Assessing the effect of grazing on dairy cow welfare – using a multi-dimensional welfare index

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PRESENTATION

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doi:10.1017/S1751731112002297

animal

Effect of grazing on the cow welfare of dairy herds evaluated by a multidimensional welfare index

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(Received 27 April 2012; Accepted 30 September 2012)

Structural development in the prime sector has led to increasing herd sizes and new barn systems, followed by less summer grazing for dairy cows in Denmark. Effects of grazing on single welfare measures in dairy cows – for example, the presence of integument alterations or mortality – have been studied under different conditions. However, the effect of grazing on welfare,

What is the effect of grazing on dairy cow welfare?

Who is asking the question?

What is mend by animal welfare?

What is mend by grazing?

Different stakeholders – different goals

The farmer — **Recommendation**

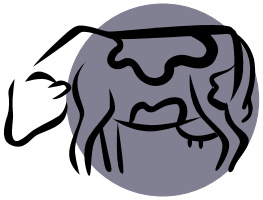
Operational decision support

The consumer — **Certification**

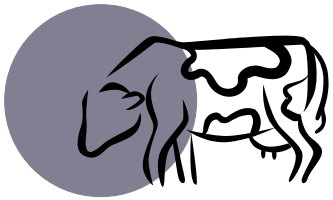
The citizen / the authority — **Clasification**

Animal welfare definitions,
Different 'schools' – different methods

Biological fitness

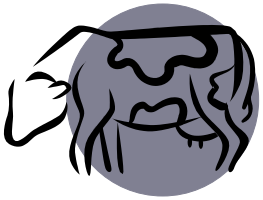


Feelings



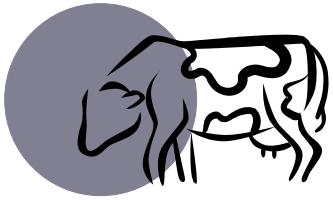
Naturalness

Biological fitness



Production, re-production,
Subclinical and clinical disease
Mortality
SCC
…

Feelings



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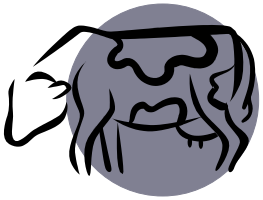

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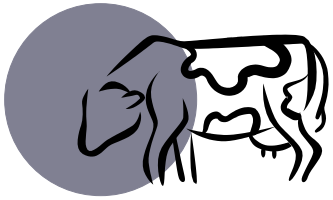
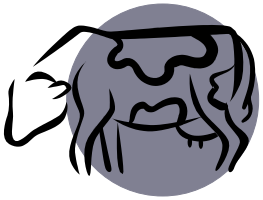


Flight distance to humans
Lameness associated with pain
Social stress
Discomfort at getting up or lying down
…

