



Faculty of Agricultural and
Nutritional Science

C | A | U

Christian-Albrechts-University
Kiel
Institute of Animal Breeding and Husbandry

Assessment of dairy cow personality

P. Hasenpusch, T. Wilder, A. Seidel, G. Thaller

Institute of Animal Breeding and Husbandry, Christian-Albrecht-University Kiel

74th Annual EAAP Meeting Lyon, France

August 26th – September 1st, 2023

Session 67, Abstract number 42140, phasenpusch@tierzucht.uni-kiel.de

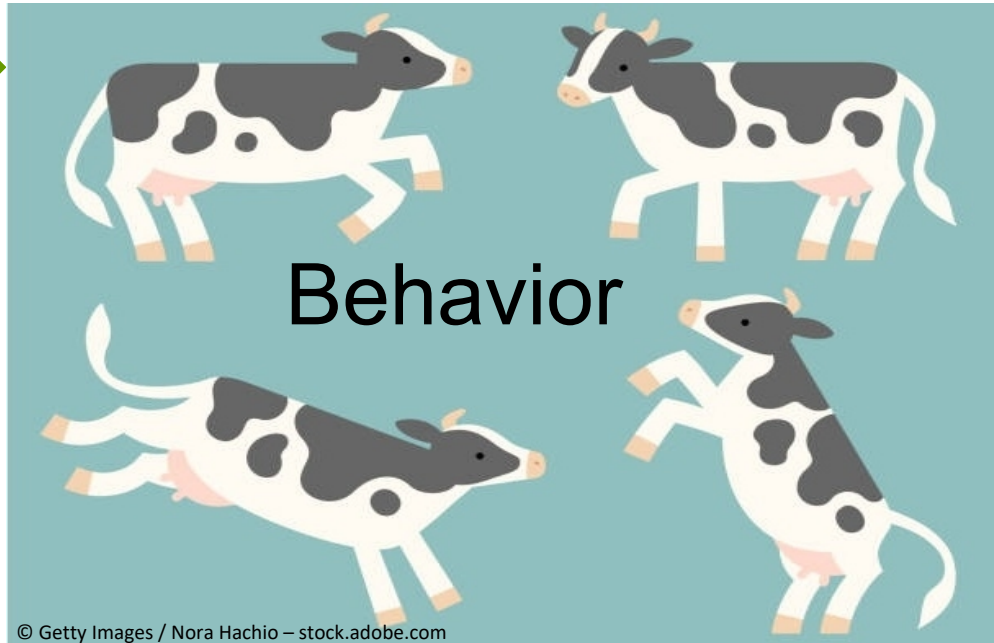




Introduction

Personality

Consistent across
time and contexts



Welfare





Introduction

Assessment

Personality



© Getty Images / Nora Hachio – stock.adobe.com

Past

- Behavioral tests
- Time consuming
- Observer bias

Future

- Automated identification of personality traits

Automated identification needs to be validated with reliable methods.



Materials & Methods

Novel object test & forced human approach test

	Day 1	Day 2	Day 3	Day 4	Day 5
Morning	10 cows	10 cows	10 cows	10 cows	10 cows
Afternoon	10 cows	10 cows	10 cows	10 cows	10 cows

100 Cows



Materials & Methods

Novel object test & forced human approach test

Time\Day	Day 1	Day 2	Day 3	Day 4	Day 5
Morning	10 cows	10 cows	10 cows	10 cows	10 cows
Afternoon	10 cows	10 cows	10 cows	10 cows	10 cows

100 Cows

October 2022

February 2023

June 2023

78 Retests



Materials & Methods

Novel object test (NOT)

Measured variables

- Latency to
 - Approach (1 meter)
 - Contact the object
 - Vocalize
- Number of
 - Contacts
 - Vocalizations
- Duration of every contact with the novel object
 - Mean, total and standard deviation (sd) of every cow's contact duration used in further analysis





Materials & Methods

Forced human approach test (FHAT)

- Three approaches
- Measured variable
 - Minimal distance between human and animal at every approach





Materials & Methods

Data Preparation

- To account for testing period and daily temperature
 - Split Data into 6 groups (3 testing periods x 2 testing sessions per day)
 - Subtracted the group mean from individual values
- Log transformation for left sided variables to achieve normal distribution



Materials & Methods

Principal component analysis (PCA)

- Conducted a principal component analysis on first time tested cows (222)
- Named principal components according to crucial variables
- Principal component are a linear combination of measured variables
 - Linear combination and measured variable produce trait score
 - Used linear combination of variables that form a principal component to calculate trait scores for the 78 retests



Materials & Methods

Consistency analysis

- 78 cows with test and retest scores
- Intra class correlation (ICC)
 - How consistent are the measurements?

