Responding to the Marketplace:

Providing the consumer with better early-season navel quality

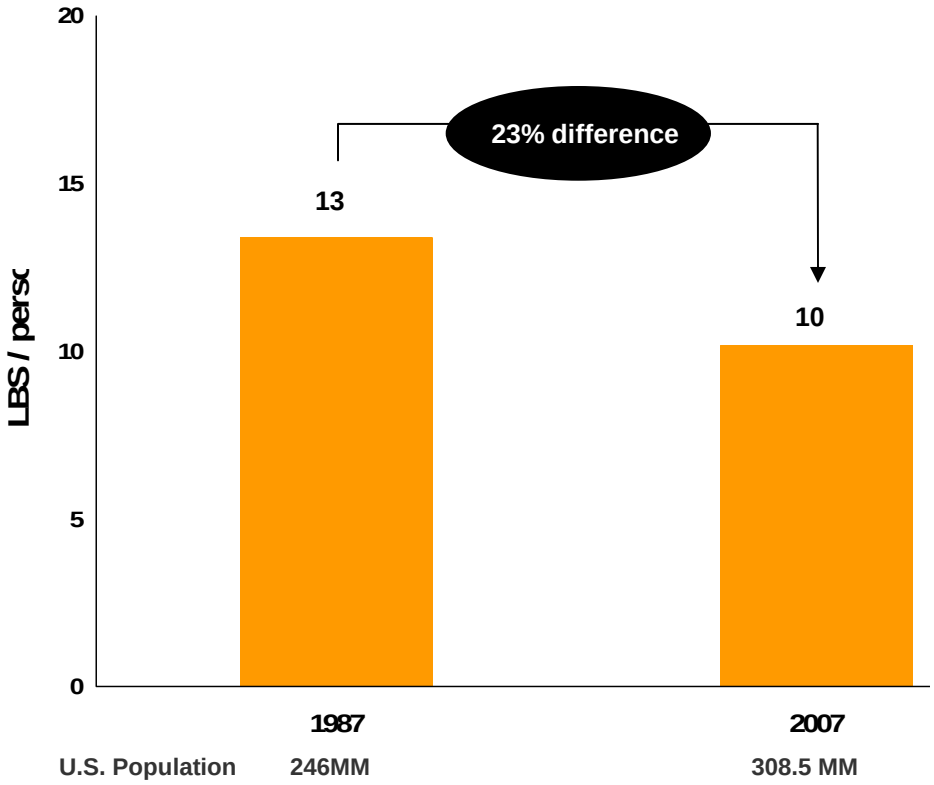
The California Standard

March 03, 2011

Consumers ate ~3 lbs more fresh oranges per person twenty years ago

Changes in fresh orange consumption (lbs/person)[1]

1987 vs. 2007



Fresh orange consumption down 23% since 1987[1]

- Total ~3 billion lbs sold in 2007
- Missed opportunity of ~ 900MM lbs (equiv. of ~3lbs per person)

Not all citrus *(i.e. mandarins)* is in decline

- Other citrus consumption (e.g. mandarins, tangelos, limes) is increasing ~2% per year[3] (see appendix slide 17)

At $7.2 / box average on-tree returns, the missed market opportunity of not selling 3lbs of oranges per person equates to ~$108 MM loss

1.ERS/USDA total per capita consumption of fresh, processed and juice fruit; 2. FAO; 3.ERS/USDA total per capita consumption of fresh, processed and juice fruit; 4. Based on USDA/ERS per capita data and FAO population data

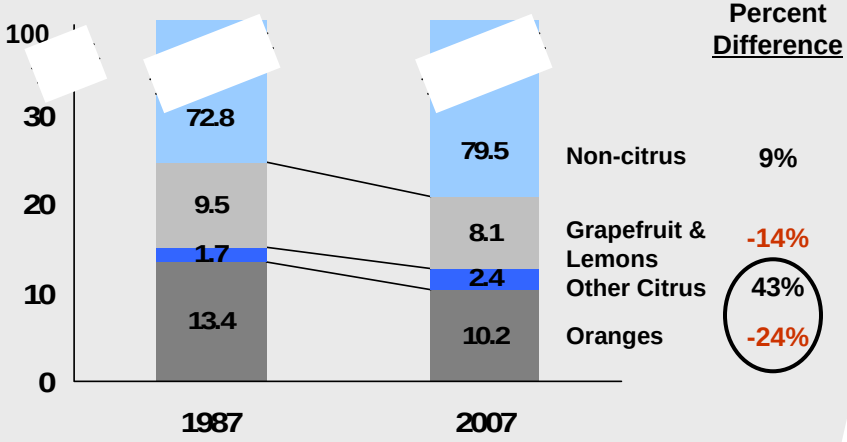
Overall fresh fruit consumption is increasing as consumers are faced with more produce options then ever before

Overall fresh fruit consumption has increased ~3lbs per capita since 1987[1]

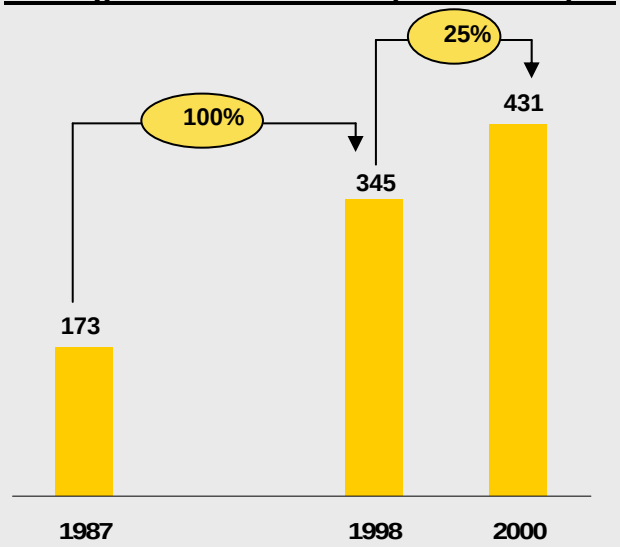
- Average number of options in the produce department more than doubled since 1987
- Fresh fruit imports have doubled in the last ten years[2]

Consumption of Fresh Fruit[1]

(Lbs per person)