Naturalness

Biological fitness



Production, re-production,
Subclinical and clinical disease
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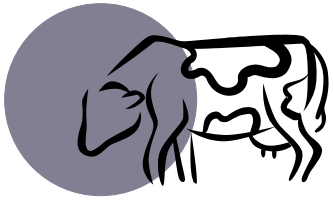
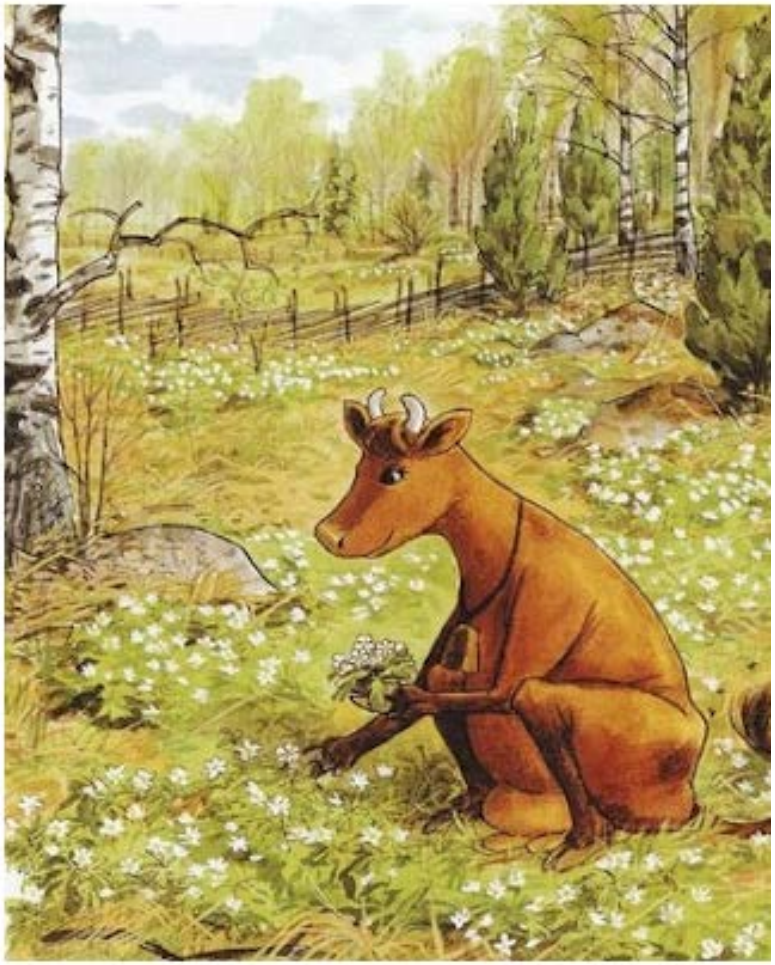


Flight distance to humans
Lameness associated with pain
Social stress
Discomfort at getting up or lying down
…

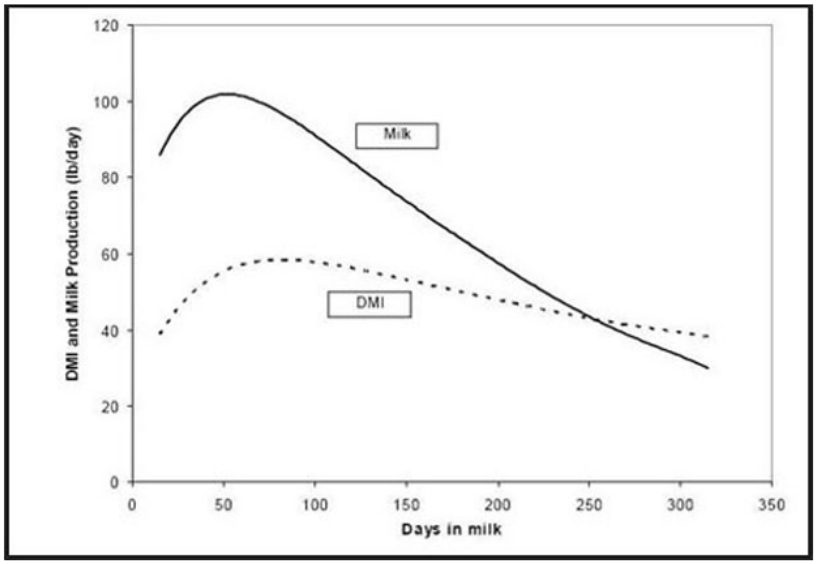
Naturalness

Grazing in it self
…

Being well…



Producing well…



Back to nature…

What is grazing?

Access to outdoor run / Considerable grass intake on pasture

Few Hours / Day vs. Night / Free access

Season / All year round

Specific groups of animals only (eg heifers, dry cows) / All animal groups

What is known?

What is known?

- Lower mortality risk (Thomsen et al., 2006; Burow et al. 2011)
- Lower prevalence of integument lesions (Keil et al., 2006; Rutherford et al., 2008; Corazzin et al., 2010)
- Better gait (Rutherford et al., 2009; Corazzin et al., 2010).

What is known?

- Lower mortality risk (Thomsen et al., 2006; Burow et al. 2011)
- Lower iprevalence of integument lesions (Keil et al., 2006; Rutherford et al., 2008; Corazzin et al., 2010)
- Better gait (Rutherford et al., 2009; Corazzin et al., 2010).

