

# Use of automated activity, temperature and rumination and rumen pH boluses to assess the effect of maintain dairy cows on grazing on pasture full time or intermittently

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A close-up, vertical photograph of a horse's head, focusing on its eye. The horse has dark, short hair and a white blaze on its face. The eye is dark and looking slightly to the side. The background is a soft, out-of-focus light color.

Keeping an  
eye on THE  
FUTURE

# Background

Challenge is to increase dairy food protein yield, while reducing environmental impact of dairying (FAO, 2012; Capper et al., 2009)

Increase dairy production, with minimal increase in land area associated with dairying:

- Increase milk per kg feed consumed (Hegarty et al., 2005)
- Increase animal fertility and health, thus productivity (Garnsworthy, 2004; Kolver et al, 2001)
- Reduce number of non productive animals (dry, empty, replacements) and increase longevity
- Reduce / mitigate environmental impact; restricted grazing and better nutrient utilization of nutrients and complementation

# Background: NZ Dairying

- National herd increasing, 4.78 million dairy cows
- Increasing genetic merit (BW & PW) = 12.5 annum (NZ dairy stats 2013)
- **Land used for** dairy expands, greater climatic challenges, system type and feeds used
- **Nitrogen** run off and council permits (48 v 8 kg N/year)
- **Housing** replacing 'stand off ' and being applied more generally (North and South Island)



# Increased climatic challenge: Pole barn with plastic roof





# Cantilever divisions & front to front beds



# Poster

9.5.2

**Effect of bed surface on daily behaviour pattern of adult dairy cattle newly introduced to free stall housing, on a part time daily basis, compared with herd mates grazed pasture**

Margerison, JK, Lau, J., Hedley, M, Horne, D, Hanly, J, Brown, N and Shilton, A

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# Materials and Methods

36 adult empty dairy cattle, selected at random from Massey #1 and #4 Dairy units, were grazed together for 5 weeks

Allocated at random to 3 groups balanced for live weight and age (<4, 4 & >4 years of age) for 3 weeks.

- 12 cows (568 kg LW) grazed throughout
- 12 cows (569 kg LW) and
- 12 cows (569 kg LW) were trained to use stalls (n13) on sand beds prior to using a range of bed types

Manual scan sampling and activity meters (accelerometers)

# Materials and methods

36 adult dairy cattle (5 to 13 years of age) acclimatised to beds till full uptake (7 days = full uptake)

## **Grazing period:**

- Restricted period of 4 h/d (11.00 to 15.00 h)
- Stood for two 2 h simulated milking periods (9.00 to 11.00 & 15.00 to 17.00 h)
- Housed or grazed for 16 h/d (17.00 to 9.00 h) nightly

