

Effects of Bale Size and Density on TSNA Levels in Cured Burley Tobacco

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2004 Bale Sizes & Densities

Small Bale
36" x 24" x 12"



1/2 Big Bale
42" x 42" x 40"



Big Bale
42" x 42" x 40"



Density	Weight
Low	60 lbs
Standard	80 lbs
High	100 lbs

Density	Weight
Low	204 lbs
Standard	272 lbs
High	340 lbs

Density	Weight
Low	408 lbs
Standard	544 lbs
High	681 lbs

Low = 10 lbs/cu ft
Standard = 13.33 lbs/cu ft

High = 16.67 lbs/cu ft
Flue-cured = ~18 lbs/cu ft

2005 Bale Sizes & Densities

Small Bale
36" x 24" x 12"



Density	Weight
Standard	80 lbs
High	100 lbs

½ Big Bale
42" x 42" x 40"



Density	Weight
Standard	272 lbs
High	340 lbs

Big Bale
42" x 42" x 40"



Density	Weight
Standard	544 lbs
High	681 lbs

2006 & 2007 Bale Sizes & Densities

Small Bale
36" x 24" x 12"



Density	Weight
Standard	80 lbs
High	100 lbs

Big Bale
42" x 42" x 40"

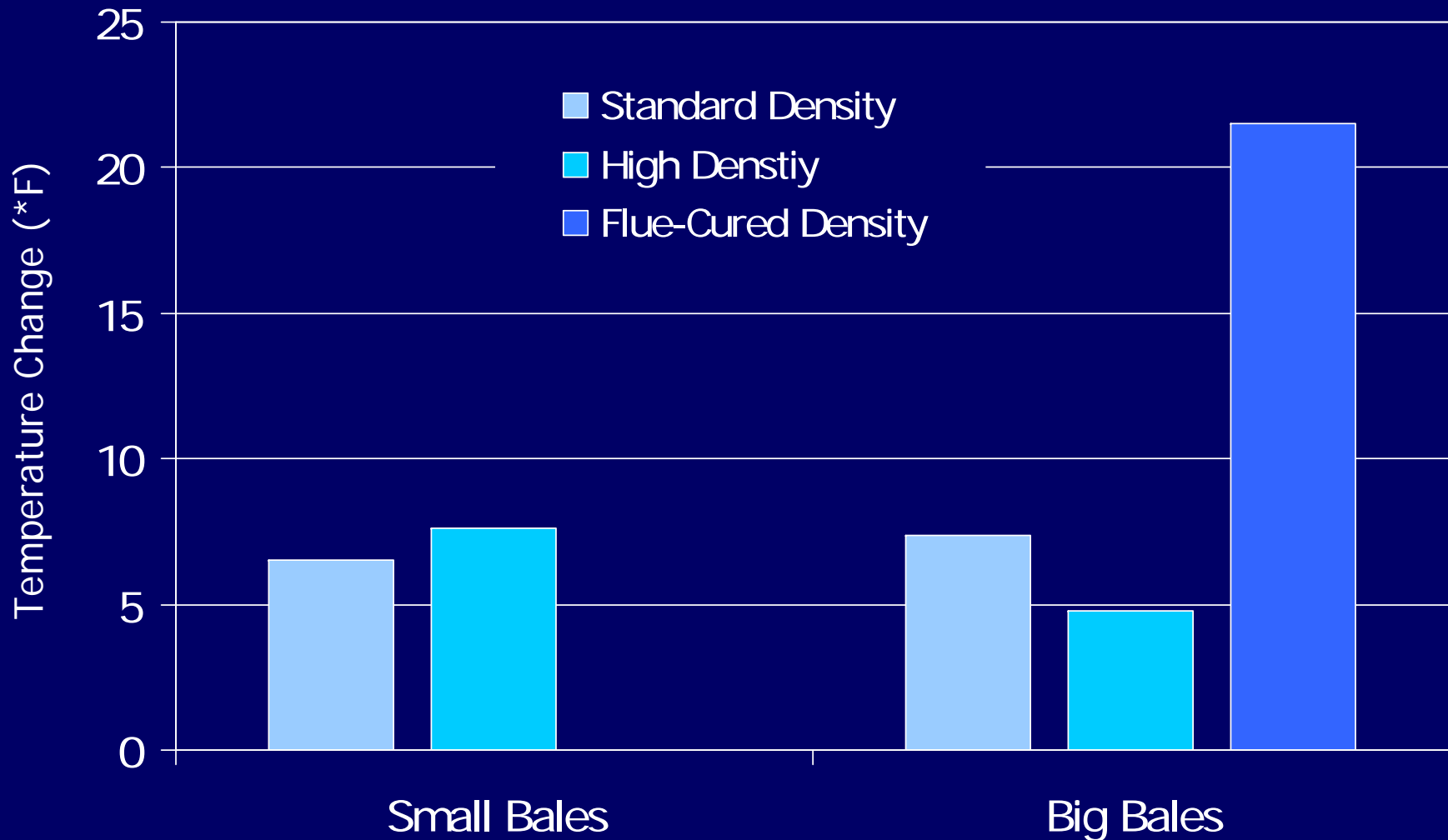


Density	Weight
Standard	544 lbs
High	681 lbs
*Flue-cured	750 lbs

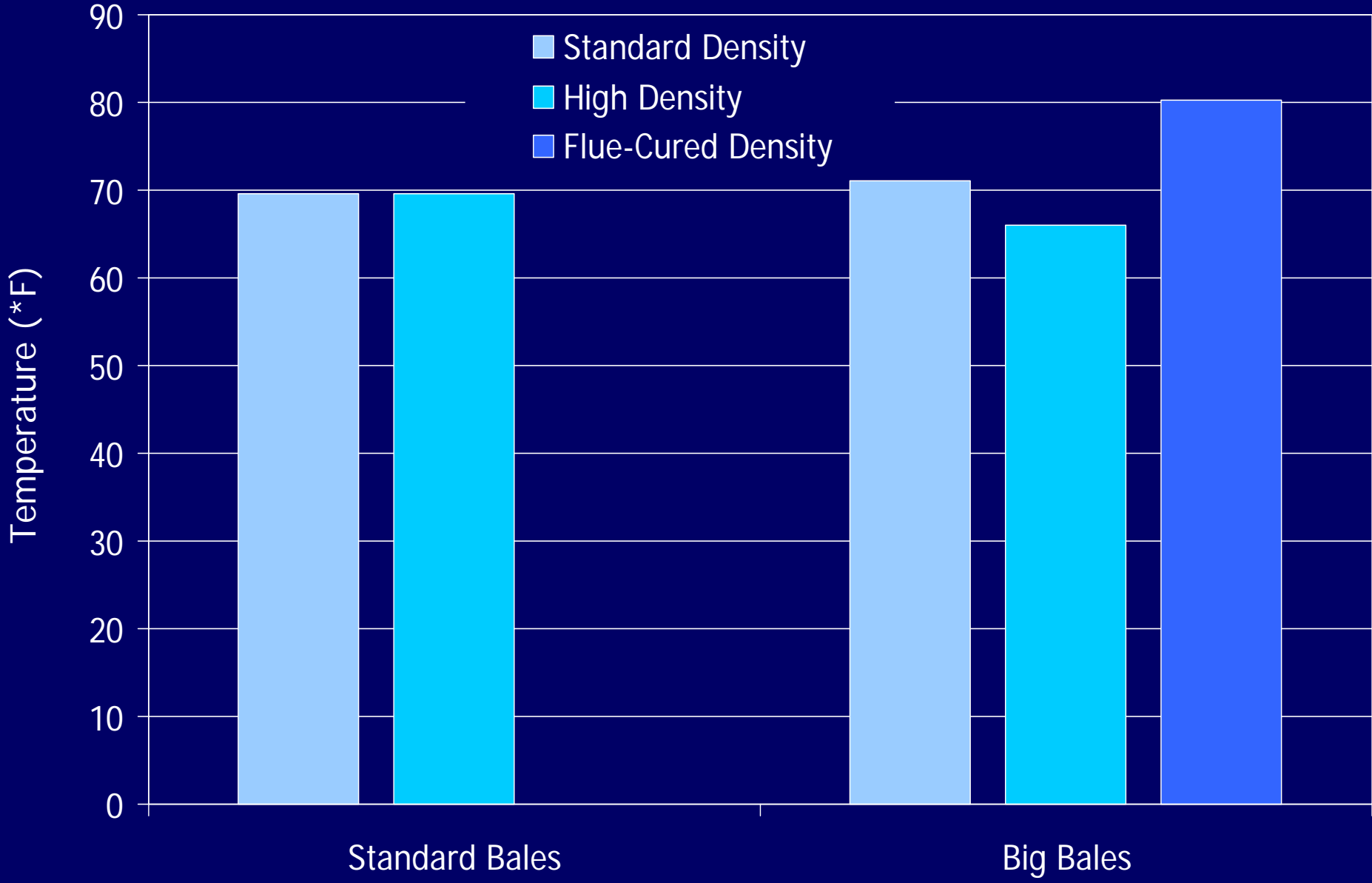
2006 Data Analysis

Average Change in Bale Temperature (*F)

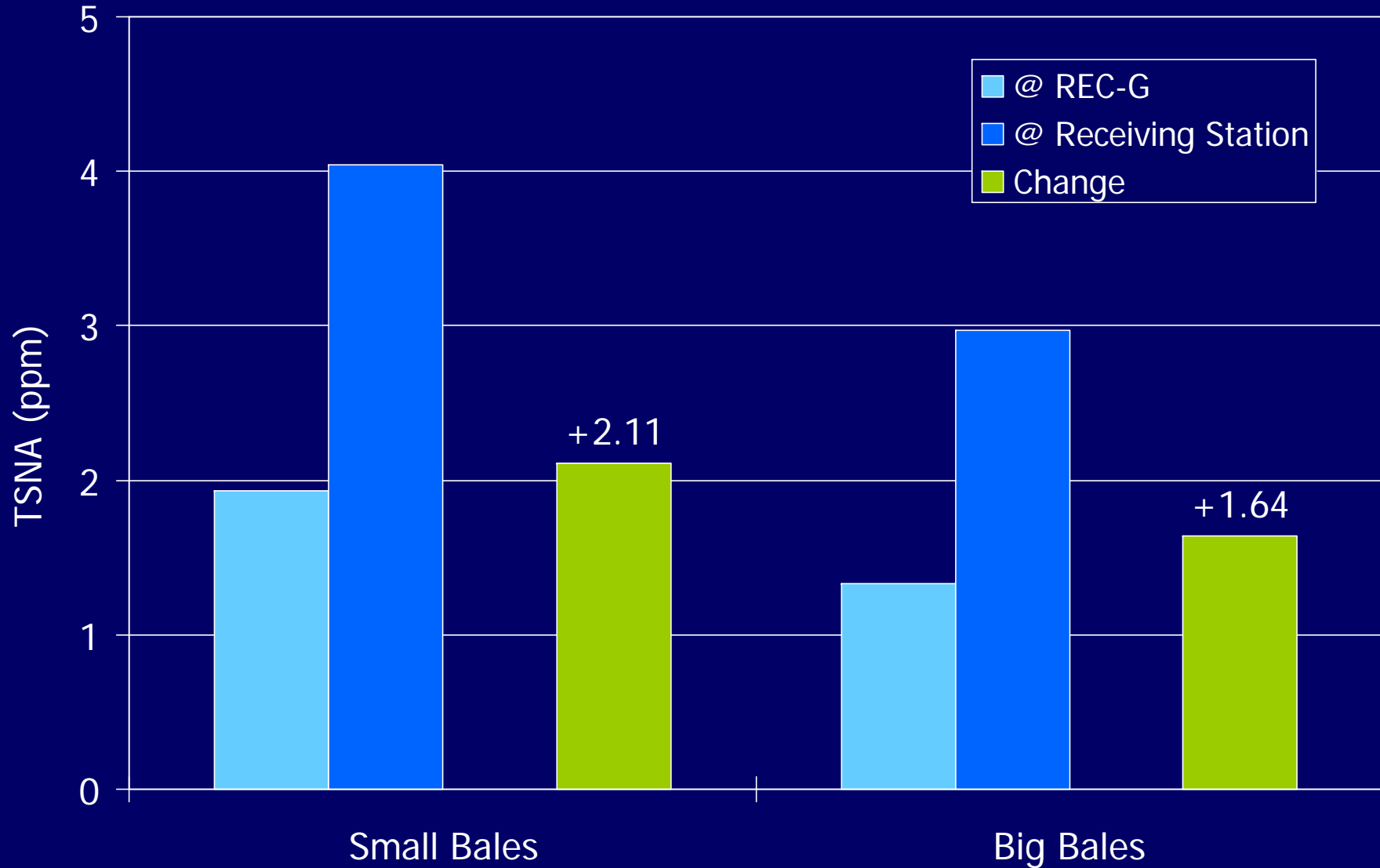
Based on the maximum bale temperature reached less day 1's temperature



