COMPASSION in world farming Food Business

Measuring Welfare in Dairy Cows

Comfort **Mobility** **Mastitis**

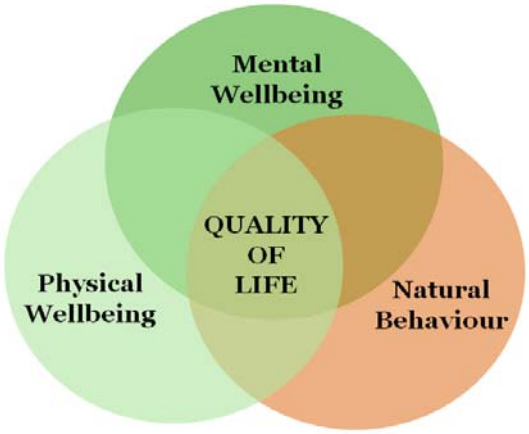
Culling **Body Condition** **Behaviour**

CONTENTS

INTRODUCTION

WHAT IS ANIMAL WELFARE?

Animal welfare can be a challenging concept to understand because it has no single definition and can mean different things to different people. Welfare generally refers to "the quality of an animal's life as it is experienced by an individual animal"[1]. A holistic approach to animal welfare encompasses not only the health and physical wellbeing of the animal, but also the animal's psychological wellbeing and ability to express natural behaviour[2] (below left). Welfare can be described as high if animals are fit and healthy, feeling good and free from suffering, as described by the Five Freedoms[3] (below right).



THE FIVE FREEDOMS

1. **Freedom from hunger & thirst** by ready access to fresh water & a diet to maintain full health & vigour
2. **Freedom from discomfort** by providing an appropriate environment including shelter & a comfortable resting area
3. **Freedom from pain, injury or disease** by prevention or rapid diagnosis and treatment
4. **Freedom to express normal behaviour** by providing sufficient space, proper facilities & company of the animal's own kind
5. **Freedom from fear & distress** by ensuring conditions & treatment which avoid mental suffering

HOW CAN WELFARE BE MEASURED?

Traditionally, welfare has been assessed by the resources provided (inputs) and by assuming good resources ensure good welfare. While this is the only way to measure some parameters (e.g. shelter, pasture access), outcomes utilise animal-based measures. Outcome measures are a subjective way to assess the actual state of the animals[4]. Scoring outcomes regularly enables existing welfare problems to be identified, targets to be set and a unique improvement programme to be developed for a farm. Using a combination of inputs and outcomes is the best approach to measure welfare.

WHICH OUTCOMES SHOULD BE USED?

This table shows six key outcomes which should be scored for dairy cows. They incorporate physical wellbeing, mental wellbeing and natural behaviour components of welfare. Different welfare outcome measures exist for dairy cows, such as scoring injury and cleanliness, incidence of broken tails, damage from dehorning and longevity (as cows that live longer generally have better health). However, for a basic starting point to cover a range of key welfare issues, six key outcomes should be recorded - see table below. This guide describes these outcomes, information on which scoring method to use, suggested targets, what action should be taken following scoring and where to find further information,

Outcome Measure	Welfare component		
	Physical Wellbeing	Mental Wellbeing	Natural Behaviour
1. Mobility	✓		✓
2. Culling	✓	✓	
3. Mastitis	✓	✓	
4. Body Condition	✓		
5. Comfort		✓	✓
6. Herd behaviour		✓	✓

SELECTED OUTCOME MEASURES

1. MOBILITY Mobility scoring assesses the prevalence and severity of lameness. Lameness is a serious welfare issue causing pain, reduced movement, body condition, milk yield, feed intake and fertility; as well as increasing the likelihood of culling. In Europe, the level of lameness has not reduced for 20 years[5]. Producers are generally only aware of 1 in 4 lameness cases, which highlights the need for regular and standardised scoring. The DairyCo mobility scoring system is easy to use and can be incorporated into a farm's routine.

2. CULLING Culling refers to the removal of cows from the herd by euthanasia, sale for slaughter or disposal of cows that died on farm. Culling rates are estimated at 22-25% in the UK, 35% in the USA and are similar in Europe (27-34% in the Netherlands and 27% in Ireland)[6]. Major causes of culling include infertility, mastitis, lameness, metabolic disorders, age and poor milk production. Recording culling is important to identify the causes of why cows leave the herd, particularly as many leave prematurely (involuntary culling).

