The Effect on TSNAs of Cutting and Housing Wet Tobacco

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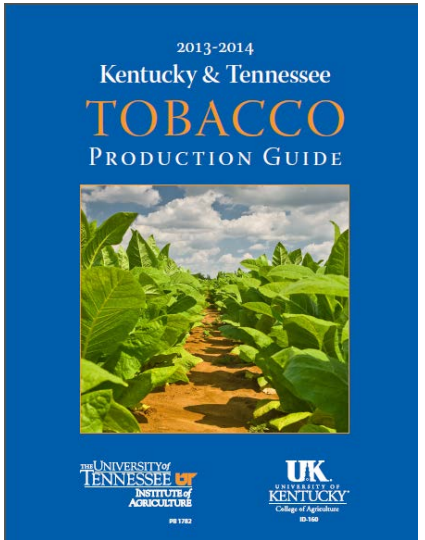
Background

- Previous work with pre-harvest applied anti-oxidants → TSNAs
  - Water control > unsprayed control
- Possible that wetting leaf ↑ TSNAs
  - Provisionally advised growers not to cut or house wet tobacco
  - Little supporting data



Objectives

- Test our recommendations to growers
  - Not to cut or house wet tobacco

Procedure

Experimental Design

Split plot, 4 RCB

- 2 cutting treatments (*main plots*)
- 4 housing treatments (*subplots*)
- 2 varieties (*sub-subplots*)

Cutting Treatments

Cut dry

Cut wet

200 gallons acre^{-1}

Housing Treatments

Railwagon

No sun
No rain

Wilted on wagons

Sun
No rain

6 days cutting to pickup

Field wilted, housed dry

Sun
Rain

Field wilted, housed wet

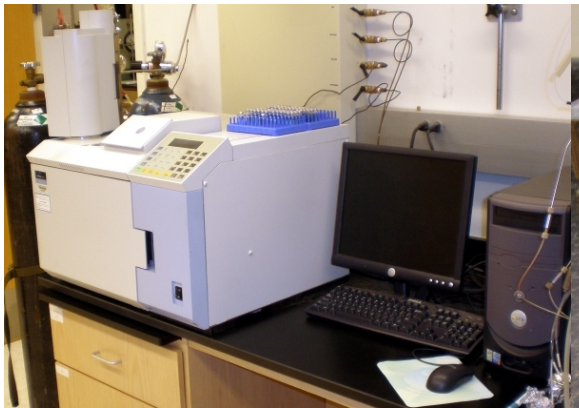
Varieties

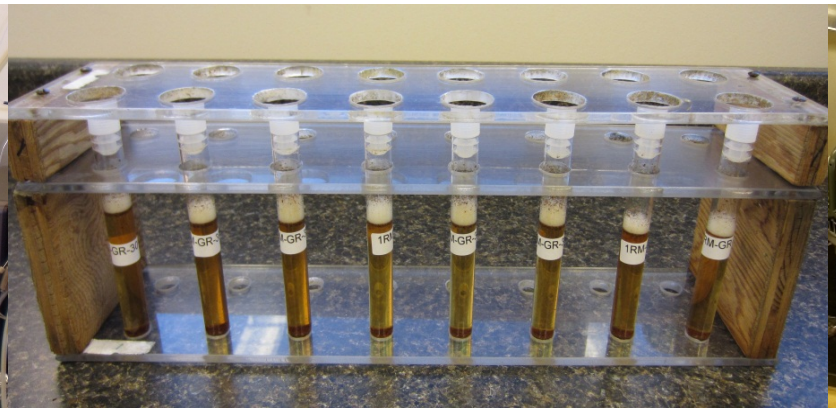
TN 90LC

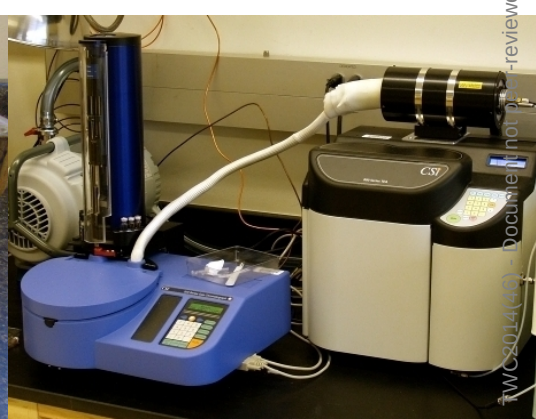
TN 90H

Variables

- Alkaloids
- TSNAs
- NO_2 N
- NO_3 N







Statistical Analysis

- SAS Proc Mixed
- Tests to verify model assumptions
  - Some variables heteroscadistic
  - Transformations for means separation
    - Log, square root
    - Untransformed data presented

Weather

2011

- Set late – wet spring
  - Housed late in season
- Unfavorable curing
  - Cold
  - Low TSNAs
    - 3-4 ppm in high converter
- Rain after cutting
  - “Wilted on wagon” treatment
    - Ineffective because left indoors