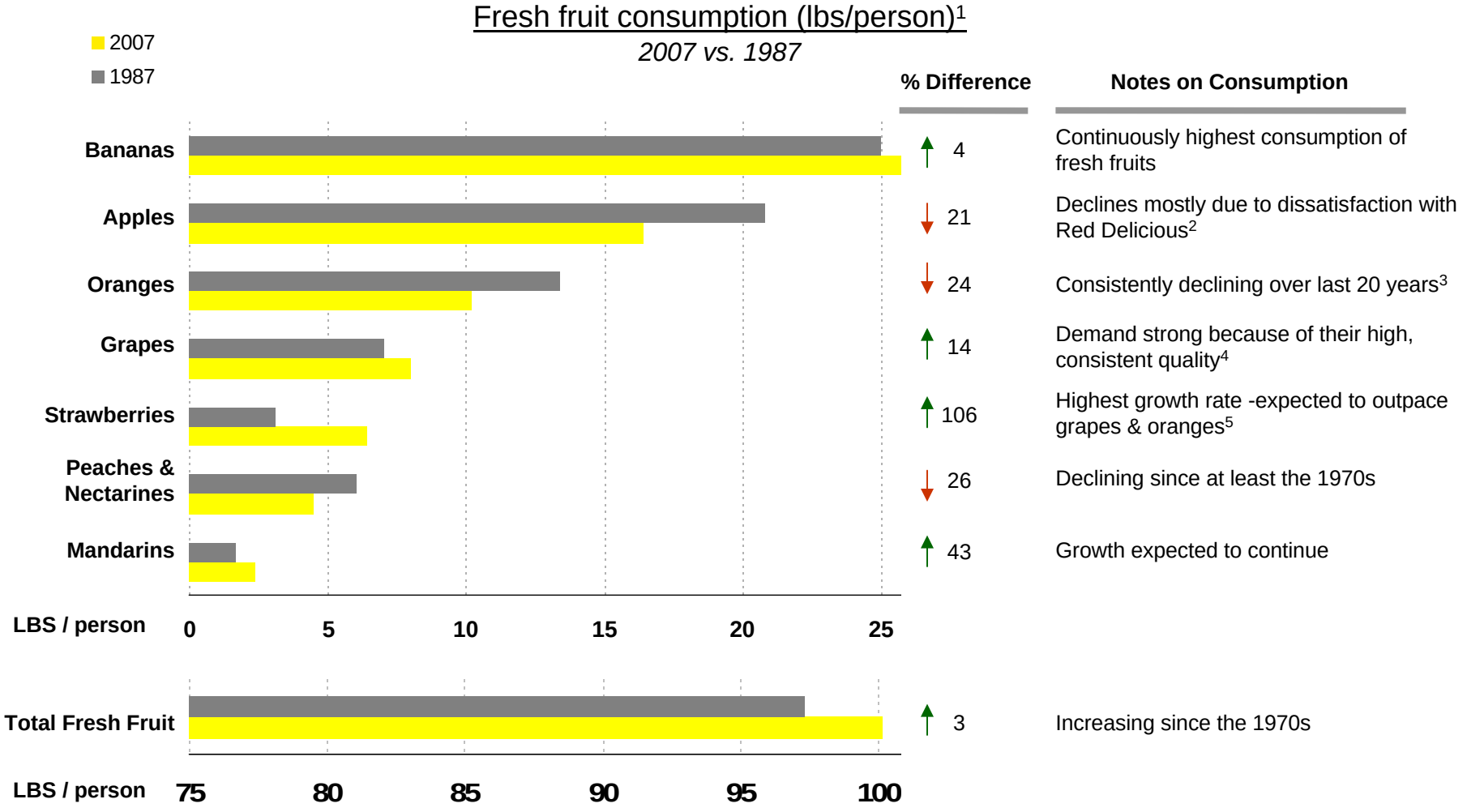
Average # of items in the produce dept.[3]



Increases in imports are affecting consumer fresh fruit purchases

1. ERS/USDA; 2. U.S. Dept. of Commerce Foreign Trade Statistics (mixed quantities); 3.. Postharvest Technology of Horticultural Crops, Ed. Adel A. Kaded, 2002

Traditional winter fruits (oranges, apples) have been experiencing declines in consumption, while other fruits have become more popular



1. ERS/USDA; 2. Washington Tree Fruit Postharvest Conference, *Consumer Response to Apples* (2001); 3. Based on ERS/USDA Data Projections based on CAGR of last 20 years; 4. Agricultural Marketing Resource Center, Fresh grapes profile. Revised May 2009; 5. Based on ERS/USDA Data Projections based on CAGR of last 20 years

The Citrus Industry should improve maturity standards to attract consumers

Overall fresh fruit consumption has increased; therefore declining orange consumption is likely due to inconsistent eating quality and proliferation of other options

Overall domestic citrus consumption is declining; and oranges are the largest driver of this loss

The California Standard [*(SSC – (4*TA))*16.5*] has been identified as a more accurate predictor of consumer acceptance

Adopting the new standard will help to reduce the decline by responding to consumer taste preferences

Background of California Navel Maturity Standards

1915 – California adopted the 8:1 ratio as the minimum maturity standard

1925 – Florida followed California by adopting an 8:1 ratio standard

1949 – Florida raised the minimum orange maturity standard to a 9:1 ratio

1983-1985 – CCM sponsored a consumer study of navel oranges. The study recommended that the ratio should be raise to 9:1.

2003 – California drops B color from the maturity standard

2003-2006 – At CCM's request CRB conducted a three year taste study with University of California researchers. The study concluded that sugar to acid ratios were not the best method of measuring flavor. *Brix minus Acid* was proven to be a much better predictor of flavor.

2008 – CCM received a Specialty Crop Grant to fund a consumer study at Tragon consumer labs in Chicago. This study, using 400 actual consumers, confirmed that *Brix minus Acid* was a much better predictor of consumer acceptance than a simple ratio. *(Conducted under the direction or Dr. Mary Lu Arpaia, UC Riverside)*

2010 – CCM Board agrees to pursue moving to a *Brix minus Acid* standard for navel oranges and decided to call it the California Standard.

How is the California Standard calculated?

The California Standard is easily converted to a table format, similar to the SSC/TA tables currently in use

Steps involved in determining the California Standard

- Juice sample using Boswell Press
- Determine Brix using standard protocols
- Determine Titratable Acidity using standard protocols
- Use Table to determine California Standard

Formula for California Standard:

California Standard = (Brix – (TA * 4)) * 16.5

What is the California Standard?

Relationship between Brix and Acid

Brix \ % TA	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5
16.0	238	231	224	218	211	205	198	191	185	178	172	165
15.5	229	223	216	210	203	196	190	183	177	170	163	157
15.0	221	215	208	201	195	188	182	175	168	162	155	149
14.5	213	206	200	193	186	180	173	167	160	153	147	140
14.0	205	198	191	185	178	172	165	158	152	145	139	132
13.5	196	190	183	177	170	163	157	150	144	137	130	124
13.0	188	182	175	168	162	155	149	142	135	129	122	116
12.5	180	173	167	160	153	147	140	134	127	120	114	107
12.0	172	165	158	152	145	139	132	125	119	112	106	99
11.5	163	157	150	144	137	130	124	117	111	104	97	91
11.0	155	149	142	135	129	122	116	109	102	96	89	83
10.5	147	140	134	127	120	114	107	101	94	87	81	74
10.0	139	132	125	119	112	106	99	92	86	79	73	66
9.5	130	124	117	111	104	97	91	84	78	71	64	58
9.0	122	116	109	102	96	89	83	76	69	63	56	50
8.5	114	107	101	94	87	81	74	68	61	54	48	41
8.0	106	99	92	86	79	73	66	59	53	46	40	33
7.5	97	91	84	78	71	64	58	51	45	38	31	25
7.0	89	83	76	69	63	56	50	43	36	30	23	17
6.5	81	74	68	61	54	48	41	35	28	21	15	8
6.0	73	66	59	53	46	40	33	26	20	13	7	0

