COMPOST BEDDED PACK BARNS AS A LACTATING COW HOUSING SYSTEM

UK Ag
Dairy Compost Bedded Pack Barns
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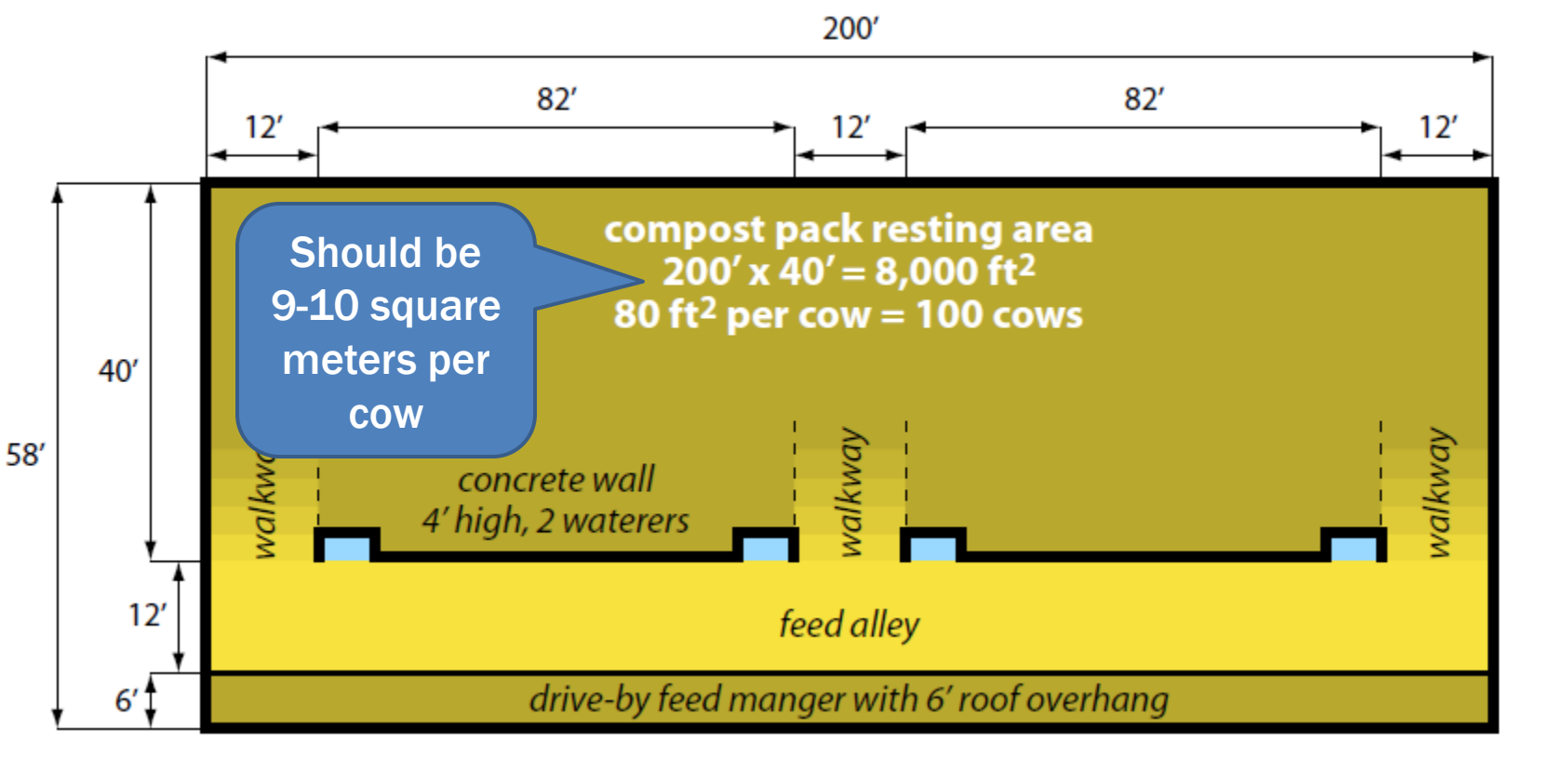
Compost Bedded Pack Barn Concept

- Loose-housing with large, open resting area
- Not your grandfather's bedded pack barn!
- Intensively managed compost process keeps cows dry and clean
- Risks for mismanagement higher than stall barns
- More management/less labor than stall barns

COMPOST BARNS TODAY

- Minnesota: Foundation work, growth limited by bedding cost
- Kentucky: 80 to 90
- Israel: predominant system
- Brazil and Argentina: starting movement
- Netherlands, Denmark, Italy: active research and user groups

