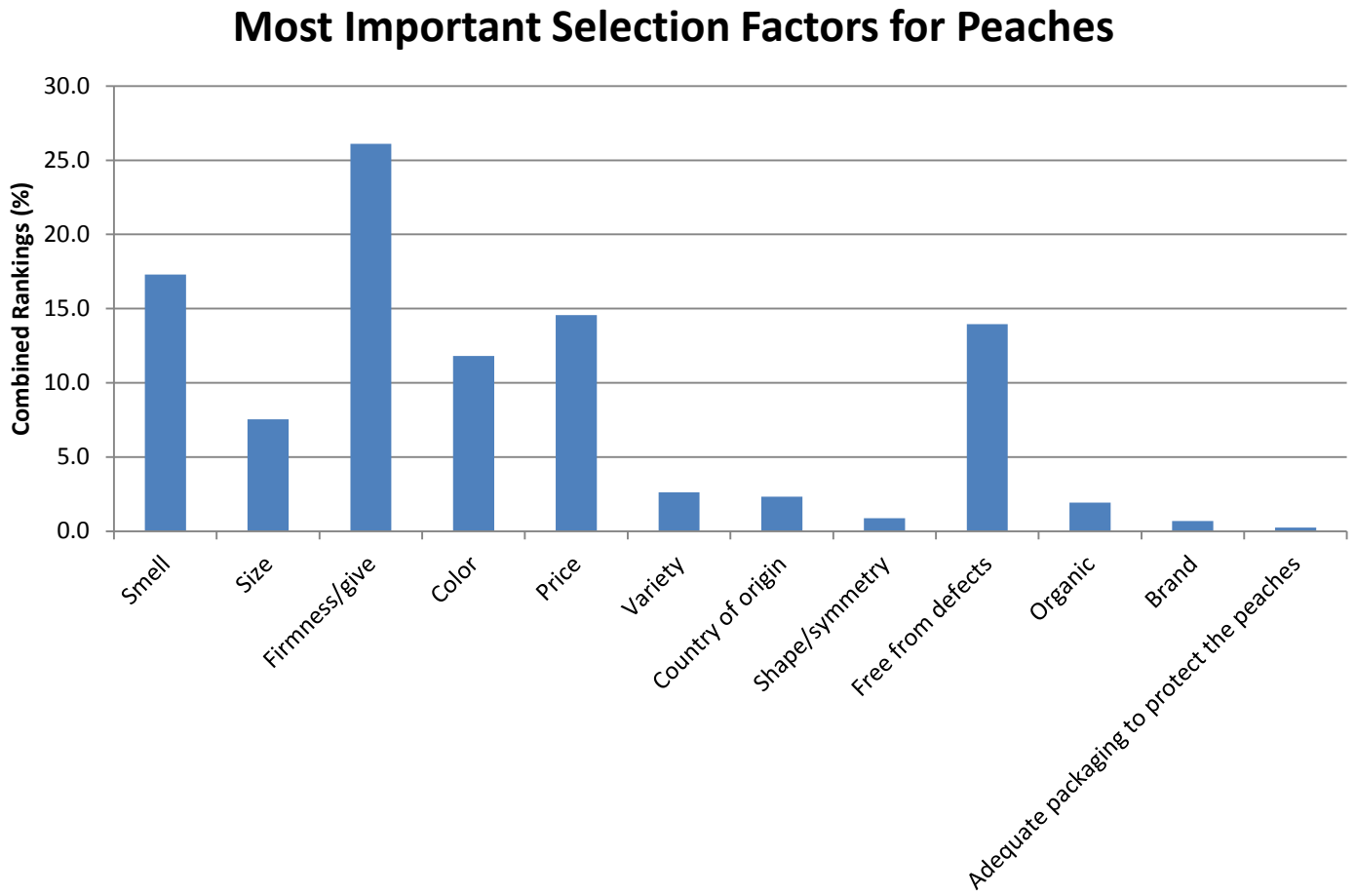
Consumers purchasing frequency of peaches.



