DIGAD Data Standard
for Submitting
Body Condition Score Data
for Animal Evaluation for Dairy Cows

(‘BCS for AE’)

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Log of Amendments

Standard issued by NZAEL Board the 7 day of May 2024, Version 30 April 2024

Amendment	Effective date	Version	Method of Authorisation

Summary of amendments[1]:

[1] The type of change – substantive or non-substantive is provided with a description of the details for each approved amendment.

1 Introduction

Body Condition Score (BCS) data are recorded to assess the energy reserves (fat cover) of a cow. BCS is an important phenotypic measure used for Animal Evaluation (AE) and farm management.

Cow genetics and BCS at calving have a stronger influence on BCS loss post-calving than nutrition or milking frequency. Up to 60% of the variation in BCS with a herd can be due to the genetic makeup of the cows. During the first 50 to 100 days after calving, BCS loss is largely regulated by genetics.

AE can calculate Estimated Breeding Values to indicate the genetic difference between animals. The economic value has two key components in late lactation:

- cows in good condition and milk well into late lactation rather than being dried off due to a low BCS; and
- reducing costs of a cow that maintains its body condition.

For more information on the importance of BCS 'The reference guide for New Zealand dairy farmers' ('BCS reference guide') - https://www.dairynz.co.nz/media/hjpl5oj2/body-condition-score-reference-guide-2024.pdf .

2 Scope

This standard is a DIGAD data standard. It defines:

- the requirements, processes, and procedures required for accurately recording BCS data and associated metadata for individual cows; and
- submitting these data to DIGAD for use in AE for dairy cows enrolled in DIGAD.

This standard is applicable for Certified Data Providers (CDPs) providing BCS services to farmers and data to DIGAD or to a Herd Record Provider (HRP). BCS are not completed on young stock as they are not under the pressures of milk production.

It does not apply to:

- BCS data used for assessing an average BCS for a herd for herd management; and
- farmers (i.e. participants) collecting BCS data for the cows under their care, and for which they have the right to submit data to an HRP. Where a farmer uses a CDP for BCS assessment and submits the data through their HRP, if an HRP does not provide the name of the CDP providing the data, the data are assumed to be provided by the participant (i.e. a non-certified source).

3 Normative References

The following documents are referred to in the text in such a way that some, or all, of their content are included in this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- DIGAD Data Standard Terminology. This defines the terms used in this standard.
- NAIT Standard for Animal Identification Devices (December 2020), with amendments or replacements as gazetted by the New Zealand Government. This standard identifies the radio frequency devices applied to cattle and deer for NAIT tracing in New Zealand.
- ISO 11784:1996. Radio frequency identification of animals. The standard for the code structure used in radio frequency devices for identifying animals, including the amendments published in 2004 and 2010.

4 Terms and Definitions

For the purposes of this standard the following terms which have particular meaning in this standard

Animal durable key	The primary unique animal identification assigned to each animal when it is enrolled with DIGAD. The animal durable key is a lifetime identification that persists regardless of change to other mandatory or optional identifiers.
Animal Evaluation model	The model used to calculate an animal's genetic performance. It includes a description of the nature and scope of factors and effects to include when analysing a particular trait for genetic performance. The model's description includes its equation, location parameters, dispersion parameters, and – in some cases – the distributional properties of its effects. The AE models that New Zealand Animal Evaluation Limited (NZAEL) uses are documented by NZAEL.
Animal identifiers	The industry identifiers used to identify and animal. In the NZS8100 Standard they are termed 'unique animal identifiers.
Certified Data Provider (CDP)	Individuals or organisations that are certified by the approved Certification Body as meeting the appropriate standard for the supply of non-regulated data or information to NZAEL. Each farmer (i.e. participant) can contract multiple Certified Data Providers.
Contemporary groups	A set of animals that have an equal opportunity to perform. Animals will be assigned to the same contemporary group for the measurement activity where: a) Animals are at the same farm location and share the same environment (this includes the same geographic location, temperature, rainfall, and grass growth); and b) Animals are in the same herd and share the same farm-management practices (this includes but it not limited to the stocking rate, supplement and feed regimes and walking distances). c) Animals belong to the same age group (that is two-year-olds, three-year-olds, four-year-olds or five- to seven-year-olds. d) For animals in a lactating herd, the animals have the same energy outputs such as milking regime (that is, OAD milking, TAD milking variable milking, calves are running with cows or dry); and e) Animals share the same calving season.
Cow	A female dairy animal that has had at least one calf and is used for dairy production.
Dairy Industry Good Animal Database (DIGAD)	A database containing ancestry and performance data for every recorded dairy cow in New Zealand. This database is intended to contain all the data required for AE. DIGAD contains the core database and other data fields.
Distributed milking system (DMS)	A system where individual cows in a herd select their milking time and are milked at variable times and frequencies using automated or robotic machinery.
Herd management group	Animals grazing as a group of animals, a herd, or a mob where animals have an equal opportunity the same energy inputs and energy outputs.
Herd Record Provider (HRP)	A DIGAD Data Provider certified by the approved Certification Body as meeting the appropriate standard for the supply of data or information to NZAEL. An HRP is contracted by a farmer to