COMPOST BEDDED PACK BARN DESIGN



Janni et al., 2007

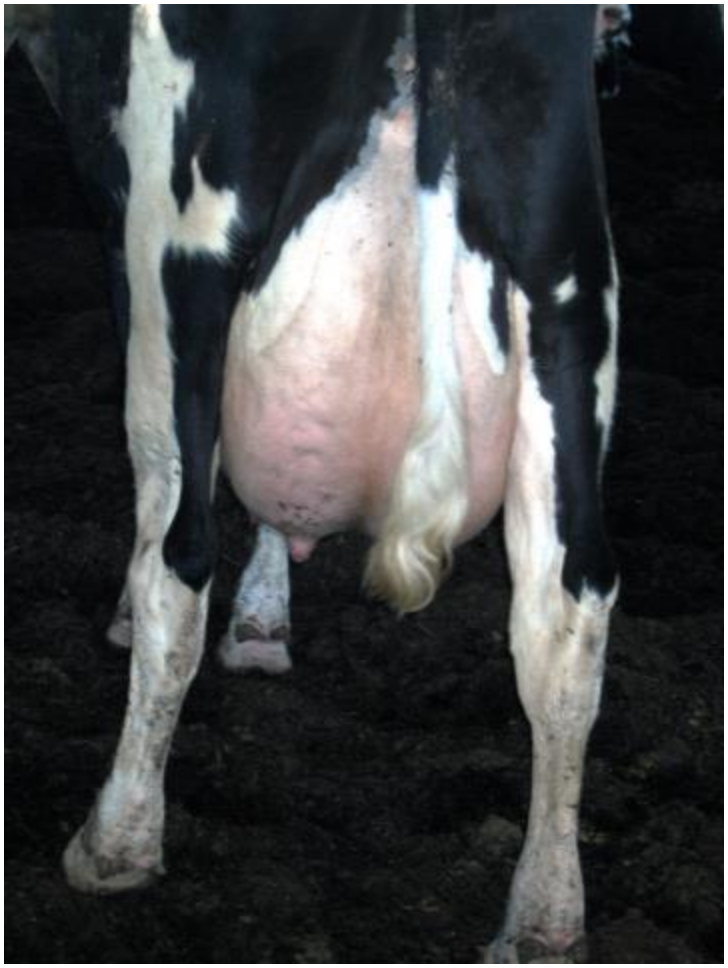
Comfortable Resting Surface

Easy to lay down or rise from resting without restrictions associated with freestall loops

Cows of different breeds and sizes can be housed together easily

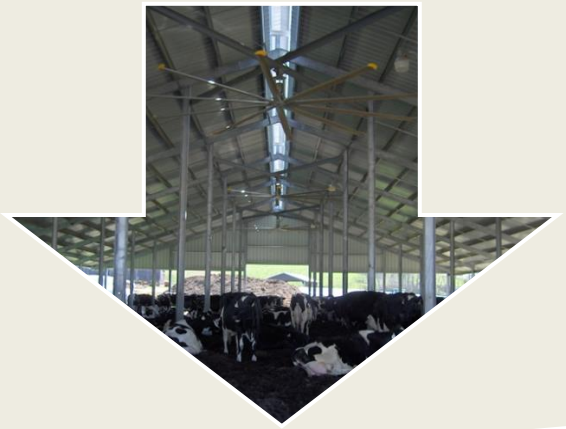
Cows exhibit heat well because of improved footing compared to concrete

NATURAL COW BEHAVIOR



When managed properly, compost bedded pack barns provide a dry resting surface for cows resulting in clean cows and udders

COMPOST BEDDED PACK



Advantages

- Excellent cow comfort
- Low investment
- Good milk quality
- Manure handling

Disadvantages

- Sawdust availability
- Sawdust availability
- Higher variable costs
- Management ability
- Does not work well in retrofits
- Building footprint

