

# Crop load management in wine grapes

**Horst Caspari, Christa Hawke, Tana Archuleta, Ben Catrell**  
**Colorado State University**

**Bill Musgnung**  
**Consulting winemaker**  
**CWIDB**

# Introduction

The crop load concept is based on the Menge-/Gütegesetz (quantity/quality law) of Justus von Liebig:

There is a negative relationship between crop load (yield) and (grape and wine) quality.

Grape growers must strive to find a balance between vegetative and productive growth to maximise .....what?

Winemaker's answer:

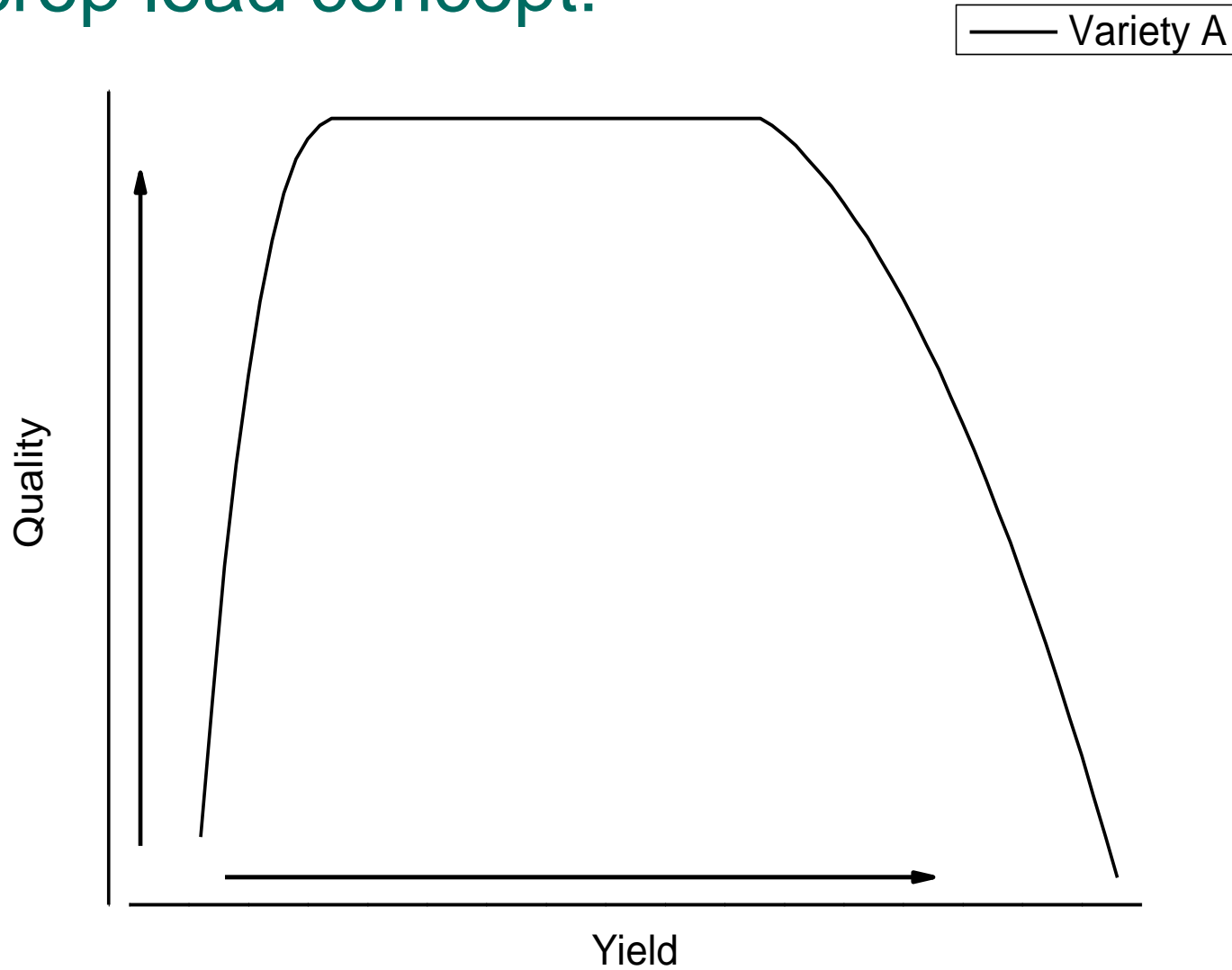
Grape and wine quality

Grape grower's answer:

