



Faculty of Agricultural and Nutritional Science

Behavioral tests for welfare assessment in dairy cows: Reliability and factors of influence

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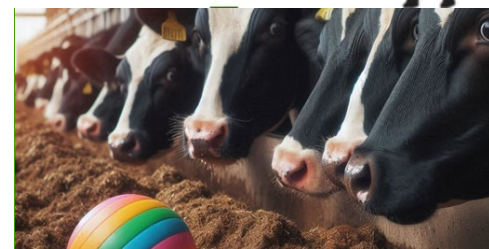
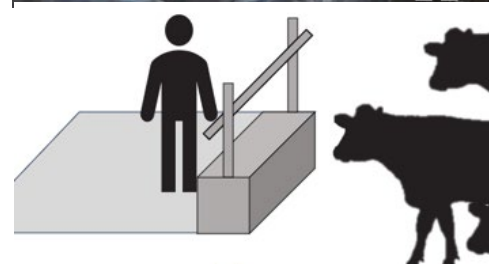
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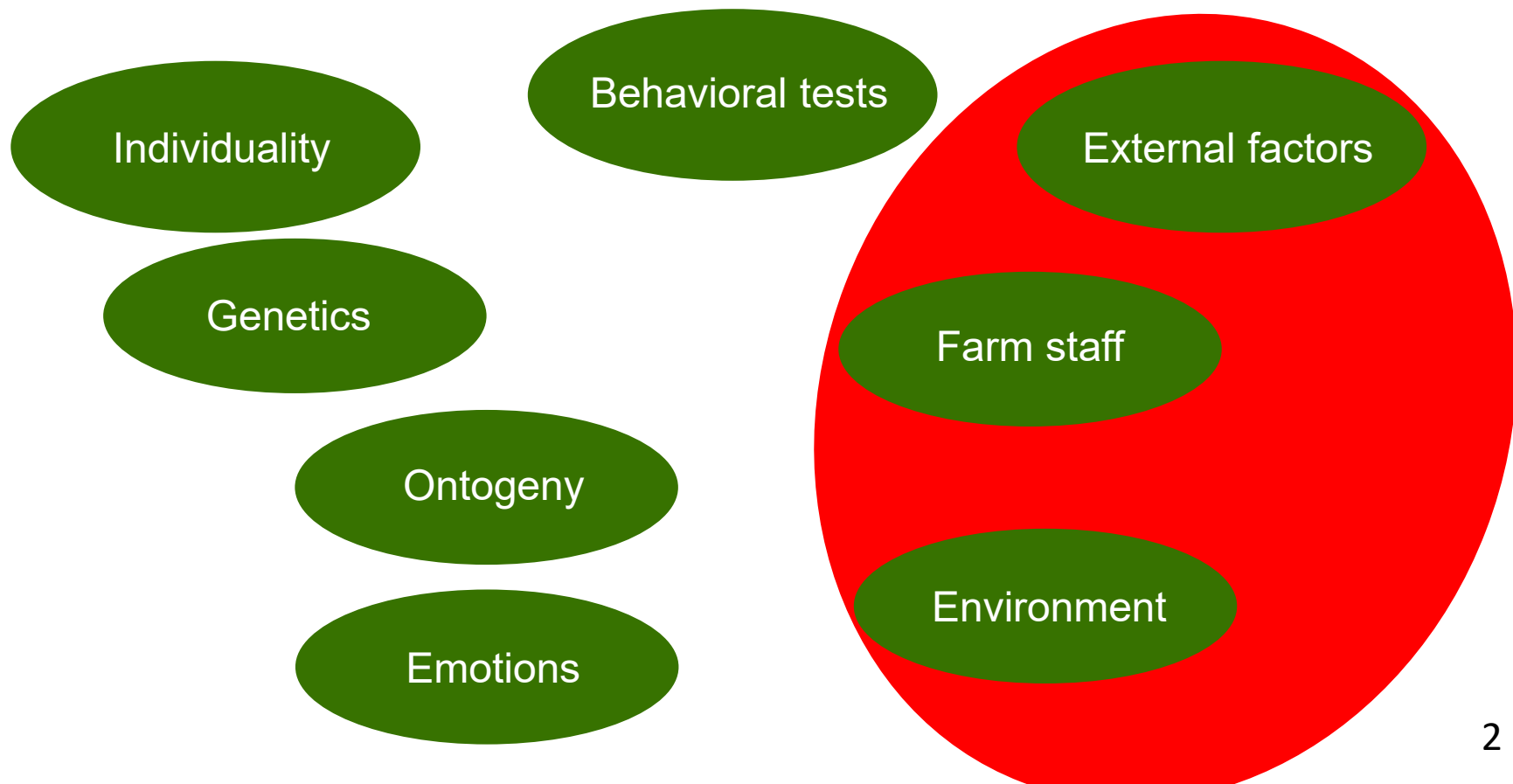
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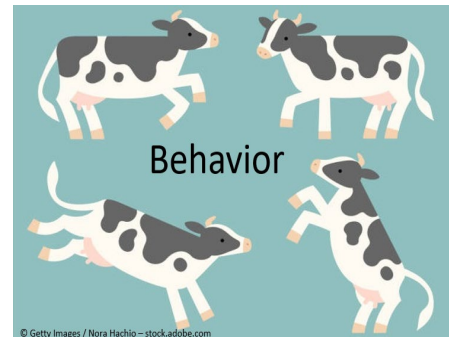


