

# Comparison of mastitis, its indicators, and lameness in compost bedded pack and sand freestall farms



E.A. Eckelkamp, J.L. Taraba, R.J. Harmon, K.A. Akers, and J.M. Bewley,  
*University of Kentucky, Lexington, KY, USA*

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# Compost bedded pack barns (CBP)



# Sand bedded freestall barns (SFB)



# Introduction

## ∞ Housing

- Lying surface influences
  - Lameness
  - Hygiene
  - SCC
  - Mastitis incidence and pathogen

## ∞ More than 60% of US operations house cows

- More than 30% use freestalls
- Around 3% use open-area housing
  - Compost bedded pack
  - Conventional bedded pack

# Mastitis

## ☞ Most costly disease in the dairy industry

- > \$300.00 per clinical case of mastitis (Liang et al., 2013)

## ☞ Greater somatic cell count (SCC) indicates a subclinical infection

- Decreased milk production and milk quality

## ☞ Contagious

- *S. aureus*
- *S. agalactiae*

## ☞ Environmental

- Environmental streptococcus
- Coliforms
  - *E. coli*
  - *Klebsiella* species

# Lameness

## 🌀 Lameness

- Can be caused by a hoof, hock, or other leg injury
- Influenced by lying and walking surface

## 🌀 Another costly disease

- \$100 to \$300 per lameness case (Liang et al., 2013)

## 🌀 Decreased intake, decreased production

- Greatest percentage of cost from veterinary costs

## Locomotion Scoring of Dairy Cattle\*



PERFORMANCE MINERALS\*

[www.zinpro.com](http://www.zinpro.com)

Available from:

LOCOMOTION SCORE

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Clinical Description:

**NORMAL**

Description: Stands and walks normally with a level back. Makes long confident strides.



Back Posture Standing: Flat



Back Posture Walking: Flat

LOCOMOTION SCORE

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Clinical Description:

**SEVERELY LAME**

Description: Pronounced arching of back. Reluctant to move, with almost complete weight transfer off the affected limb.



Back Posture Standing: Arched



Back Posture Walking: Arched

\* Adapted from Sprecher, D.J., Hostetler, D.J., Kansons, J.B. 1997. Theriogenology 47:1178-1187 and contribution from Cook, N.B. University of Wisconsin.

# Study Objective

∞ To assess differences between compost bedded pack and sand freestall barns:

- Visually observed and sampled clinical mastitis
- Dairy Herd Information (**DHI**) somatic cell count
- Bulk tank somatic cell count
- High somatic cell count prevalence
- Cow hygiene
- Lameness



# Materials & Methods

## ∞ 15 Kentucky farms

- 8 compost bedded pack
- 7 sand freestall

## ∞ On DHI test

- Low SCC herds (yearly mean < 300,000 cells/mL)





# Materials & Methods

☞ May 6, 2013 through May 1, 2014

☞ 26 biweekly visit periods

○ One visual observer recording:

- Hygiene (Cook and Reinemann, 2007):
  - 1 = clean and 4 = filthy
- Locomotion (Sprecher et al., 1997):
  - 1 = normal and 5 = severely lame

# Mastitis

∞ Mastitis and its indicators included:

- Clinical mastitis
  - Pathogen type
  - Severity score
- DHIA herd somatic cell count
- High somatic cell count prevalence (% of herd > 200,000 cells/mL)
- Bulk tank somatic cell count



# Statistical Analysis

## ∞ Comparisons between housing types

- Proc MIXED
  - Locomotion
  - Hygiene
  - Mastitis
- Proc FREQUENCY with chi-square analysis
  - Mastitis causative pathogen
  - Mastitis severity score