2012

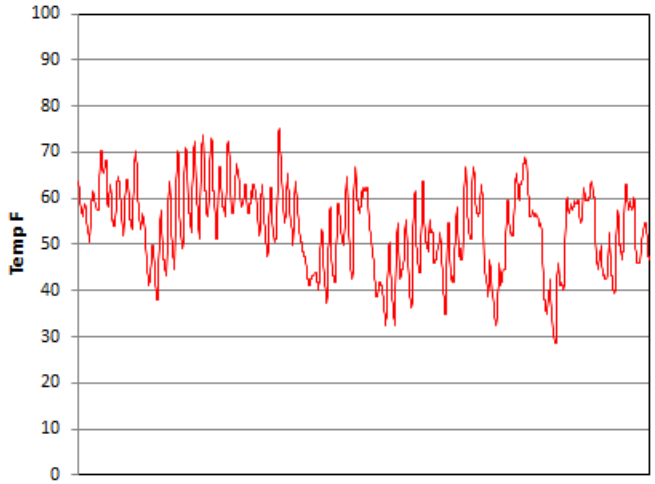
- Set on time
  - Housed early in season
- Extended drought
  - Drip irrigation
- Favorable curing
  - Warm & humid
  - Higher TSNAs
    - 10-11 ppm in high converter
      - vs 3-4 ppm in 2011