FREESTALL

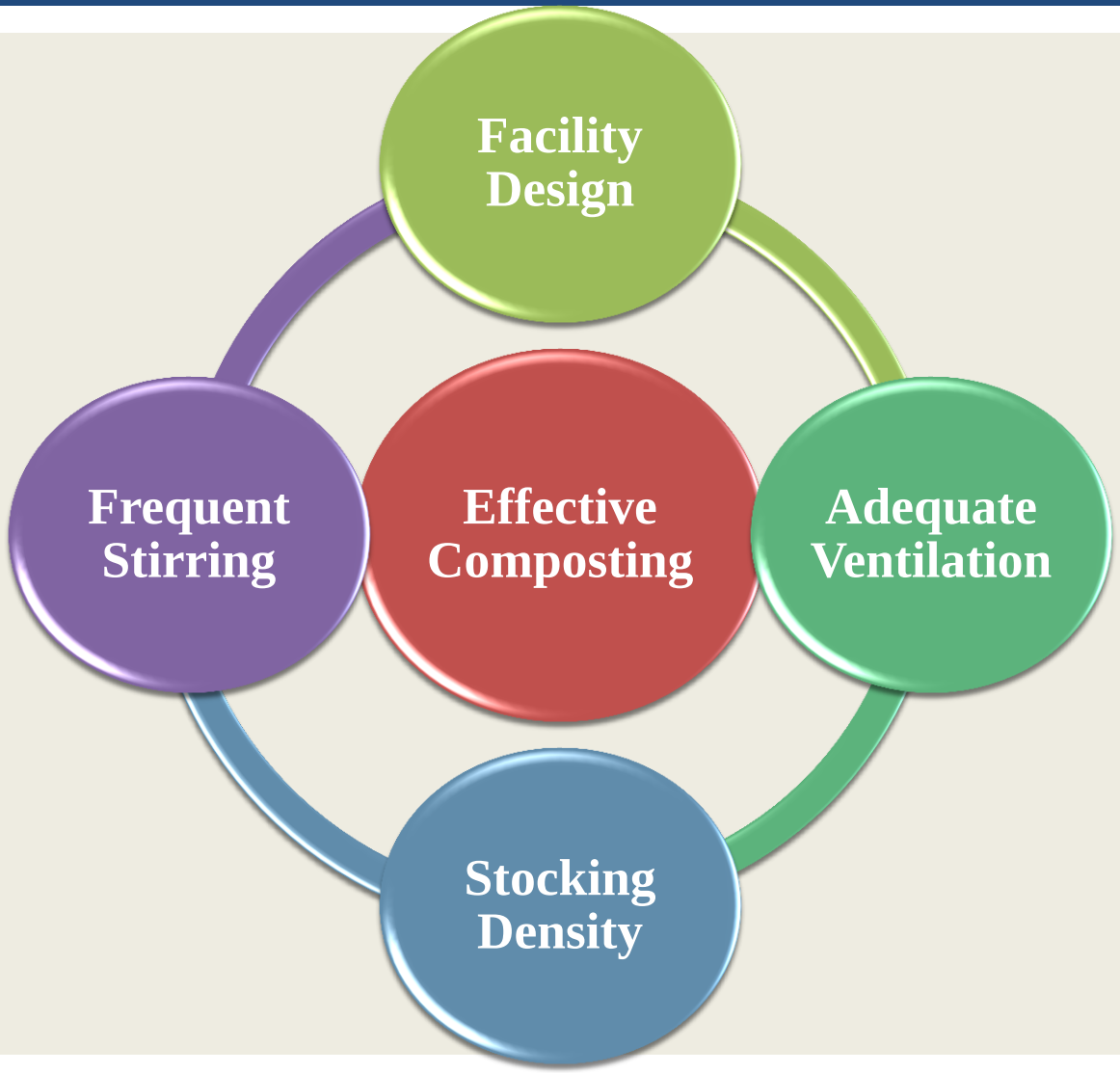
Advantages

- Cow comfort can be excellent
- More environmental control
- More animals per square feet of barn
- Automation/management options

Disadvantages

- Poorly designed/maintained freestalls= poor cow comfort
- Concrete, loops, mattresses can be expensive
- Manure management

KEYS TO MANAGING A CBP BARN



PACK MANAGEMENT

- 0.5 to 0.6 m of bedding to start, may take 2-4 semi-loads of sawdust
- New bedding (5-20 cm) added when pack starts looking moist
- New bedding added every 1-8 weeks (more when humid or wet and in winter)
- Packs cleaned 1-2 times per year (fall & spring)

Stirring Equipment Examples

Stirring Equipment Examples

Sweeps or Shovels Increase Mixing

Roto-tillers break up clumps of bedding material

Uniform Bedding with Roto-Tiller

UK TILLAGE TOOL

Steam is Good But Doesn't Mean Pack is Heating

Stirring in multiple directions or in circles increases air infiltration and helps break up clumps

Too many posts within the barn can make pack stirring difficult

Heavy Tractors Compact Bedding Material

MANAGEMENT CHECKS

- Temperature: 43 to 66° C or “just hot enough you don’t want to touch it”
- Moisture: 45 to 55% or can you form a ball without too much water
- Fluffiness: subjective (looking for give in bedding as you walk across it)
- Distribution of cows within barn
- Dirty cows (next to last resort)
- SCC or clinical mastitis (last resort)

Temperature Monitoring

Example of compost heating well with high temperature

Example of compost heating well with high temperature and dry material.

Example of compost that is too wet with insufficient temperature.

Example of compost that is too dry with insufficient temperature

A dedicated thermometer, easily accessible within the barn, is recommended

Dry, Fluffy Compost

High moisture, clumps, lack of uniformity

2011 COMPOST STUDY

- 43 Kentucky farms (51 barns)
- October 2010 to March 2011
- Compost samples collected from 9 equally distributed locations throughout each barn to produce a composite sample
- Producer questionnaire
- DHIA data

Black et al., Journal of Dairy Science (2013): 96: 8060-8074

PRODUCER CITED BENEFITS OF COMPOST BEDDED PACK BARNS

- Improved cow comfort (n = 28)
- Improved cow cleanliness (n = 14)
- Low maintenance (n = 11)
- Good for heifers, lame, fresh, problem, and old cows (n = 10)
- Natural resting position (no stalls) (n = 9)
- Improved feet and legs (n = 8)
- Proximity to parlor (compared to pasture) (n = 8)
- Decreased SCC (n = 6)

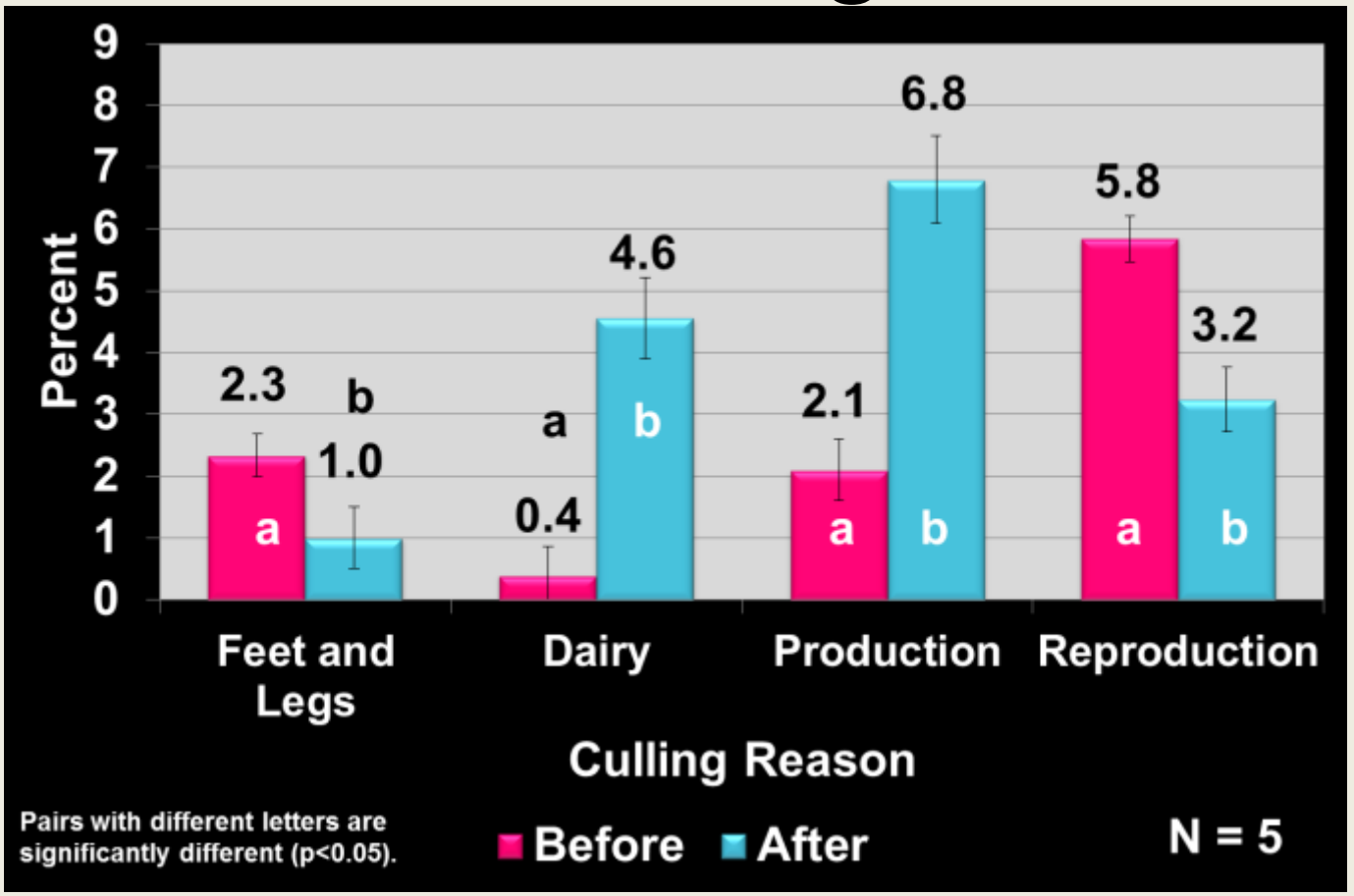
Black et al., Journal of Dairy Science (2013): 96: 8060-8074

