

Animal welfare: definition, measurement and use in the context of dairy herd improvement

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Standards to dairy farms around the world





Australian Dairy Farmers

Enhancing livelihoods Improving wellbeing Reducing environmental impact

A Strategic Framework for keeping the Australian dairy industry in business for the long term

Standards to dairy farms around the world

 Whole Food Market: 5-Step[®] Animal Welfare Rating Standards en coll./

• BC SPCA

LELIFE OF DAIRY CA

BLELIFE OF DAIRY CAT Standards to dairy farms around the world WTO mandated the OIE to WORLD ORGANISATION FOR ANIMAL HEALTH Protecting animals, preserving our future develop animal welfare **Terrestrial Animal** recommendations for Health Code international commercial trade

2015

Assessing dairy welfare is common place

- Improving welfare, and overall dairy farming sustainability by enhancing profitability and reducing environmental impact
 - Industry or stakeholder-led initiatives

Assessing dairy welfare is common place

- Improving welfare, and overall dairy farming sustainability by enhancing profitability and reducing environmental impact
 - Industry or stakeholder-led initiatives
 - Earning public trust i.e. consumer assurance programs
 - 'Doing the right thing'
 - Metrics to support
 - Verification system
 - Reaching targets
 - Progress overtime
 - Communication

Fraser et al., 1997 AW 6:187; Fraser, 2008 Acta Veterinaria Scandinavica 2008, 50(Suppl 1):S1

Type of animal welfare indicators

- Risk factors
- Outcome measures

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 - Housing-based
 - E.g. density, stall size, etc.
 - Management-based
 - E.g. hoof trimming routine, pasture access, etc.

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- Outcome measures
 - 'true' measure of welfare i.e. how housing/management affect welfare status

Typical outcome measures

- Visual evaluation
 - Lameness
 - Injuries
 - Hygiene
 - Body condition

Numerical scoring charts

SCORE 0

SCORE 2

SCORE 3

No Swelling. No hair is missing, some hair loss or broken hair.

No Swelling or minor swelling (< 1 cm). Bald area on hock Medium swelling (1-2.5 cm) **and/or** lesion on bald area. Major swelling (> 2.5 cm). May have bald area/lesion.

- How to make sure we are measuring what we are intending to?
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#1 Validation of scoring system

- #2 Development of training program
- #3 Ensuring high repeatability of assessors

Numerical scoring charts

- Validation of a method to assess lameness in tie-stall herds
 - Lameness prevalence at the stall highly correlated with 'gold standard' gait scoring (r=0.88)

Numerical scoring chart

 Development and implementation of a training program to ensure high repeatability

| d1 - d4 | | d5 | d6 | d7 | |
|-----------|--------------|--------------|--------------|----------------------|--|
| am | pm | | | | |
| Classroom | Barn | Classroom | On Farm | On Farm | |
| -SOPS | Live Scoring | - Data Input | Live Scoring | Live Scoring n=20 | |
| -CD ROM | n=20 | | n=20 | | |
| -Photos | | | | | |

• All trainees achieved target repeatability K_w>0.6

Vasseur et al. 2013 JDS 96:4725; Gibbons et al. 2012 AW 21:379

Numerical scoring charts

- Ensuring high repeatability of assessors
 - Require continuous checking

About the importance of training

Higginson Cutler et al. 2017 JDS 100: 9871

- Truly representative of the herd status i.e. reliable estimates of herd prevalence
 - How many days, how many cows, etc.
 - Correcting for effect of season, milk production, DIM, etc.

Time and time again

- Visual evaluation require
 - Long period of data collection on farm
 - Days (if the farm is big), multiple visits
 - Training and follow-up checks of assessors to maintain repeatability
 - Time = \$\$\$ = animal care assessment very costly to implement
 - Choices need to be made... but be careful that it is not in detriment to quality of the assurance program
 - Auto-evaluation every 2nd year e.g. proAction[®] initiative (Canada)

Future avenues?

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• Automation

App for clinical scores

- **Body Condition Scoring**
 - Elanco Animal Health BCS guidelines
 - based on Wildman (1982)

THE 5-POINT BODY CONDITION SCORING SYSTEM

Body condition scoring (BCS) refers to the relative amount of subcutaneous body fat or energy reserve in the dairy cow. BCS is an important management tool for maximizing milk production and reproductive efficiency while reducing the incidence of metabolic and other peripartum diseases.

Most body condition scoring systems use a 5-point scoring method with quarter-point increments

This system concentrates its accuracy toward the mid-range scores (2.50 to 4.00), which includes most cows. This mid-range is the most critical for making management decisions. Scores outside this range indicate significant problems (1.00 denotes a very thin cow, while 5.00 indicates an excessively fat cow). Exact scoring of BCS extremes is less critical. BCS is not an indication of energy balance. You should monitor changes in body condition over time.

Begin by viewing the cow's pelvic area from the side

Check the line formed from hooks to the thurl to the pins to determine if it is angular (V-shaped) or crescent (U-shaped). This is the most difficult part of the scoring process, especially if the cow is near the 3.00 or 3.25 score.

< 3.00: Flattened V

If the line forms a flattened V, then BCS ≤ 3.00. Move to the rear of the cow to view the hooks, then pins and short ribs to determine BCS to the precise quarter point. Use the quide drawings below.