3. MASTITIS Mastitis is the inflammation of the mammary gland and udder tissue, and is the most common and costly disease affecting dairy cows. It is usually caused by an infection due to environmental pathogens entering the teat canal. In 2004-5 in the UK, nearly 25% of farms had more than 100 cases per 100 cows per year, and 47-65 cases per 100 cows per year was typical[7]. Monitoring mastitis is crucial to effectively control the disease.

4. BODY CONDITION Body condition scoring is an important tool to assess body fat reserves, which indicate the energy balance of the cow. This in turn should inform feeding and management decisions. The Penn State Scoring system can be used to ensure each cow has the right condition for the stage of her lactation cycle. It is useful for management at crucial stages, including pre-calving and the dry period. The right body condition is crucial for easy calving and to avoid excessive weight loss or gain, which leads to poor production, metabolic disorders and reduced welfare.

5. COMFORT Comfort scoring involves using a stall use index, knee test and observation of behaviour to assess the comfort of lying areas in housing. Comfort is important to dairy cows because it is related to physical health, including rates of lameness, and expressing natural lying behaviour. Comfort is also important to producers because improved comfort has been associated with increased milk yield.

6. HERD BEHAVIOUR Scoring herd behaviour gives an objective assessment of stockmanship quality. Flight distance is the scoring method used to record how close a person can approach before a cow turns away. The score gives an indication of the cow's internal emotional state, as cattle that are fearful of people or experiencing pain or stress turn away sooner; calm and relaxed cattle allow people to get closer. Whilst cattle's reaction to people is affected by temperament, the score can be used as an overall indicator for the herd to assess the quality of the human-animal relationship.

MOBILITY

DairyCo Mobility Score[8]

SCORE	DESCRIPTION	TARGET
0	"Walks with even weight bearing and rhythm on all four feet, with a flat back. Long, fluid strides possible"	5% or less of the herd at score 2 or 3
1	"Steps uneven (rhythm or weight bearing) or strides shortened; affected limb or limbs not immediately identifiable"	
2	"Uneven weight bearing on a limb that is immediately identifiable and/or obviously shortened strides (usually with an arch to the centre of the back)"	
3	"Unable to walk as fast as a brisk human pace (cannot keep up with the healthy herd) and signs of score 2"	

HOW TO SCORE

- Mobility scoring should be carried out frequently to monitor and reduce lameness
- Scoring should be performed as cows walk continuously in a straight line on a flat, even surface
- Scoring is more valid if performed by an independent individual, e.g. a tractor driver
- Score the whole herd monthly, or at least four times per year
- Record each score to cow ID number

ACTION TO TAKE

- Set regular targets based on the farms' recorded score
- Lame cows (score 2 or 3) should be promptly diagnosed and treated, as early detection and treatment improves chances of recovery
- In order to prevent, treat and reduce herd lameness, a holistic, whole-farm approach is needed to manage lameness

Foot Trimming

- Lame cows or those with overgrown hooves should undergo corrective foot trimming, using Dutch 5-step trimming (see 'further resources')
- Healthy cows need their feet inspected 2-3 times per year and to be trimmed only when necessary
- Correct claw length varies between individuals, ages, breeds and different claws[9]

Foot Baths

- Footbaths can help prevent and treat lameness, but must be kept clean to be effective. They can be used daily after milking, depending on which chemical is used

Hygienic Environment

- Hooves must be kept clean and dry to prevent lameness[10]. Indoor flooring must be kept clean and dry, with comfortable beds to encourage lying
- Rubber matting in indoor housing improves comfort. Too much or poor quality rubber is detrimental, therefore it should be good quality, slip-resistant and used specifically in standing areas, such as alleyways and at the feed trough
- Access to pasture can help lame cows recover[11]

CULLING

Recording Culling

SCORE	DESCRIPTION	TARGET
Replacement rate	Percent of herd replaced per year	<15%
Average no. lactations of the herd	Average number of lactations of cows at culling, each year on the farm	>5 lactations per cow

HOW TO SCORE

- To monitor and identify problematic causes of culling, details of culling should be recorded. This includes the number of cows that were euthanised on-farm, died on-farm and sent for slaughter
- Causes of the cull-cow leaving the farm, the number of lactations at cull (average per year) and the replacement rate (% of herd per year) should also be recorded

ACTION TO TAKE

- Record number of cows culled for mastitis, lameness, fertility and production reasons
- The major causes of culling identified from scoring need to be acted on when the targets for number of lactations and replacement rate are not met

Overall Health

- Investment to reduce the causes of mortality is beneficial in the long-term and reduces the need for culling
- Overall herd health should be improved through optimising yield and feed intake, and by providing good housing, veterinary care and gentle stockmanship