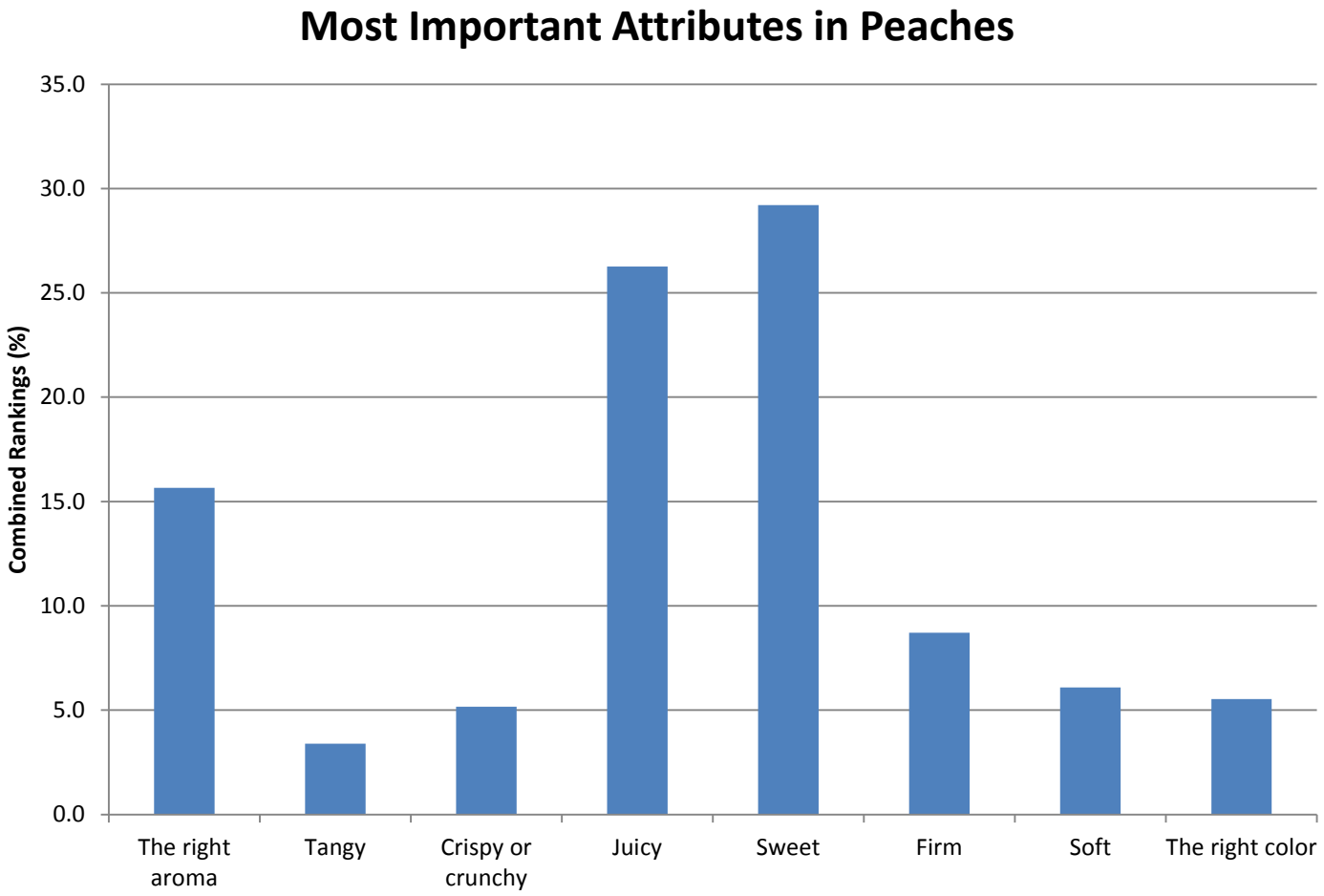
Percent of the combined rankings of the reasons why consumers purchase peaches.