Introduction



Introduction

- Welfare assessment can be divided into four basic principles



- Domestication changed
 - Environment
 - Human contact→ Nature vs nurture



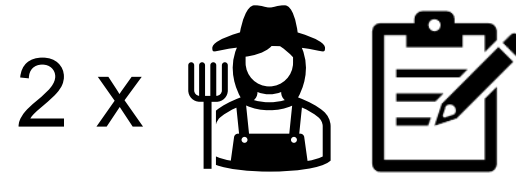
Research questions

1. Do tests differ in reliability (inter-observer, test-retest)?

2. Which farm factors need to be accounted for to maximize comparability in the assessment of the human-animal relationship (HAR)?

Materials & Methods

- December 2016 to May 2017
- 11 Farms in lower saxony



1 week



1 week



- Five behavioral tests were conducted on cows chosen at random
 - Executed between feeding and milking times
 - Home pen at herd level

Materials & Methods

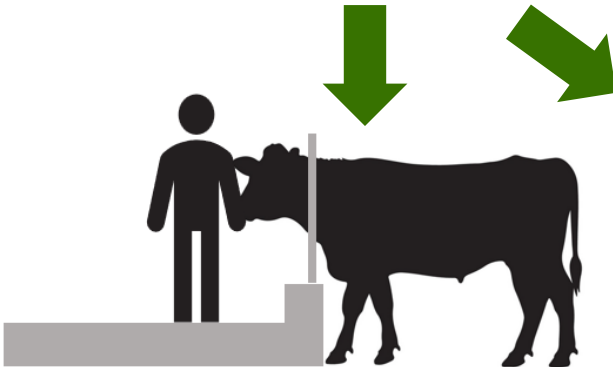
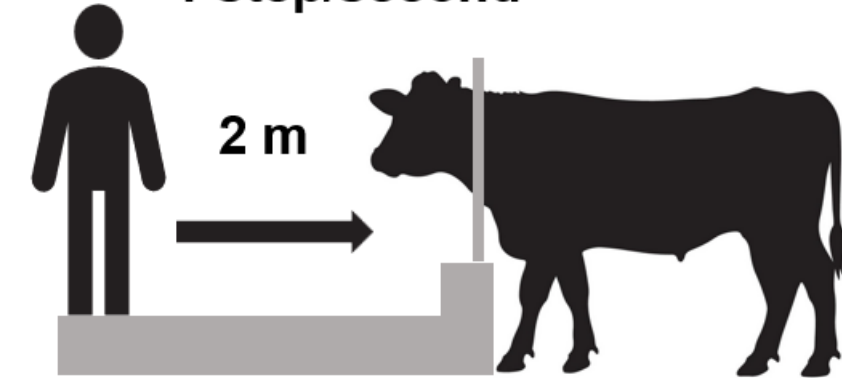
1 step/second

Avoidance distance test at the feeding area (ADTF)