**Nightly:** Three groups of 12 cows, equal for age and live weight

- Pasture
- Sand beds
- Dual chamber water beds \*

**Offered:** 5 d training, 3 days 24 h obs, 5 d rest



# Training time on Sand beds

Cantilever soil beds in  $2.6 (\pm 1.2)$  days

Molasses encouragement

No enforcement required

No bed refusal



# Time spent

Housed (16 h)	Pasture	Sand	Water	P value
Lying, h	10.4 (2.64) <sup>a</sup>	10.4 (2.17) <sup>a</sup>	7.3 (3.51) <sup>b</sup>	<0.0001
Standing, h	1.5 (2.46) <sup>b</sup>	1.7 (1.44) <sup>b</sup>	2.9 (2.60) <sup>a</sup>	<0.0001
Feed/ graze, h	4.0 (0.92) <sup>a</sup>	3.1 (1.19) <sup>b</sup>	3.1 (1.00) <sup>b</sup>	<0.0001
Walking, h	0.04 (0.044)	0.00 (0.043)	0.00 (0.056)	0.300
Grazing (4 h)				
Lying, h	0.75 (0.569) <sup>c</sup>	1.17 (0.632) <sup>b</sup>	1.67 (0.620) <sup>a</sup>	<0.0001
Standing, h	0.33 (0.367) <sup>a</sup>	0.08 (0.314) <sup>b</sup>	0.08 (0.296) <sup>b</sup>	<0.0001
Grazing, h	2.67 (0.565) <sup>a</sup>	2.50 (0.647) <sup>a</sup>	2.00 (0.648) <sup>b</sup>	<0.0001