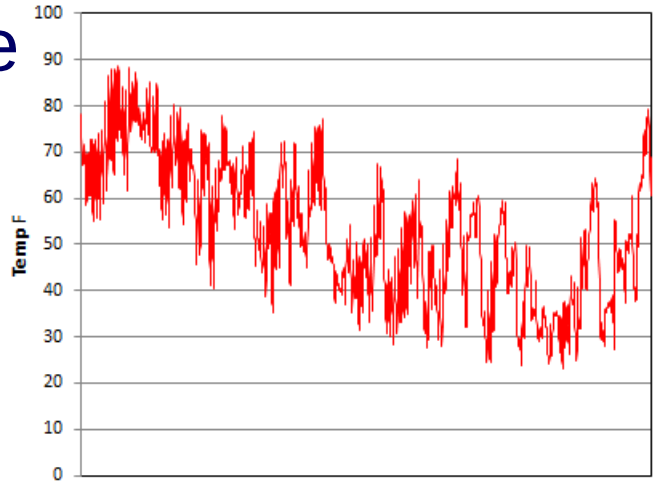
Curing conditions

2011

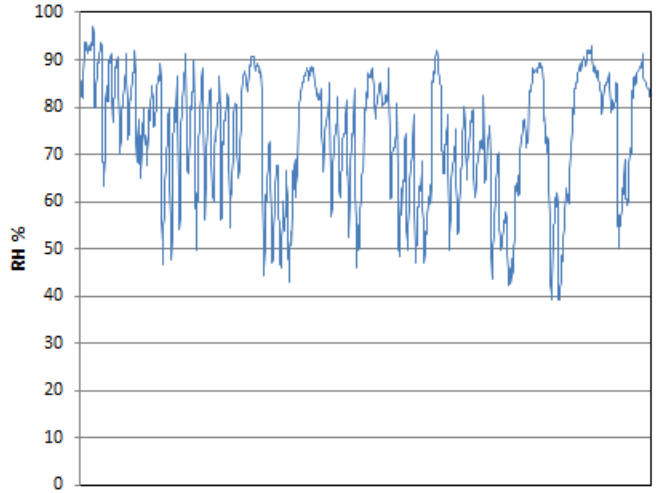
2012

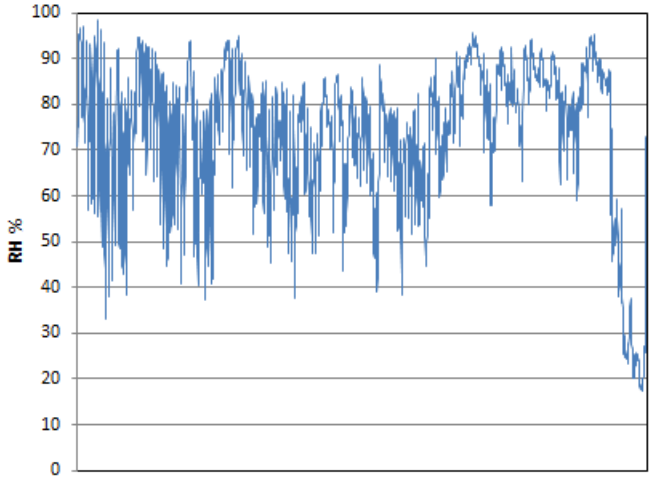
temperature





humidity





Results

All Variables: 2011

Both Varieties, Lamina & Midrib

Cutting	NS
Housing	NS
Cut x Hse	NS

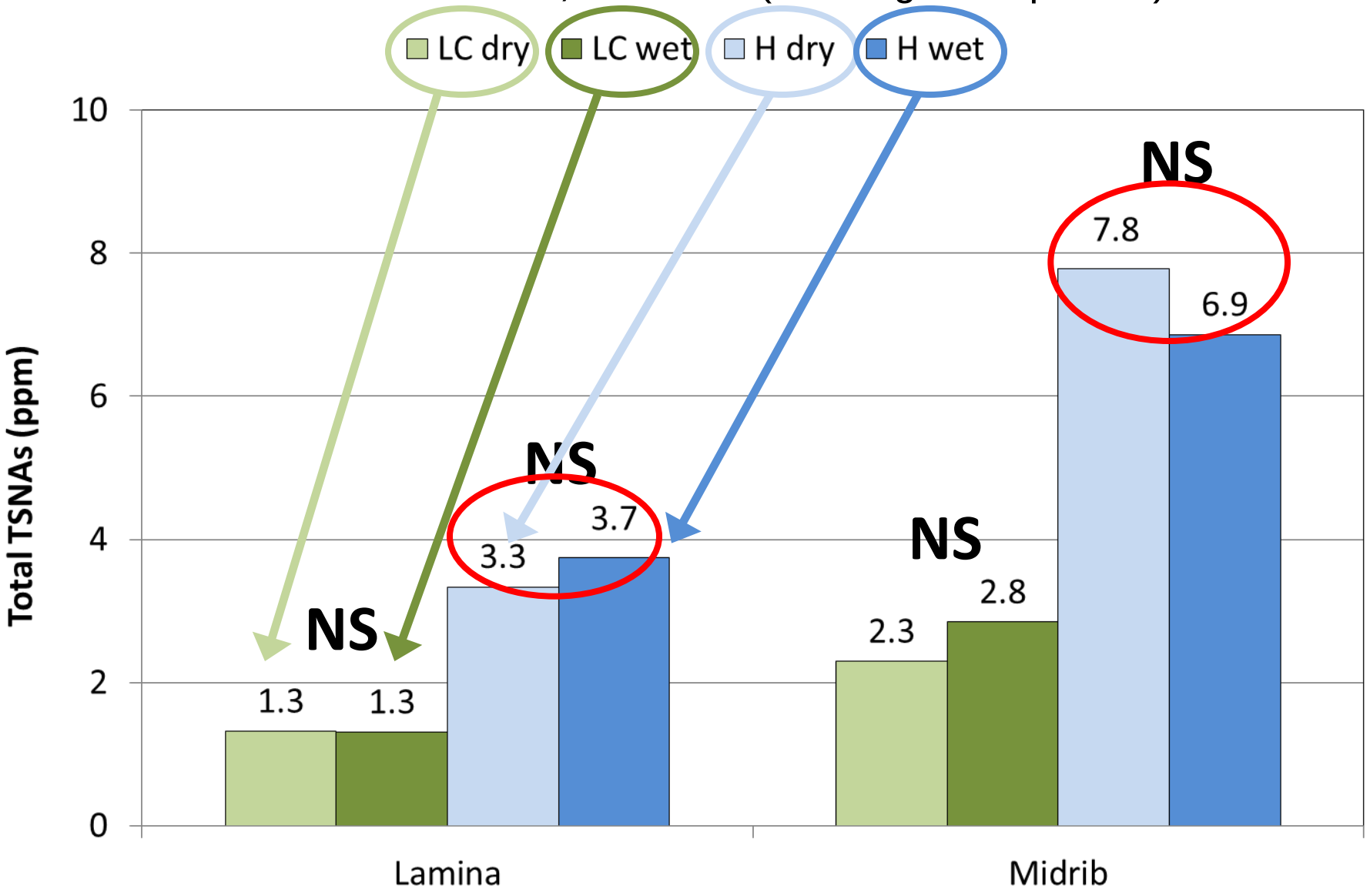