(SSC – (4*TA))*16.5

Decided to call it the *California Standard* in order to differentiate ourselves

- Investigated alternatives but wanted something California specific
- Option to simply increase the Ratio to 9.0 delayed the start of the season and did not increase consumer acceptability enough

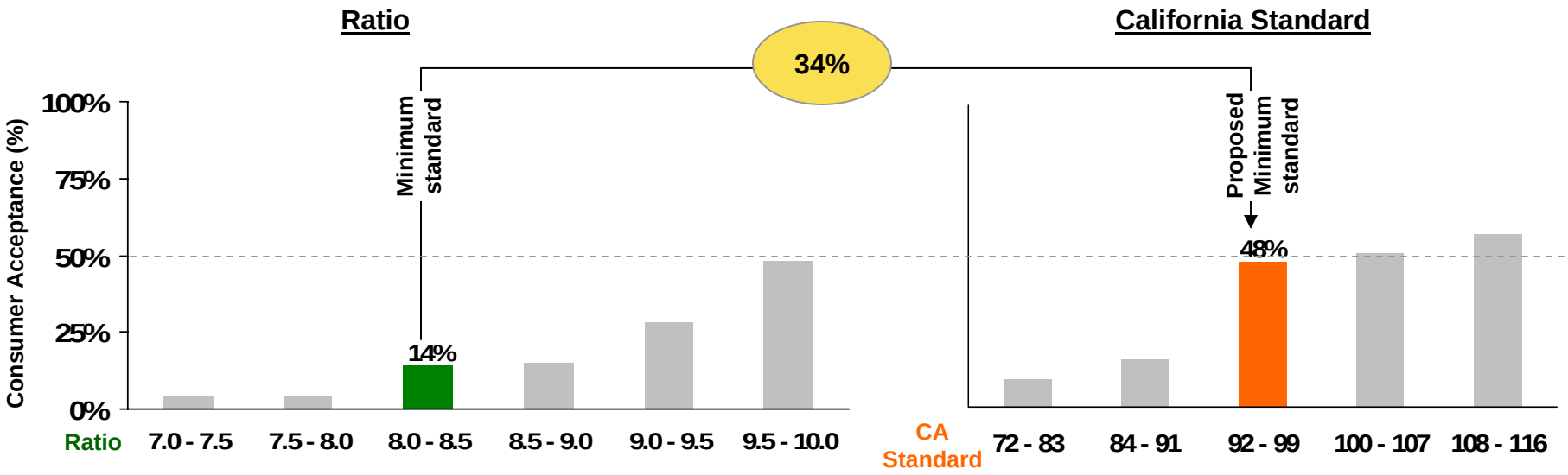
The current minimum standard is less likely to guarantee consumers a positive Eating experience

The California (CA) Standard of 90 replaces ~35% of fruit deemed unacceptable with acceptable fruit

Currently there is low (less than 15%) consumer satisfaction of early season oranges (ratio 8:1 to 9:1)[1]

- In order to achieve the ~50% acceptability of the CA Standard minimum, would require at least a 9.5 Ratio

Percentage of consumers who rated fruit at least "liked slightly"[1]



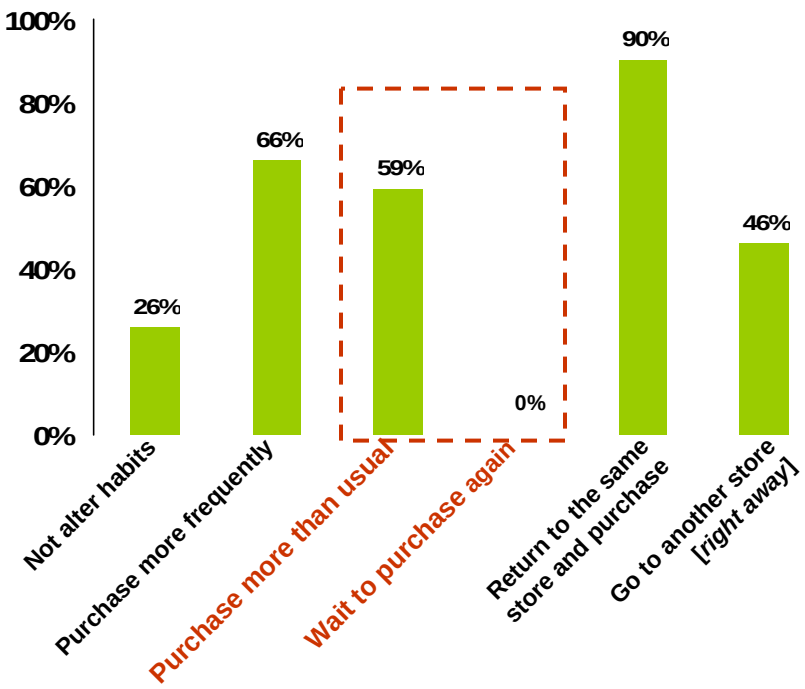
The California Standard is more likely to supply consumers with acceptable fruit

1. 2009 Tragon Study

Over 65% of consumers say they would purchase oranges more frequently if they ate a delicious orange[1]

Changes to Behavior After Positive Eating Experiences

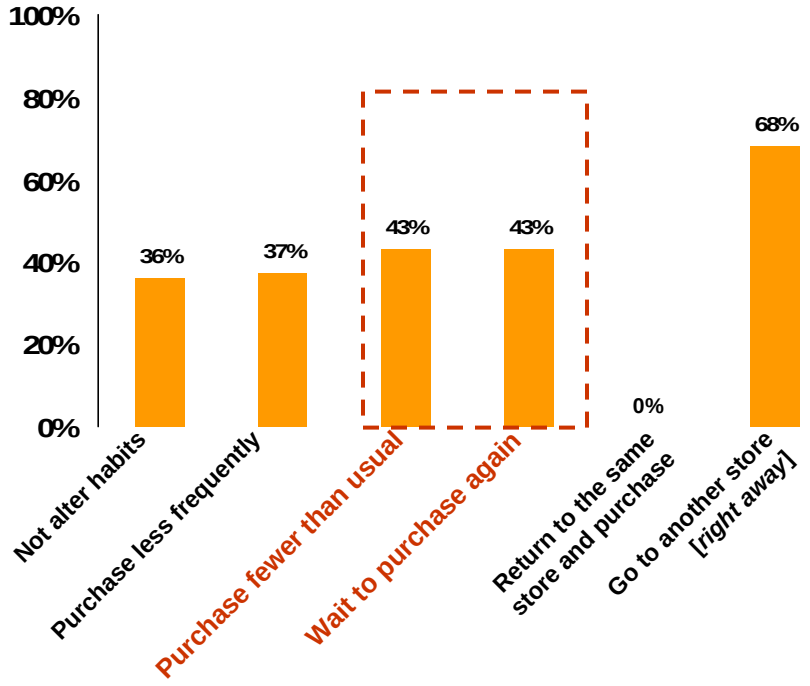
(Percent of respondents)



A **positive** eating experience with an orange may initiate additional purchases . . .