	enrol animals, manage animal movements, and animal termination in DIGAD on behalf of the farmer. Each farmer (i.e. participant) can only contact one Herd Record Provider.
Metadata	Data that provides information about other data and assists with forming accurate contemporary groups.
Milking regime	Milking intervals prescribed by a farmer for cows in a herd or herd-management group. Intervals can be OAD, TAD, variable or distributed.
NAIT location number	A registered property where animals are kept is known as a NAIT location, and can comprise of a single property or 2 or more properties that fall within or straddle the circumference of a circle with a 10-kilometre radius.
Participant code	Code issued to the herd owner by the manager of the core database, via the Herd Record Provider.
Traits Other than Production (TOP)	The physical attributes of cow which contribute to the overall value of the cow in a herd. Farmers score animals for traits relating to their management at milking time and qualified inspectors score traits relating to the physical conformation of the animals.
TOP inspector	An inspector qualified to score TOP traits for dairy animals.
TOP inspection subgroup	A subset of two-year old cows on farm, that have been selected and approved for assessment under the Traits Other than Production (TOP) Standard and Guidelines.
Variable milking	Any milking sequence where a cow is not repeatedly milked OAD or TAD. For example, variable milking could be three milkings in two days (3in2) or ten milkings in seven days (10in7).
Young stock	The weaner through to in-calf heifer age group. The data collected during the growth phase of young stock.

5 Information About Body Condition Score Data (Informative)

5.1 Introduction

BCS is an on-farm management tool for individual cows and for cows at a herd level.

Body Condition Score is a visual assessment of the amount of fat in a cow's body. The amount of fat stored by the cow is a direct reflection of the amount of energy and protein a cow consumes. Excess energy intake is stored as fat, and adequate protein intake results in maximal muscle deposition. The deposition of fat and muscle leads to the appearance that creates a cow's BCS. The BCS is therefore an assessment of a cow's energy reserves, rating the "fatness" of a cow on a scale of 1 to 10, where 1 is emaciated and 10 is obese.

The BCS for this standard is the measurement method developed and supported by DairyNZ. It was introduced and developed over 40 years ago, the method is internationally recognised. The standard is recognised and recommended by the Ministry for Primary Industries and embedded as Schedule II in the Dairy Cattle Code of Welfare 2019.

For AE the individual cow data and their herd management group (i.e. the herd mates being managed under the same farm management practices) is required.

5.2 Importance of Body Condition Score data

BCS data are an important phenotype for AE in addition to liveweight. BCS and liveweight measurements provide different information for AE and they are not interchangeable. Whereas liveweight is affected by the cows age, size, gut fill or pregnancy and breed, BCS is independent of these factors. There are significant differences in size and angularity between the common New Zealand dairy breeds, however, being cognisant of these differences, the same guidelines for BCS assessment can be applied to all breeds. Figure 1 below shows the breed variation and BCS from the BCS reference guide.

Jerseys are typically smaller framed, with a comparatively narrow body and prominent hip bones.

Crossbreds and New Zealand-type Holstein Friesians are medium framed animals that carry fat reserves evenly over the body.

New Zealand-type Holstein Friesians are generally, shorter, rounder and blockier than the larger overseas Holstein Friesian type.

Overseas Holstein Friesians are more angular, appear thinner and tend to carry more body fat over the long ribs and less around the tailhead than New Zealand-type Holstein Friesians.