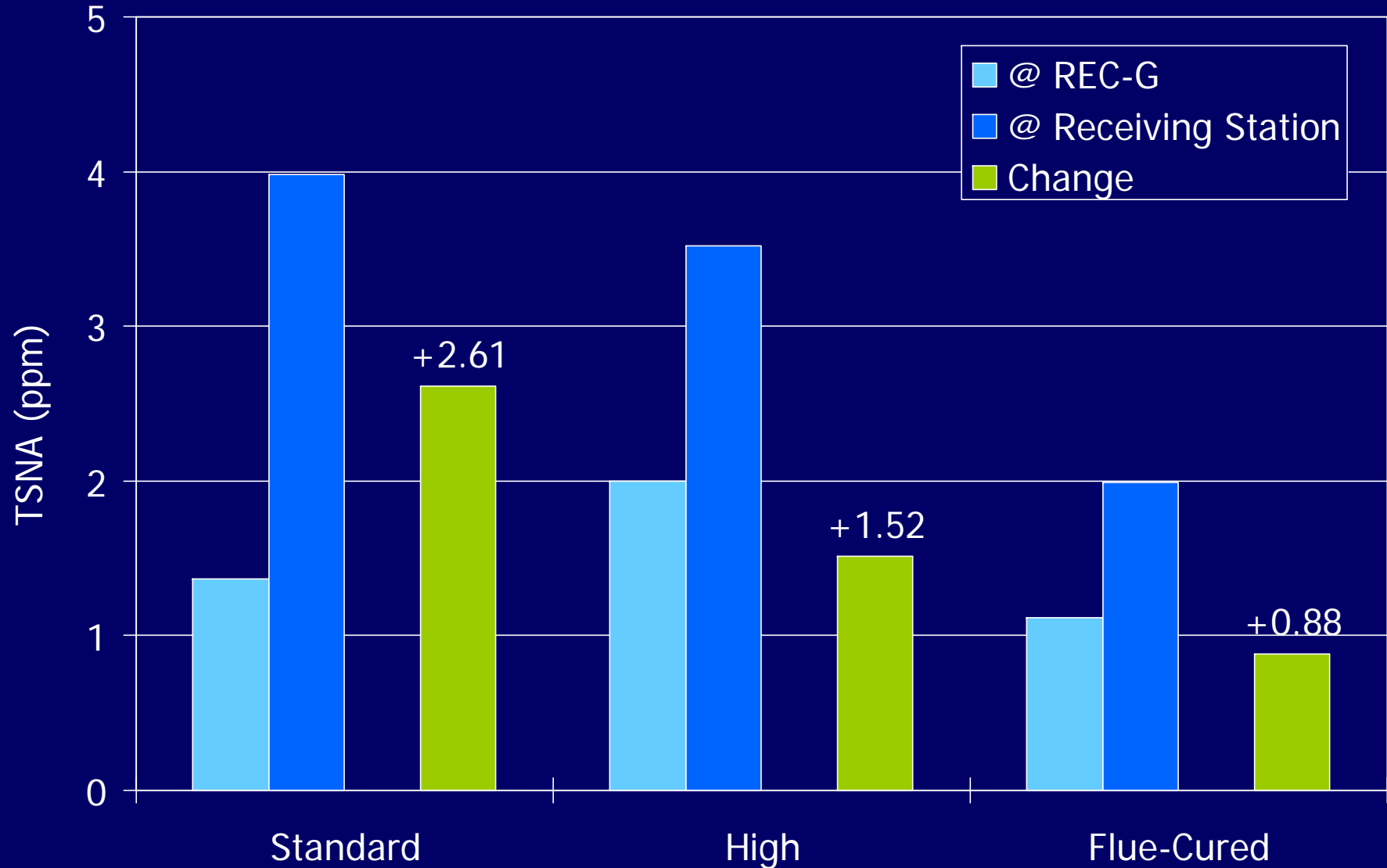
Average Maximum Bale Temperature (*F)