Humane Endpoints

- There is often a trade off between the best economic decision for a farmer and the humane endpoint for the cow when culling should occur
- Culling should not be delayed when an individual cow's welfare is at risk
- Cattle that cannot be successfully treated and are unfit for transport and handling should be humanely euthanised on-farm by a qualified person

MASTITIS

Recording Mastitis

SCORE	DESCRIPTION	TARGET
Incidence Rate	Number of treatments per 100 cows per year	<10%
Reoccurrence Rate	Number of cows that become re-infected per year	<10%
Herd Average (Bulk) SCC	Somatic cell count (SCC) is the number of somatic (white blood) cells per millilitre milk, which increases in response to mastitis-causing pathogens and an infected udder. SCC <150,000 is normal, >200,000 indicates infection in at least one quarter of the udder and 300,000 indicates significant infection	100-199

HOW TO SCORE

- Record somatic cell count (SCC) at an individual level when possible (e.g. if using an automatic milking system), or record bulk SCC of the herd at least weekly. Bulk SCC increases due to several subclinical cases (cows not showing overt symptoms) or one or more clinical cases (cows showing symptoms) in the herd
- Mastitis symptoms to look for include udder abnormalities (e.g. swelling, heat, hardness, redness, or pain), milk irregularities (e.g. flakes, clumps, clots, pus or watery appearance), behaviour changes (e.g. reduced appetite, reduced mobility), reduced milk yield, increased temperature, sunken eyes, diarrhoea and dehydration[12]
- Record cases of clinical and subclinical mastitis to cow ID number. Record which quarter is affected, clinical symptoms including date observed, and all treatment details, including administration date, diagnosis from bacteriology and response to treatment[13]

ACTION TO TAKE

California Milk Test

- If an increase in SCC is recorded, use a California milk test to identify infected individuals (see 'further resources')
- This test can identify which quarter (teat) is contributing to raised SCC and can identify subclinical mastitis. Milk from each teat is mixed with a coloured reagent in separate quarters of a dish. If the mix turns thick and stringy, it shows a positive result which requires treatment
- This test should also be performed routinely 2-4 times per year to identify subclinical mastitis

Treatment

- A milk sample culture is needed to diagnose mastitis in individuals
- Treatment should be prompt, and most appropriate for the symptoms. Chronically infected cows (with a persistent infection or repeated infection with few symptoms in-between) should be humanely culled to prevent unnecessary suffering and to avoid infecting the rest of the herd
- Mastitis is a painful condition. Non-steroidal anti-inflammatory drug (NSAIDS) can reduce the associated pain and should always be used for clinical cases of mastitis. Antibiotics should be given that are appropriate for the bacteria associated

Bactoscan Test

- This test identifies which bacteria are present in milk and is routinely performed by milk buyers
- Results of this test highlight the source of infection from the farm environment, and can be used to help reduce future incidence (e.g. cleaner beds, altered parlour routine)

Prevention

- A hygienic farm environment is the key to preventing mastitis, particularly in the milking parlour (see 'further resources') and lying areas in housing

BODY CONDITION

Body Condition Scores[14]

SCORE	DESCRIPTION	STATE
5	"*Tail head* – buried in fatty tissue, pelvis impalpable even with firm pressure"	Grossly Fat
4	"*Tail head* – completely filled and folds and patches of fat evident. *Loin* – cannot feel processes and will have completely rounded appearance"	Fat
3	"*Tail head* – fat cover over whole area and skin smooth but pelvis can be felt. *Loin* – end of horizontal process can only be felt with pressure; only slight depression in loin"	Good
2.5	-	Ideal
2	"*Tail head* – shallow cavity but pin bones prominent; some fat underskin. Skin supple. *Loin* – horizontal processes can be identified individually with ends rounded"	Moderate
1	"*Tail head* – deep cavity with no fatty tissue under skin. Skin fairly supple but coat condition often rough. *Loin* – spine prominent and horizontal processes sharp"	Poor

HOW TO SCORE

- The Penn State University method, which scores to the nearest 0.25, is the recommended scoring system (see further resources)
- Scoring is best carried out while cows are at the feed bunker
- Score by standing directly behind a cow for a visual inspection and handle them quietly to assess fat cover thickness and prominence of the tail head
- Consistency is the key to good scoring
- Score at least four times per year- at calving, 60 days post calving, 100 days before drying off and at drying off
- Record each score to cow ID number