Walking, h	0.12 (0.092)	0.12 (0.082)	0.12 (0.135)	0.843
Total daily (24 h)				
Lying, h	11.5 (2.77) <sup>a</sup>	11.2 (2.76) <sup>a</sup>	9.6 (3.43) <sup>b</sup>	<0.0001
Standing, h	5.6 (2.41) <sup>a, b</sup>	5.6 (1.45) <sup>b</sup>	6.7 (2.66) <sup>a</sup>	<0.0001
Feed/graze, h	6.7 (1.14) <sup>a</sup>	5.6 (1.23) <sup>b</sup>	5.2 (1.11) <sup>b</sup>	<0.0001
Walking, h	0.42 (0.156)	0.42 (0.137)	0.50 (0.244)	0.076



# Sand beds





# High occupancy rates: Sand beds





# Low use of Water beds





**Bed surface did make a difference:  
Water beds**

# Poster

9.5.1

## **Uptake of free stalls by novice adult dairy cattle with no previous experience of free-stall housing**

Reed, C., Margerison, J.K., Hedley, M., Christensen, C.,  
Butcher, N., Liefertink, H.

A close-up, vertical photograph of a horse's head, focusing on its eye. The horse has dark, thick fur and a dark eye. The background is blurred.

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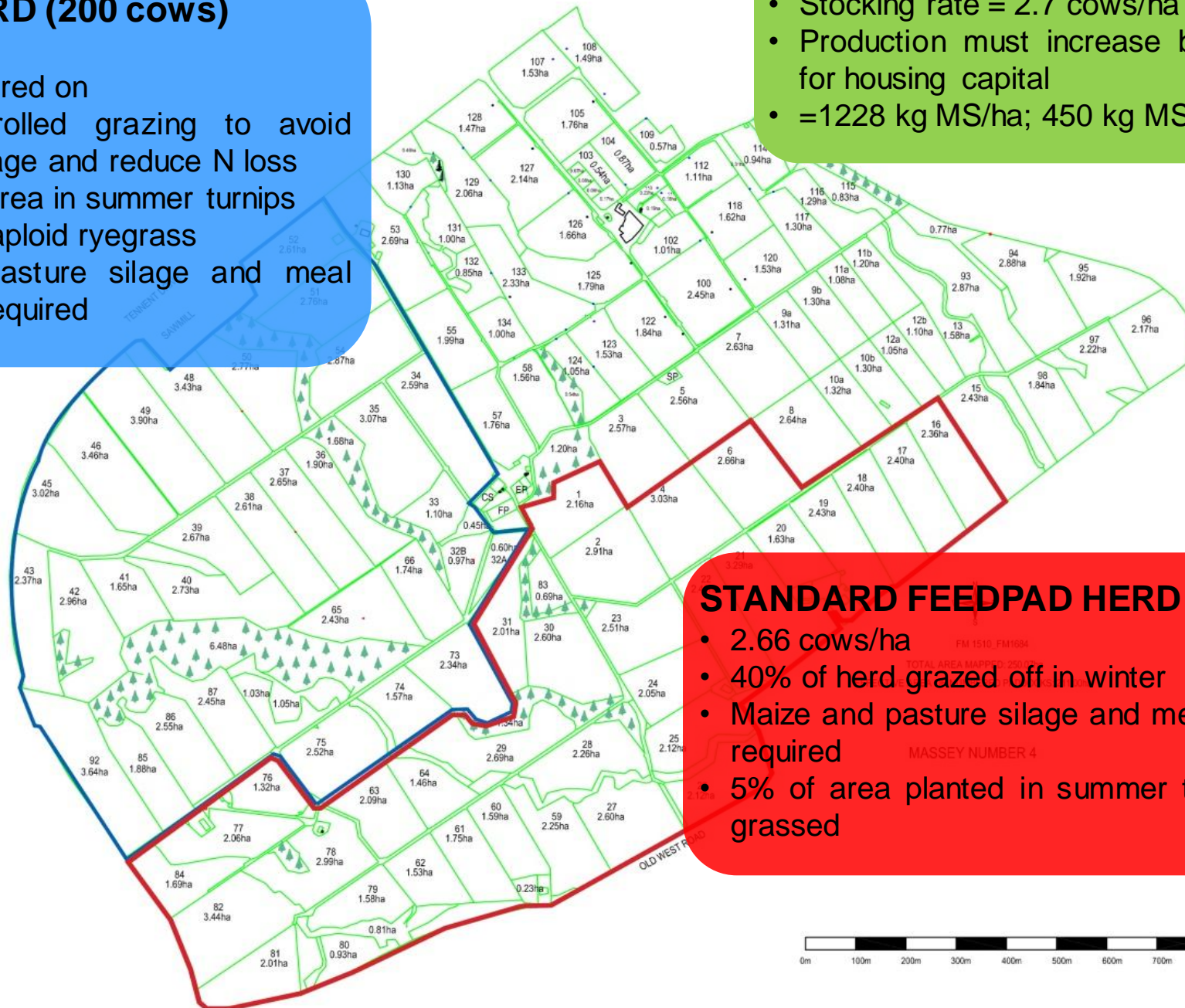