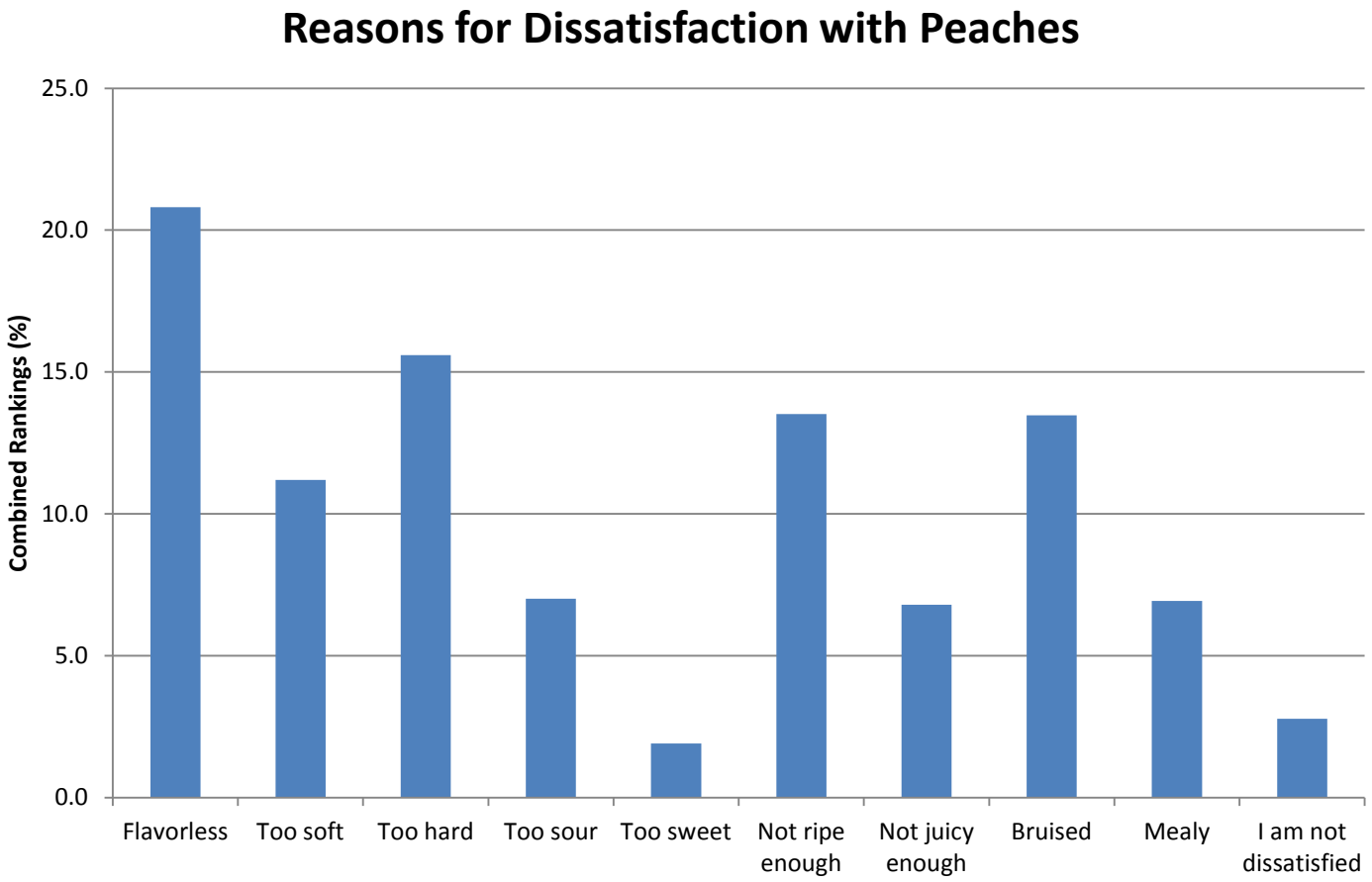
Percent of the combined rankings for consumers' three highest priorities when selecting peaches to purchase.



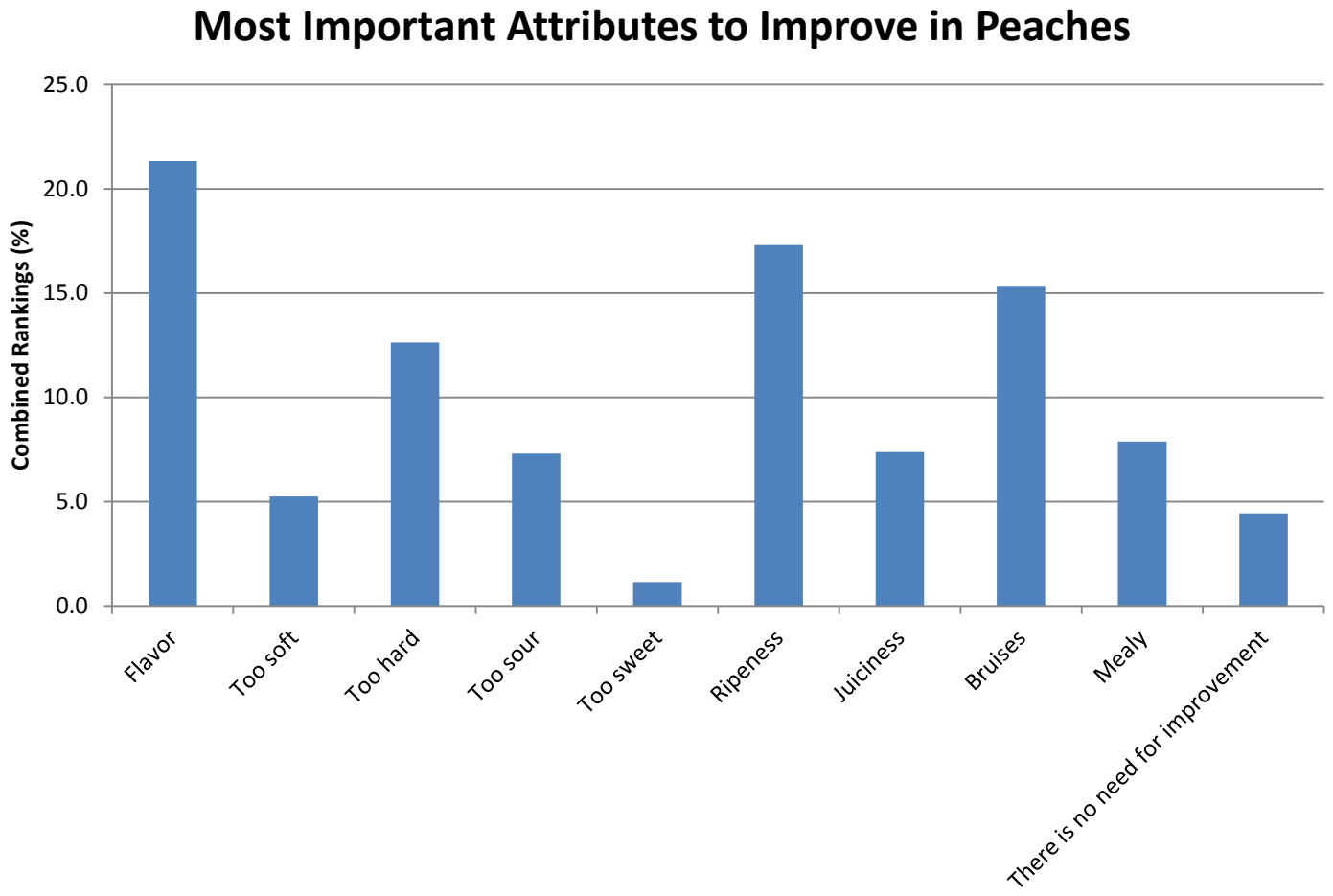
Percent of the combined rankings for consumers' three highest preferences for peach attributes.