Economic return

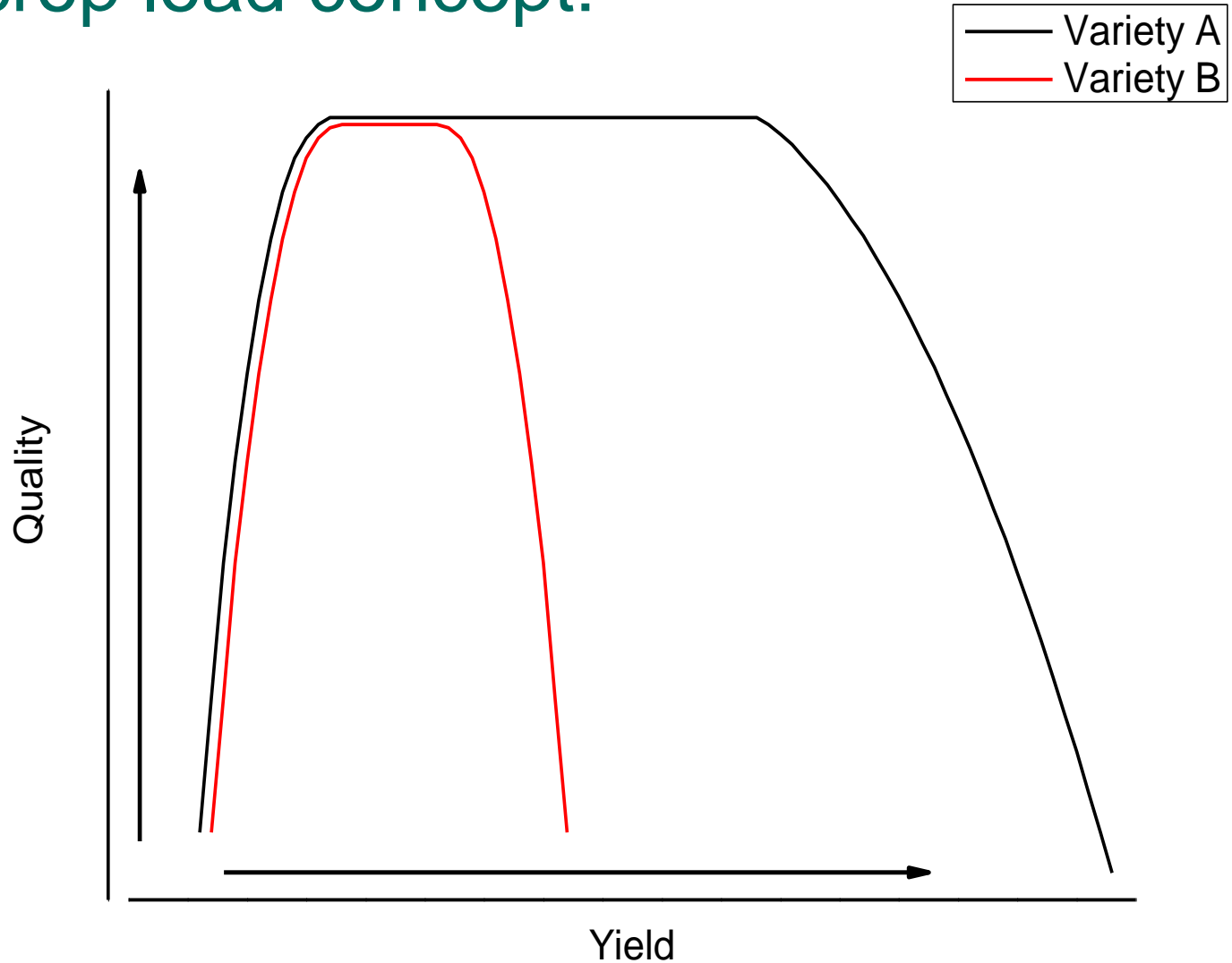
# Introduction

The crop load concept:



# Introduction

The crop load concept:



# Objective

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Determine the effect of crop load on grape and wine quality

# Materials and Methods

## Three field sites in 2005 - 2007

- Vineyard A
  - Cabernet Sauvignon
  - Planted in 1998, 5' x 10' (871 vines per acre)
  - Smart-Dyson
- Vineyard B
  - Cabernet Franc
  - Planted in 1987, 4' x 9' (1210 vines per acre)
  - VSP
- Vineyard C
  - Cabernet Sauvignon
  - Planted in 1991, 5' x 9' (968 vines per acre)
  - VSP

# Materials and Methods

At each site, 15 vines were either thinned at veraison or not thinned. The target was to remove ~ 33 %.

