Welfare assessment system

Network for production systems, technology and management

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Welfare assessed using animal-based indicators

- **Introduction**
  - Increased requirements for resources within the barn
    - Length of cubicles,, aisle width
  - However, no guarantee for better animal welfare
    - Large variation between herds – depending on the farmers management of the herd.
  - Can animal-based welfare indicators be a better way to evaluate true animal welfare?

- **Purpose**
  - The purpose of the project is to improve the assessment of animal welfare ni Danish dairy herds, using animal-based welfare indicators, in stead of only focusing on minimum requirements of the recourses of the barn

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Dyrebaserede data

Ressourcedata
Sengedimensioner
Areal/ko
Belægningsgrad
Længde af ædeplads
Længde af vandkar

Registerdata
Dødelighed
Sygdomsbehandlinger
Kælvningsalder

Stalddata
Halthed
Renhed
Skader
Rejse sig adfærd
Flugtafstand

Sensordata
Daglig mælkeydelse
Ædeadfærd
Drøvtygning
Aktivitet
Liggeadfærd
Vægt

Sammenvejning

Målt dyrevelfærd

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Which method to create animal-based index?

- Method which:
  - describes animal welfare, based on what the cow experiences and expresses and not only the resources of the barn
  - is practically applicable – evaluation of the animal welfare must not be too time consuming
  - however, it represents a snapshot of the animal welfare in the herd

- Output
  - A model weighing together indicators that represents animal welfare from the cow's perspective
  - A model that creates an animal welfare index for each herd

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Which indicators to include and how to weight indicators?

- Group of experts with input to which indicators to use
  - Good feeding, Good housing, Good health, Appropriate behavior, Other

- Scoring and choosing the indicators with highest scores
  - Register-based indicators from the Danish Cattle Database (KVDB)
  - Animal-based indicators
  - Resource-based indicators

- Constructing the model based on method from Otten et al., 2016
  - Animal-based indicators
  - Register-based indicators (KVDB)

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Animal based indicators

- Avoidance distance
- Placement within cubicle
- Rising behavior
- Collisions with inventory during rising
- Skin alterations
- Body condition score
- Hygiene
- Hair coat
- Lameness
- Overgrown claws

- Assessed on a scale of 0 - 2
  - 0 – Best
  - 1 – Moderate
  - 2 - Severe

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Resource-based indicators

- Not included in the welfare index – describe the resources of the barn

- Registrations
  - Cows per m2
  - Number of cows per cubicle
  - Water supply (cleanliness and cows per m2)
  - Aisle width
  - Length of cubicle
  - Number of cows per cow brush
  - Floor type and bedding

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Registrations in commercial dairy herds

- Data from 60 herds, visited in 2022 and 2023
  - Loose-housing system and no grazing or organic herds with large breeds
  - Herds randomly selected within 3 groups, based on resource-based measures
  - Resource-based measures
    - Aisle with
    - Length of cubicles

- 3 groups:
  1. Complies with legislation on chosen resource-based measures (n=18)
  2. Complies with Danske anbefalinger 2001 on chosen resource-based measures (n=14)
  3. Does not comply with Danske anbefalinger 2001 or legislation on at least one of chosen resource-based measures (n=28)

- Herd recordings were performed by 5 trained observers

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App for registering scores

- Avoidance distance

Opret ny frygtsomhedstest

Ny registrering af frygsomhedsscore

* Name

Anja

Sektion nr.

1

CKRnr.

99999

Frygtsomhedsscore

1. Koen undviger mellem 10 cm - 0,5 m

Gem data

Staldregistrering

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Ny registrering på enkeltdyr

Koens placering i sengebås?

0. Koen ligger korrekt i sengebås

Hvordan er koens rejse-sig adfærd?

0. Pause på max. 3 sekunder på forknæ

Kollisioner med inventar eller nabodyr?

0. Ingen kollision med inventar eller nab

Hvordan er koens almene tilstand?

0. Upåvirket

Hudforandringer?

1. Samlet areal under én håndflade

Huld?

0. Normal

Renhed?

Indsend data

Animal based indicators

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Data from Danish cattle database (KVDB)

- Treatment of mastitis/other disorders
- BHB
- Somatic cell count
- Years of milking
- Lean cows at slaughter
- Rate of new cases of SCC over 200.000
- Still born
- Calf mortality
- Cow mortality

- Abattoir remarks
  - Fractions
  - Peritonitis
  - Liver abscesses
  - Lung disorders
  - Trykninger???????