Figure 1: The breed variation and BCS differences. Photos and content from DairyNZ publication: The reference guide for New Zealand dairy farmers.

5.3 Factors affecting Boby Condition Score measurements

5.3.1 Consistency of Body Condition Score Scoring

Farmers and rural professionals can BCS cows. However, as the assessment is visual it requires training, regular practice and regular calibration to ensure accuracy and consistency. Certified Data Providers Submitting Body Condition Score Data for Cattle to the Dairy Industry Good Animal Database for Animal Evaluation ('CDP Body Condition Score for AE'), requires an assessor to score cows to a 0.5 BCS unit visually with confidence between BCS 2.5 and 7.5[2], and 1 unit for a BCS of eight or above. BCS the accuracy of assessment reduces outside the 2.5 and 7.5 BCS range due to the inability to accurately assess subcutaneous reserves for obese cows and a lack of association between the subjective BCS and the total fat stores in very thin cows[3]. For cows with BCS below 3.0 the farmer shall be advised of the cows' identifiers and the need for urgent remedial actions.

5.3.2 Effect of Rumen Fill

The assessor's position in relation to the cow is important. BCS is assessed from the rear and right side of the cow to minimise the effect of rumen fill. Rumen fill can reduce the visibility of the long and short ribs on the left-hand side of the cow when her rumen is fill.

5.3.3 Adverse weather conditions

The accuracy of BCS assessment can be negatively affected by adverse weather conditions where it is cold with wind or rain or both. In such conditions the cow's stance and physical appearance are affected by such conditions as the cow conserves heat.

5.3.4 Body Condition Score assessing environment

BCS can be scored in different locations on a farm. The locations will impact on the accuracy of the assessment depending on the ability of the assessor to see the eight body points used to assess the overall BCS for a cow. In addition, the location will impact on the ability of the assessor to record the animal identifier with the BCS score. Paddock assessment while suitable for herd management BCS is generally unacceptable for BCS for AE. The locations stated below are acceptable for BCS assessments for AE.

5.3.4.1 A vet race

A vet race is the best location to provide an accurate BCS score, as the assessor can place their hands on the eight body parts of the cow. Also, the cow's animal identification can be read. The cows

- need to be in single file, with the right side of the cow being unobscured (no distracting shadows, fences, gates, or other stock)
- should be stationary, or moving very slowly, whilst being inspected for scoring.

This method is time consuming. It is ideal for learning and calibrating but time consuming for scoring large numbers of cows.

5.3.4.2 On a rotary platform

Scoring from a rotary milking platform is acceptable, providing the scorer is on a raised platform. From a raised platform the scorer can view the pin bones, hip bones and tailhead and can make a reasonably accurate assessment of the backbone, short ribs and rump. The thighs and long ribs will be obscured to some degree by the rails.

The rotary speed needs to be sufficiently slow to enable the scorer enough time to score each cow. If necessary, the rotary should be stopped periodically to allow scoring as needed. In this manner it is possible to score all cows in the herd in this location.

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[2] Technically BCS can be assessed to 0.25 BCS units BCS within the 2.5 and 7.5 BCS range. This level of accuracy requires the assessor to be able to feel the body parts and to assess the cow from both the rear and the front of the cow. BCS assessments to 0.25 BS unit is time consuming and required for some research purposes where fewer cows are assessed with a high level of accuracy.

[3] J. R. Roche et. al., (2009): *Invited review:* Body condition score and its association with dairy cow productivity, health, and welfare. Journal of Dairy Science; 92: 5769 – 5801.

Inadequate lighting in farm dairy can have a substantial effect on the ability to score accurately.

The scoring should not be complete from the pit as the position has limited visibility and limits the accuracy of any BCS assessment (see 'BCS reference guide').

5.3.4.3 On the herringbone platform

BCS scoring for AE is not acceptable due to the limited visibility of the cow unless the scoring is completed with a mobile or raised working platform.

5.3.4.4 In a yard

Cows may be assessed for BCS in a yard. Ideally the yard should be level as a sloping yard affects the stance if the animal. If the yard be sloping the animal's stance may change to compensate for the slope and the assessor should consider how the stance may be affecting the body part being assessed. It is important the cows are scored from the rear and right-hand side of the cow to avoid rumen fill.

The cow's animal identification is also required.