PRODUCER CITED BENEFITS OF COMPOST BEDDED PACK BARNS

- Increased heat detection (n = 6)
- Ease of manure handling (n = 3)
- Increased dry matter intake (compared to pasture) (n = 3)
- Increased production (n = 3)
- Increased longevity (n = 3)
- Fewer leg and teat injuries (n = 2)
- Minimizes time standing on concrete (n = 2)

Black et al., Journal of Dairy Science (2013): 96: 8060-8074

Culling rate before and after moving into a CBP barn used as primary housing



Calculated using 12 months before move in and 6 to 12 months after move in

Black et al., Journal of Dairy Science (2013): 96: 8060-8074

Hygiene depends on management!

HYGIENE

- Heat generated by composting process dries bedding material creating a drier lying surface
- Drier packs decrease hygiene score which may reduce exposure to mastitis pathogens
- Effective composting more critical to cow hygiene during winter

BACTERIA

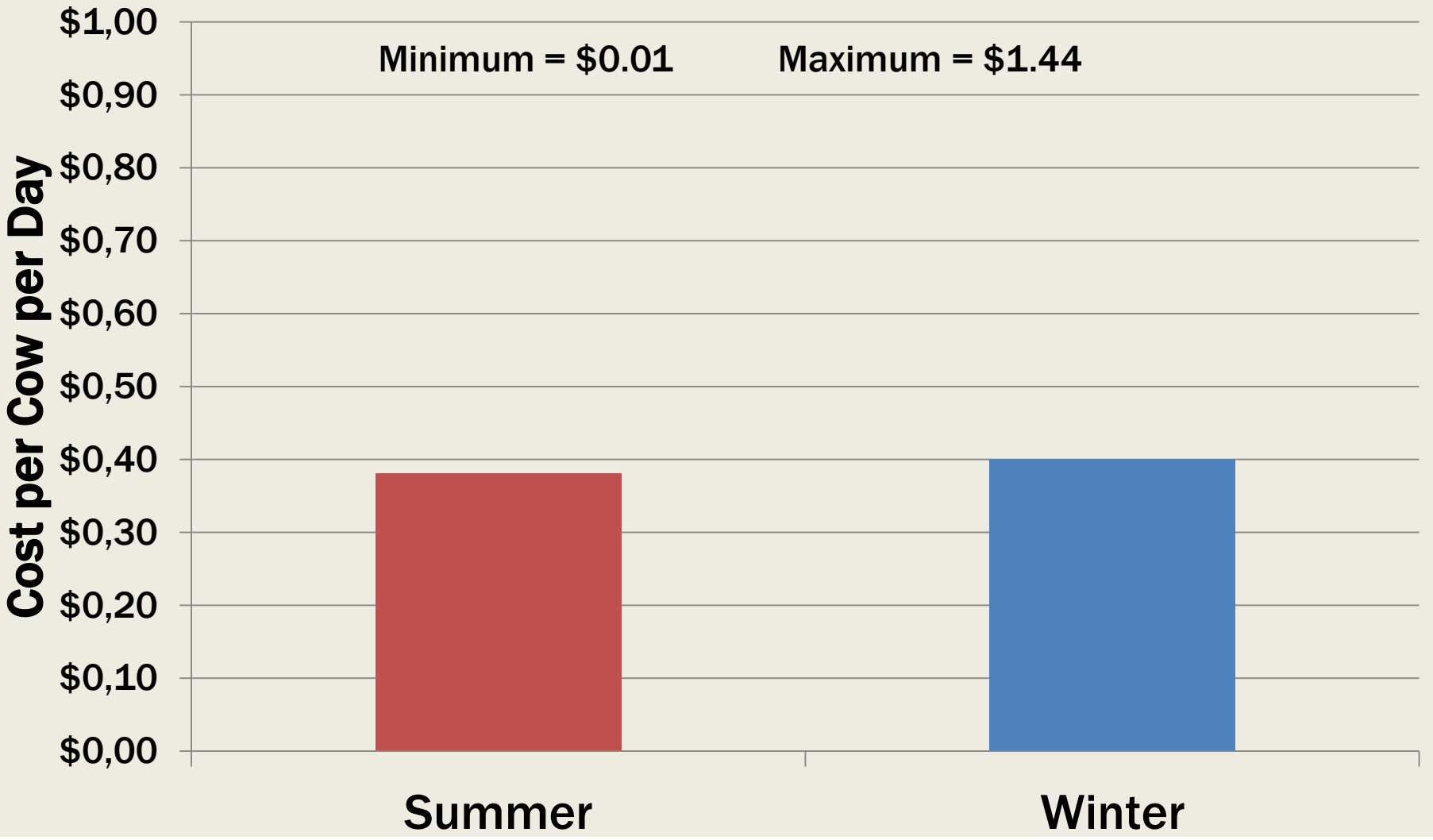
- Bacteria load high in all compost bedded packs
- Coliform and Staphylococcal species seem to thrive in optimal composting conditions
- Streptococcal species may be more susceptible to composting heat
- Bacteria likely flourish in warmer ambient conditions