Changes to Behavior After Negative Eating Experiences

(Percent of respondents)



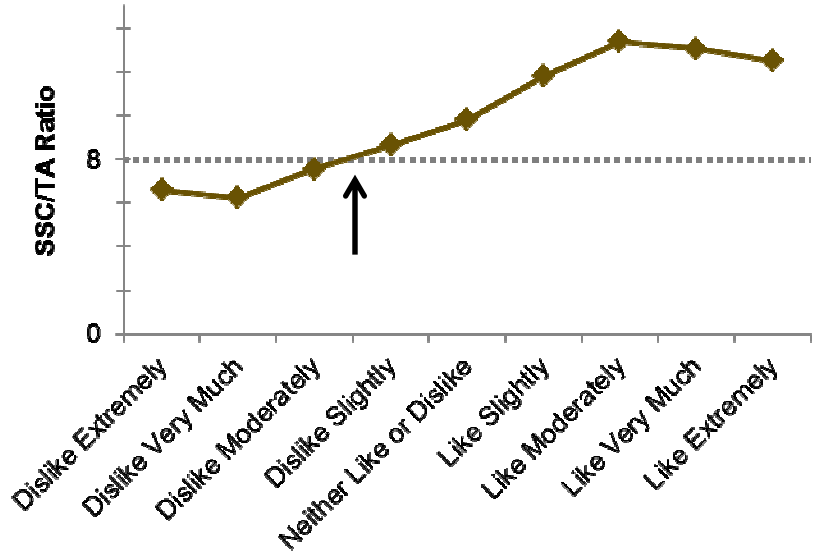
. . . while **negative** experiences either reduce quantities purchased or send consumers searching for better oranges

Consumer eating experiences (of navel oranges) directly affect repeat purchases

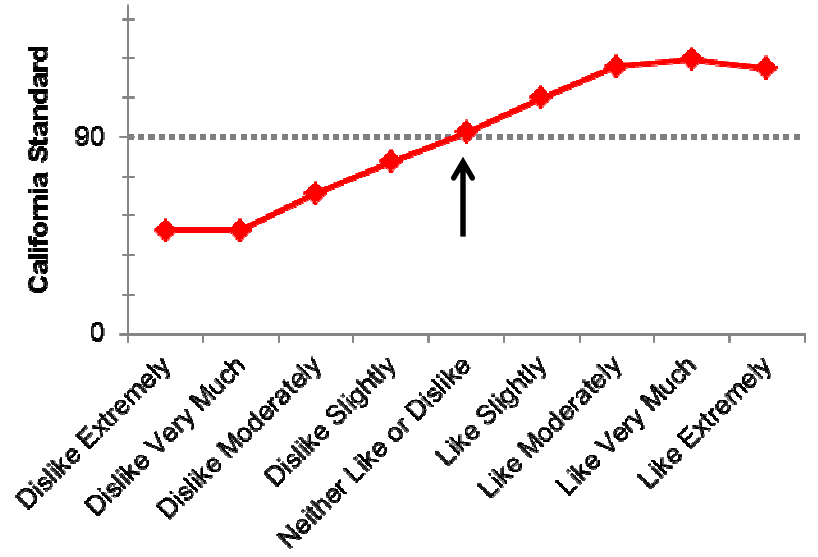
1. 2008 Tragon Study

The relationship between eating quality and either SSC/TA ratio or the California Standard

An 8:1 SSC/TA fruit is slightly to moderately disliked



A 90 California Standard fruit is neither liked or disliked



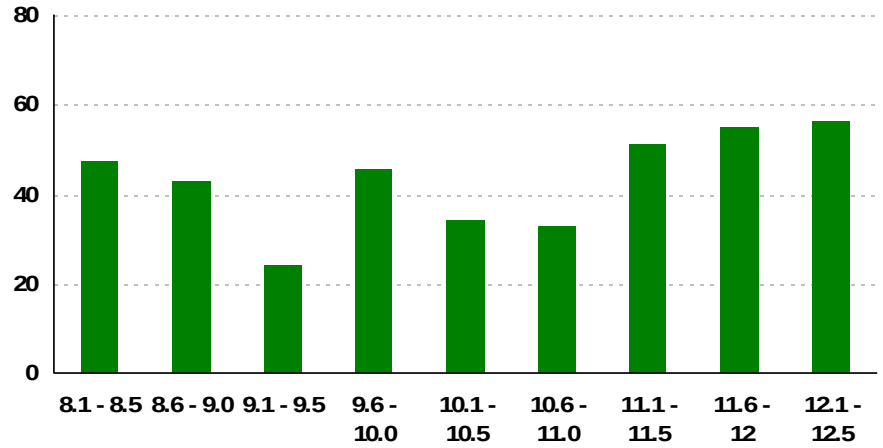
Calculated from all data (CRB, UC Davis and Tragon). Took average score per fruit and related to either SSC/TA ratio or California Standard (BrimA * 16.5).

The CA Standard shows a predictable linear progression – as the score improves so does consumer acceptance

Current maturity standards do not deliver fruit that ensures consumers will want to repurchase

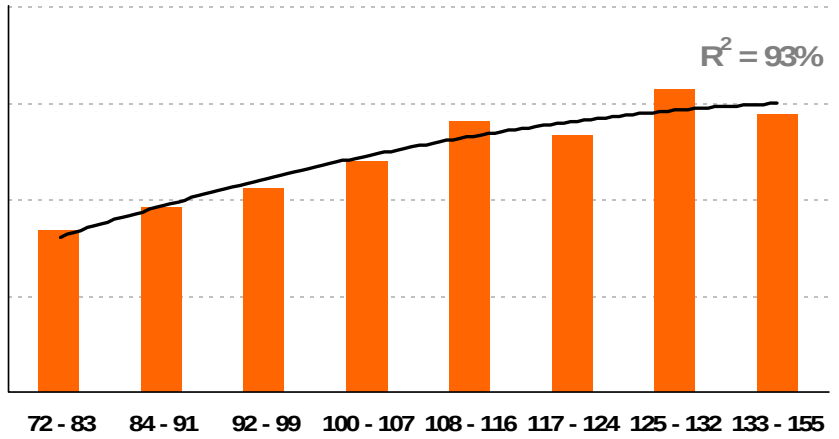
Percentage of consumers who "would purchase"[1]

Ratio



Ratio is not predictable (exhibits no logical pattern) in determining purchase intent . . .