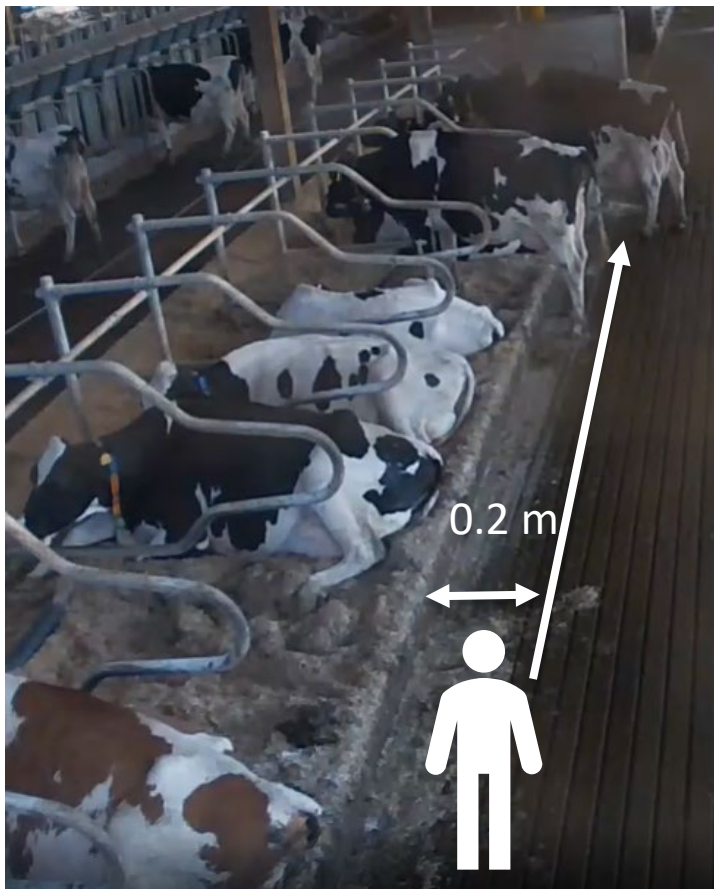
2 m

Avoidance distance test at lying area in the stable (ADTS)

– Same procedure



Materials & Methods



- Lie pass test (LPT)
 - 1 Step per second
 - Only awake & lying cows were tested
 - Number of cows that show one of the predefined behaviors were counted
 - Disregarding the assessor
 - Looking at the assessor at least once
 - Standing up when being passed

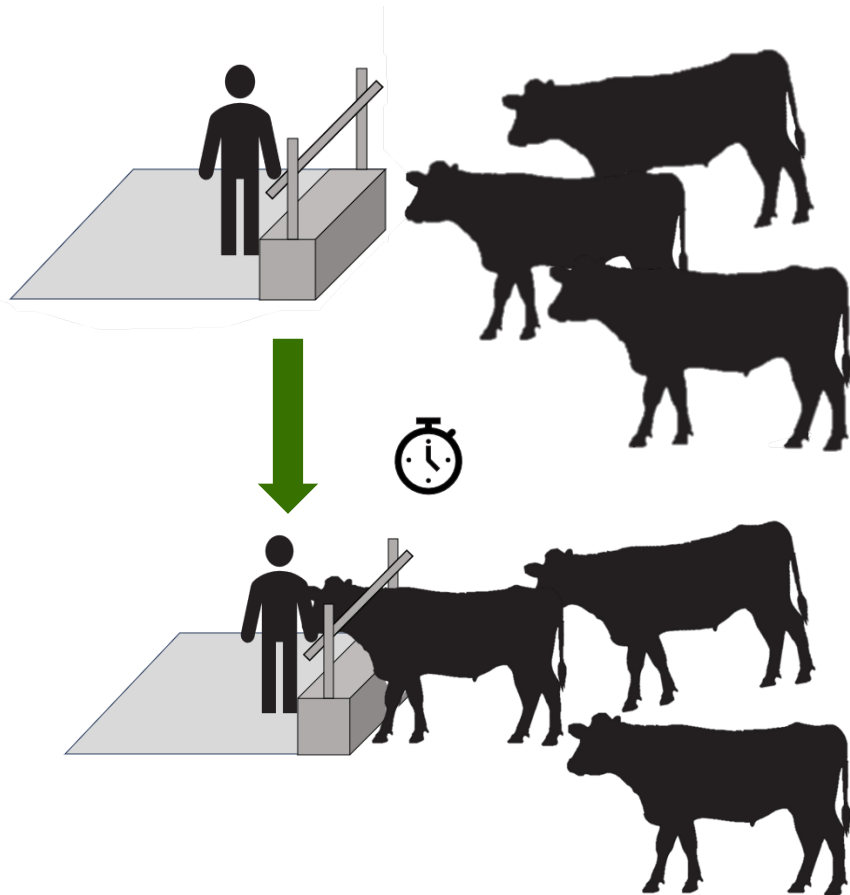


Materials & Methods



- Novel object test (NOT)
 - Number of cows that
 - Disregarded the object
 - Looked at object but didn't touch it
 - Touched the object
 - Latency until the first cow touches the object is noted
 - Test ends 15 seconds after the first cow touches the object