- Vineyard A
  - High crop load: 146, 89, 111 bunches per vine
  - Low crop load: 101, 65, 94 bunches per vine
- Vineyard B
  - High crop load: 48, 37 bunches per vine
  - Low crop load: 32, 25 bunches per vine
- Vineyard C
  - High crop load: 46, 41, 44 bunches per vine
  - Low crop load: 31, 28, 33 bunches per vine

# Materials and Methods

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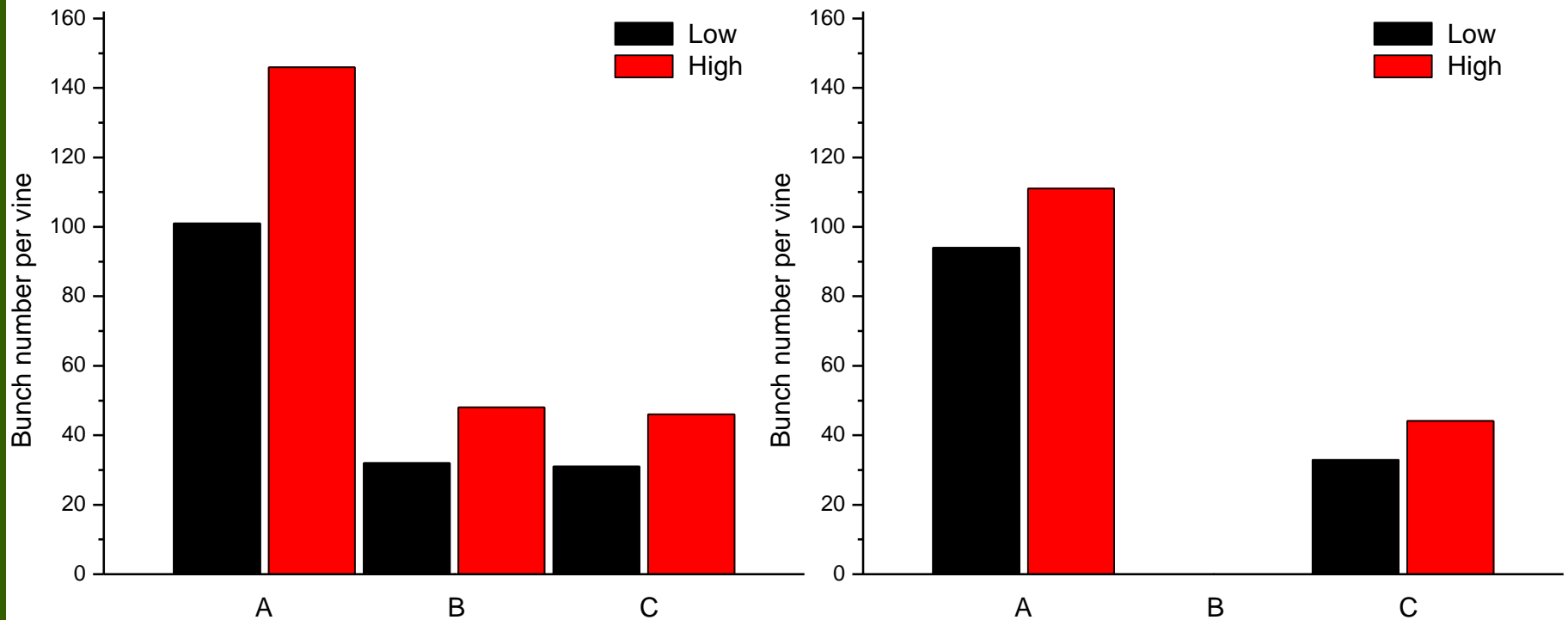
## Harvest measurements (per vine)