The California Standard



. . . while the CA Standard exhibits 90%+ accuracy in determining purchase intent

The California Standard more accurately predicts purchase intent

1. 2009 Tragon Study

California Standard vs. Ratio: relationship to consumer acceptance

Brix \ % TA	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
16.0	238	231	224	218	211	205	198	191	185	178	172	165
15.5	229	223	216	210	203	196	190	183	177	170	163	157
15.0	221	215	208	201	195	188	182	175	168	162	155	149
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12.0	172	165	158	152	145	139	132	125	119	112	106	99
11.5	163	157	150	144	137	130	124	117	111	104	97	91
11.0	155	149	142	135	129	122	116	109	102	96	89	83
10.5	147	140	134	127	120	114	107	101	94	87	81	74
10.0	139	132	125	119	112	106	99	92	86	79	73	66
9.5	130	124	117	111	104	97	91	84	78	71	64	58
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The California Standard

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16.0	40.0	32.0	26.7	22.9	20.0	17.8	16.0	14.5	13.3	12.3	11.4	10.7
15.5	38.8	31.0	25.8	22.1	19.4	17.2	15.5	14.1	12.9	11.9	11.1	10.3
15.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5	11.5	10.7	10.0
14.5	36.3	29.0	24.2	20.7	18.1	16.1	14.5	13.2	12.1	11.2	10.4	9.7
14.0	35.0	28.0	23.3	20.0	17.5	15.6	14.0	12.7	11.7	10.8	10.0	9.3
13.5	33.8	27.0	22.5	19.3	16.9	15.0	13.5	12.3	11.3	10.4	9.6	9.0
13.0	32.5	26.0	21.7	18.6	16.3	14.4	13.0	11.8	10.8	10.0	9.3	8.7
12.5	31.3	25.0	20.8	17.9	15.6	13.9	12.5	11.4	10.4	9.6	8.9	8.3
12.0	30.0	24.0	20.0	17.1	15.0	13.3	12.0	10.9	10.0	9.2	8.6	8.0
11.5	28.8	23.0	19.2	16.4	14.4	12.8	11.5	10.5	9.6	8.8	8.2	7.7
11.0	27.5	22.0	18.3	15.7	13.8	12.2	11.0	10.0	9.2	8.5	7.9	7.3
10.5	26.3	21.0	17.5	15.0	13.1	11.7	10.5	9.5	8.8	8.1	7.5	7.0
10.0	25.0	20.0	16.7	14.3	12.5	11.1	10.0	9.1	8.3	7.7	7.1	6.7
9.5	23.8	19.0	15.8	13.6	11.9	10.6	9.5	8.6	7.9	7.3	6.8	6.3
9.0	22.5	18.0	15.0	12.9	11.3	10.0	9.0	8.2	7.5	6.9	6.4	6.0
8.5	21.3	17.0	14.2	12.1	10.6	9.4	8.5	7.7	7.1	6.5	6.1	5.7
8.0	20.0	16.0	13.3	11.4	10.0	8.9	8.0	7.3	6.7	6.2	5.7	5.3
7.5	18.8	15.0	12.5	10.7	9.4	8.3	7.5	6.8	6.3	5.8	5.4	5.0
7.0	17.5	14.0	11.7	10.0	8.8	7.8	7.0	6.4	5.8	5.4	5.0	4.7
6.5	16.3	13.0	10.8	9.3	8.1	7.2	6.5	5.9	5.4	5.0	4.6	4.3
6.0	15.0	12.0	10.0	8.6	7.5	6.7	6.0	5.5	5.0	4.6	4.3	4.0

Ratio

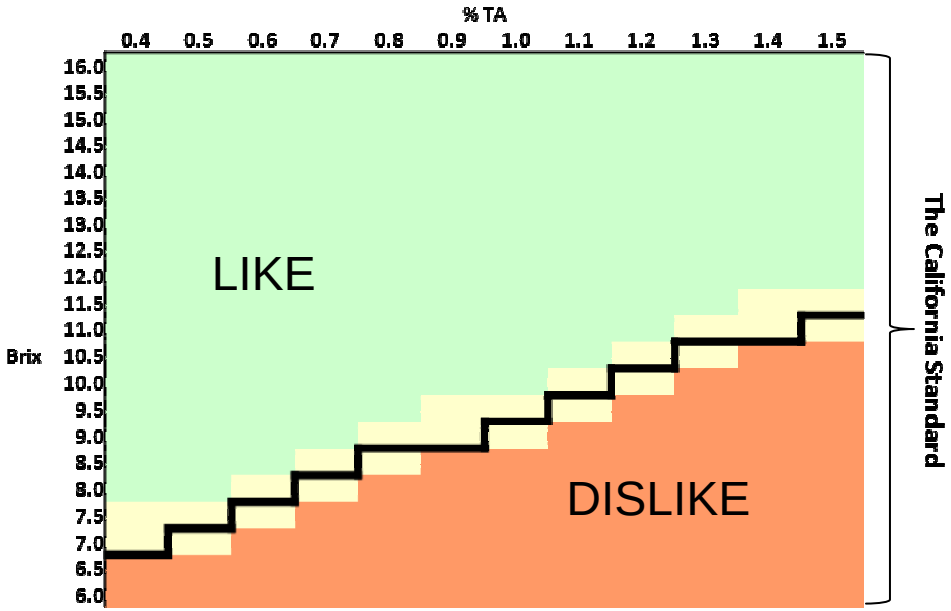
Key: Consumer Acceptance

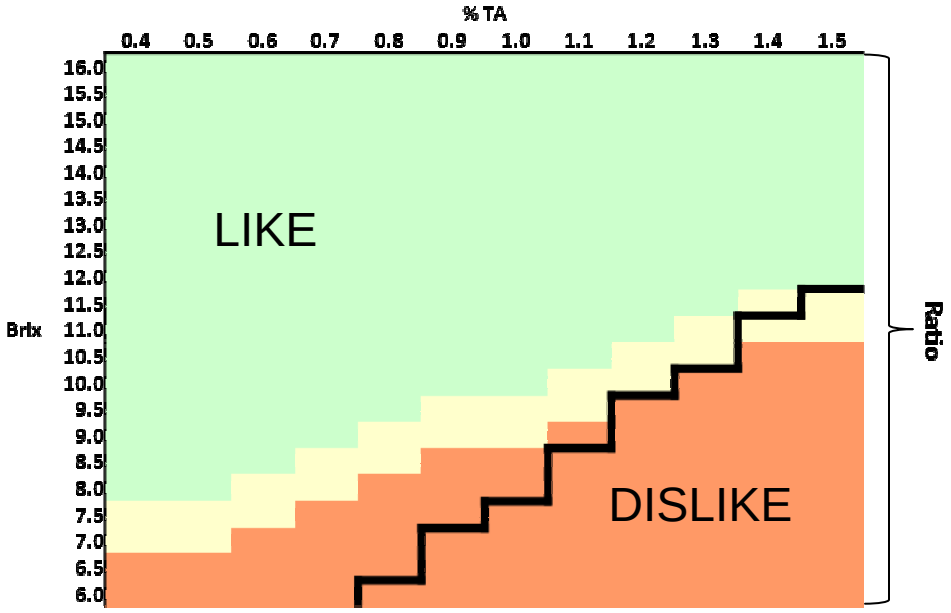
Dislike	*Neither like nor dislike*	*Like*