- No effect on hock integument (Haskell et al., 2006)

- Loss in body condition (Boken et al., 2005)
- Increase in hoof lesions (Baird et al., 2009)

Our approach…

Welfare Quality WQ

Existing welfare assessment systems:

'Welfare Quality' (http://www.welfarequality.net/everyone)

- *Good feeding*
  - No hunger or malnutrition
  - No thirst
- *Good housing*
  - Resting comfort
  - Thermal comfort
  - Ease of locomotion
- *Good health*
  - No injuries
  - No diseases
  - No mutilations
- *Appropriate behaviour*
  - Social behaviour
  - Other species-specific behaviours
  - No fear of humans
  - No general fear

Measure	Measure scores
Body condition	1: thin
	2: lean
Faeces consistency thin	1: thin or fluid[a]
Faeces consistency dry	1: dry or compact[a]
Hygiene lower hind leg	1: splashes of dirt
	2: large areas or plaques of dirt
Hygiene hind quarter	1: splashes of dirt
	2: large areas or plaques of dirt
Hygiene udder	1: splashes of dirt
	2: large areas or plaques of dirt
Integument carpal joint	1: ≥2 cm hair loss
	2: ≥2 cm lesion and/ or swelling
Integument hock joint	1: ≥2 cm hair loss
	2: ≥2 cm lesion and/or swelling
Integument rest of body	1: ≥2 cm hair loss
	2: ≥2 cm lesion and/ or swelling
Claw conformation	1: overgrown
Hair coat	1: dull or dusty
	2: scrubby
Gait	1: moderately lame
	2: severely lame
Rising behaviour	1: interrupted
	2: with difficulty or abnormal
Lying-down duration	1: hesitating
	2: very slow
Lying-down collision	1: min. one collision
Water provision	0 (0.0%): sufficient and clean to 4 (100.0%): insufficient and very dirty
Food provision	0 (0.0%): sufficient and clean to 4 (100.0%): insufficient and very dirty

(Burow et al, 2013)

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AWI

Expert opinion approach:

32 Danish professionals where asked to join an expert panel

20 accepted the invitation:

5 cattle veterinarians,
3 animal scientists
6 production consultants
5 persons from the cattle federation
3 three legislation controllers
1 person from an animal protection organisation

2 questions where asked:

What is the relative weighing of.

1) Severe vs. moderate level of welfare measurements eg. severe vs. moderate lameness?

2) The individual welfare measurement in comparison to the other welfare measurements?

Measure	Moderate *v.* severe measure score	Weight of moderate in relation to severe measure weight set to 1
Gait	Moderately lame *v.* severely lame	0.33 *v.* 1
Integument carpal joint	Hair loss *v.* lesion/swelling	0.33 *v.* 1
Integument hock joint	Hair loss *v.* lesion/swelling	0.33 *v.* 1
Integument rest of body	Hair loss *v.* lesion/swelling	0.33 *v.* 1
Body condition	Thin *v.* lean	0.33 *v.* 1
Rising behaviour	Interrupted *v.* difficulty/abnormal	0.33 *v.* 1
Lying-down duration	Hesitating *v.* very slow	0.50 *v.* 1
Hair coat	Dull/dusty *v.* scrubby	0.50 *v.* 1
Hygiene hind quarter	Splashes *v.* large areas/plaques	0.50 *v.* 1
Hygiene udder	Splashes *v.* large areas/plaques	0.50 *v.* 1
Hygiene lower hind leg	Splashes *v.* large areas/plaques	0.67 *v.* 1

(Burow et al, 2013)

Category	Measure	Proportion
Health	Gait	8.33
Health	Integument carpal joint	7.41
Health	Integument hock joint	7.41
Health	Integument rest of body	7.41
Feeding	Body condition	7.41
Feeding	Water provision	7.41
Housing	Claw conformation	6.93
Feeding	Food provision	5.56
Feeding	Faeces consistence thin	5.56
Housing	Rising behaviour	5.56
Housing	Lying-down duration	5.56
Housing	Lying-down collision	5.56
Health	Hair coat	5.09
Feeding	Faeces consistence dry	3.70
Housing	Hygiene lower hind leg	3.70
Housing	Hygiene hind quarter	3.70
Housing	Hygiene udder	3.70
		100.00