5.3.4.5 On the feedpad

Walking quietly behind cows as they feed on the pad can be a useful location to BCS cows. It is important the cows are scored from the rear and right-hand side of the cow to avoid rumen fill. However, identifying the cow's animal identification may be more difficult especially if the cows are not known to the assessor.

5.4 Body Condition Score and Animal Evaluation

Accurate AE relies on accurate contemporary groups. A herd management group is a subgroup of cows grazing together for farm management purposes. The herd management group is a contemporary group factor, which accounts for farm management practices. For animal evaluation all cows in the herd must have equal opportunity to access energy inputs and expend energy. Measurements for BCS for AE require metadata to record factors in a herd management group where a cow has preferential treatments that affect the cow's energy inputs and outputs compared with her herd mates. For example, if in a herd management group all cows have the same opportunity to access fed as each other (i.e. energy inputs), but some cows have different milking regimes when they are at the milking shed (i.e. some cows are milked twice-a-day (TAD) whereas other cows are milked once-a-day) then the cows on a OAD milking regime within the herd management group have preferential treatment as the energy outputs for the cows on OAD milking regime are less the cows on TAD . In such situations the metadata for the different milking regimes in the herd management group shall be recorded to account for the different herd management practices for accurate animal evaluation.

6 Standard Operating Procedure (Normative)

The CDP shall have a standard operating procedure for BCS cattle shall include the following key components.

6.1 Training requirements

Training requirements are based on the certification for the DairyNZ Certified Body Condition Assessors. The training requirements are set out in the DairyNZ BCS Assessor Certification Programme in New Zealand https://www.dairynz.co.nz/support/training/bcs-assessor-certification/

The persons undertaking the BCS assessments for AE for cows shall be:

(a) A Certified Body Condition Assessor having passed a BCS assessment or calibration session scoring either at least 11 out of 16 final herd points and at least 3 'hands on points' ('pass')

(Appendix 1)[4] Where the pass rate is at least 14 out of 16 herd points or above, the Certified Body Condition Assessor shall attend and pass a calibration assessment at least every two years from becoming a Certified Body Condition Assessor for AE. Otherwise, the Certified Body Condition Assessor shall attend and pass a calibration assessment at least annually from becoming a Certified Body Condition Assessor for AE.

(b) Members of the Body Condition Score Calibration Team for the DairyNZ BCS Assessor certification programme; or

(c) A certified Traits Other than Production (TOP) inspector. The TOP inspectors shall be trained annually with a TOP inspector who meets the requirements of 'a' above, and who has attended a calibration session with the Calibration Team for the BCS Assessor Certification Programme.

TOP inspectors record BCS as one of the TOP phenotypes. They use the NZ BCS method (10-point scale) but truncate the scale to 9 for obese cows. This is done to align with the international guidelines (International Committee for Animal Recording Guidelines on Conformation Recording Methods in Dairy Cattle, Beef Cattle and Dairy Goats). See Traits Other than Production (TOP) Standard and Guidelines' (TOP standard) for more details.

The TOP inspectors who are not a Certified Body Condition Assessor cannot be listed on the register for either Certified Body Condition Assessors or CDP for BCS for AE.

The BCS assessor for AE, shall have an understanding of the factors that are important for BCS for AE and the difference between BCS for farm management practices and BCS for AE.

A participant or client may complete the BCS assessment and submit the data through a Certified Data Provider Submitting Body Condition Score Data for Dairy Cows to the Dairy Industry Good Animal Database for Animal Evaluation ('CDP Body Condition Score AE'), if they meet the training requirements identified above.

Training records shall be held for each person recording BCS assessments for the CDP.

6.2 Identification of cows

- The BCS assessor for AE shall ensure that cows are uniquely identified by a Birth ID or RFID. If management tags are read by the assessor, these shall be linked to the Birth ID for the cow and their accuracy validated before data are submitted.
    - All cows shall be identified with the herd or group of animals that they have been grazing with (i.e. the herd management group. See section 6.2.3.2). The data for different groups of cows shall be kept separate and not amalgamated into a single BCS group.
    - If a cow has grazed with a different group of animals, its BCS shall be recorded with the herd management group it has grazed with, even if the cow returns to its original group later.

6.3 Assessing Body Condition Score

The procedures for assessing BCS are set out in 'The reference guide for New Zealand dairy farmers' Section 1 Assessing BCS or 'Body Condition Scoring Made Easy: The official field guide.