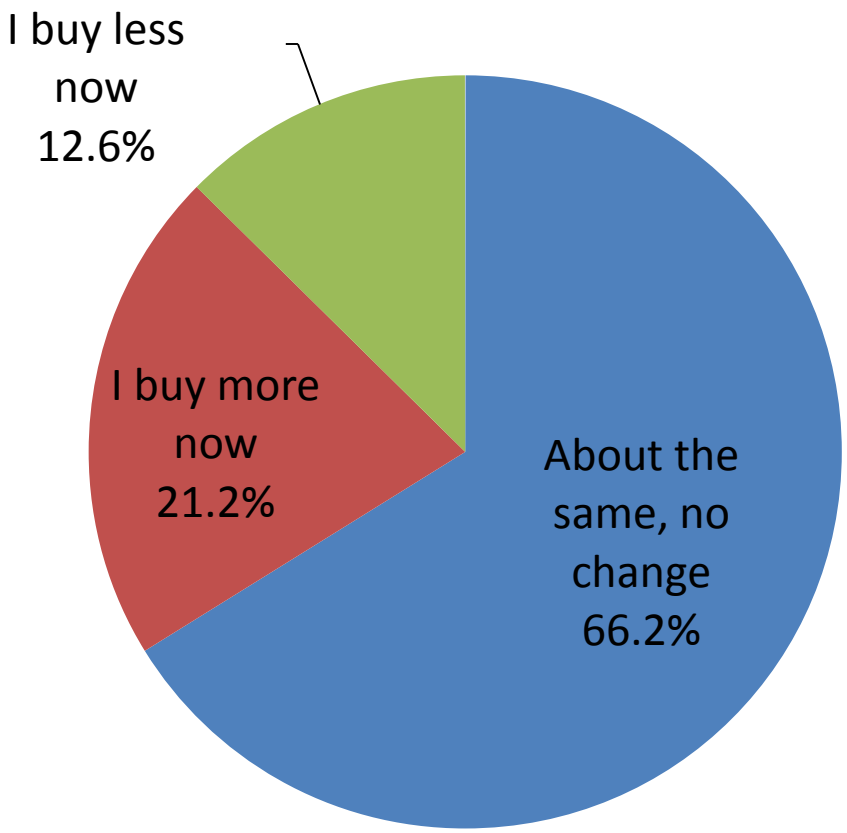
Percent of the combined rankings for consumers' three most common reasons for dissatisfaction with peaches.