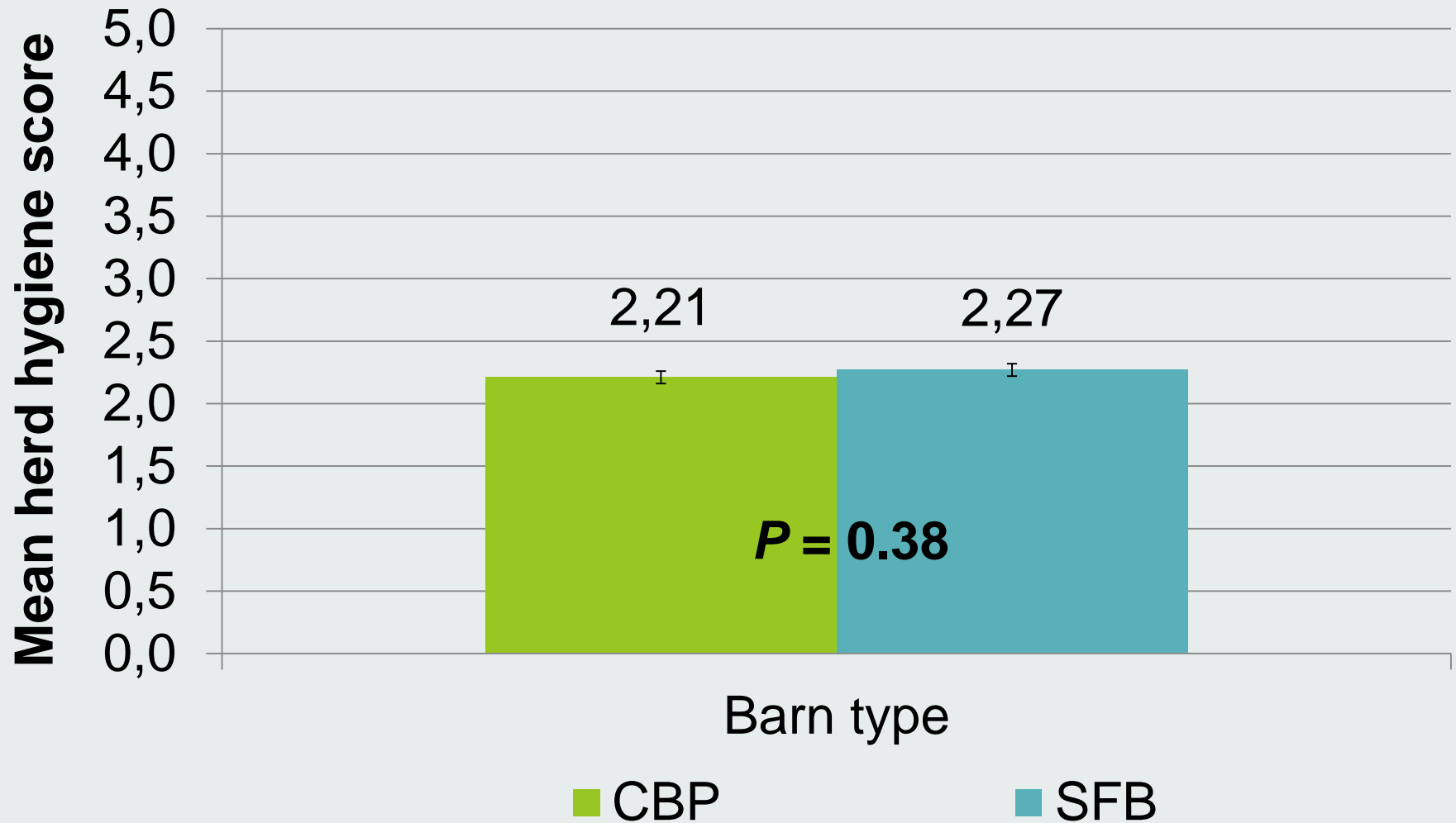
# Results



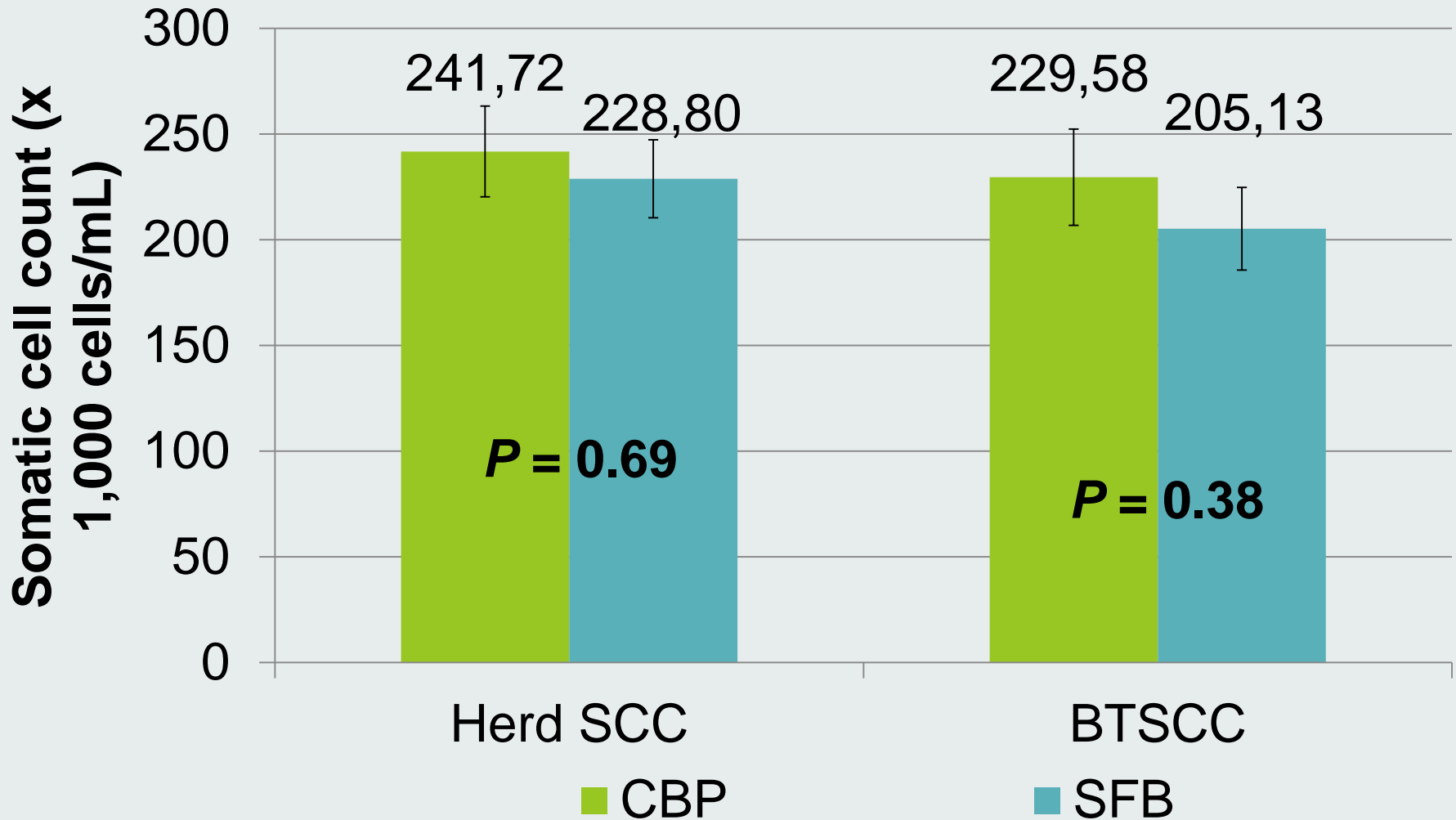
# Mean herd information for cows housed in compost and freestall barns

Variable	Compost bedded pack barns (n = 8)	Sand bedded freestall barns (n = 7)
Lactating cow number	178.08 ± 107.89	83.98 ± 36.88
Test day milk yield (kg/cow/d)	33.69 ± 4.29	32.15 ± 4.83
Stocking density (%)	91.81 ± 11.61	88.93 ± 14.40