All Variables: 2012

Both Varieties, Lamina & Midrib

Cutting	NS
House	various
Cut x Hse	NS

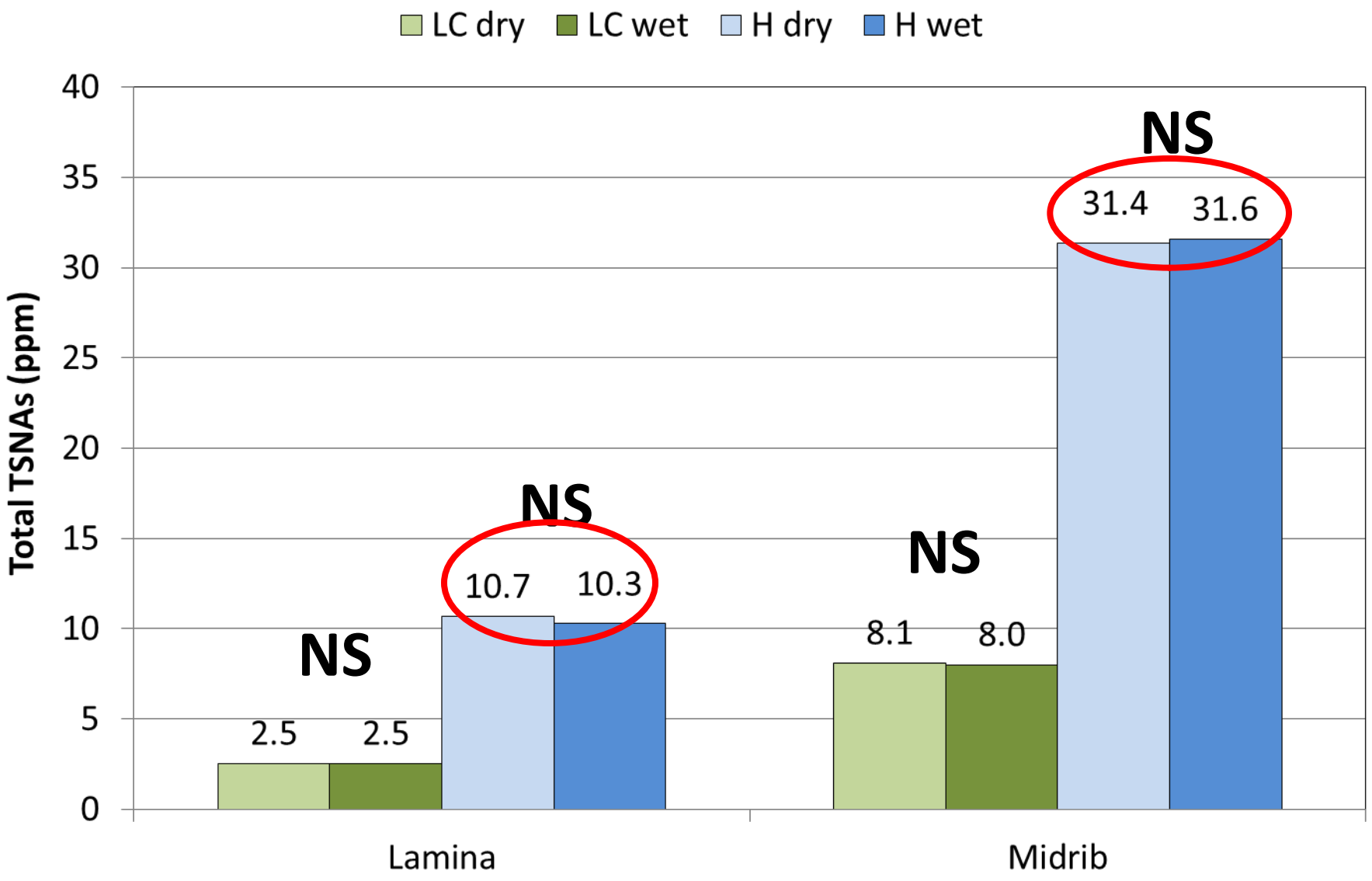
Total TSNAs 2011: Cutting Treatments

Lamina & Midrib, LC & H (housing trmts pooled)



TOTAL TSNAs 2012: Cutting Treatments

Lamina & Midrib, LC & H (housing trmts pooled)