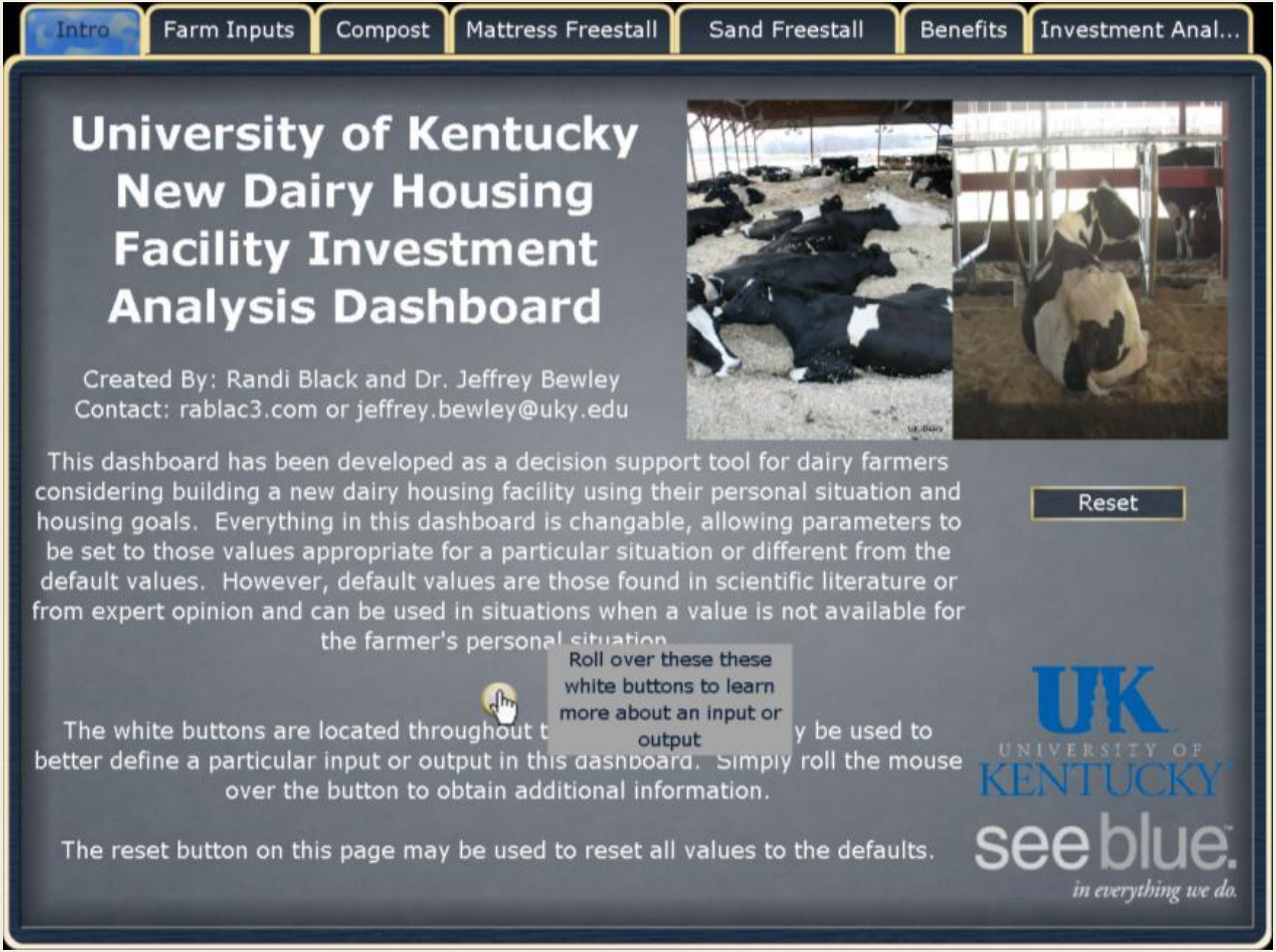
Black et al., Journal of Dairy Science (2014): 97: 2669-2679

INVESTMENT COSTS

	Average	Minimum	Maximum
All Barns			
Barn cost	$85,362	$10,900	$300,000
Cost/cow @ 9 sq meters/cow	$855	$215	$1,875
Barns with Attached Feed Bunk			
Barn cost	$103,729	$30,000	$300,000
Cost/cow @ 9 sq meters/cow	$1,051	$421	$1,876
Barns without Attached Feed Bunk			
Barn cost	$51,454	$10,900	$155,000
Cost/cow @ 9 sq meters/cow	$493	$196	$833