- Bunch number
- Yield
- Juice soluble solids (Brix), pH, titratable acidity

Separate lots used for microvinification

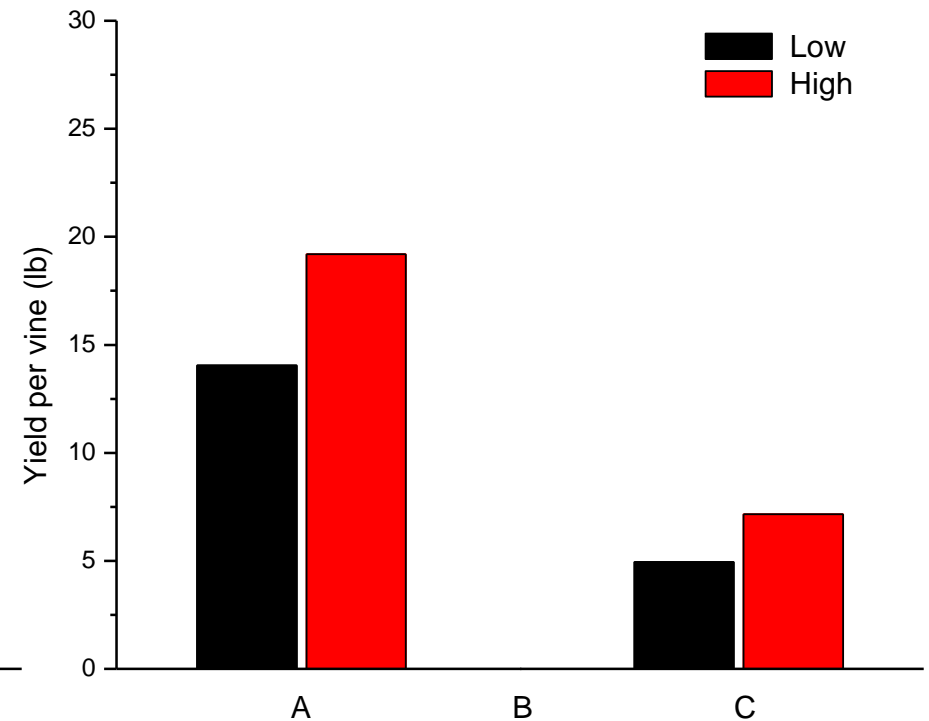
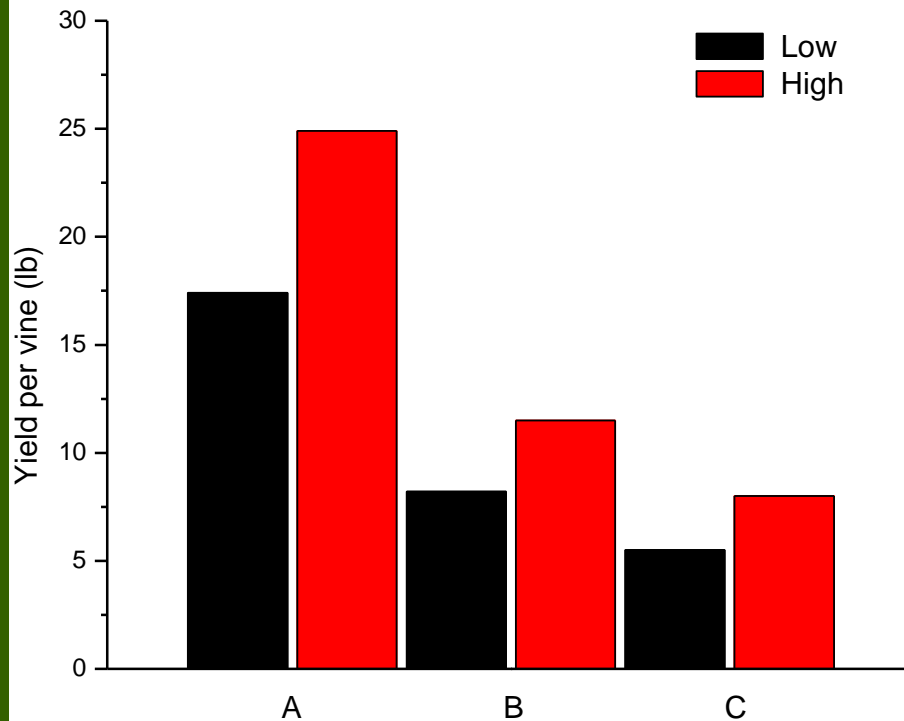
# Results