≥ 3.25: Flattened U > 4.00: Straight line Turn this page over for more information.

No fat pad on pins between tip

2.00: Corrugations visible three-fourths of the way from tip to spine

Hooks angular

on pins

More prominent padding

Hooks rounded

on point of pins

< 2.00: Thurl prominent Saw-toothed spine

Pins and hooks angular

Fat pad slightly palpable

Visible corrugations halfway and spine of short ribs

App for clinical scores

- Body Condition Scoring
 - Elanco Animal Health BCS guidelines
 - based on Wildman (1982)
 - App for BCS

| 1 | Applications | Catégories 🗸 | Accueil | Au sommet des | palmarès 1 | No |
|----------------------|--------------------------------------|--------------|------------------------|--------------------------|-----------------------------|----|
| | Mes applications Magasiner | | | BCS Co | wdition | |
| J F C | Jeux Famille Choix de l'équipe | | 5 | Bayer HealthCare | AG Médecine | b |
| | | 🥁 Cow List | (±) | Cow Details | ₩⊿∎ 18 | 24 |
| Mon activité Play | | 9 Petra | 2.5 | EDIT COW ANNI | KA 24 | |
| Ma liste de souhaits | | 24 Annik | ca 4.0 | Annika | | |
| U | tiliser un code | 45 Beat | 3.0 | COW NUMBER | DATE OF BIRTH 02/19/2011 | |
| A | cheter une carte-cadeau | 65 Bonn | y 1.0 | CALVING NUMBER | LAST CALVING | |
| G | uide des parents | 78 Erika | 2.0 | BREKO Minihota Cattle | HERD | , |
| | | 105 Don | s 4.25 | CURRENT BCS | 1. | |
| | | 365 Hel | na 3.0 | Fat | (4.0) | 1 |
| | | | | ABORT | SAVE | _ |

App for clinical scores

Automatic classification of skin injury

• Machine learning techniques using 2,364 2D-images

Activity monitor

- More and more common on commercial dairies
 - Used for heat detection, feeding activity, rumination, etc.

Activity monitors to **predict** welfare status?

- A large amount of data generated from those various technologies
 - Used for <u>early detection</u> of health/welfare issues at the <u>cow level</u>
 - Frequency of visits at the AMS or feeders¹

Activity monitors to predict welfare status?

- A large amount of data generated from those various technologies
 - Used for early detection of health/welfare issues at the <u>cow level</u>
 - Frequency of visits at the AMS or feeders
 - Great potential to be used to predict welfare status at the <u>herd level</u>
 - However, technologies do no 'talk to each other' i.e. different companies, different software
 - Data are stored for a limited period and stayed at the farm
 - Future research should focus on valuation system of those data

Future avenues?

- Automation
- Early indicator/predictor of welfare status
 - Remote indicators

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A remote assessment tool for farm animal welfare through dairy herd improvement data

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Remote predictors of welfare status?

- Remote-based reporting could help to 'flag' herds, prior to do a costly on-farm visit animal welfare assessment
 - Sensitivity + specificity to be improved

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- Discriminating between good vs. poor welfare status
 - Links between protective practices (in management, genetics, etc.) and cow longevity and herd profit
 - At all stage of animal life (including rearing period)
 - Herd vs. cow level
 - Conditions of use
 - Which data require? How to calculate predictors? How do they evolve in time?

Future avenues?

- Automation
- Early outcome measure of welfare
 - Remote indicators
 - Performance and health data (DHI database)
 - Predicting cow welfare status in milk using biomarkers

• To date, no research in the world led to the development of biomarker to detect cow welfare status easily detectable in a milk sample.

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 - sensitive and specific to cow health issues <u>but not overall welfare</u> <u>status</u>
 - invasive, technically demanding and expensive
 - BHBA in milk correlated positively with that in circulation
 - Denis-Robichaud et al. 2014 JDS 97:3314
 - Milk could be used to measure biomarkers of cow health

- Objectives of current research project:
 - Develop precision markers that could be routinely recorded (e.g. milk samples collected by milk recording system DHI) to detect herds and cows within a herd experiencing lower level of welfare and health.

Summary

- Emphasis on AW is increasing and AW assessment in place in most part of the world – either industry or stakeholder led
 - Farmers required to achieve high level of AW and health
 - In this context, the development of reliable indicators for assessing and monitoring AW status is of high importance

Summary

- Currently available indicators to assess cow welfare status are either qualitative and/or require
 - On-farm assessment and monitoring (e.g. BCS)
 - Technology not available in most farms (e.g. measuring resting time using electronic data loggers)

Summary

- Future avenues regarding outcome measures of welfare are
 - Automation
 - behavioral + performance data (e.g. frequency to access feeders and AMS)
 - could be used as early indicators of health/AW issues
 - more work to be done on how to use this huge amount of data (the 'big data')
 - » Technologies that do not talk to each other
 - » Sorting/data mining

- Future avenues regarding outcome measures of welfare are
 - Automation
 - Remote indicators, especially DHI and health data, 'flagging' herds with issues
 - Identify best predictors,
 - at each stage of animal's life
 - at herd and individual level

- Future avenues regarding outcome measures of welfare are
 - Automation
 - Remote indicators, especially DHI and health data, 'flagging' herds with issues
 - It would make sense to be able to assess dairy cow welfare status in a simple milk sample... but we're not there yet!

Thank you! Questions?

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