(Burow et al, 2013)

Aggregation of measurements into one index…

Aggregation of measurements into one index…

Animal Welfare Index AWI=

(HP, %for $X_{\text{moderate level}}$) + (HP,%for $X_{\text{severe niveau}}$) + (HP, %for Y)+

HP *Herd prevalence, %*

X *2 level measurements – moderate vs. severe*

Y *1 level measurements – severe level*

.

Animal Welfare Index AWI=

(30%moderately lame) + (20%severely lame) + (10%w overgrown claws)+

HP *Herd prevalence, %*

X *2 level measurements – moderate vs. severe*

Y *1 level measurements – severe level*

.

Animal Welfare Index AWI=

(HP, %for $X_{\text{moderate level}}$ * MLW for $X_{\text{moderat vs. severe level}}$) +

(HP,%for $X_{\text{severe niveau}}$) + (HP, %for Y)+

MLW *Measurement level weight*

HP *Herd prevalence, %*

X *2 level measurements – moderate vs. severe*

Y *1 level measurements – severe level*

.

Animal Welfare Index AWI=

(30%moderately lame* 1/ 3) + (20%severely lame) + (10%w overgrown claws)+

MLW	*Measurement level weight*
HP	*Herd prevalence, %*
X	*2 level measurements – moderate vs. severe*
Y	*1 level measurements – severe level*

.

Animal Welfare Index AWI=

$$(((HP, \%\text{for } X_{\text{moderate level}} * MLW \text{ for } X_{\text{moderat vs. severe level}}) +$$

$$(HP, \%\text{for } X_{\text{severe niveau}})) * MW \text{ for } X) + ((HP, \%\text{for } Y) * MV \text{ for } Y) +$$

MW	*Measurement weight*
MLW	*Measurement level weight*
HP	*Herd prevalence, %*
X	*2 level measurements – moderate vs. severe*
Y	*1 level measurements – severe level*

Animal Welfare Index AWI=

(((30%moderately lame* 1/ 3) + (20%severely lame))*0.08) + ((10%w overgrown claws)*0,07)+

MW	*Measurement weight*
MLW	*Measurement level weight*
HP	*Herd prevalence, %*
X	*2 level measurements – moderate vs. severe*
Y	*1 level measurements – severe level*

Herds

41 randomly chosen grazing dairy herds…

Characteristics	Level	Herds	Cows
Production method[a]	1: organic	26	1217
	2: conventional	15	651
Flooring in alleys	1: slatted	31	1422
	2: solid	7	297
	3: mixture of slatted and solid	3	149
Cubicle bedding	1: rubber mattress/concrete	30	1547
	2: straw/chipped wood/sand/turf	11	283
Milking system	0: traditional	32	1435
	1: automatic	9	433
Herd size in cow years[b]	Mean ± s.d.	164 ± 71	

41 randomly chosen grazing dairy herds….

26 Organic herds: 6 h daily grazing during daylight from the 15th of April to the 1st of November.

4 conventional grazing herds: 6 h daily grazing from the 1st of May to the 30th of September

The 41 herds were divided into two groups:

1) 3 to 9 h of daily pasture access (average 6.5 h)

2) Day and/ or –night grazing offering above 9 up to 21 h of daily pasture access (average 14 h)