# Farm & 2013/14

## HOUSED HERD (200 cows)

- 2.75 cows/ha
- All cows wintered on
- Duration-controlled grazing to avoid treading damage and reduce N loss
- 12% of farm area in summer turnips
- Re-grass tetraploid ryegrass
- Maize and pasture silage and meal imported as required

- Historic production = 360 kg MS/cow; 965 kg MS/ha
- Stocking rate = 2.7 cows/ha (250 cows)
- Production must increase by 27% to pay for housing capital
- =1228 kg MS/ha; 450 kg MS/cow



## STANDARD FEEDPAD HERD (200 cows)

- 2.66 cows/ha
- 40% of herd grazed off in winter
- Maize and pasture silage and meal imported as required
- 5% of area planted in summer turnips and re-grassed

# Massey Cow house (built 2013/14)

650 cow unit

400 cows

- 200 graze/feed pad

- 200 housed

212 free stalls





# Adoption study - testing beds for cow acceptance



Canvas-covered foam

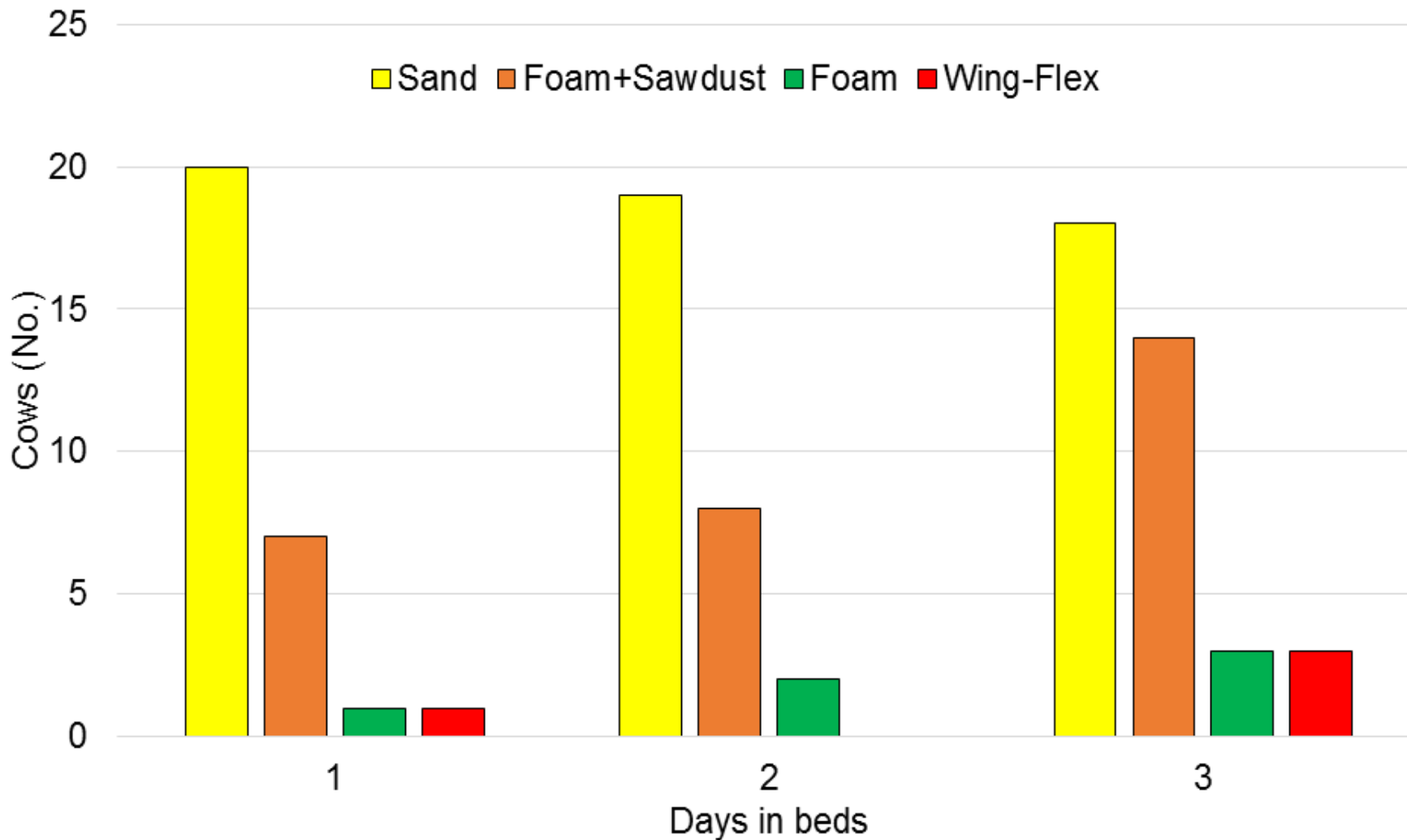


Modified Sand



Rubber Wing-flex

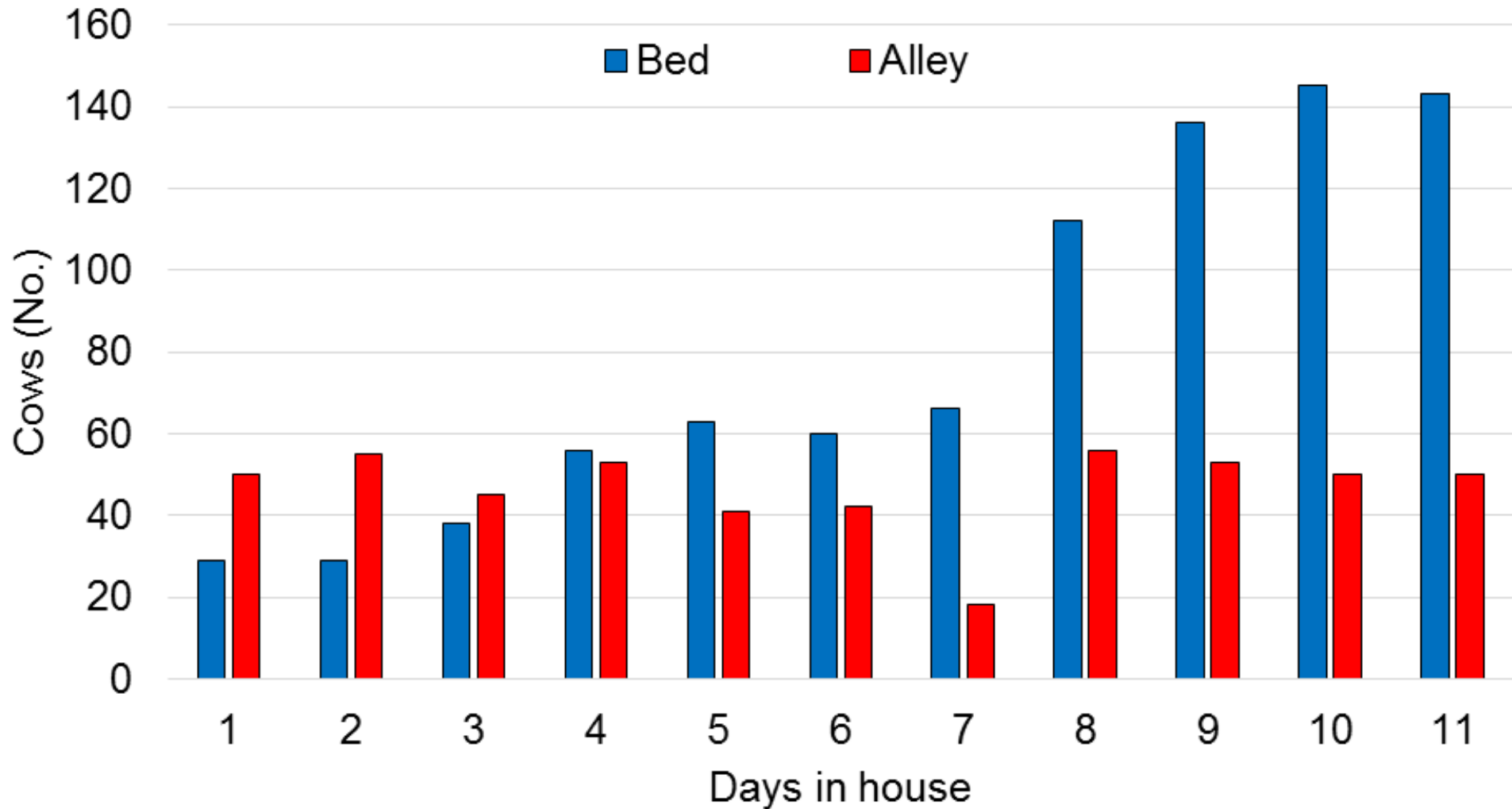
# Initial response to bed types (first 3 nights)