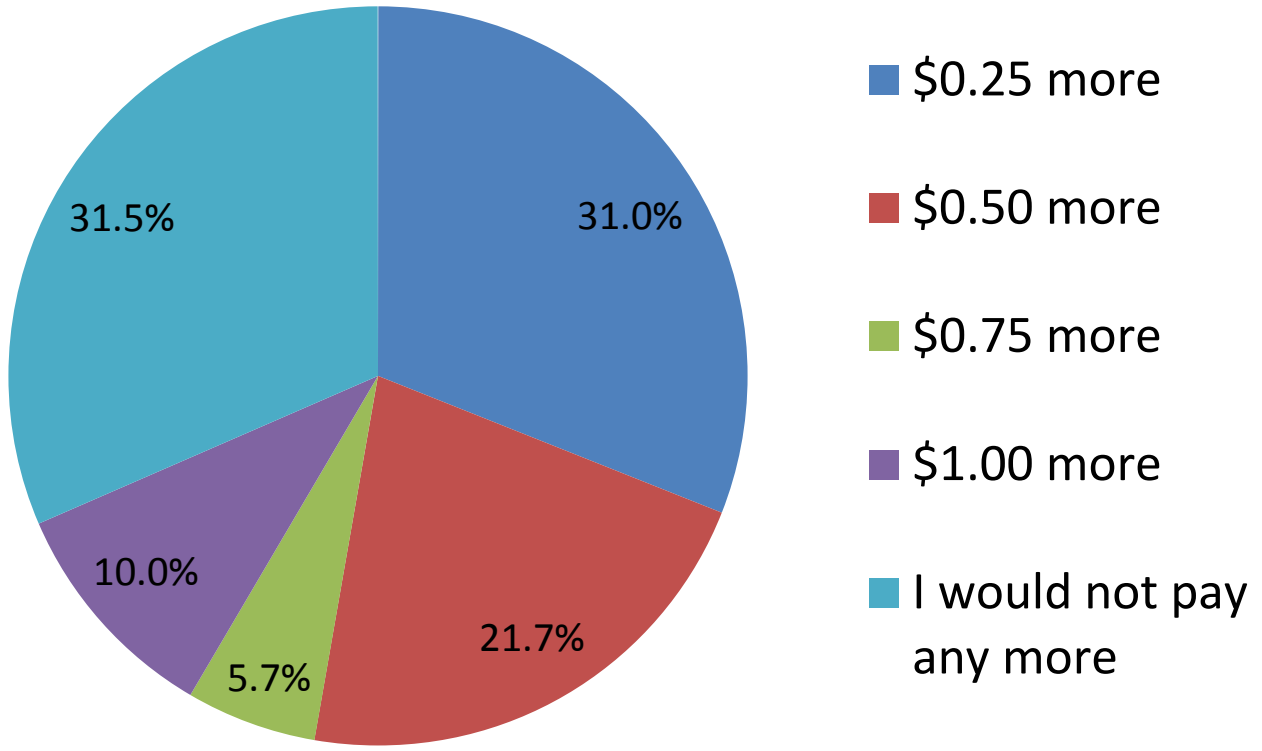
Percent of the combined rankings for consumers' two most important attributes to improve in peaches.



Consumers answered the question “has the amount of fresh peaches you buy changed in the last few years”.



How much more, per pound, consumers would be willing to pay for reliably better tasting peaches.



Harvest Maturity

- Optimum harvest maturity corresponds to maximum taste and storage quality (adequate shelf life)

Harvest Maturity

- Harvest maturity determines a fruit's postharvest potential:
  - **Too early** = poor flavor potential, and greater susceptibility to physiological disorders, abrasion injury, and water loss
  - ⇨ The ability of the fruit to ripen properly can be compromised
  - ⇨ More susceptible to chilling injury (internal breakdown)
  - **Too late** = greater susceptibility to bruising and decay; possible off-flavor

Maturity Indices

- Size (minimum diameter)
  - Peaches may begin ripening before they reach full size
- Ground color development (green to yellow)
- Softening first occurs at the blossom end
- Location on tree: top and outside fruit normally mature first
- Also, internal color, **soluble solids content** (SSC), acidity and SSC/acidity ratio all change

http://www.prima.com

Best Maturity Indices for Harvesting

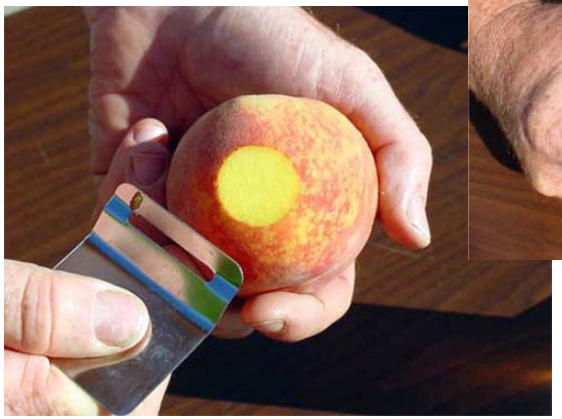
Ground color has been found to be the most reliable nondestructive maturity index and the most easily understood by pickers (Kao et al. 2012)

- the best ground color at harvest varies by variety and intended market, so workers should be shown examples before harvest commences

Best Maturity Indices for Harvesting

For varieties with 100% red color, fruit **firmness** is the next best maturity criteria (Brovelli et al., 1998)

- Firmness at harvest is very well correlated with consumer satisfaction after storage/shipping
- Of course, SSC must be acceptable



http://msue.anr.msu.edu/news/monitoring_peach_and_nectarine_ripening

Quality Indices

- High SSC is the most important attribute for high consumer acceptance
- Fruit acidity, SSC:acidity ratio and phenolic content are also important for consumer acceptance
- Fruit below 6-8 lbf are more acceptable to consumers than firmer fruit