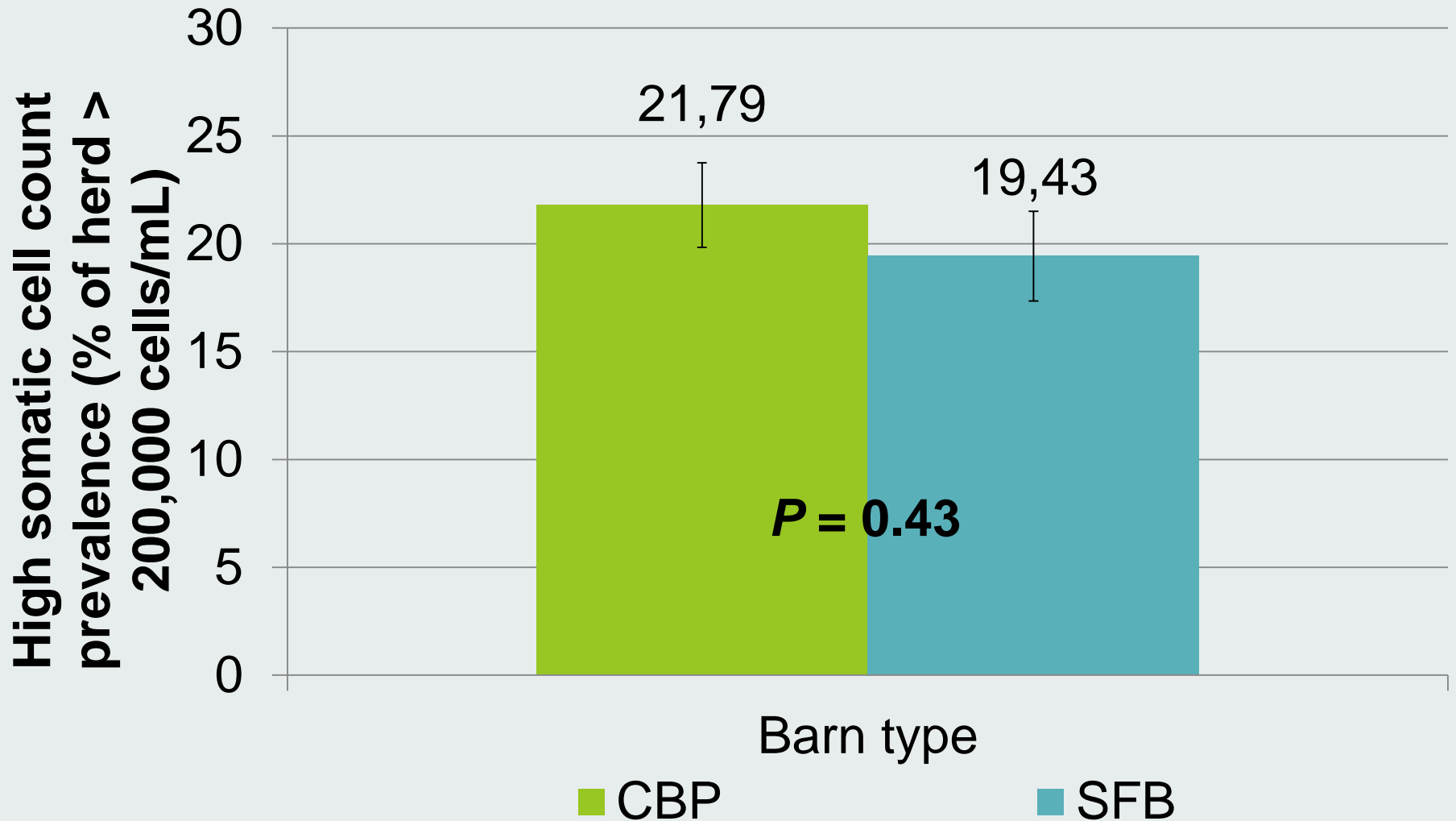
# Effect on Hygiene Score



# Effect on Somatic Cell Count

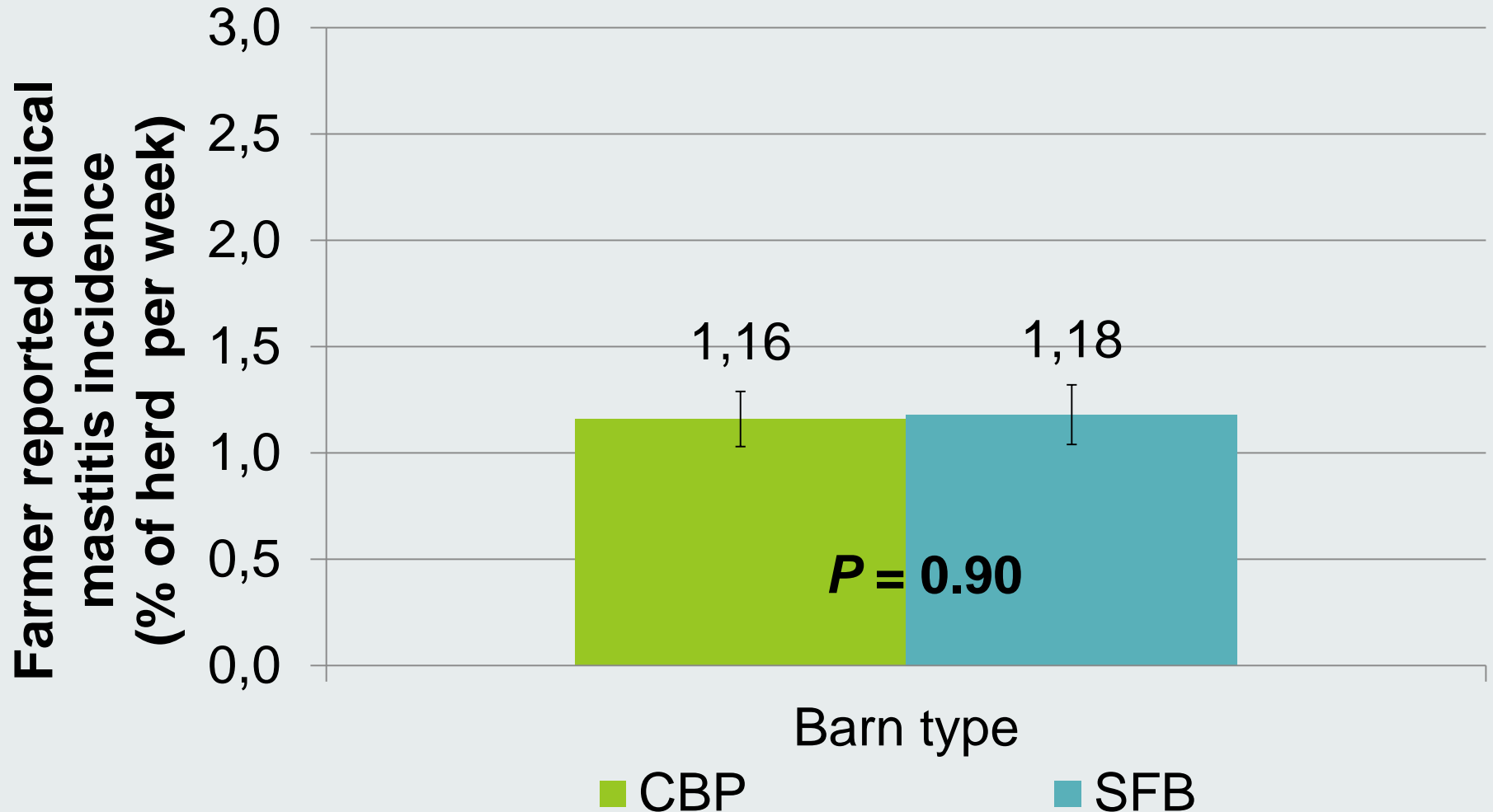


# Effect on High Somatic Cell Count Prevalence

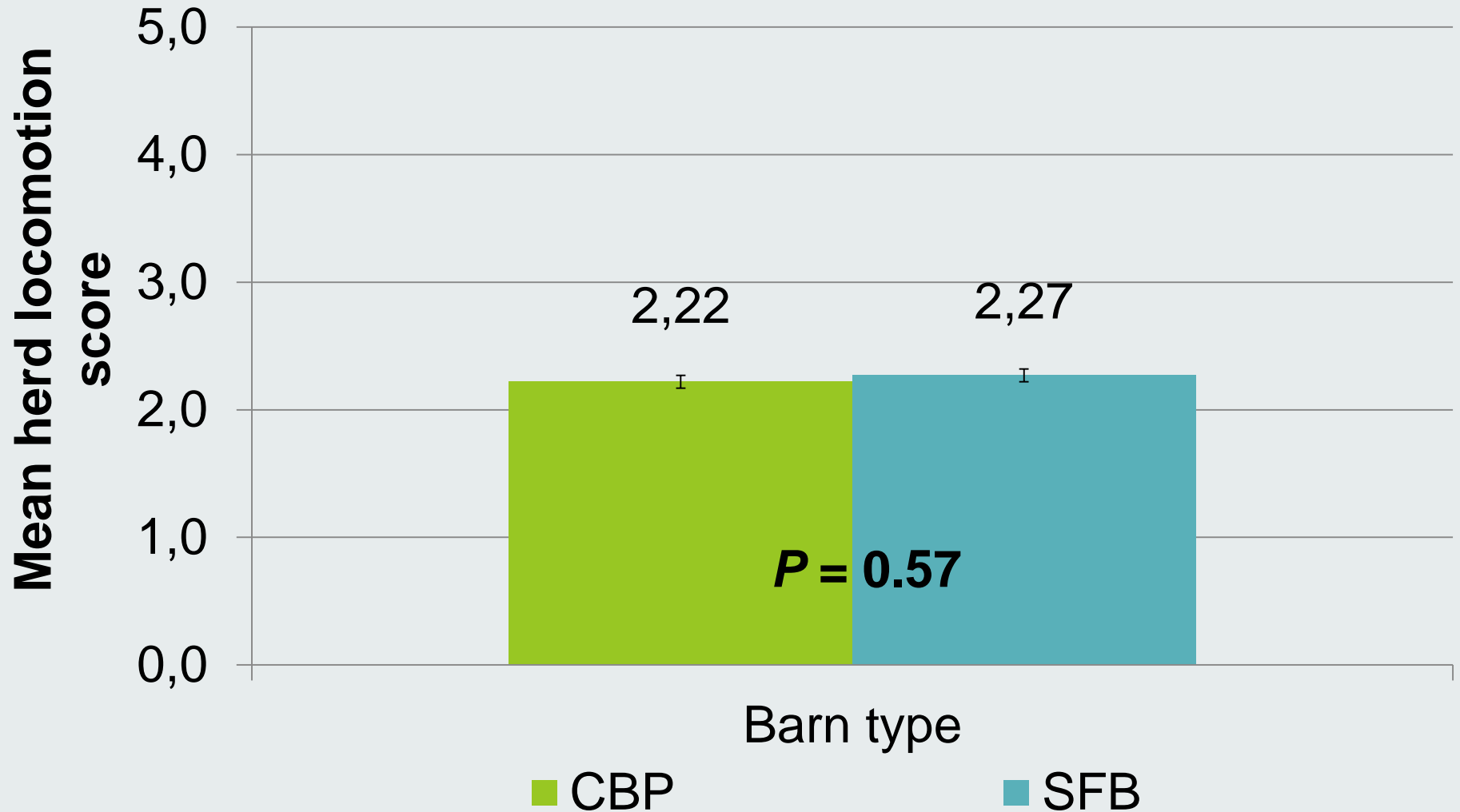




# Effect on Clinical Mastitis



# Effect on Locomotion Score



# Frequency of isolates from clinical mastitis cases in compost bedded pack barns and sand freestall barns ( $P = 0.15$ )

Pathogen Isolated	Compost bedded pack barns Total # of cases = 212 Total # of isolates = 214 Mean ( $\pm$ SE) # of cows = $190 \pm 146$	Sand freestall barns Total # of cases = 87 Total # of isolates = 88 Mean ( $\pm$ SE) # of cows = $65 \pm 25$
	Percent of total	Percent of total
CNS	7.9	4.5
Environmental streptococci	16.8	19.3
<i>Escherichia coli</i>	29.0	21.6
Klebsiella species	1.4	4.5
<i>Staphylococcus aureus</i>	5.1	6.8
Yeast species	3.3	3.4
Other gram-negative species	13.5	6.8
Other gram-positive species	3.7	9.1