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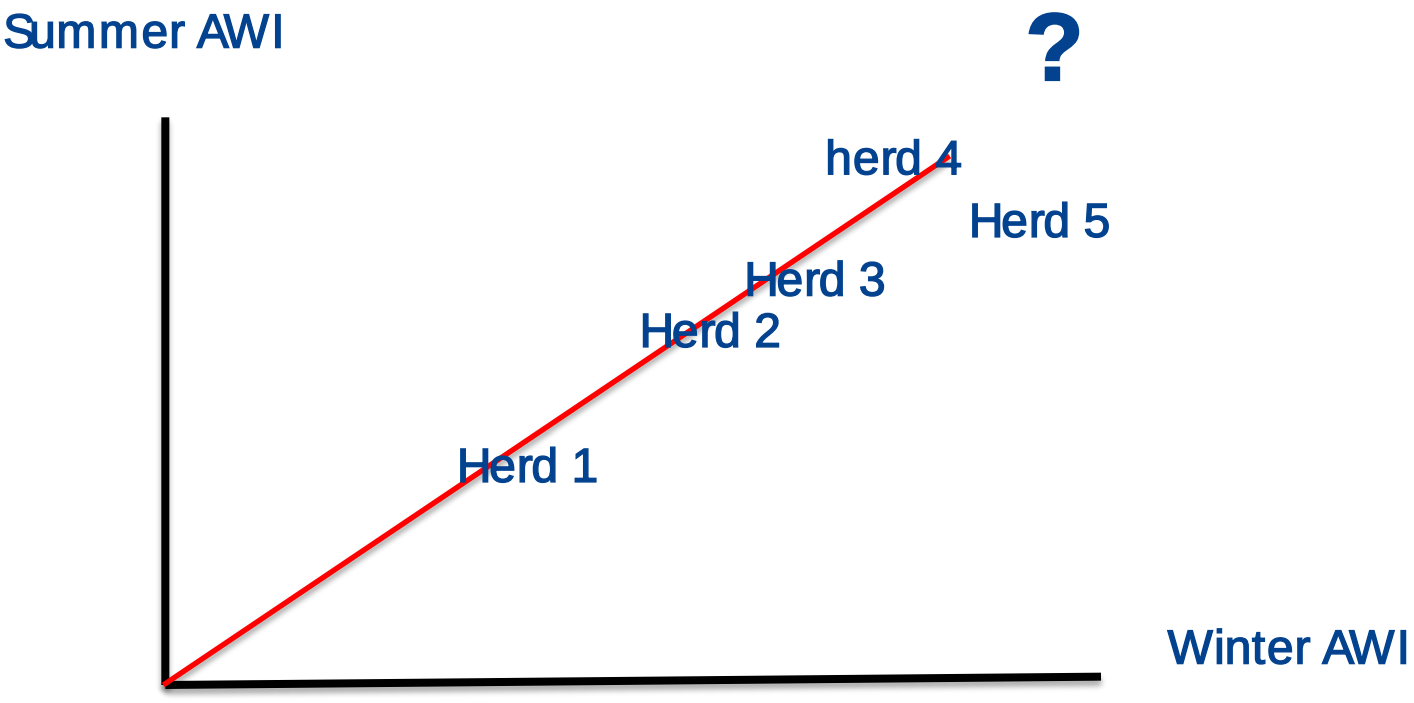