Bed uptake by cows: Sand > Foam + Sawdust > Foam > Wingflex

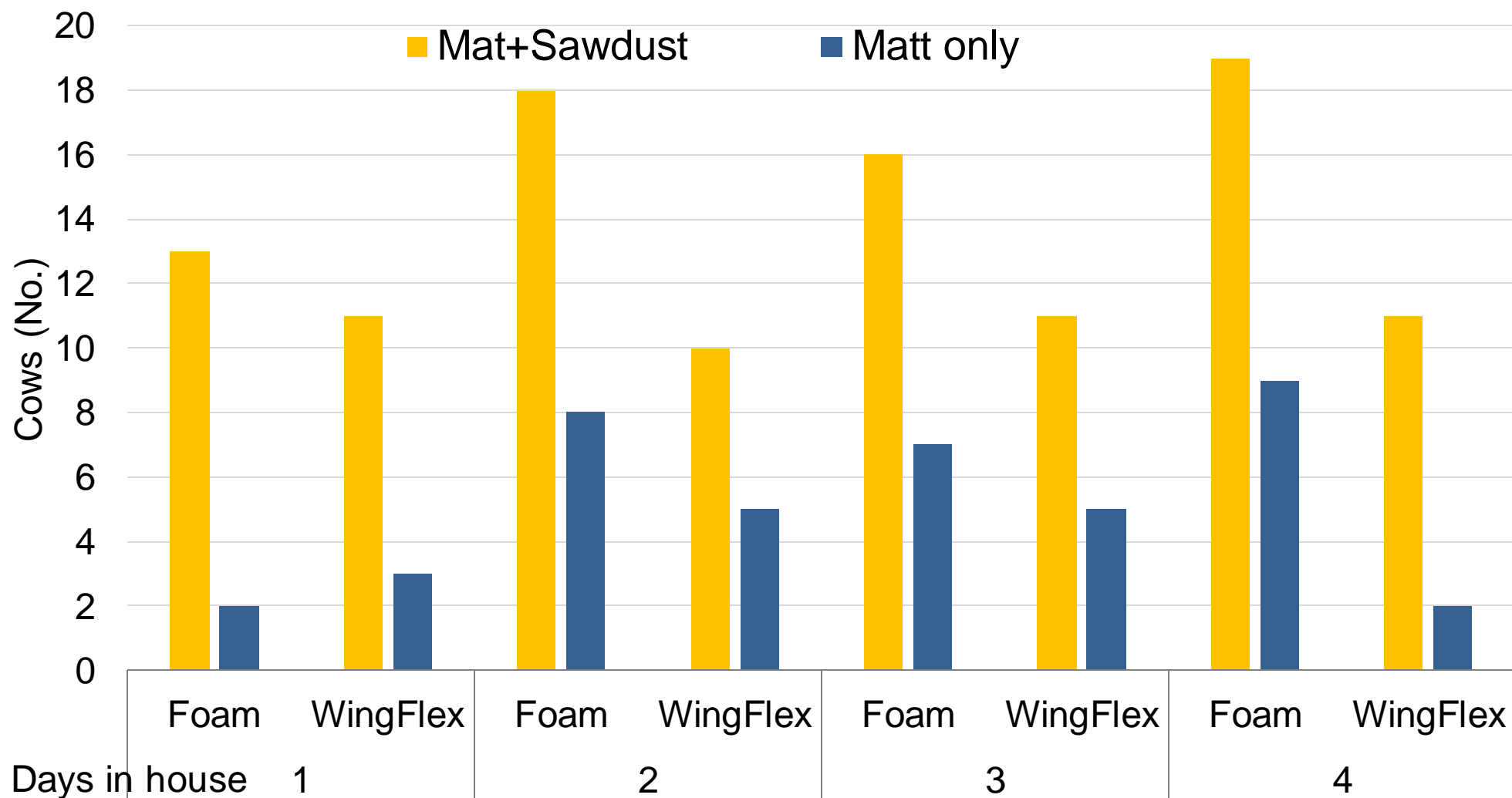


# Cows lying in stalls and alleyways over first 11 nights of housing (9 pm – 5 am)



Cows lying in beds increased with more nights spent in house

# Effect of sawdust on bed uptake



Sawdust had marked effect on bed uptake

# Introduction to free stall use - testing beds for cow acceptance



Modified Sand



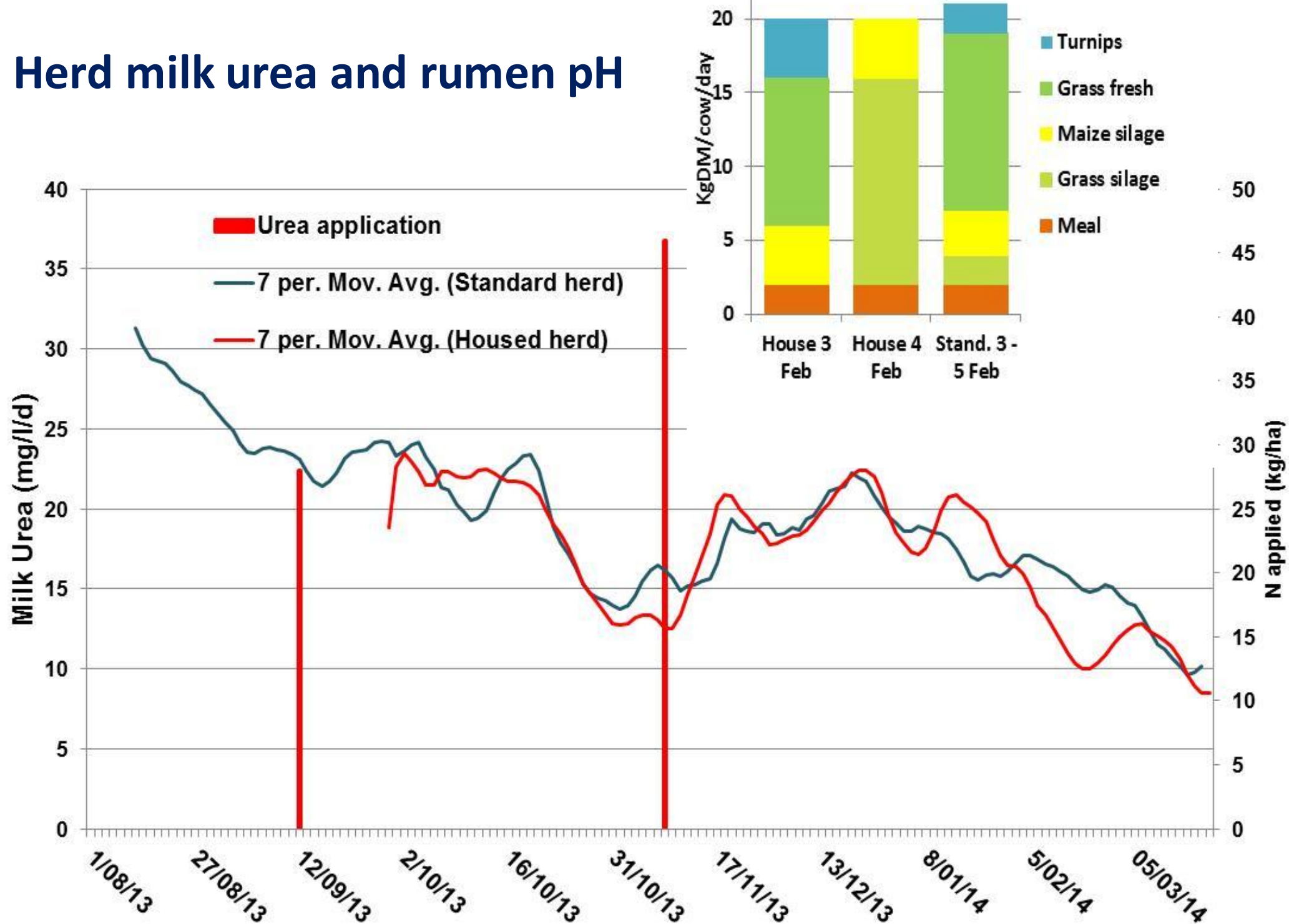
Canvas-covered



Rubber Wing-flex

Period (d)	
Day 1 to 3	<b>Bed preference</b> 54 % cows used sand beds, 26 % used canvas covered foam mats 6 % used rubber wing-flex mats.
Day 3 to 4	<b>Addition of sawdust</b> increased use 48 % of cows on foam mats and 47 % on rubber WF mats, 53 % on sand beds (total 7 days of bed use).
Day 7	74 % cows using beds, 26 % cows lying in the alley.
Day 10	26 % of cows that lay in the alley, (re-introduced with hay) 12 % remained lying in alley.
Day 42	After day feeding and night enclosure of cows, 92 % cows using beds. 8 % cows not using beds, of these 1 % lay half in the beds and 7 % of cows consistently lay in the alley.