California Standard minimum standard would eliminate unacceptable fruit in the marketplace *(in brown)*

Current standard allows significant amount of unacceptable fruit into the marketplace (*in brown)*

California Standard vs Ratio: relationships to consumer acceptance





Key: Consumer Acceptance

Dislike	*Neither like nor dislike*	*Like*

The California Standard would eliminate unacceptable fruit in the marketplace *(in brown)* since a passing value is rated "neither like or dislike"

Current standard allows significant amount of unacceptable fruit into the marketplace (*in brown)* since fruit will pass ratio even though judged as "dislike"

Propose of the California Standard is to improve fruit quality in the marketplace by enhancing eating quality and reducing fruit variability

	Ratio	CA Standard
Implications of change	**Increasing to a 9.0 Ratio** • Minimally changes current measurement protocol • Moderately improves consumer acceptability early season and slightly delays harvesting	**Implementing California Standard of 90 (minimum)** • Most likely will not change fruit availability • Greatly improve consumer acceptability early season
Acceptability	• 8.0 Ratio: Less than 15% of fruit tasted by consumers is deemed "acceptable" • 9.0 Ratio: Increases the amount of acceptable fruit to ~30%	• CA Standard of 90: ~50% of consumer tasted fruit is "acceptable"
Considerations	• SSC/TA unpredictable in its progression • Raising SSC/TA to 9.0 does little to improve the fruit quality in the marketplace • Ratio is not a good predictor of eating quality	• Shows a predictable linear progression – as the score improves so does consumer acceptance • If there is a shift in the season, then it would affect the entire industry, so no one grower would necessarily gain over another • Indicators show there will be no lack of availability of qualifying fruit

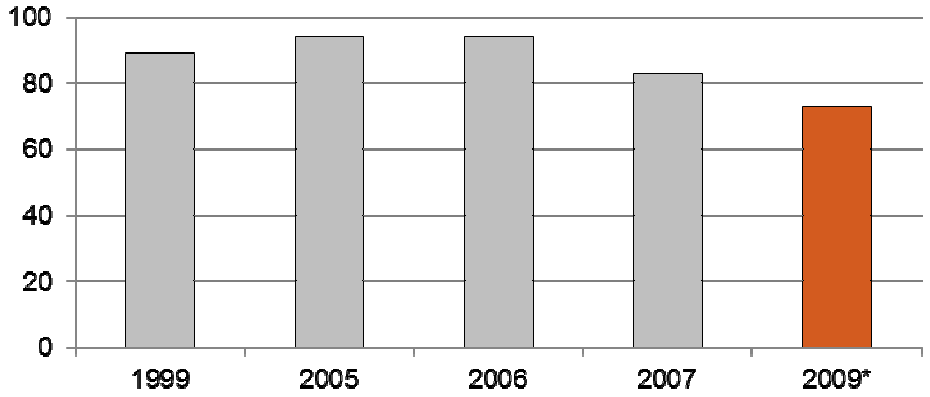
The California Standard more likely to align with consumer preferences and help stem declines in consumption

Note: Acceptability numbers from 2009 Tragon Study

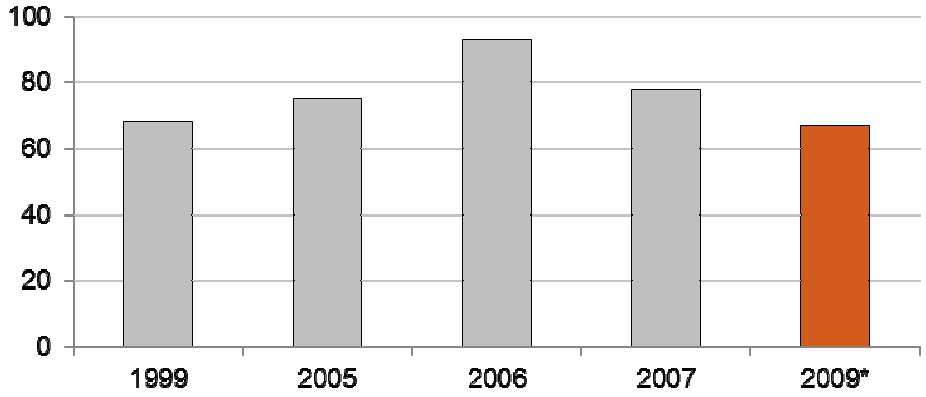
Comparing Early Season

Ratio Tests with California Standard Tests

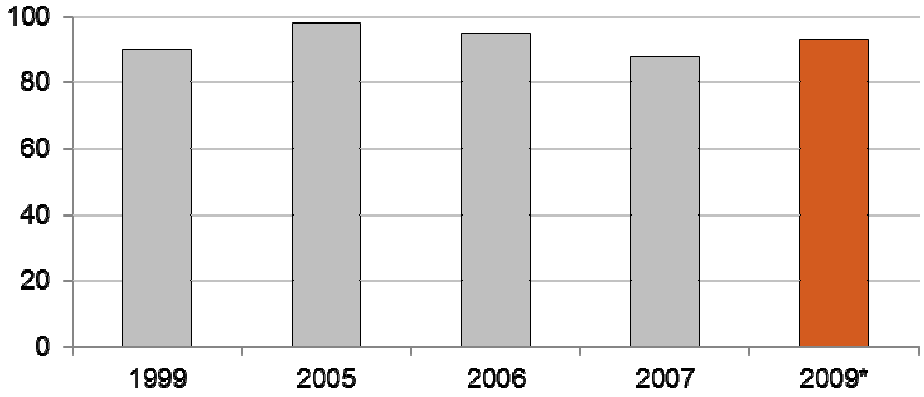
Percentage of Ratio-passing fruit that could pass California Standard - ALL DATES



Percentage of Ratio-passing fruit that could pass California Standard - Prior to Nov. 1