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Model for animal welfare index

Indeksberegning for Kvægdatabaseparametre

$$AWI = \sum_{j=1}^{k} N_j W_j$$

N er score af parameter på Kvægdatabasen i forhold til opgørelse på landsniveau
W er vægtningen baseret på ekspertvurderinger

Indeksberegning for dyrebaserede indikatorer

$$AWI = \sum_{i=1}^{k} (M_i MW_i + S_i) W_i$$

M og S er prævalens af moderat (score 1) og svær (score 2) for de enkelte dyrebaserede parametre
MW er vægtningen for ekspertvurderinger for moderate
W er vægtningen baseret på ekspertvurderinger

Otten et al., 2016

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Model for animal welfare index

- Model adapted from Otten et al., 2016
- Register-based indicators
  - Sum of (score x weight) for all indicators
    - Score = 0 when the individual result for each indicator ≥ 25 % of the best herds
    - Score = 0.33 >25 – <75 %
    - Score = 0.67 <75 – 90 %
    - Score = 1 ≥ 10 % worst herds

- Animal-based indicators
  - Sum of ((prevalence of score 1 and 2 x weight ratio) x weight) for all indicators

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Presentation of animal welfare index

- Index presented as:
  - Deviation from 100 - below animal welfare worse and above 100, better than average

- Animal-based indicators and register-based indicators are weighted equal

- Animal-based and register-based indices are standardized to compensate for the unlikelihood of herds only scoring 2, on one or more animal based indicators

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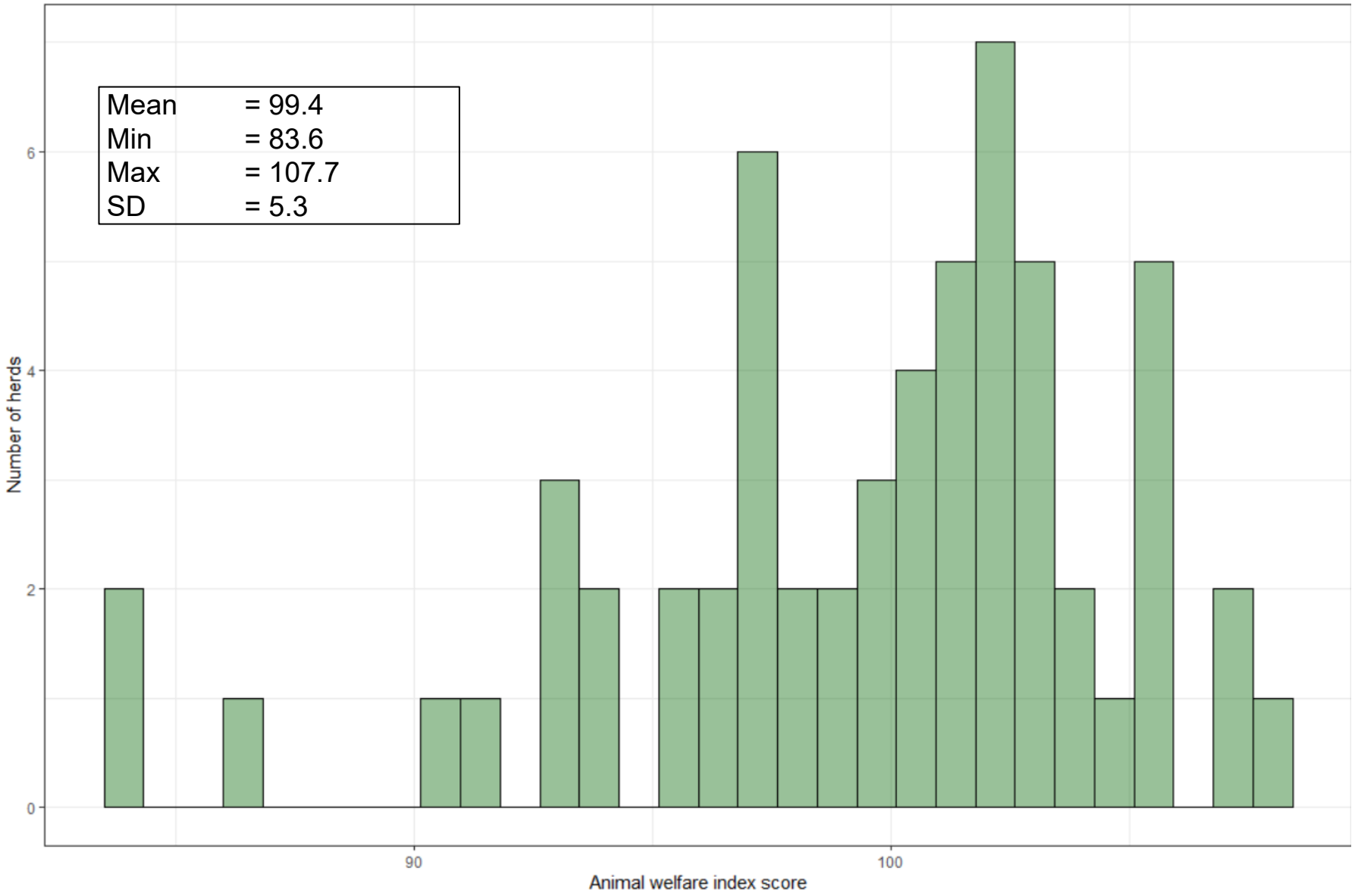
Animal welfare index