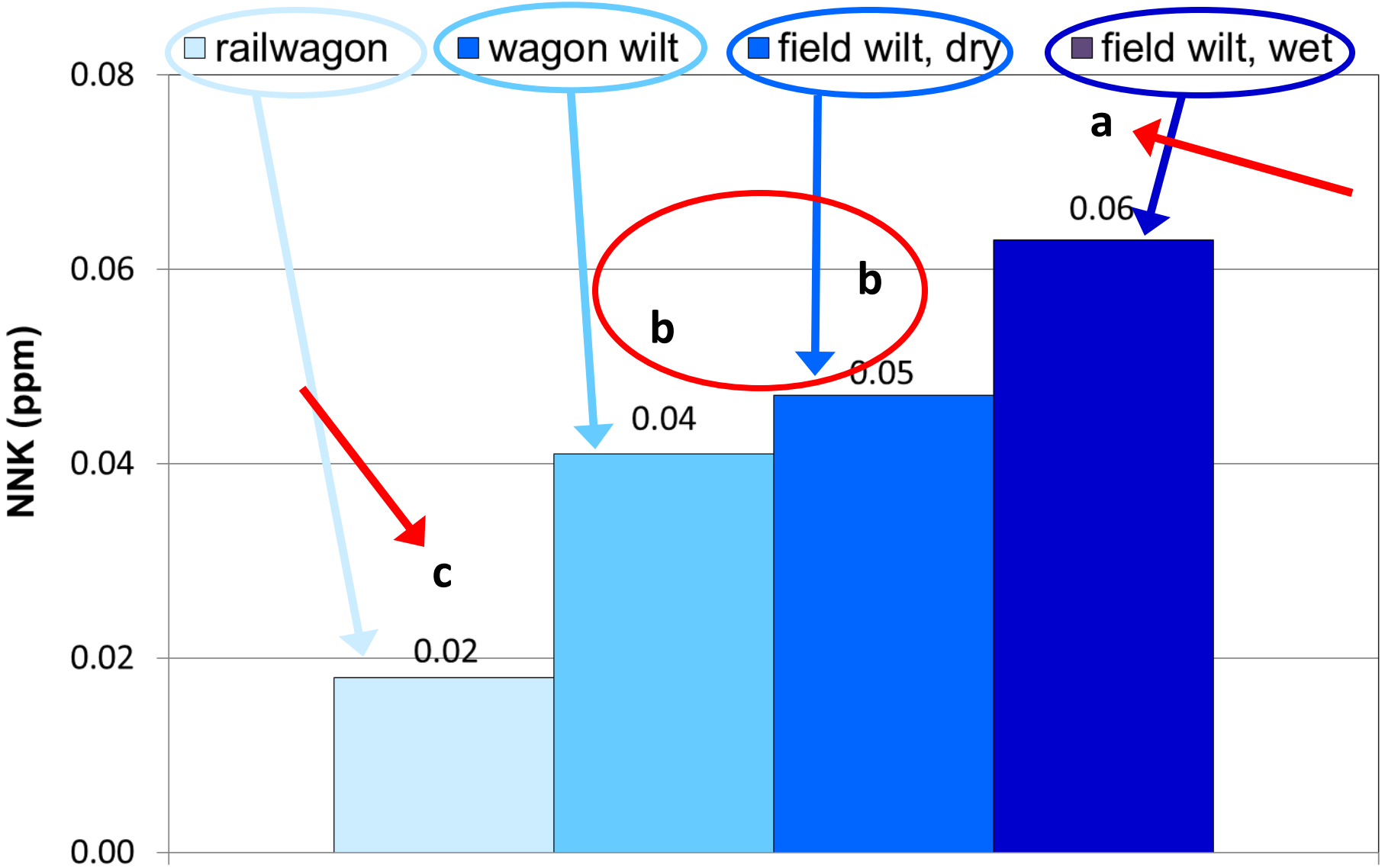
TSNAs: 2012

	TSNAs	NAT
	LC & HC, Lamina & Midrib	
Housing	NS	NS

	NNK	NNN
	LC & HC, Lamina	LC, Lamina & Midrib
Housing	***	*

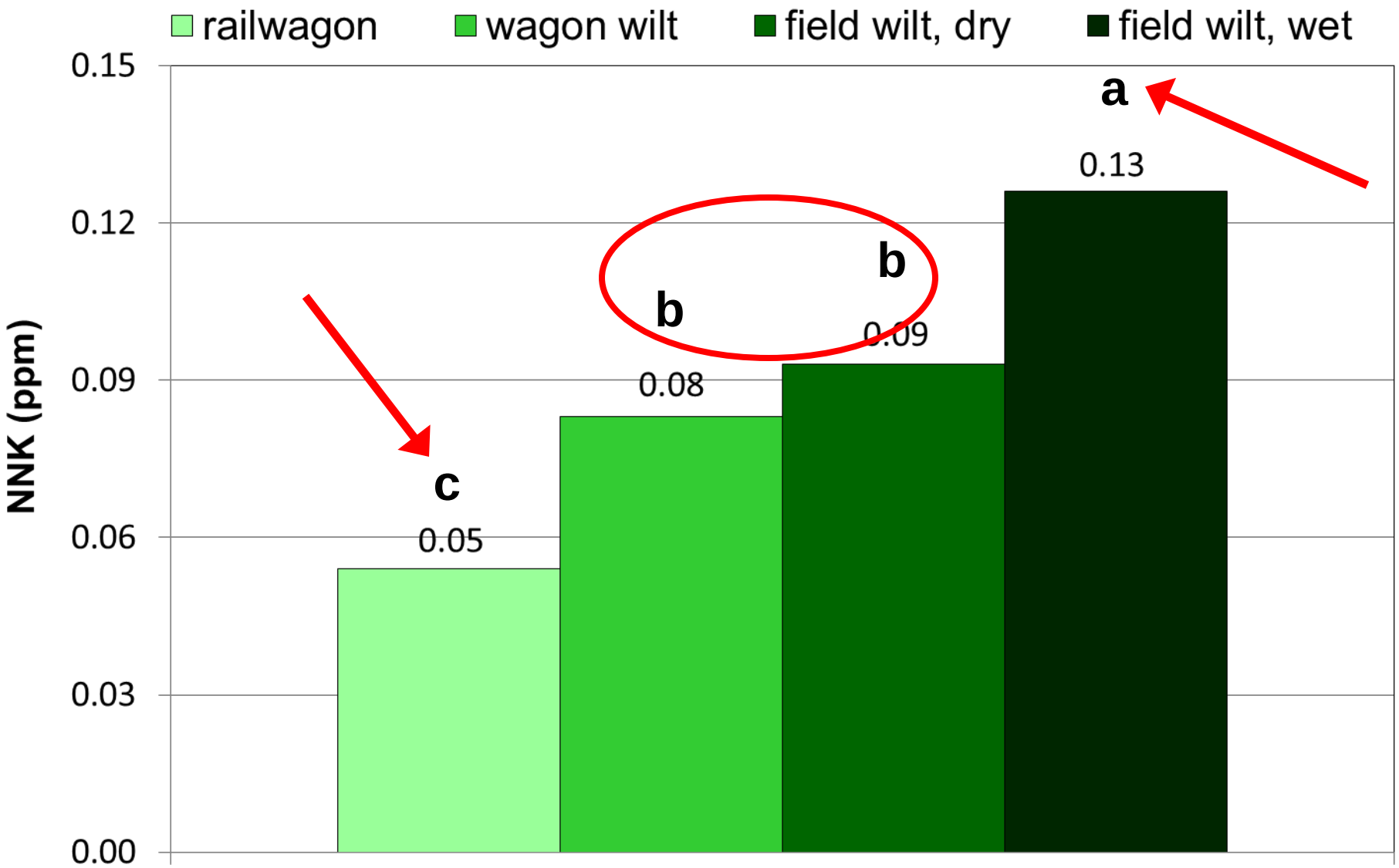