A fourfold difference between highest and lowest bunch number per vine



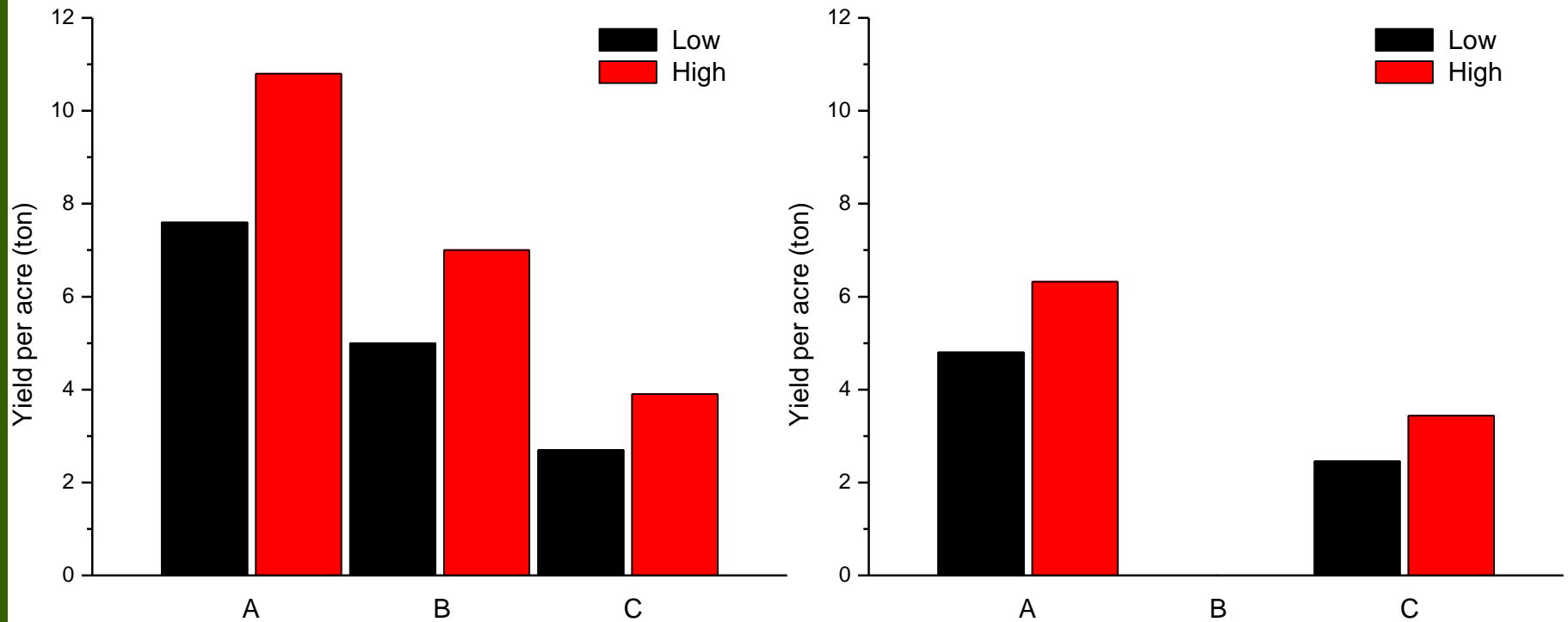
# Results

More than fourfold difference between highest and lowest yield per vine



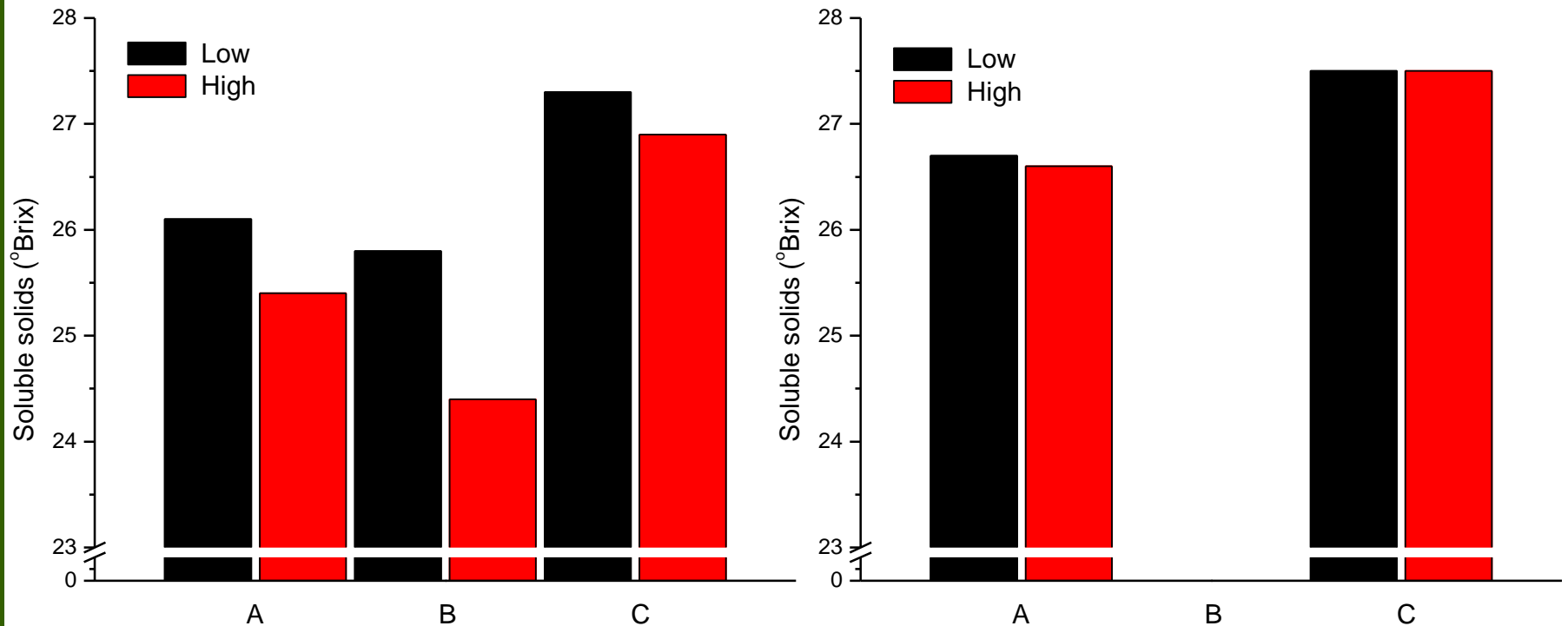
# Results

A two- to fourfold difference between highest and lowest yield per acre



# Results

Soluble solids were always higher with low crop load in 2005, but not different in 2007



# Questions

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Is any one of the three vineyards over-cropped?

And which one could carry more crop?

# Definitions

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How do we define crop load?

- Yield per acre (ton)
- Yield per vine (lb)
- Yield per shoot (lb)
- Yield to pruning weight ratio (lb/lb)

# Definitions

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How do we define crop load?

- Yield per foot of cordon/cane (lb / ft)
- Yield per unit leaf area (g / cm<sup>2</sup>)
- Yield per unit canopy surface area (Kg / m<sup>2</sup>)

# Results

How do the vineyards compare?

- Yield per acre

A > B > C  
10.8    7.0    3.9

A > C  
6.3    3.4

- Yield per vine (lb)

A >> B > C  
24.9    11.5    8.0

A > C  
19.2    7.2

# Results

How do the three vineyards compare?

- Yield : pruning weight (lb/lb)

A < B > C  
5.25    5.9    3.8

- Yield per shoot (lb)

A > B > C  
0.32    0.31    0.28

# Results

How do the three vineyards compare?

- Yield per foot of cordon/cane (lb / ft)

A > B > C

3.74      2.76      1.58

- Canopy surface area per unit yield (m<sup>2</sup> / Kg )

A > B << C

0.76      0.55      0.99

- Yield per unit canopy surface area (Kg / m<sup>2</sup>)

A > B << C

1.3      1.9      1.0

# Summary

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- There are many different indices to express crop load.
- In our study, the ranking of the vineyards changed dependent on the index used.
- The apparently high-cropping vines in vineyard A did carry a medium crop load when expressed on a canopy surface area.

# Acknowledgements

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- Thanks to Canyon Wind Cellars, Grande River Vineyards, and Whitewater Hill Vineyards for allowing us to use their vines for this study.