DAILY BEDDING COSTS





http://www2.ca.uky.edu/afsdairy/DairyHousingInvestment

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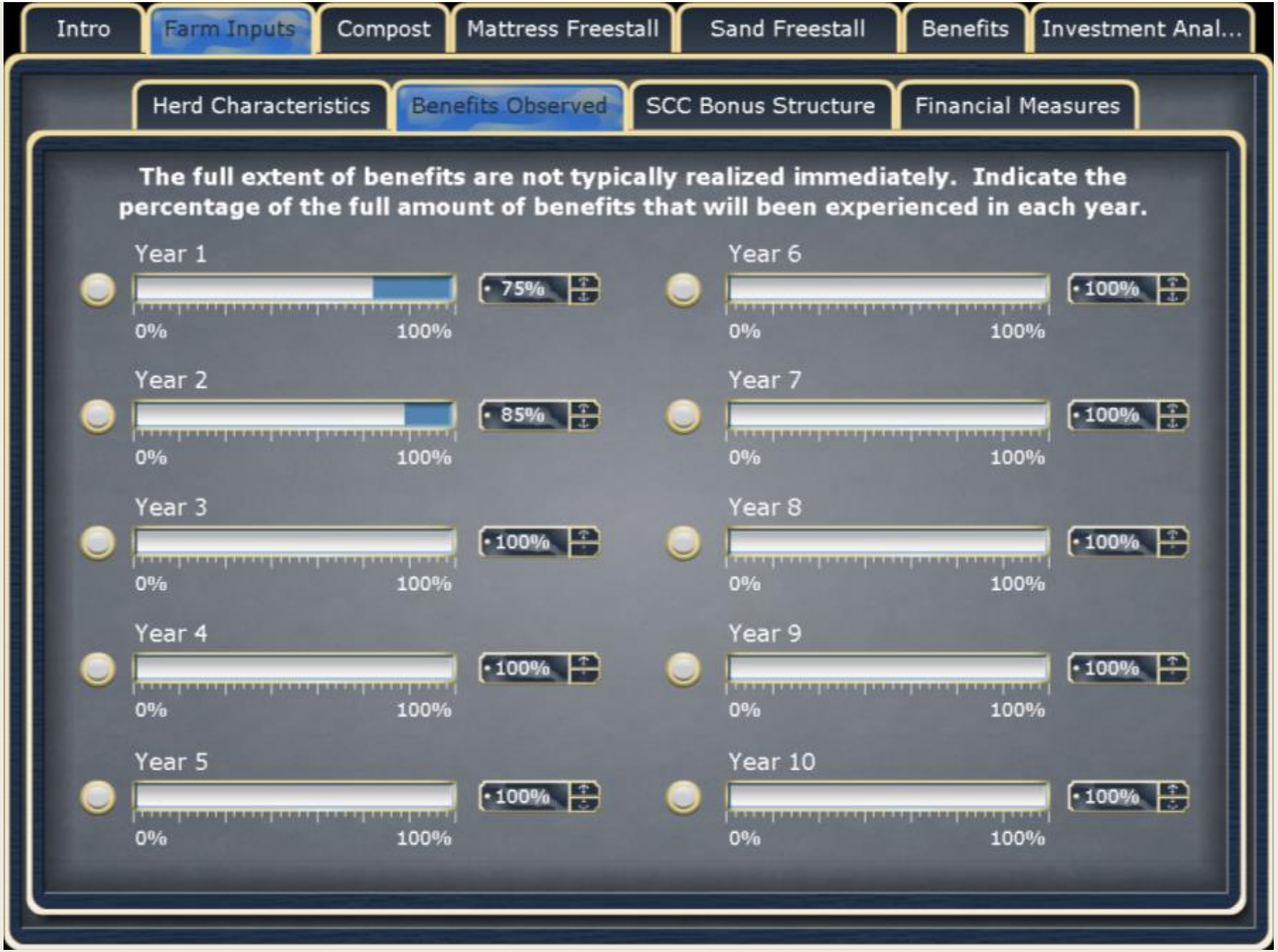