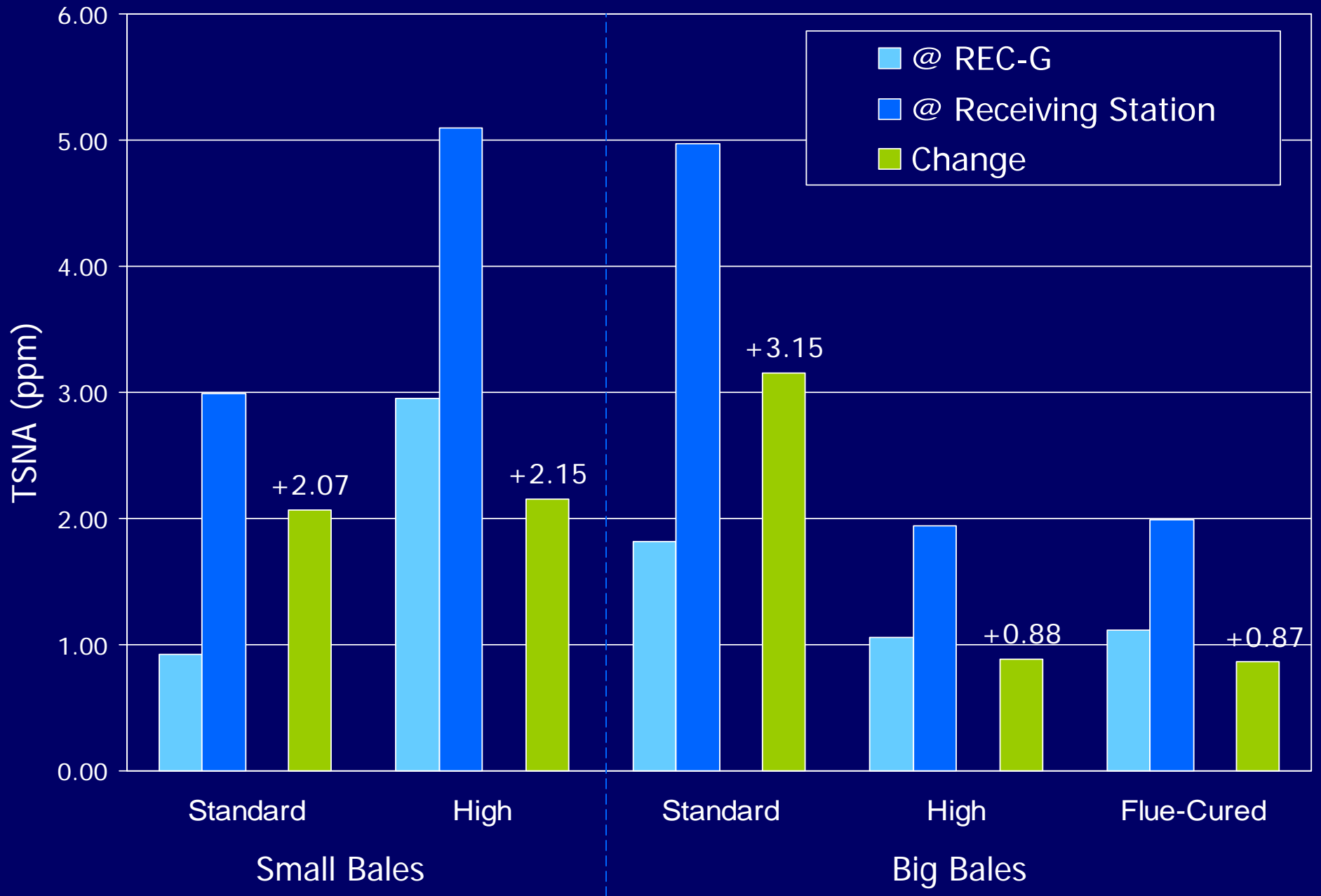
Average TSNA by Bale Size



Average TSNA by Density



Average TSNA by Bale Size & Density



TSNA Levels at Time of Baling

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Bale Size	1	18	0.17	0.6871
Density	2	18	1.06	0.3657
Bale Size*Density	1	18	14.59	0.0013

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ae1

TSNA1L - using the TSNA before values (at baling time) transformed by taking the log to create a normal distribution of the TSNA before values

ag econ, 11/28/2007

TSNA Levels at Time of Sale

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Bale Size	1	18	0.08	0.7793
Density	2	18	0.75	0.4873
Bale Size*Density	1	18	4.48	0.0485

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ae2

TSNA2L - using the TSNA after values (at the receiving station at time of sale) transformed by taking the log to create a normal distribution of the TSNA after values

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Changes in TSNA Levels Between Time of Baling and Time of Sale

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Bale Size	1	18	0.08	0.9282
Density	2	18	0.75	0.4255
Bale Size*Density	1	18	4.48	0.3729

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ae3

TSNA2 minus TSNA1 = TSNADIFF

TSNADIFF + 1 = tsnadiffm

Ln(tsnadiffm) = tsnadl