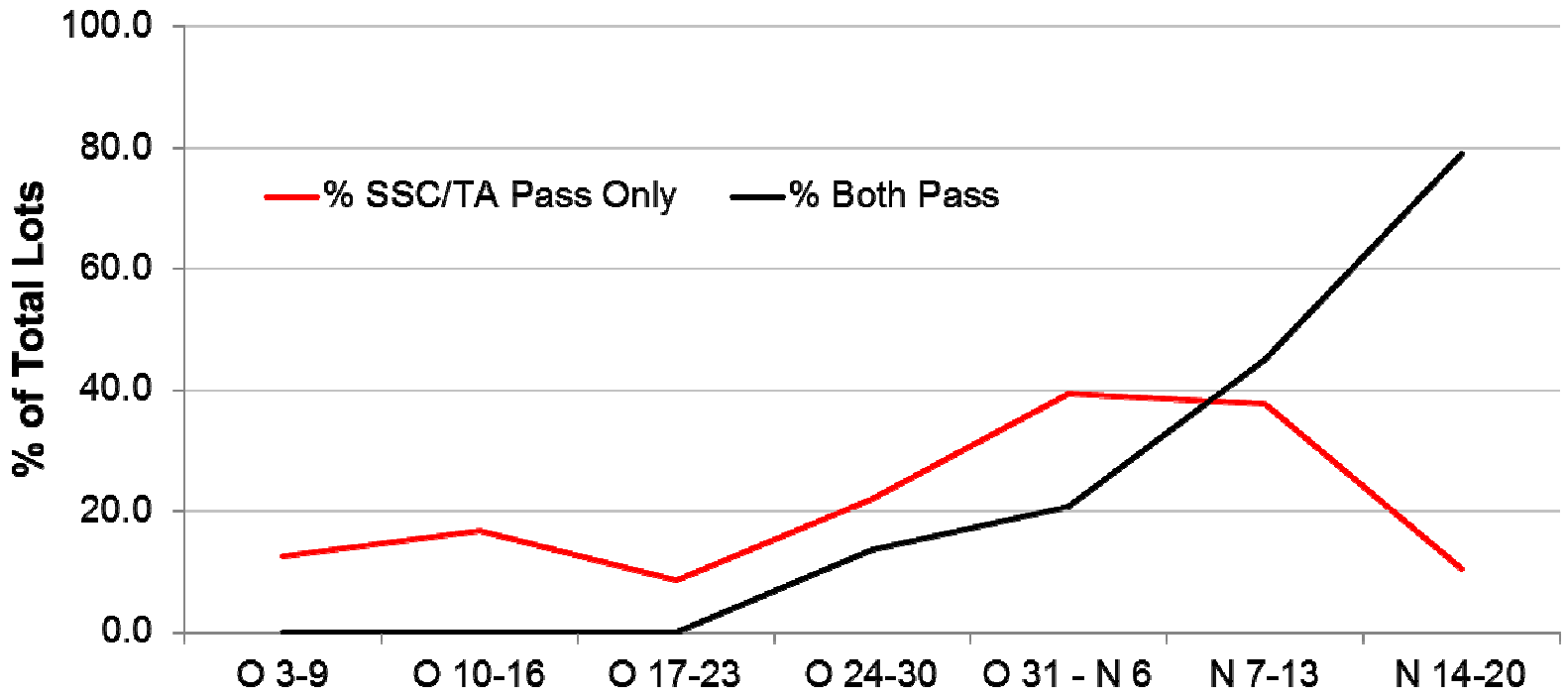


Percentage of Ratio-passing fruit that could pass California Standard - After Nov. 1



* 2009 based on SSC/TA and passing color “A” using ONLY Field data. Other years based on SSC/TA only and a combination of both field and packinghouse data.

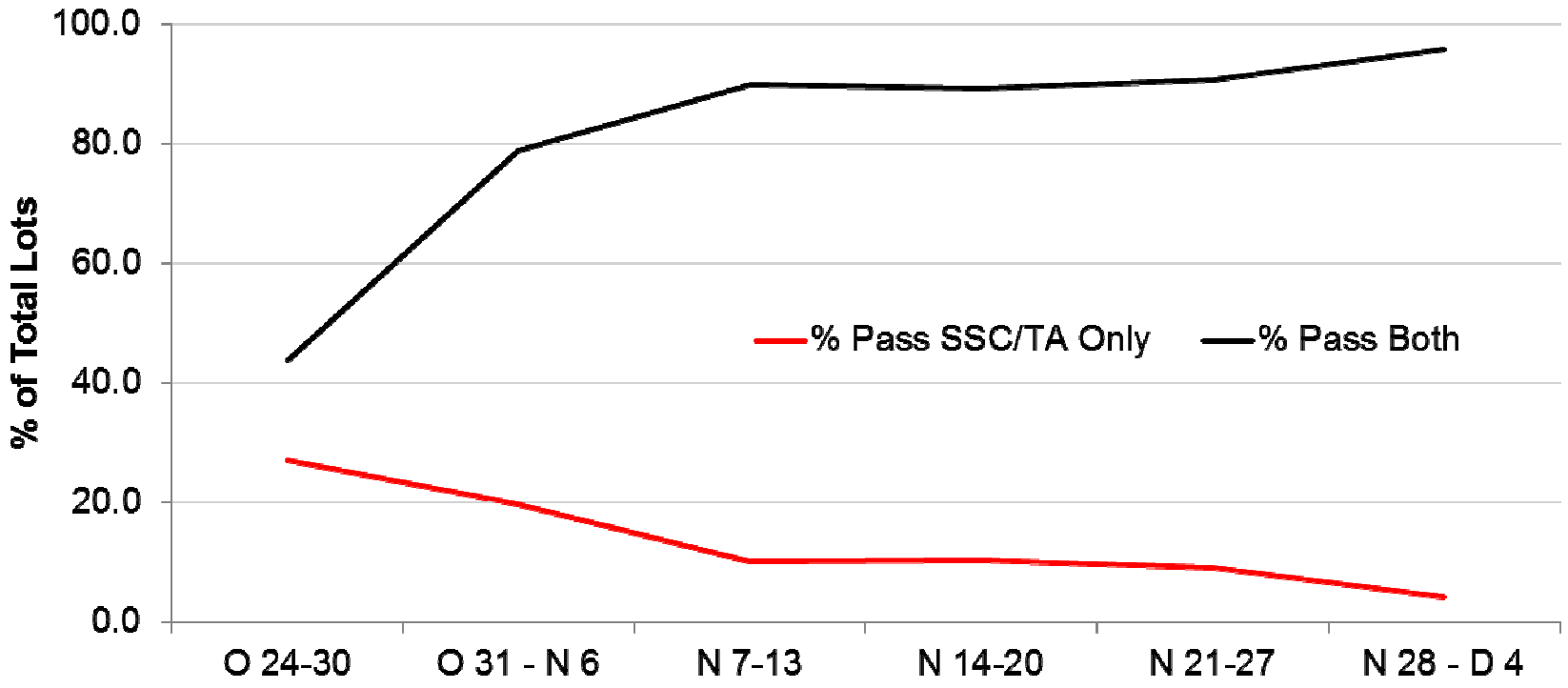
California Standard vs. Ratio Standard Early Season - 2010