# Questions?

**Dr. Horst Caspari**  
**Department of Horticulture & Landscape Architecture**  
**Colorado State University**  
**Western Colorado Research Center**  
**Grand Junction, CO 81503**  
**Ph: (970) 434-3264**

# Wine tasting

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- 4 wines from 2005
- 2 wines from 2006
- 2 wines from 2007

# Wine tasting procedure

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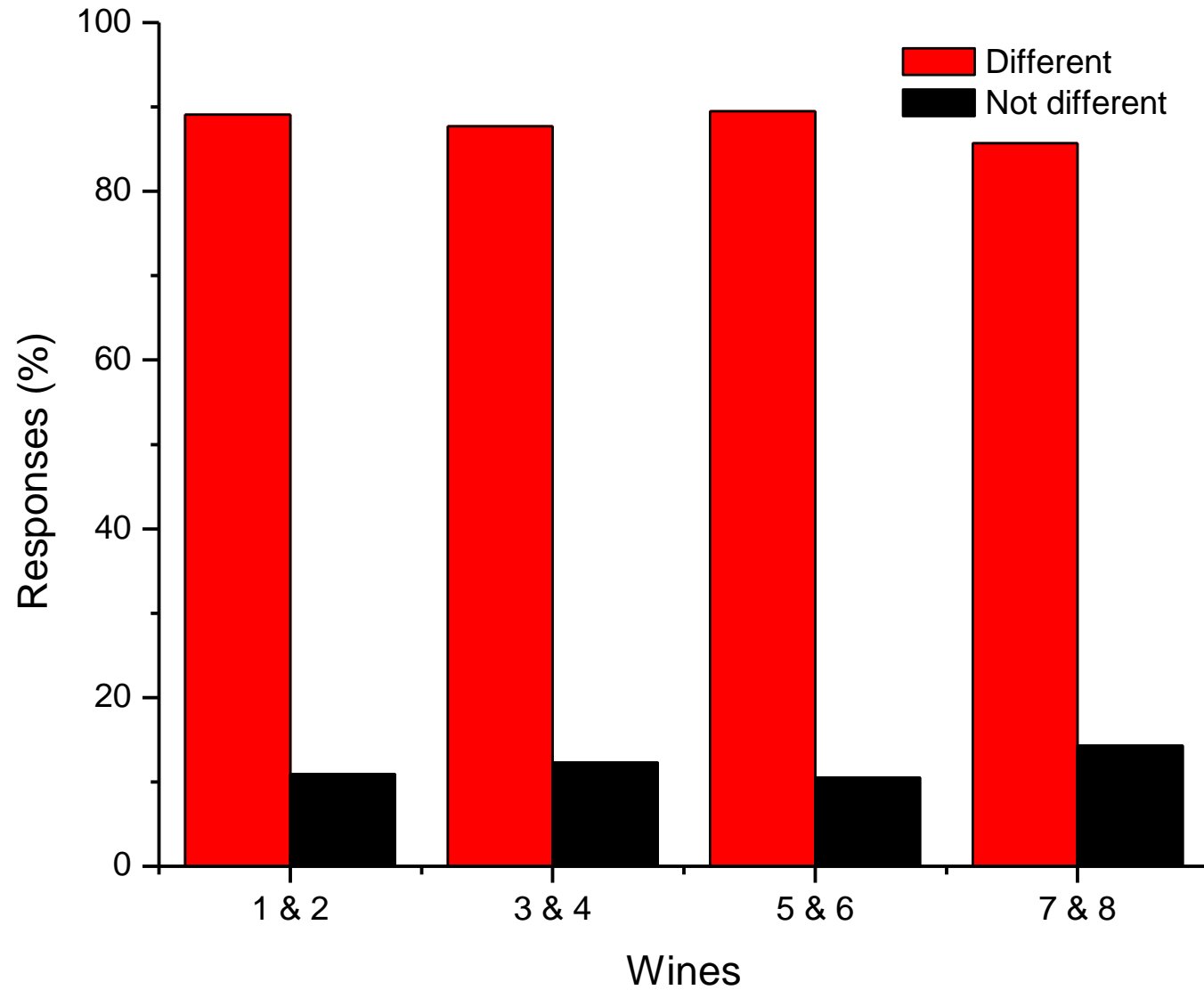
- 4 flights of 2 wines