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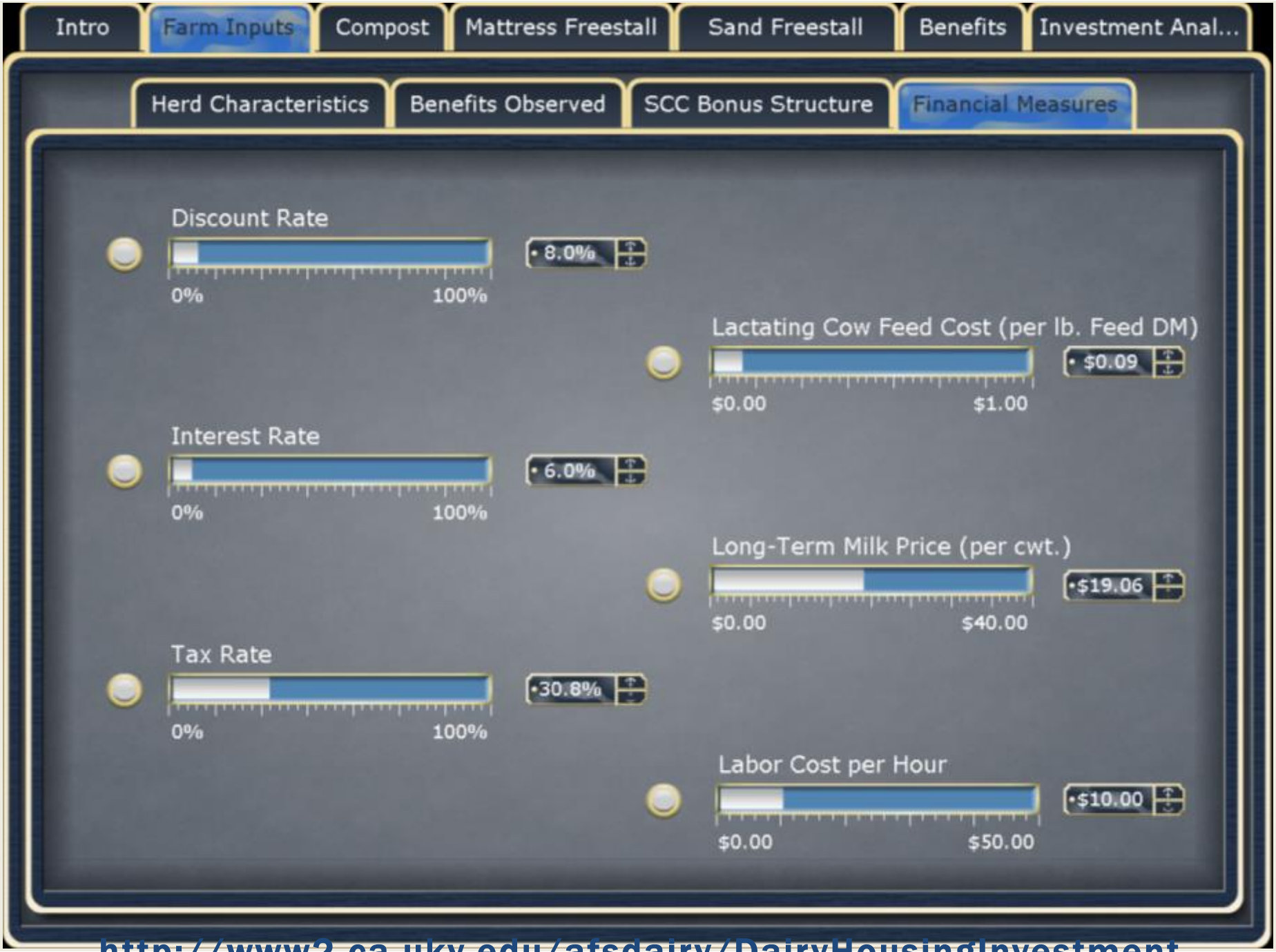

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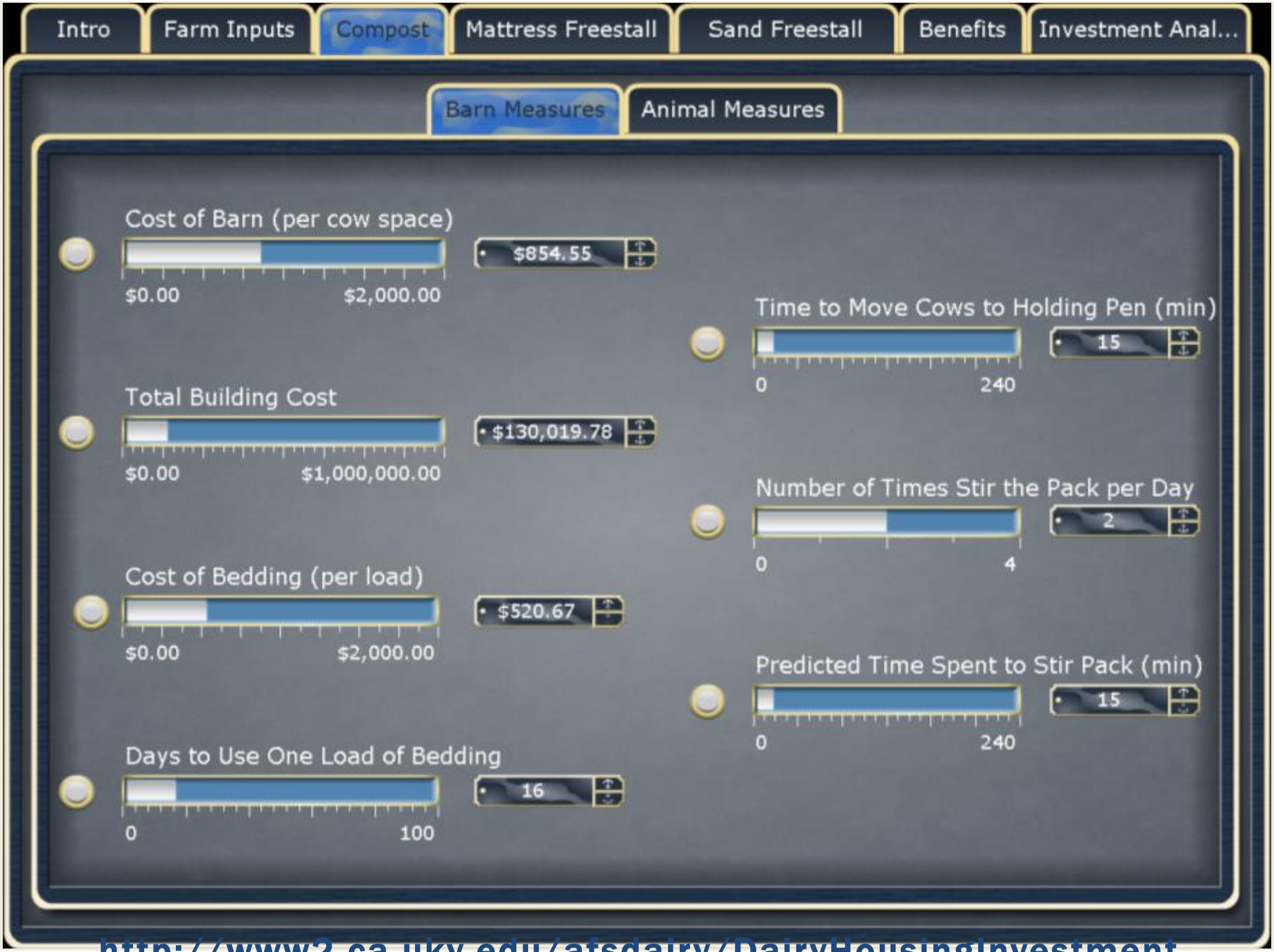