that is - TSNA differences transformed by adding one and taking the log of the sum

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Effects of Bale Size, Density, & Change in Temperature on TSNA Levels

Single Year Analysis - 2006

Type 3 Tests of Fixed Effects

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Bale Size	1	2.5813	2.5813	0.67	0.4245
Density	1	4.6842	4.6842	1.22	0.2859
tmxs ¹	1	0.2286	3.3500	0.87	0.3643
Bale Size*Density	1	0.1843	0.1843	0.05	0.8294
Bale Size*tmxs	1	3.4144	3.4144	0.89	0.3599
Density*tmxs	1	5.7473	5.7473	1.50	0.2390
Bale Size*Density*tmxs	1	0.0081	0.0081	0.00	0.9639

¹tmxs = max bale temp less starting temp

Effects of Bale Size and Density on TSNA Levels

Multiyear Analysis including 2004, 2005, & 2006 Data

Type 3 Tests of Fixed Effects

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Bale Size	1	0.2475	0.2475	0.80	0.3746
Density	1	0.6217	0.6217	2.01	0.1615
Bale Size*Density	1	0.175	0.1750	0.57	0.4549
Year	2	2.0921	1.0461	3.39	0.0408
Package*Year	2	0.1459	0.0730	0.24	0.7904
Density*Year	2	0.4749	0.2375	0.77	0.4684
Bale Size*Density*Year	1	0.1323	0.1323	0.43	0.5155

Conclusion:

Based on the statistical results of three years of aggregated data, there is no significant effect of bale size or density on TSNA levels.

Future Research:

Influence of bale moisture, storage conditions, and length of storage on TSNA formation