6.4 Recording of metadata

CDP Body Condition Score for AE shall have methods for recording the metadata requirements as set out in Table 1, to ensure the BCS can be accurately used for AE.

[4] The minimum requirements are the pass rate recorded in this standard or as set by the DairyNZ Certified Body Condition Assessor standard whichever is the higher. Passing an annual calibration session unless the pass rate is 14 out of 16 points or higher.

6.5 Accounting for all cows in a herd management group

To ensure data integrity all the cows in a herd management group (cows grazing as a group of animals or a mob) shall have a BCS, or a measurement discrepancy code shall be used to provide a valid reason for a cow's exclusion (see section 7.2.3.3). For permitted exemptions all available cows present shall have a BCS assessment, and any measurement discrepancy code provided by the farmer shall be recorded.

6.5.1 Permitted exemptions

BCS assessments also permitted for the groups defined below (see sections **Error! Reference source not found.** and **Error! Reference source not found.**).

6.5.1.1 Contemporary age groups

BCS assessments are permitted for the following age groups:

a) two-year-old cows; or
b) three-year-old cows; or
c) two- and three-year-old cows.

These animals may be weighed separately from the lactating cows in a herd or a herd management group.

To be eligible for acceptance as a permitted age group, all of the cows in the age group shall either be managed as a herd management group or if cows have been drafted from more than one herd (i.e. management groups) then their herd management group shall be recorded. See Appendix 2 for examples of herd management groups.

6.5.1.2 Body Condition Scores associated with Traits Other than Production (TOP) inspection subgroups

TOP inspection subgroups of two-year old first lactation cows can be assessed for BCS if they have been selected under the TOP standard[5].

The list of herds and cows in the TOP inspection subgroup shall be provided to the participant and to NZAEL. NZAEL shall complete the analysis of the liveweight data for the TOP inspection as outlined in the TOP standard.

6.6 Recording cow health factors affecting Body Condition Score assessment

Where a person identifies that a cow's BCS has been compromised by ill health a measurement discrepancy code may be recorded as metadata for the BCS.

6.7 Recording animal movements or termination

Participants and their HRPs are responsible for recording animal movements between locations (including the reason for the movement), and for an animal's termination (and the reason for its termination).

The CDP's responsibility is limited to recording BCS at the time of the BCS event and accounting for all cows in the herd management group using the measurement discrepancy code (i.e. recording metadata for the BCS measurement, not recording animal movements).

[5] 'TOP standard' Genetic Evaluation Inspection Groups (Section 5.1), Analysis of TOP inspection subgroup herds (Section 5.2) and Appendix 3.

7 Body Condition Score Data Requirements (Normative)

7.1 Introduction

Three types of data are required for each BCS event to ensure accurate data are available for animal evaluation:

- static data (entered at a herd level for each weighing event),
- cow BCS assessments, and
- metadata for each animal.

All data are submitted to DIGAD and linked to DIGAD unique identifier i.e. the animal durable key.

7.2 Description of data elements submitted with Body Condition Score data

The following data elements (i.e. metadata) are used when entering data from a BCS event into DIGAD.

7.2.1 Relationship identifiers

7.2.1.1 Certified Data Provider Identifier

The Certified Data Provider Identifier alphanumeric code is used to identify the participant or CDP interacting with the DIGAD. It is issued by the DIGAD Database Manager. It is used when uploading data to DIGAD (see Table 2).

7.2.1.2 Participant code

HRPs use a Participant code to identify a herd owner. It is a three to five-letter alphabetical code excluding 'vowels' and 's' and 'z,' issued by the DIGAD Database Manager. The Participant code shall be allocated before enrolling animals with the DIGAD and it is required to access each animal's animal durable key.

7.2.2 Animal identifiers

7.2.2.1 Animal durable key

The animal durable key is the primary unique animal identification that DIGAD assigns to each animal when it is enrolled with DIGAD. It is a lifetime identification and persists regardless of change to other mandatory or optional identifiers. It is assigned so that DIGAD has internal identifiers to maintain its integrity.

The animal identifiers shall be linked to the animal durable key for data to be submitted to DIGAD.

The animal durable key shall be used to submit data to the DIGAD.