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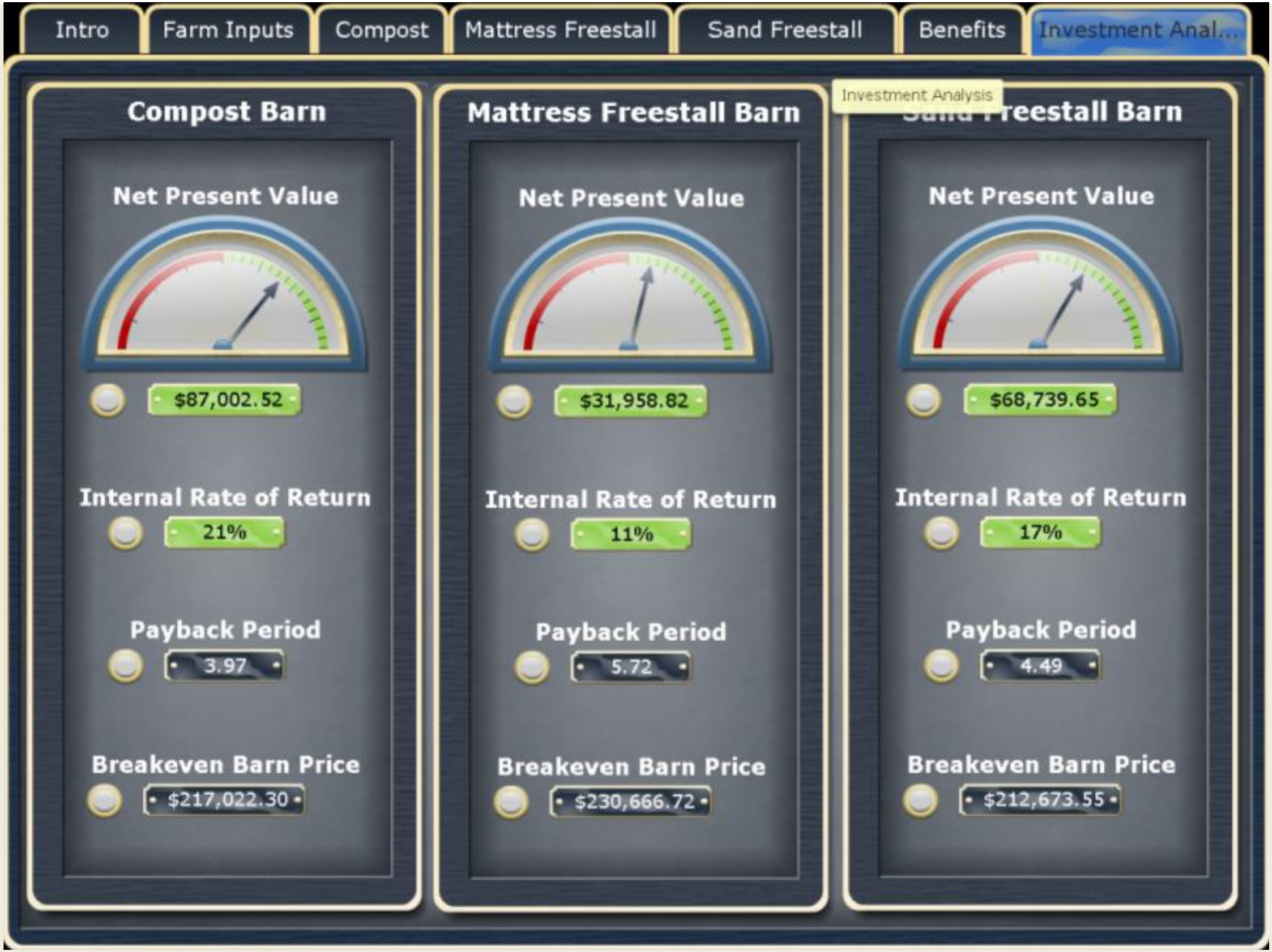

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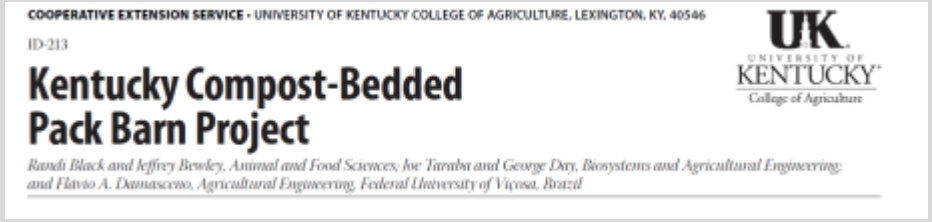
WHY DON'T ALL PACKS WORK?

- Barn design flaws
- Stocking density (too many cows!)
- Material used (straw, cedar)
- Stirring frequency/depth
- Inadequate/ineffective stirring
- Starting pack in the winter
- No curtains in winter

UK Compost Resources



QUESTIONS

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