ACTION TO TAKE

Appropriate score for lactation stage

- Early lactation is a stage of nutritional stress, therefore careful feeding is required to ensure cattle do not lose more than 0.5 of a body condition score. At calving, cattle should be 'fit not fat', moderately supplemented to prepare for early lactation and at calving cattle should not be excessively fat. The correct body condition at insemination to avoid an energy deficit will also avoid reducing fertility
- The ideal score at calving is 2.5-3, at 60 days post calving is 2-2.5, at 100 days before drying off is 2.5-3 and at drying off is 2.5-3

Feeding Management

- Allowances should be made for different breeds (e.g. Montbéliardes will score higher)
- Individual cows with a very low or high body condition should be checked daily
- Individual cows which undergo a rapid change in body condition (0.5 of a score), should have their feeding adjusted, to meet their needs for their stage of lactation
- Body condition score can be used to manage the feeding plan at herd level

COMFORT

Stall Use Index

SCORE	DESCRIPTION	TARGET
100%	All cows that are not feeding are lying down in stalls	Ideal level is 100% cows lying, but improvement is needed at <80%
0-99%	Number of cows lying down in stalls (percent of total number of cows in the barn that are not feeding)	

HOW TO SCORE

Stall Use Index

- The Stall Use Index (SUI)[15] is an objective measure of comfort, which accounts for the availability of lying spaces and willingness of cows to use them. As this willingness depends on the time of day, and to increase validity, the test is more accurate if repeated over 3 days[15]

Knee Test

- The Knee test[10] is an additional test of comfort
- Perform the test by simply dropping to your knees on the bedding surface
- If this is uncomfortable, it indicates the bed is too uncomfortable for cattle to lie on
- If after 25 seconds of kneeling you have wet knees, it indicates the bedding is too wet
- The comfort and depth of the lying substrate, dryness and stall dimensions are reliable measures of comfort. Cleanliness of legs and udders and cows lying outside of stalls are further indicators.

ACTION TO TAKE

Improving comfort in housing

- If the SUI score or knee test indicate lying areas are not comfortable enough, the cause of this must to be addressed
- Providing more clean bedding increases comfort in stalls, and changing bedding more frequently or using a more absorbent material helps it to stay dry
- Provide at least 5% more stalls than cows, ideally 20% more. This ensures all cattle can lie down simultaneously by allowing avoidance of less preferred beds and choice of companions to lie near
- Factors including time of day, weather, proximity to milking, stage of lactation and number of parities affect lying behaviour. Stalls which poorly fit the breed of cow or have sharp protrusions reduce lying times
- In the longer term, deeply-bedded open barns provide the best comfort, but require good management to prevent mastitis. Stalls with deep bedding (e.g. sand) are more comfortable than mattresses topped with a little bedding

Cow signs indicating good comfort[16]

- Cows lie and rise smoothly, without hesitating or touching partitions and lie down immediately
- Cows can lie straight, comfortably on their side and stretch their head and one leg forward
- Cows can stand with all four feet in the stall
- Cows groom standing on three legs in alleyways (indicates flooring has good grip)
- Cows are clean and less than 10% of cows have hock or other injuries

Cow signs that indicate poor comfort[16]

- There are changes to normal behaviour (lying, rumination, feeding, general activity)
- Cows ruminate while standing instead of lying after feeding
- Cows lie in the alleyway instead of a stall, stand or lean in a stall instead of lying or overhang the stall
- Shiny areas on stall hardware are visible, indicating repeated contact
- There is abnormal lying behaviour, e.g. perching (standing with two feet in the stall), dog sitting or standing diagonally in the stall; indicating the stall or lunge space is too small
- Cows are dirty, with large areas of dirt on the legs or udder; indicating bedding needs to be cleaner or they are lying outside the stalls
- There are injuries to the hock, knee or neck, indicating poorly fitting stalls or insufficient bedding

HERD BEHAVIOUR

Recording Flight Distance[17]

SCORE	DESCRIPTION	TARGET
0	Cow's muzzle can be touched	The ideal level is the whole herd at 1-49cm. Improvement is needed if the majority of individuals are at more than 50cm
1 – 49	Cow can be approached to 1-49cm, before showing signs of withdrawal	
50 - 99	Cow can be approached to 50-99cm, before showing signs of withdrawal	
100 - 199	Cow can be approached to 100-199cm, before showing signs of withdrawal	
>200	Cow shows signs of withdrawal at >200cm	