ICC value	Interpretation
1	Perfect
1 – 0.7	Good
0.7 – 0.4	Acceptable
0.4 – 0.0	Unacceptable

- Calculated the differences between test and retest scores for each animal and trait
 - Which cows differ highly in between their test and retest score?
 - In which traits do they differ?



Results

Principal component analysis (PCA)

Test	Component	Crucial variables	Explained variance
NOT	Explorative	Contact number Contact duration (mean, total, standard deviation)	43 %
	Bold	Approach the object (latency) Contact the object (latency)	25 %
	Sociable	Vocalization (latency, number)	21 %
FHAT	Trusting	Minimal distance to the animal in all three approaches	75 %



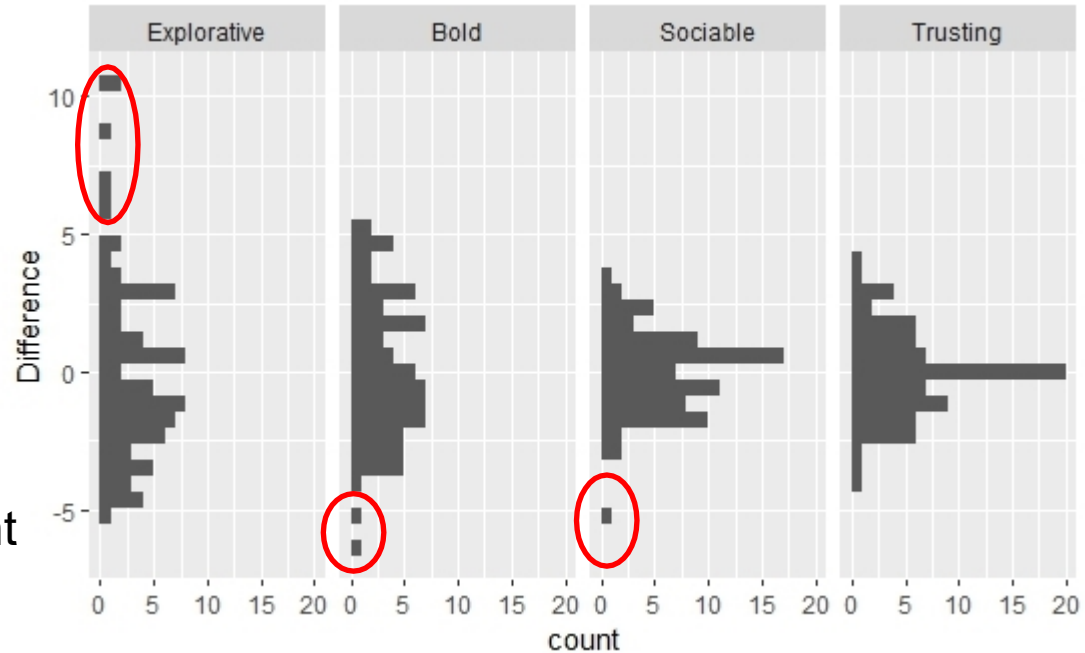
Results

Consistency analysis

Trait	ICC ¹
Explorative	0.61 ± 0.18
Bold	0.60 ± 0.17
Sociable	0.62 ± 0.18
Trusting	0.61 ± 0.18

¹Mean ± standard deviation

- All traits are acceptably consistent





Results

Consistency analysis

Trait	ICC ¹	Outlier	Mean Difference
Explorative	0.61 ± 0.18	6	0.05
Bold	0.60 ± 0.17	4	0.03
Sociable	0.62 ± 0.18	1	-0.04
Trusting	0.61 ± 0.18	0	-0.05

¹Mean ± standard deviation,



Discussion

- Comparable studies
 - Twice as many cows tested
 - Similar trait names
 - Crucial variables differ partly (explorative)
 - Results of this study are more consistent
 - Age of tested animals
 - Novel arena
- Consistency
 - ICC stable at herd level but uncertain at individual level
 - Higher certainty needs more repetitions
 - Recognition, age and adaption



Conclusion & Outlook

- High certainty for extracted traits (number of animals & in line with literature)
- Personality traits can be measured in familiar environment
- Measured variables are acceptably consistent
- Next step: Analyze data of indoor positioning system and find relations with observed traits



Thank you for your attention!



With support from



Federal Ministry
of Food
and Agriculture

Project manager



Federal Office
for Agriculture and Food

by decision of the
German Bundestag