Two questions for each flight

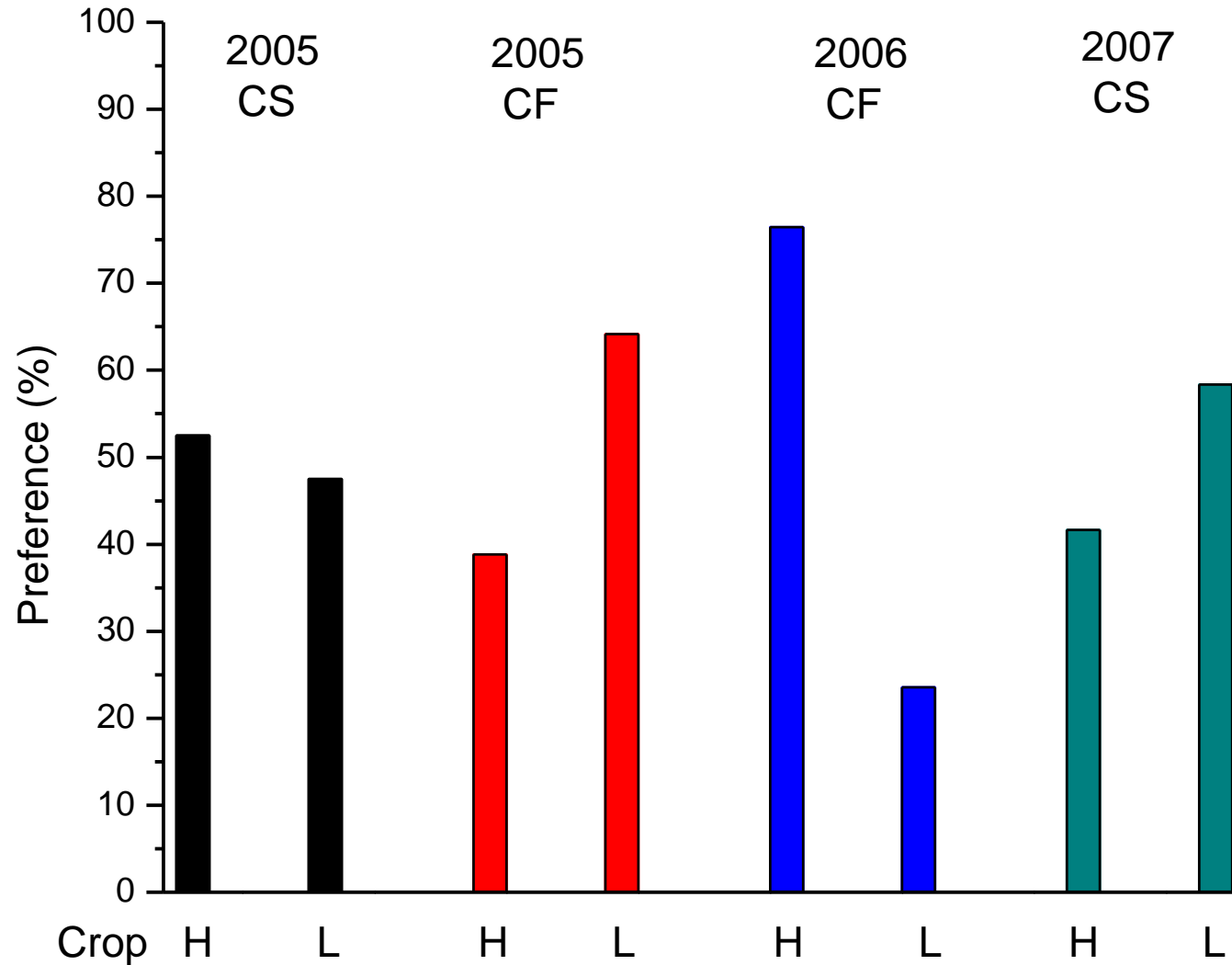
- Are these wines exactly the same or different?
- Which wine do you prefer?



# Consumer survey at Winefest 2009



# Consumer survey at Winefest 2009



# Wines tasted

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## Flight 1

- #1 2005 Cabernet Franc High
- #2 2005 Cabernet Franc Low

## Flight 2

- #3 2005 Cabernet Sauvignon Low
- #4 2005 Cabernet Sauvignon High

# Wine tasting

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## Flight 3

- #5 2006 Cabernet Franc Low
- #6 2006 Cabernet Franc High

## Flight 4

- #7 2007 Cabernet Sauvignon High
- #8 2007 Cabernet Sauvignon Low