# Severity score frequency from clinical mastitis cases in compost bedded pack barns and sand freestall barns ( $P < 0.001$ )

Severity score	Compost bedded pack barns total cases = 212 mean ( $\pm$ SE) cows = $190 \pm 146$		Sand freestall barns total cases = 87 mean ( $\pm$ SE) cows = $65 \pm 25$	
	Number of cases	Percent of total cases	Number of cases	Percent of total cases
1	147	69.3	33	37.9
2	60	28.3	36	41.4
3	5	2.4	18	20.7

# Additional Analysis

☞ Determine housing effect independent of:

- Herd SCC
- Herd management

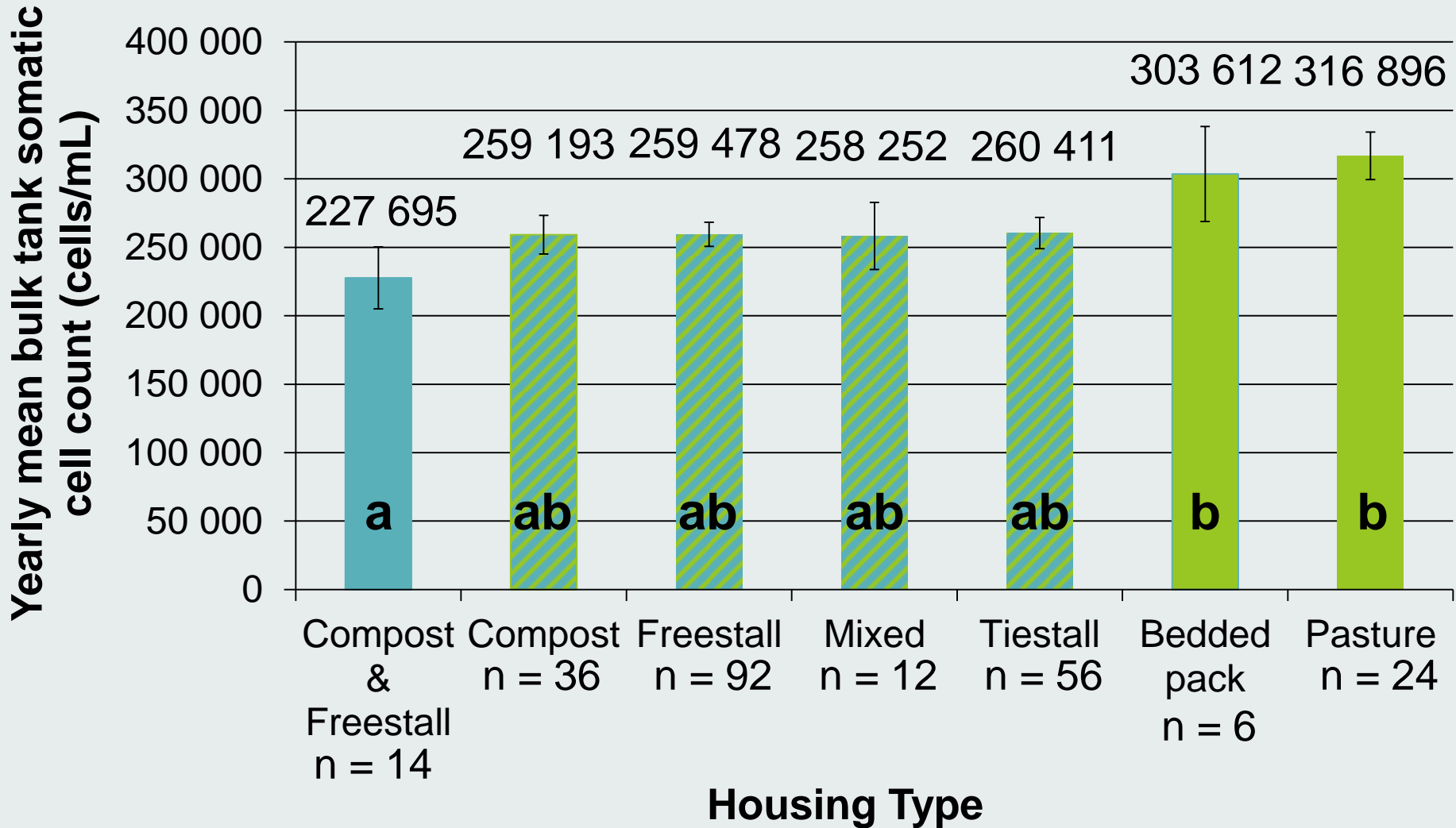
☞ All Kentucky DHI herds

- January 2013 to March 2014

☞ All housing types included



# Yearly LSMeans ( $\pm$ SE) bulk tank somatic cell count for all herds on DHIA test in Kentucky by housing type



# Conclusions

- Overall, no differences in any measurements between housing types