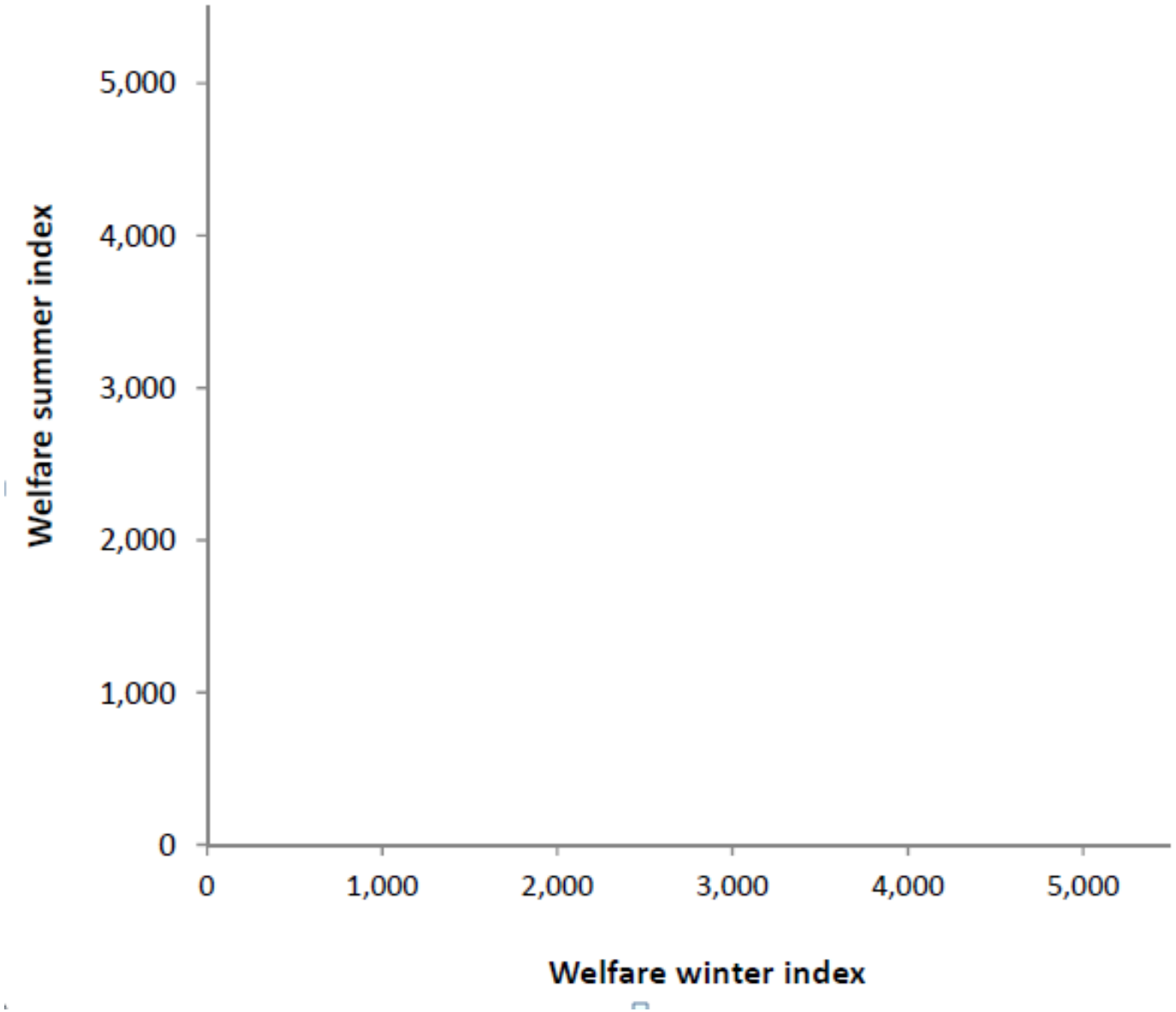
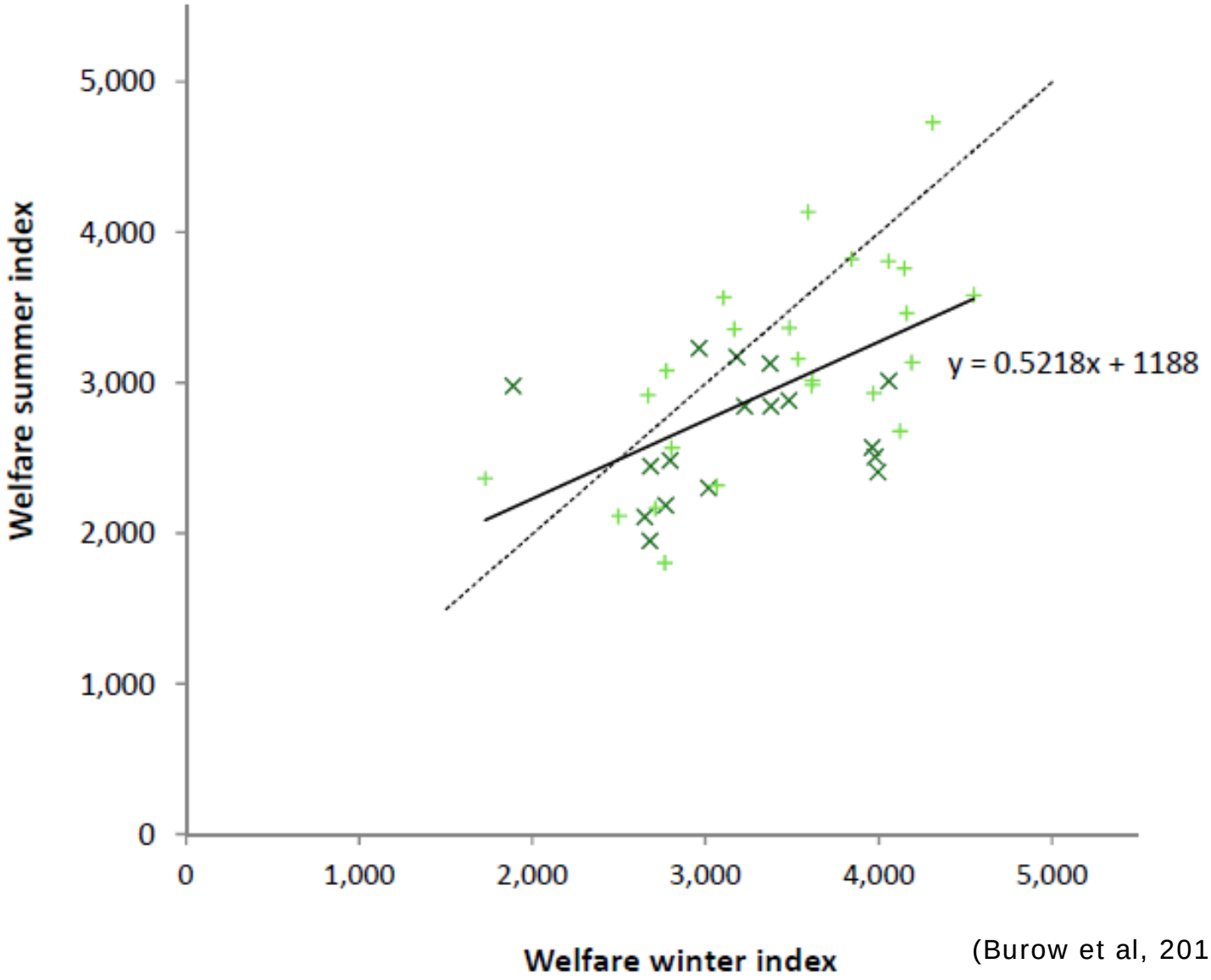
➡ **AWI**