NNK 2012: Housing Treatments

High Converter: Lamina (cutting trmts pooled)



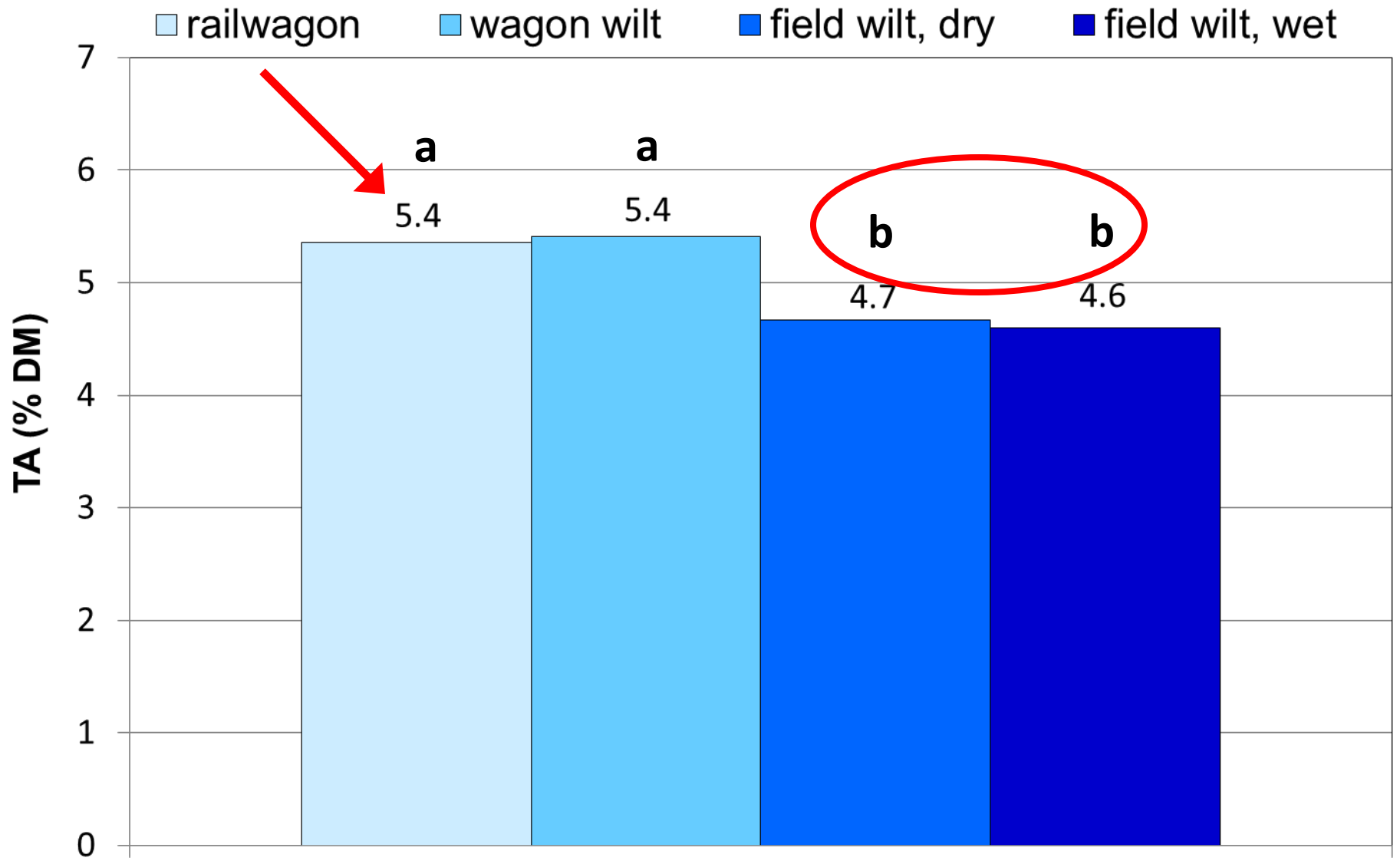
NNK 2012: Housing Treatments

Low Converter: Lamina (cutting trmts pooled)