- When properly managed, SCC and clinical mastitis similar in compost bedded pack barns and sand freestall barns



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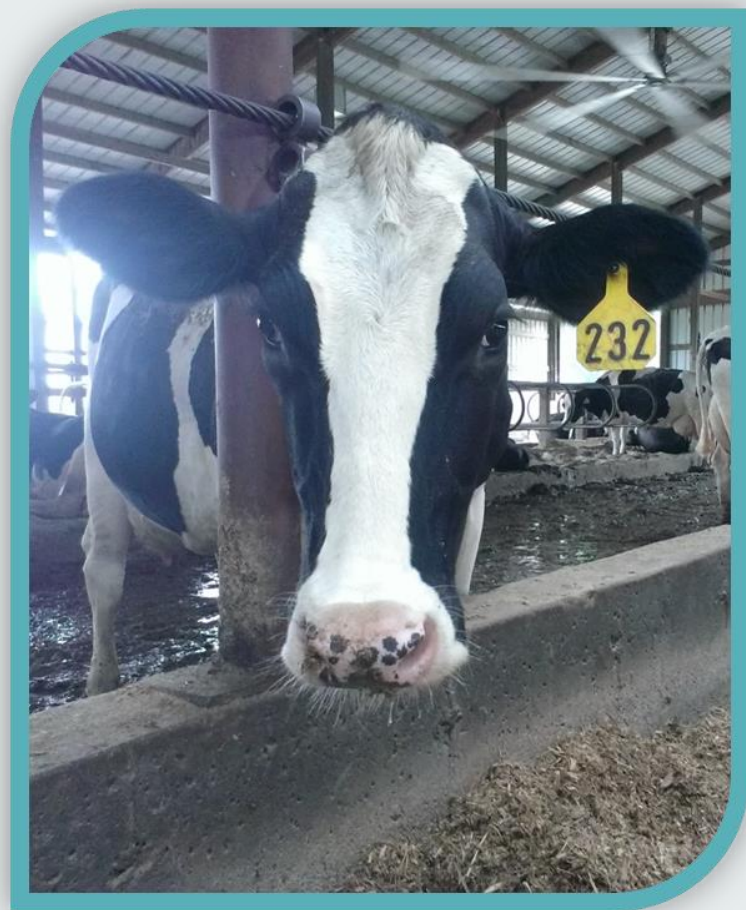
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# Questions?



Elizabeth Eckelkamp  
[eaec223@uky.edu](mailto:eaec223@uky.edu)  
408 WP Garrigus Building  
Lexington, KY 40546  
(337) 718-9764

Joseph Taraba  
[joseph.taraba@uky.edu](mailto:joseph.taraba@uky.edu)  
216 CE Barnhart Building  
Lexington, KY 40546  
(859) 218-4353

Jeffrey Bewley  
[jbewley@uky.edu](mailto:jbewley@uky.edu)  
407 WP Garrigus Building  
Lexington, KY 40546  
(859) 699-2998