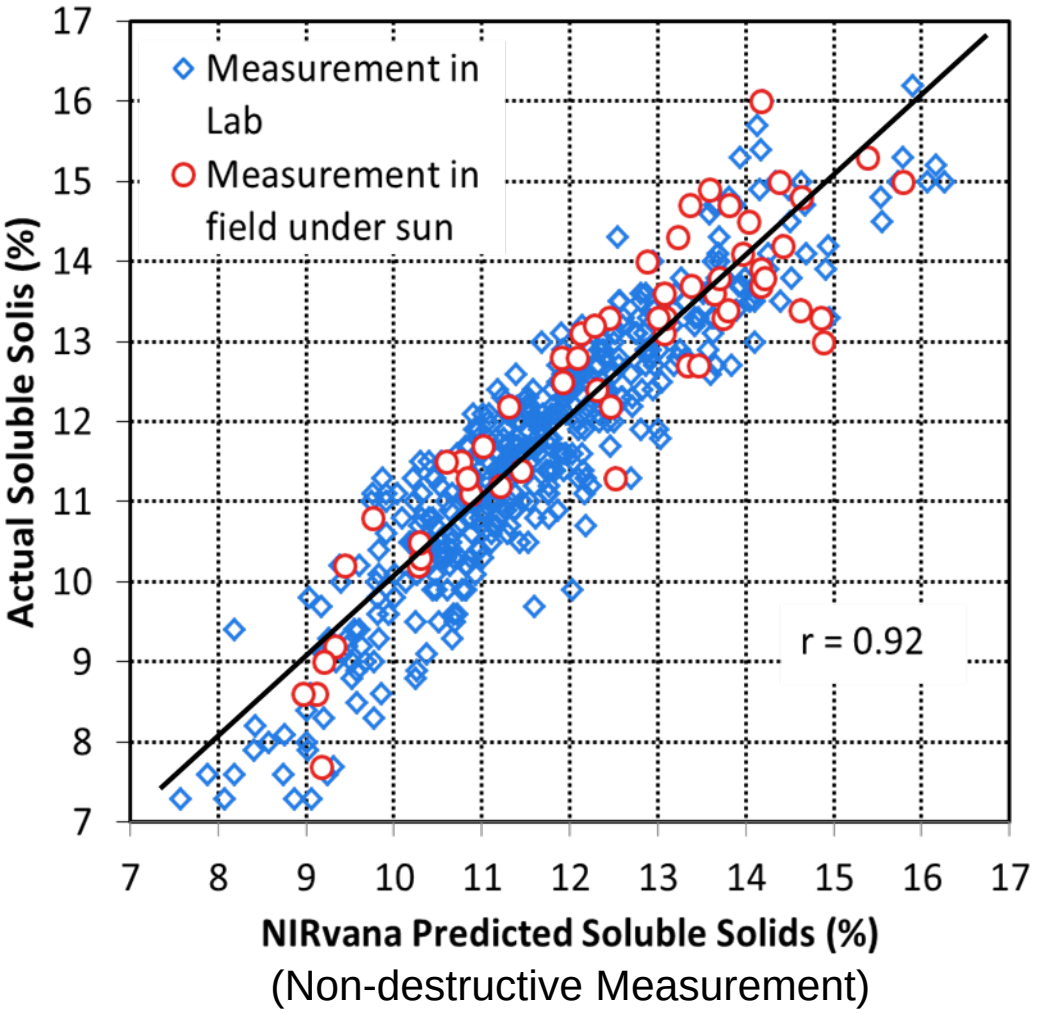
(from Crisosto, Mitcham & Kader, "*Nectarine & Peach: Recommendations for Maintaining Postharvest Quality*" http://postharvest.ucdavis.edu/PFfruits/NectarinePeach/)

Example Handheld Instrument Results for Soluble Solids (ºBrix)

Results for a local Peach calibration done at UC Davis

Non-destructive measurement on whole fruit.

NIRVANA brand optical instrument (purchased and will be released this year by Felix Instruments)



Bruising

- Avoiding bruising is extremely important to both consumers and receivers
- How to harvest & handle riper peaches without increasing bruising?
  - Grow firmer varieties that resist bruising
  - New packaging concept for tree-ripe fruit

Melting Flesh *vs* Nonmelting Flesh

- Melting flesh varieties need to be harvested before ripening gets substantially underway because excessive softening limits their shelf life
- Nonmelting flesh varieties can be harvested at a riper stage and still be firm enough to withstand handling