# Herd milk urea and rumen pH





# The SensOor

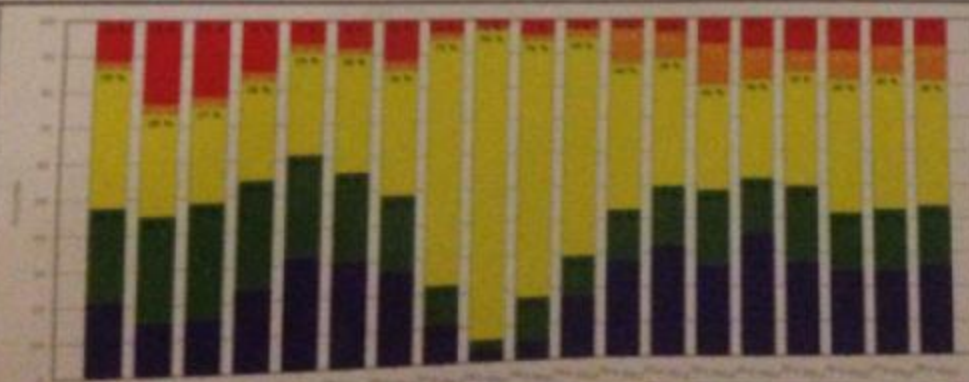
the eye of your farm, even when you are



## CowManager dashbord on your PC

Diernr	Naam	Est	Lactatie nr	Vruchtbaarheid status	Dagen drachtig	Tijdstop laatste attentie	Tucht status (aantal voren)	Standsindex status (aantal voren)	Temperatuur (°C)
3399	Fransje 55	130	3	Tuchtig groei op 26-04-2012		17-05-2012 20:00	1.5 (10)		24.7
3543	Katje 115	111	2	Gedekt op 02-04-2012	41	17-05-2012 20:00		2.5 (10)	18.1
3319	Sorja 68	378	2	Dring sinds 13-03-2012	282	17-05-2012 17:00		2.5 (10)	21.4
3457	Sis 58	143	2	Gedekt op 07-04-2012	40	17-05-2012 14:00	1.1 (10)		24.3
3249	Dit 81	112	3	Gedekt op 04-04-2012	43	17-05-2012 13:00	1.1 (10)		28.8
3204	Fransje 130	238	3	Bewust gest sinds 28-03-2012		17-05-2012 12:00	1.5 (10)		25.3
2912	Sanne 70	356	5	Dring sinds 12-04-2012	289	17-05-2012 9:00		2.5 (10)	18.4
3100	Sanne 87	276	4	Gedekt op 17-03-2012	61	17-05-2012 8:00	1.3 (10)		20.5
3255	Dit 96	261	3	Gedekt op 24-04-2012	23	17-05-2012 8:00	1.5 (10)		20.9
3523	Katje 301	543	1	Bewust gest sinds 16-11-2011		17-05-2012 8:00		2.5 (10)	22.9
3287	Katje 78	208	3	Drachtig sinds 23-02-2012	84	17-05-2012 8:00		2.5 (10)	19.7

● Herkauwen
 ● Vreten
 ● Niet actief
 ● Actief
 ● Hoog actief



# Heifer training (new)

A close-up, high-contrast photograph of a horse's eye, looking towards the left. The eye is dark and reflective, with long, dark eyelashes. The surrounding fur is dark and textured.

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# Heifer training

4 groups (2 bed X 2 groups)

Teat sealed, 1.5 m pre partum

2 bed types

- Canvas covered foam
- Rubber wing flex

2 options (both beds)

- 18 Heifer, alone
- 12 Heifers with mixed age cows (24 % heifers)

All fed maize, grass silage

Hay at front of beds (after silage)



Canvas-covered foam



Rubber Wing-flex





# Results

- Heifer only
  - 100 % uptake by all animals in 3 days
  - Bed surface was equally acceptable
- Mixed with cows
  - Approx. 16 % stood and did not lie in a stall for 3 to 4 days
  - 5.5 % of heifers did not use beds (alley lying)

## Conclusions:

Train heifers on their own, pre-partum following teat sealing and use hay.

Good type had no effect



MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT  
HINKINA WHAKATUTUKI

BEEF + LAMB  
NEW ZEALAND



First

# Thank you for your attention

## Any questions?

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