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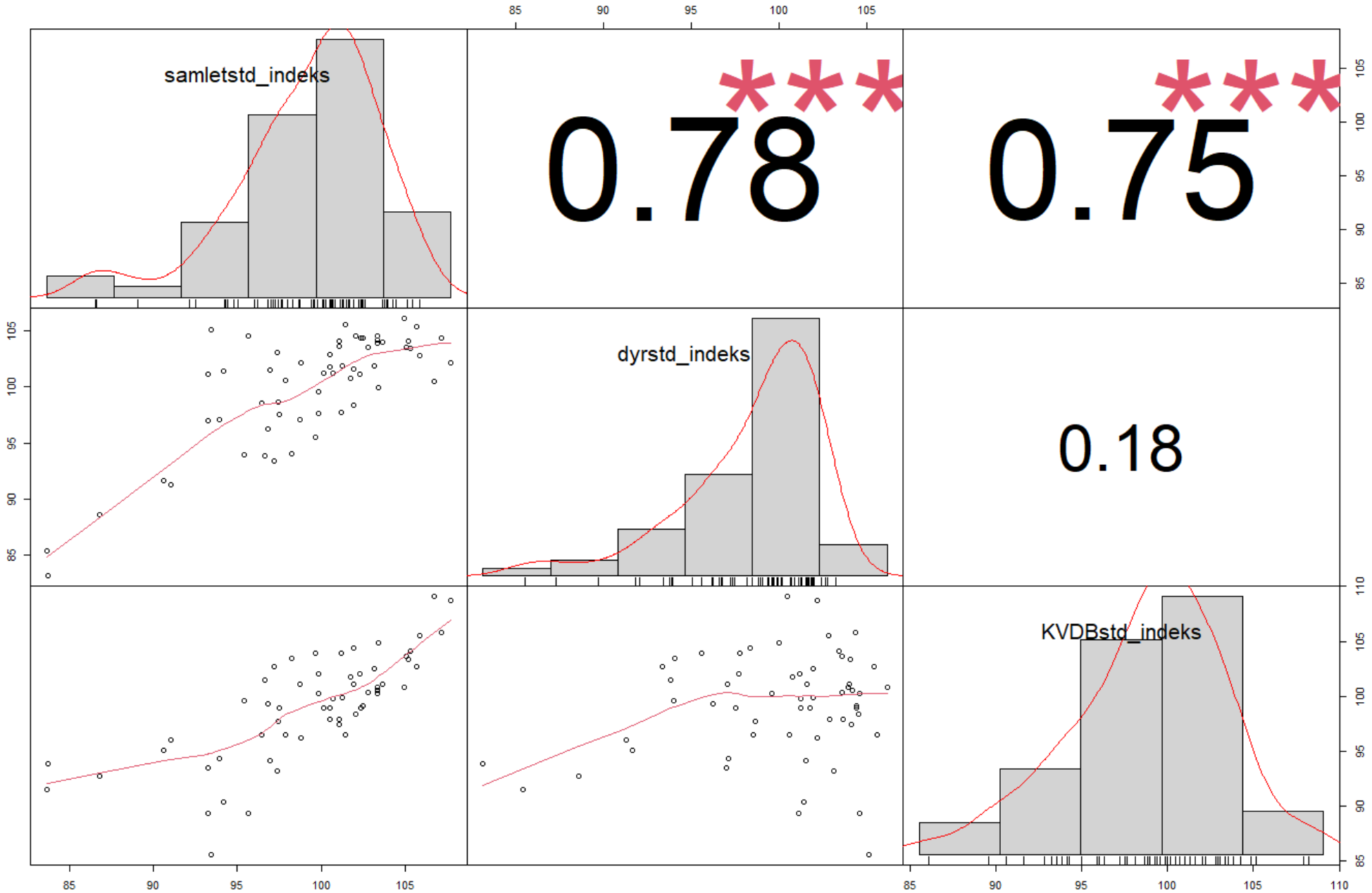