Materials & Methods



- Voluntary human approach test (VHAT)
 - Assessor avoided eye contact with the cows
 - Latency until the first cow touches the observer was noted



Statistical analysis

- Reliability parameters chosen based on literature
 - Spearman correlation (RS), intra class correlation (ICC), limits of agreement (LOA) and smallest detectable change (SDC)
- Analysis of farm factors
 - Farms were grouped within each factor
 - Dataset average as cut off
- Generalized linear mixed model (ADTF & ADTS)
- Linear mixed model (LPT, NOT and VHAT)
- Factors were added in a stepwise manner and model fits were compared using AIC and BIC



Statistical analysis

$$y_t = \emptyset \text{herd age} + \text{cows per employee} + \text{partition feeding ally} + \text{observer} + \\ |\text{farm} + \text{visit} + \text{farm: visit}|$$

y_t = likelihood, that cows show a behavior in a certain test $t = 1 - 5$

Test	y
ADTF	Likelihood that a cow can be touched
ADTS	Likelihood that a cow can be touched
LPT	Likelihood that a cow stands up
NOT	Likelihood that a cow touches the object
NOT	Latency until the first cow touches the object
VHAT	Latency until the first cow touches the human



Reliability (inter-observer)

Test	Category	RS	ICC	SDC	LOA
Avoidance distance test at the feeding trough	Flight	0.97	0.97	0.24	-0.26 to 0.23
	Touch	0.97	0.97	0.24	-0.23 to 0.26
Avoidance distance test in the stable	Flight	0.94	0.94	0.30	-0.30 to 0.29
	Touch	0.96	0.96	0.24	-0.23 to 0.26
Lie pass test	Disinterest	<i>0.46</i>	<i>0.41</i>	5.50	-5.77 to 5.22
	Interest	<i>0.68</i>	<i>0.67</i>	2.55	-3.15 to 1.94
	Get up	0.96	0.96	0.69	-0.69 to 0.69
Novel object test	Disinterest	<i>0.45</i>	<i>0.65</i>	1.62	-1.72 to 1.51
	Interest	0.90	0.92	1.21	-1.26 to 1.17
	Touch	0.98	0.99	0.24	-0.23 to 0.26

Font indicates: **Good reliability**; *acceptable reliability*; unacceptable reliability



Reliability (test-retest)

Test	Visit	Category	RS	ICC
Lie pass test	2 & 3	Disinterest	0.40	n.r.
	1 & 2	Get up	0.57	0.43
Novel object test	1 & 2	Touch	n.r.	0.42
	1 & 3	Latency	n.r.	0.46
	2 & 3		n.r.	0.46
Voluntary human approach test	1 & 2	Latency	-0.44	n.r.
	1 & 3		0.47	0.48

Only acceptable reliabilities are listed; n.r. = not reliable



Farm effects

Test	Response Variable	Age		Cows per Employee		Feed rack or Neck rail	
		< 5.7 years	> 5.7 years	< 35	> 35	Feed rack	Neck rail
ADTF	Cows that can be touched [%]	n.s.	n.s.	n.s.	n.s.	46 ± 10	61 ± 7
ADTS	Cows that can be touched [%]	16 ± 13	40 ± 22	33 ± 23	25 ± 20	25 ± 23	30 ± 16
LPT	Cows that get up [%]	n.s.	n.s.	12 ± 14	17 ± 12	n.s.	n.s.
NOT	Latency (sec)	n.s.	n.s.	n.s.	n.s.	20 ± 19	9 ± 4

Fonts indicate: **P < 0.01**; P < 0.1; n.s. = not significant



Discussion

- Interobserver reliability is mostly good
 - Clarity of category definition
- Test-retest reliability is negligible in most cases
 - Individuality
 - Number of animals tested
 - Farm factors
- Farm factors influence some tests more than others
 - Additional assessment of animal features



Conclusion

- Behavioral categories need clear definitions
- LPT, NOT and VHAT carry at least some retest reliability
 - Additionally assess aspects of the tested animal
- Assessment of the HAR is less influenced by farm factors when carried out at the feeding area



Thank you for your attention!!