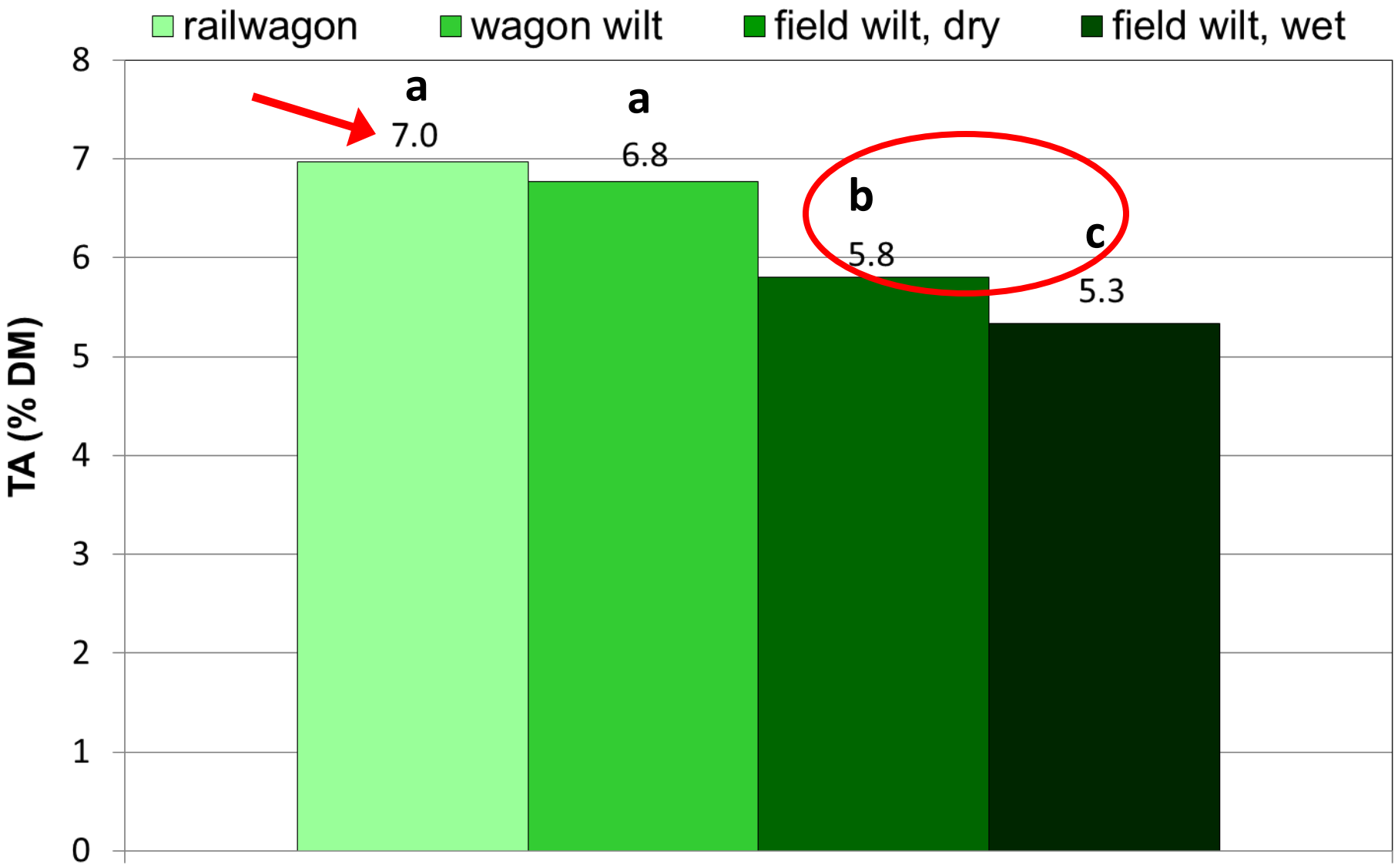
Total Alkaloids 2012: Housing Treatments

High Converter: Lamina (cutting trmts pooled)