‘Summer’ vs. ‘winter’ – same herds!!!

(Burow et al, 2013)


Summer AWI
?
herd 4
Herd 5
Herd 3
Herd 2
Herd 1
Winter AWI


Welfare summer index
5,000
4,000
3,000
2,000
1,000
0
0
1,000
2,000
3,000
4,000
5,000
Welfare winter index



(Burow et al, 2013)

	Median of category				Median of measure		
Category	Wi	Su	*P*-value[a] of category	Measure	Wi	Su	*P*-value[a] of measure
WI	3373	2931	0.0001		3371	2931	0.0001
Feeding	818	686	0.0061	Thin body	70	235	0.0005
				Water provision	300	200	0.0001
				Food provision	100	50	<0.0001
				Thin faeces	167	225	0.0187
				Thick faeces	0	0	0.2266
Housing	1369	1252	0.1230	Hygiene leg	200	200	0.0034
				Hygiene hind quarter	200	200	0.5034
				Hygiene udder	185	200	0.2766
				Rising behaviour	143	110	0.3809
				Lying-down behaviour	258	268	0.6551
				Lying-down collision	105	131	0.8066
				Claw conformation	282	146	0.0008
Health	1235	9190	0.0001	Integument carpal joint	92	0	0.0666
				Integument hock joint	280	185	0.0004
				Integument rest of body	246	164	0.0001
				Hair coat	266	222	0.0491
				Gait	310	340	0.8838

(Burow et al, 2013)