HOW TO SCORE

- The flight distance test is an objective measure of fear of humans (though is affected by temperament)
- Scoring is more valid if carried out by an unfamiliar individual, e.g. a tractor driver
- Scoring is easiest when most cows have returned to the barn after milking
- Score the whole herd when possible, or at least 25% of the herd
- Score in an area where there is 2m of space in front of the cows, ideally at the feed bunk when their head is past the neck rail or over the feed
- Stand 2m in front of the test cow, ensuring they are aware of your presence
- Approach slowly (one step per second), holding your hand straight out in front of you facing downwards. Look at the cow's muzzle, not eyes
- Stop when you see signs of withdrawal (e.g. moving away, turning head) or you reach the muzzle
- Measure or estimate the distance reached when the cow withdrew (to nearest 10cm)
- Repeat the test later if the reaction was unclear
- Score two times per year (in summer and winter)

ACTION TO TAKE

Improving the human-animal relationship

- A high flight distance suggests stockpersons are not showing sufficient positive attention towards the herd or that cattle associate people with fearful events or procedures
- Avoid inflicting fear, pain or stress wherever possible and spend more time with the herd, in a calm, quiet and relaxed manner (e.g. talking, stroking, scratching), as this can reduce fear of people and increase positive associations with them

Signs indicating good herd behaviour (calm, relaxed, sociable)[16]**:**

- Grooming
- Social licking
- Lying
- Horning (cows rub heads with no clear winner)
- Willingly approaching the stockperson
- Allowing the stockperson to approach and touch them

Signs indicating poor herd behaviour (stress, aggression)[16]**:**

- Head butting, displacing at the feed bunker, chasing, fighting
- Moving away from the stockperson, shying, eye whites visible; indicating fear of the stockperson or stress

FURTHER RESOURCES

MOBILITY

DairyCo instruction sheet: www.dairyco.org.uk/resources-library/technical-information/health-welfare/mobility-score-instructions/

DairyCo blank scoring sheet: www.dairyco.org.uk/resources-library/technical-information/health-welfare/mobility-score-sheet-blank-forms/

Dutch five step hoof trimming: www.nadis.org.uk/pdfs/Foot%20Trimming.pdf

CULLING

Cull cow calculator on economics of cows leaving the herd (in GBP): www.dairyco.org.uk/technical-information/animal-health-welfare/cow-culling/cull-cow-calculators/cull-cow-calculator/

Information on Preventing Crippled and Non-ambulatory Animals by Temple Grandin: www.grandin.com/welfare/lci/lci.html

MASTITIS

General overview: www.dairyco.org.uk/technical-information/animal-health-welfare/mastitis/

California milk test: www.dairyco.org.uk/technical-information/animal-health-welfare/mastitis/recordstools/test-kits/cmt-california-milk-test/

Asceptic milk sampling: www.dairyco.org.uk/resources-library/technical-information/health-welfare/aseptic-milk-sampling-how-to/

Hygienic teat management: www.dairyco.org.uk/technical-information/animal-health-welfare/mastitis/working-arena-prevention-of-infection/milking-routine/

BODY CONDITION

Penn State University scoring method: www.dairyco.org.uk/resources-library/technical-information/health-welfare/body-condition-scoring/

DEFRA body condition scores: www.gov.uk/government/publications/condition-scoring-of-dairy-cows

COMFORT AND HERD BEHAVIOUR

Cow behaviour (in EN): Jan Hulsen (2007) Cow Signals. A practical guide for dairy farm management. Uk/Ireland Edition Rood Bont Publishers/VetVice, The Netherlands.

Cow behaviour information (in FR): Joop Lensink & Helen leruste, 2006, L'observation du troupeau laitier, Editions France Agricole; for further information on understanding cow signals.

OTHER OUTCOME MEASURES

Assurewel Dairy Cow assessment and scoring sheets: www.assurewel.org/dairycows

Welfare Quality® Assessment protocol for cattle: www.welfarequality.net/everyone/43299/7/0/22

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COMPASSION in world farming **Food Business**

Measuring Welfare in Dairy Cows

Compassion in World Farming

Compassion is recognised as the leading international farm animal welfare charity. It was founded in 1967 by Peter Roberts, a British dairy farmer who became concerned about the development of intensive factory farming.

For more information visit **ciwf.org.uk**

Food Business Programme
Compassion in World Farming's Food Business programme is generously supported by The Tubney Charitable Trust; a grant-making charity seeking to support activities that have a long-term, sustainable, positive impact on biodiversity and welfare of farmed animals in the UK and internationally.

For more information visit **compassioninfoodbusiness.com**

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