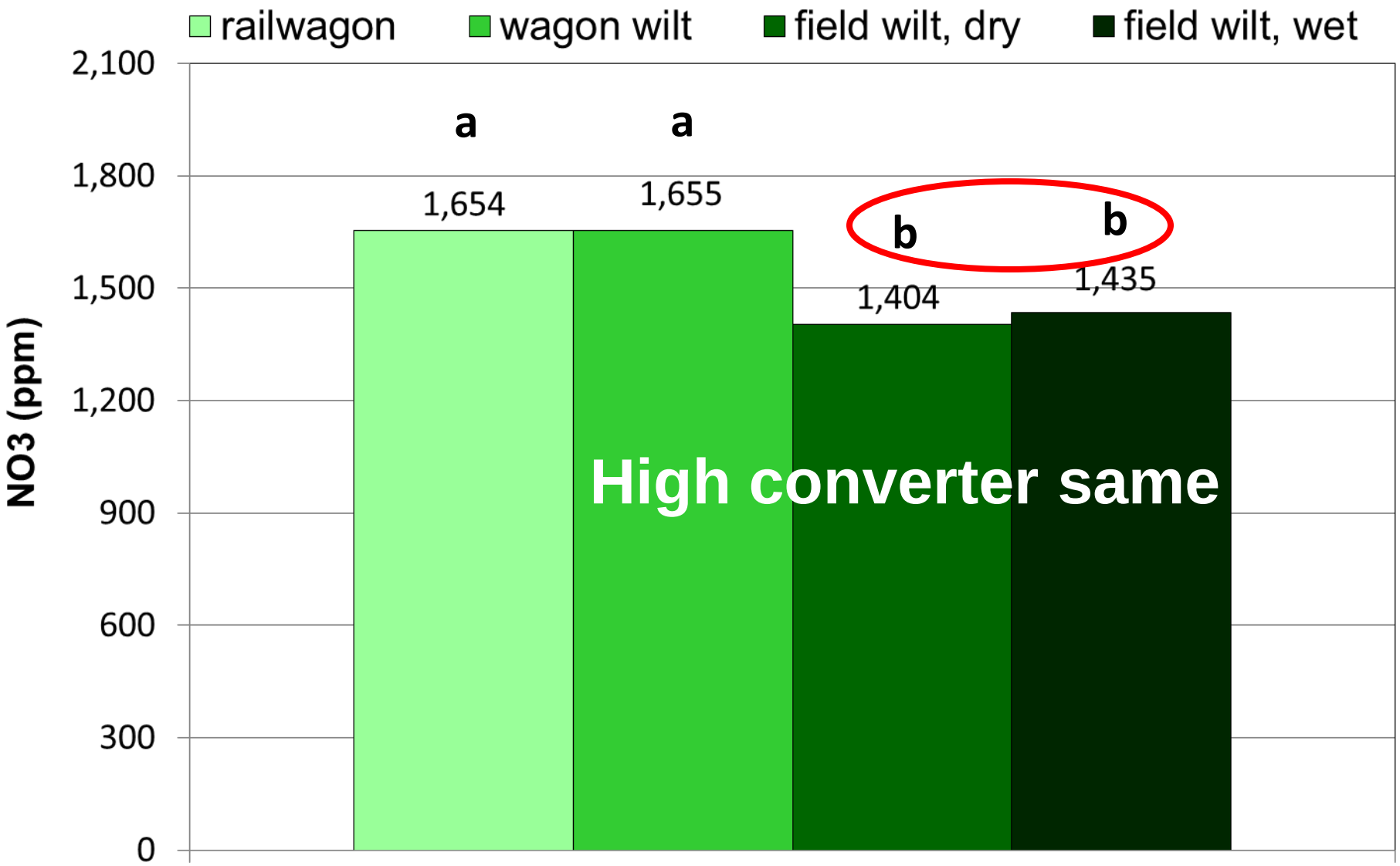
Total Alkaloids 2012: Housing Treatments

Low Converter: Lamina (cutting trmts pooled)



NO_3 2012: Housing Treatments

Low Converter: Lamina (cutting trmts pooled)



Summary

Overall

- 2011
  - Nothing significant
- 2012
  - Cutting treatments not significant
  - Housing treatments significant
    - NNK
    - Total alkaloids
    - NO_3 N

TSNAs

- Years
  - 2012 higher
- Cutting wet vs dry
  - No effect
- Housing
  - Only consistent differences in NNK lamina
    - Railwagon lowest
    - Wagon wilt, field wilt housed dry – same
    - Field wilt housed wet – highest

TSNAs - Implications

- Railwagon – lowest
  - Protected from heat & moisture
  - Suggest both heat & moisture play a role
- Field wilted housed wet – highest
  - Suggests housing wet further ↑ TSNAs

Total Alkaloids

- Years
  - Similar
    - 2012 drip – no excessively high alkaloids
- Cutting wet vs dry
  - No effect
- Housing
  - Both field wilted treatments ↓
    - Alkaloids on leaf surface dissolved off by rain?

NO_3 N

- Years
  - Higher in 2011, both lamina & midrib
    - Drought?
- Cutting wet vs dry
  - No effect
- Housing
  - Same pattern as alkaloids
    - Both field wilted treatments ↓
      - Leaching?

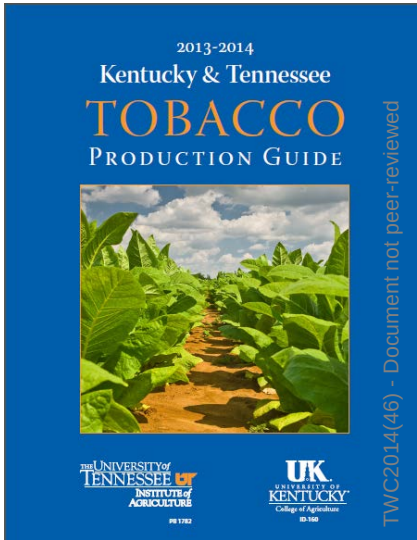
Quality

- Rain on field wilted tobacco
  - Impacts quality

Wagon wilted **Field wilted** **Railwagon**

Conclusions

- Cutting & housing wet tobacco
  - Less effect on TSNAs than anticipated
    - No effect?
    - More data needed to determine trend?
      - As for applied N
- May alter recommendation
  - Not until have 2013 data



Acknowledgements

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