  = higher SSC (Brix, sugar) and lower acidity

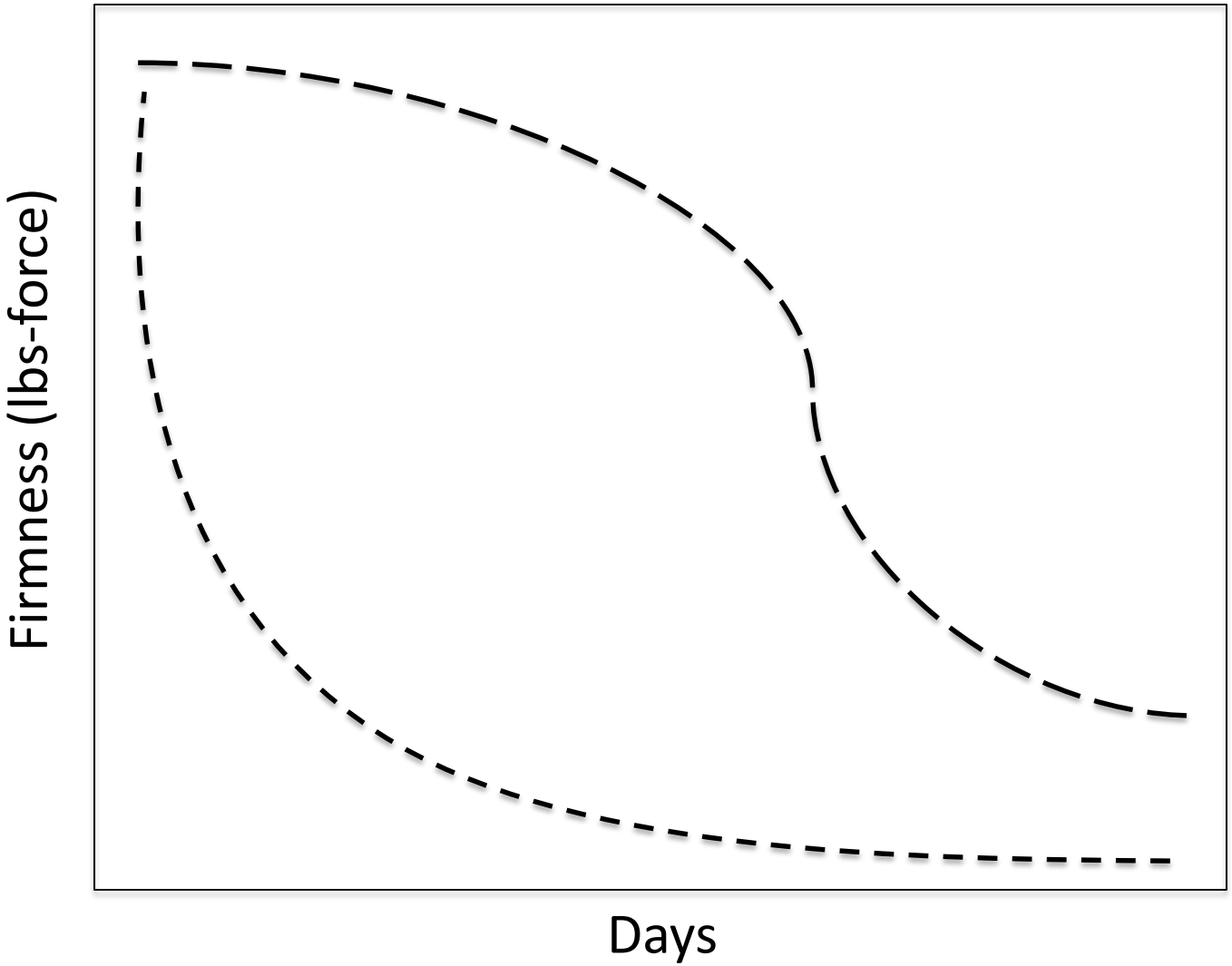
  = better color and more peach flavor

  = less susceptibility to internal breakdown (chilling injury)

Melting Flesh *vs* Nonmelting Flesh

- Let's say that 8 lbs is the minimum firmness/maximum maturity that can be run over your packingline and shipped without incurring bruising
  - ⇨ An 8-lb nonmelting flesh peach is a much riper fruit than an 8-lb melting flesh peach
- (Actual bruising thresholds actually vary substantially and therefore must be determined for each variety)

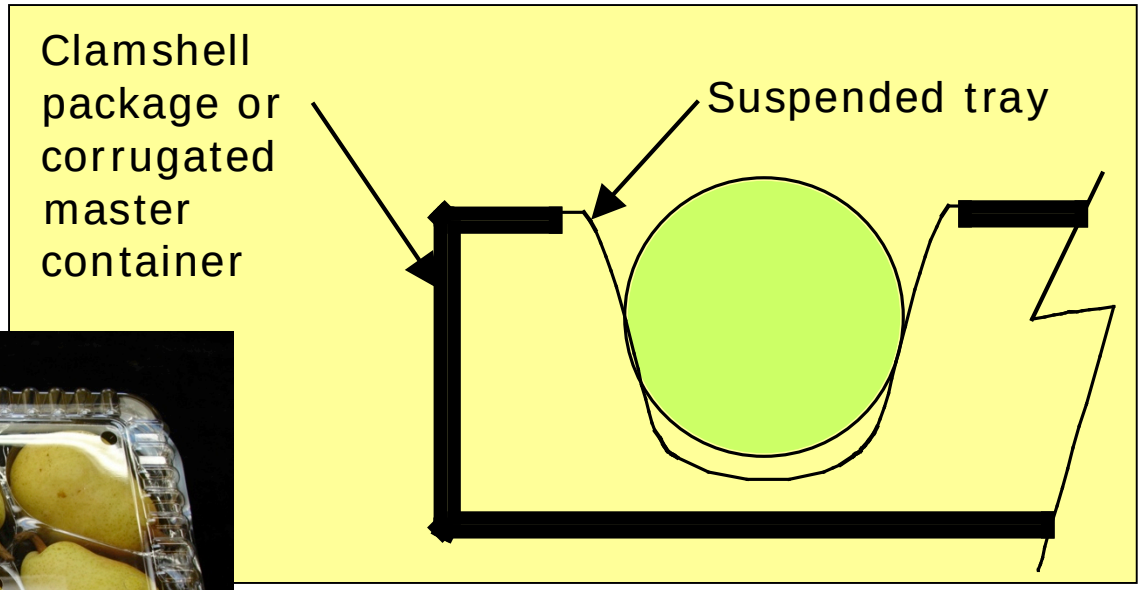
Melting Flesh and Nonmelting Flesh Peaches Have Different Softening Patterns