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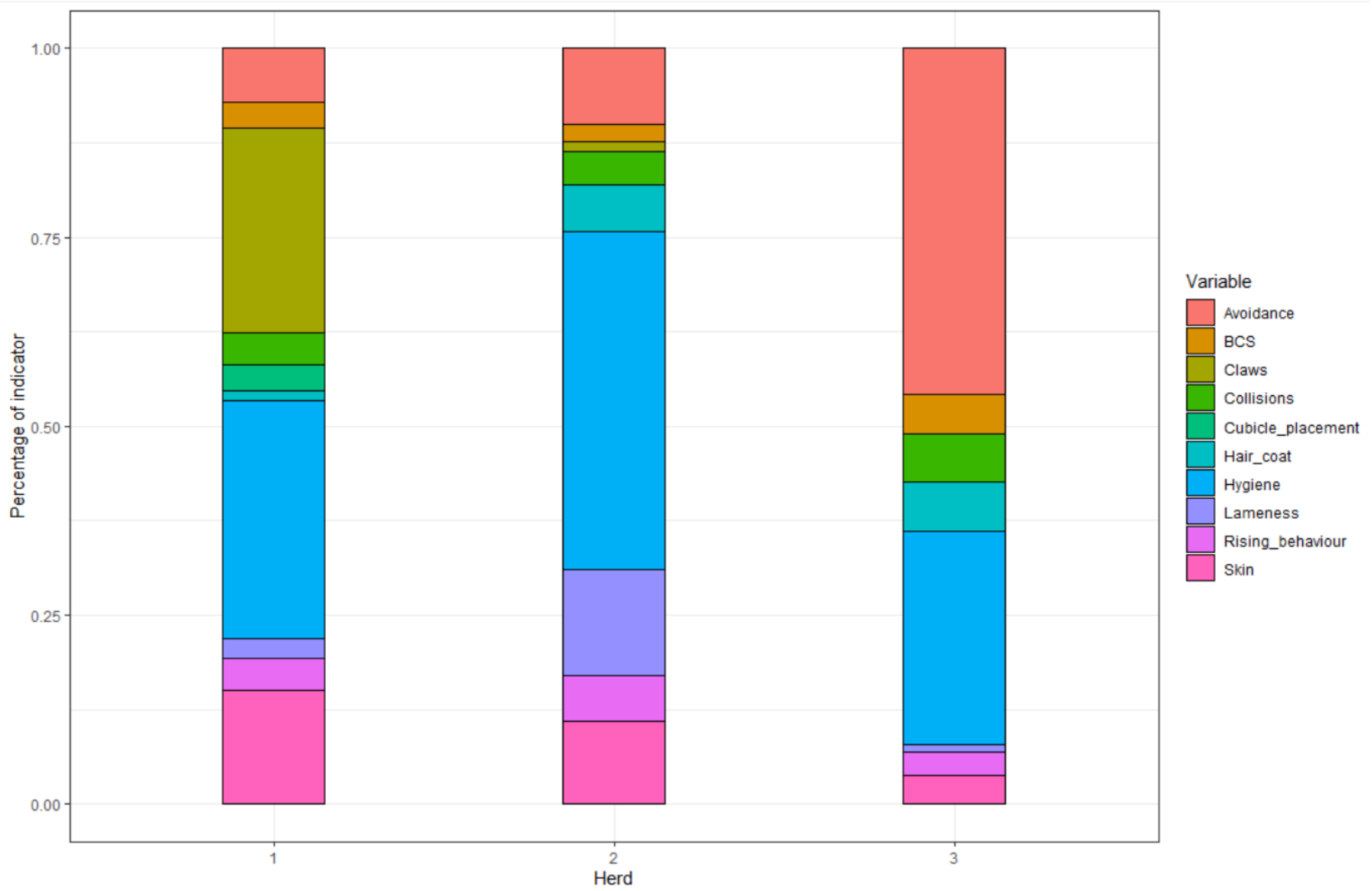
Scores for individual animal-based indicator - example



Outcome from herds

Information to the farmer on which animal-based indicator the scores was high

Apply changes in management to improve specific areas of animal welfare

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Further analysis

- No validation – however, do the observers agree with the animal welfare index?
- How does the animal welfare index relate to the resource-based indicators?
- Convert information within the animal welfare index to the farmers
  - Individual indicators
  - Group indicators to specific management areas
    - Health, Feeding, Hygiene…

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