Field Data

Graph from data provided by 4 packinghouses: 2010 field data

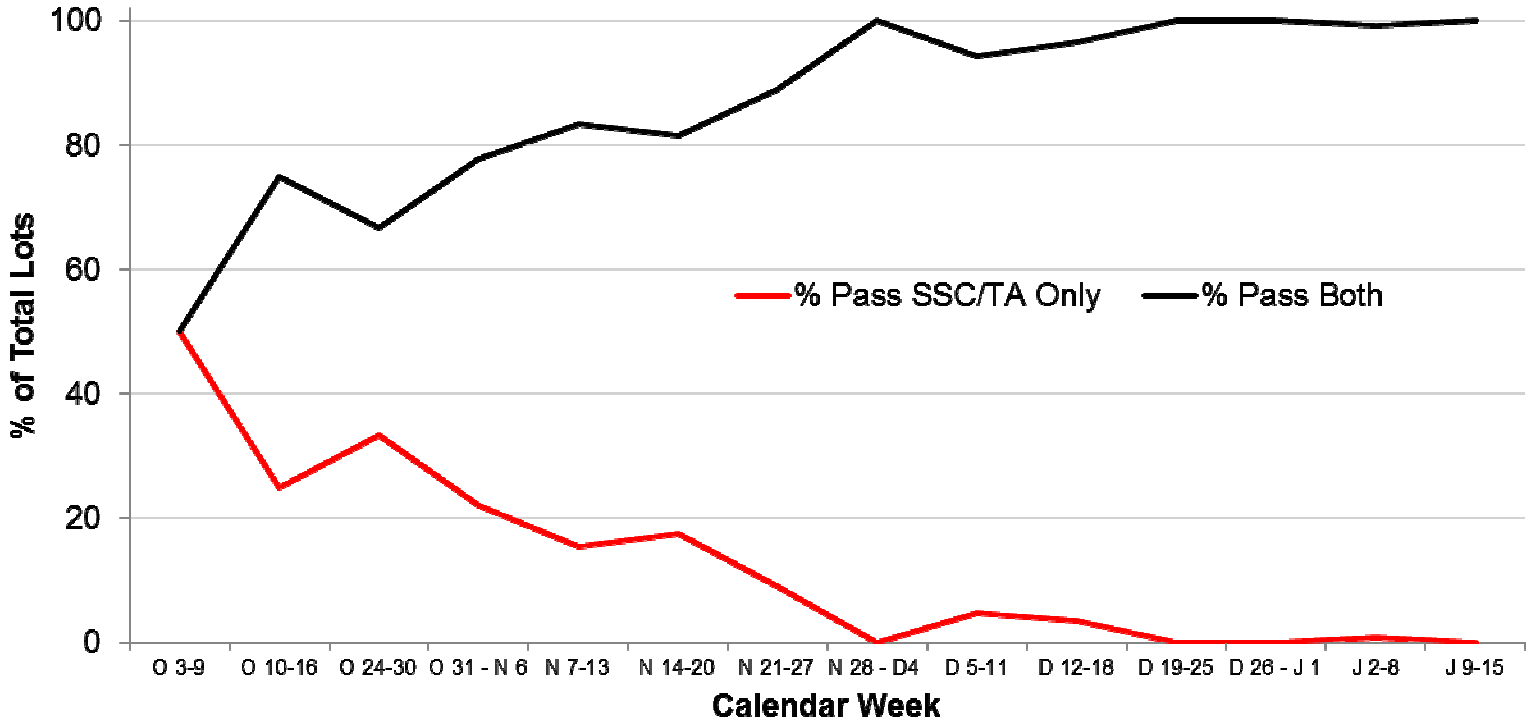
California Standard vs. Ratio Standard Early Season - 2010



Packinghouse Data
Tulare and Kern Counties Combined

Graph from data provided by Tulare and Kern County Ag. Comm. 2010 packinghouse inspections

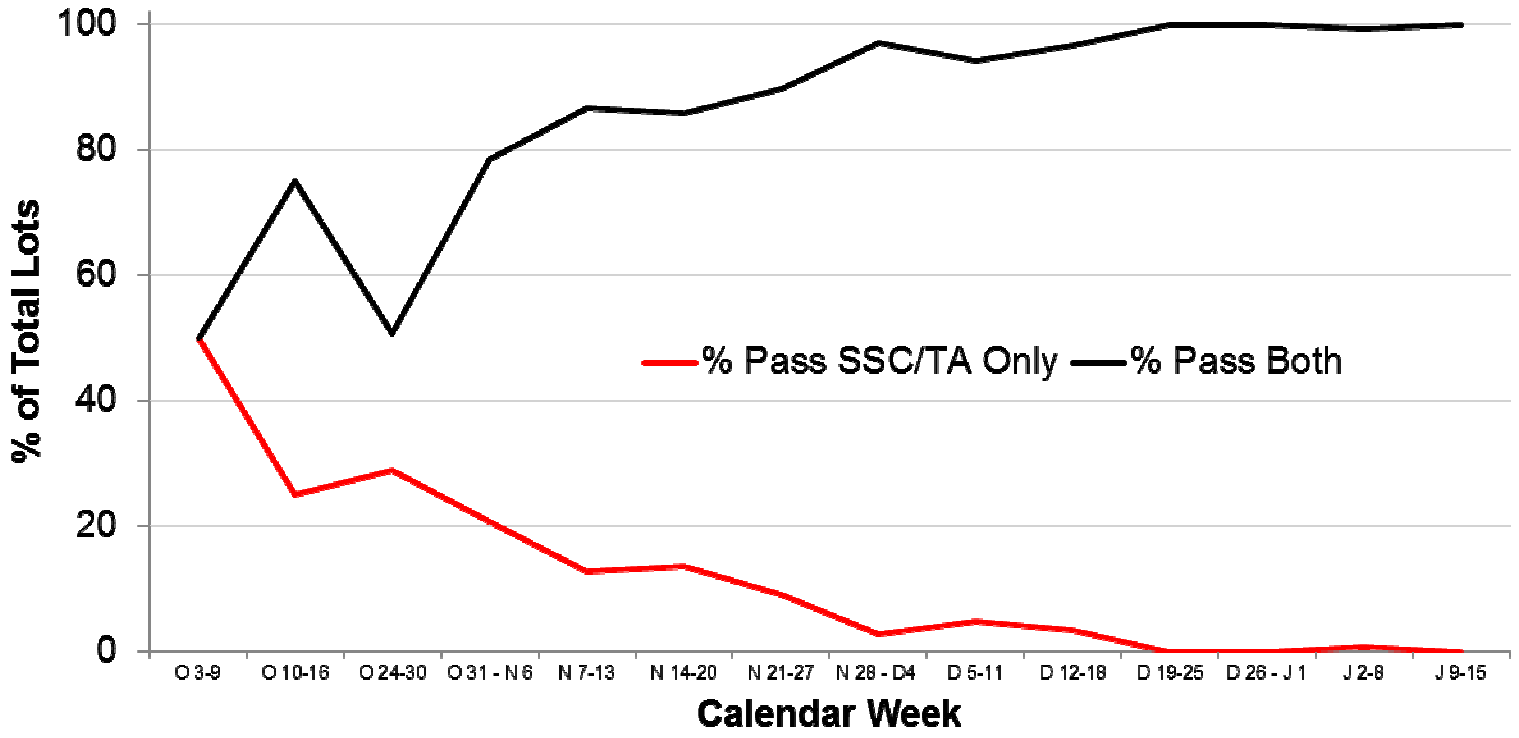
California Standard vs. Ratio Standard Early Season - 2010



Packinghouse Data
Fresno County

Graph from data provided by Fresno County Ag. Comm. 2010 packinghouse inspections

California Standard vs. Ratio Standard Early Season - 2010



Packinghouse Data
Fresno, Tulare and Kern Counties Combined

Graph from data provided by Fresno, Tulare and Kern County Ag. Comm. 2010 packinghouse inspections