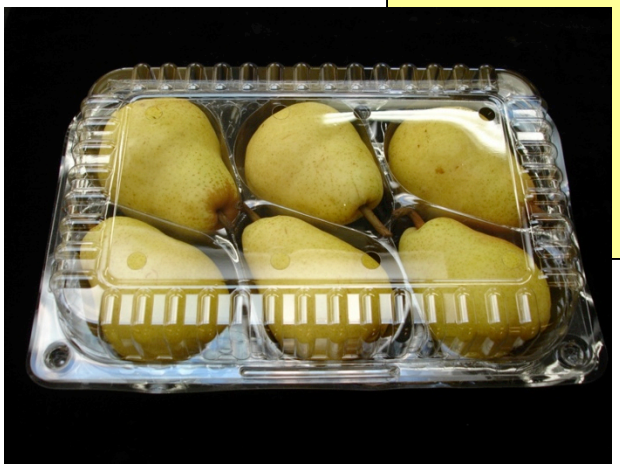


Technological Approaches for Delivering Riper Fruit

- Develop and test improved supply chain capabilities to deliver fruit with enhanced eating quality characteristics based on consumer sensory preferences.

Hammock Pack Shipping System





Can We Deliver Ripening Fruit to Consumers?

Volume-pack (left)

Hammock pack (right)

On Arrival: Sacramento, CA to Atlanta, GA

Commercial Pear Hammock Pack Progress Diagram

Packing in Sacramento, CA

Monitoring samples during ripening progress

Cooling down with rest of production

Road transportation

Consumer Demonstration in Waycross, GA

Selling Hammock Pack Pears in Waycross, GA

Monitoring samples during shipment to Atlanta, GA

Cost Comparison

44 lb. Tightfill Corrugated Boxes													
Product Cost							Transportation Cost						
Case Pack	Weekly Case Volume	FOB Unit Cost	Box Cost	Total Cost Per Pear	Total Cost Per lb.	Weekly Product Cost	Cases Per Load	Loads Per Week	Frt Rate PrLd	Weekly Trans Cost	Transp Cost Pr Cs	Transp Cost Per Pear	Total Weekly Cost
90 fruit/ case	717	$22.35	$0.95	$0.248	$0.508	$16,016	869	0.82	$5,500	$4,537	$6.33	$0.0703	$20,553

25 lb. Hammock Pack RPC's 2-Layer													
Product Cost							Transportation Cost						
Case Pack	Weekly Case Volume	FOB Unit Cost	RPC Cost	Total Cost Per Pear	Total Cost Per lb.	Weekly Product Cost	RPCs Per Load	Loads Per Week	Cost Per Load	Weekly Trans Cost	Transp Cost Pr RPC	Transp Cost Per Pear	Total Weekly Cost
48 fruit/ case	1,344	$15.98	$0.95	$0.333	$0.634	$21,470	1,325	1.01	$5,500	$5,579	$4.15	$0.0865	$27,049

Weekly Volume In LBS	Annual Volume In LBS
64,500	3,354,000

Courtesy of The Kroger Company

Bartlett Pear Sales Impacts

	Retail Dollars CURRENT	Retail Dollars PREVIOUS	Retail Dollars % Change	Scanned Movement % Change	Gross Margin % Change
Savannah (418)	$2,294	$1,684	36.2%	4.8%	39.6%
Waycross (439)	$1,347	$787	71.2%	1.6%	107.7%
Bluffton (499)	$4,517	$4,280	5.5%	-19.6%	-7.6%
Average	$2,719	$2,250	20.8%		
Control Store (404)	$1,842	$1,823	1.0%	-16.8%	-17.6%
Control Store (957)	$1,042	$903	15.4%	-8.6%	3.1%
Control Store (335)	$1,864	$2,626	-29.0%	-39.1%	-49.5%
Average	$1,583	$1,784	-11.3%		
Bartlett Pears - All Divisions	$218,849		17.3%	-6.2%	10.8%

Courtesy of The Kroger Company

Thank you for your attention!

Questions?