If an animal has not been issued with an animal durable key the participant has not enrolled the animal with DIGAD.

7.2.2.2 Birth ID

The Birth ID is allocated to animals at birth. The identification for dairy animals includes: a Participant code (representing the participant to whom the tag or identifier was issued), a four-digit year of birth for the animal, and a unique number of up to four digits for each animal. However, the birth identification tag in the animal's ear has the year of birth for the animal (without the century component). The Birth ID in the animal's ear tag is the same format as the NAIT visual identification Participant code–year–sequence number.

A Birth ID or the NAIT RFID number are required when accessing an animal durable key.

7.2.2.3 NAIT RFID number

Radio-frequency identification (RFID) or electronic identification (EID) tags are microchip transponders containing a digital RFID number. NAIT uses these in New Zealand to allocate an

unique identification to animals at birth. They are also known as a “NAIT Device” and shall conform to NZS/ISO 11784/5. The RFID number is globally unique and can be read by an RFID scanner. Rules for NAIT identifiers are managed by OSPRI through the NAIT Standard for Animal Identification Devices (NAIT Standard).

NAIT devices can get lost or damaged sometimes. When this occurs, the animal is re-tagged with a NAIT Replacement Device. The transponder chip inside the device will have a new RFID number.

The NAIT RFID number and/or the Birth ID are required when accessing the animal durable key.

7.2.2.4 Format for visual identification codes on NAIT devices

The visual identification code is printed on the outside of the tag in which the RFID number is encoded. Only one visual identification code may be printed on a device. The permitted formats for the codes are available on NAIT guidelines for approved animal identification devices, which are available at www.ospri.co.nz

There are three formats:

1. NAIT number (2 formats); or
2. NAIT birth tags and duplicate birth tags (2 formats); or
3. NAIT replacement tags (2 formats).

The NAIT number formats or the NAIT birth tags are allocated to animals at birth (see Table 1). The NAIT replacement tags (see Table 1) are used if the original NAIT device (i.e. RFID tag) has been lost or damaged. Alternatively, farmers may order a duplicate birth tag if the original NAIT device placed in the animal has been lost or damaged. The duplicate tag is an RFID tag with the same visual identifier that was used to tag the animal at birth. HRPs refer to duplicate tags as ‘replacement’ tags. A duplicate tag is unique, as it is linked to a new RFID number.

7.2.2.5 Herd management number

The herd management number is a short number, typically allocated by the person managing animals, to simplify visual identification of an animal in the herd. The herd management number should be unique within the herd but is often reissued to another animal when it is no longer required by the animal to which it was initially issued. The herd management number has a start date, which is the day when it was first allocated to an animal on farm. When no longer required by the animal an end date is entered.

When the herd management number is used it is mandatory to link the animal to a Birth ID or NAIT RFID number which shall be resolvable to the animal durable key to submit data to DIGAD. Birth ID or NAIT RFID number and animal durable key are available from DIGAD for the participants herds.

Participants and their HRPs are responsible for recording herd management number with DIGAD.

7.2.3 Other identifiers

7.2.3.1 Farm location

A farm’s location, where an assessment occurs, gives an indication of the environmental and climatic conditions experienced on a farm and by the animals on it. The spatial variation, encompassing the diversity of regions and environmental conditions on a farm, is one of the environmental factors that needs to be accounted for in the Animal Evaluation model. The farm location is also an important component for the Animal Evaluation model in forming contemporary groups.

For practical reasons, the NAIT location number is used to identify a farm’s location. The number is familiar to participants, easily remembered, and provides a simple identification to link the farm location with environmental conditions.

A NAIT location number is allocated when a farm is registered with NAIT. It may be linked to one or more rating units (which in turn link to land parcels). NAIT location numbers are managed through the National Animal Identification and Tracing Act 2012.

The NAIT location number may be linked to other farms within a 10-kilometre radius.

7.2.3.2 Herd management group

A herd management group is a group of animals, within a single farm location, that have same farm management practices (such as supplements, feed regimes, stocking rate, walking distances and milking regimes). There are often different herd management groups at the same farm location.

Herd-management groups are required if accurate contemporary groups are to be formed for animal evaluation. A herd management group enables an individual animal's performance to be compared with herd mates under the same farm-management conditions.

NOTE – Farmers may refer to a herd-management group as a 'mob', 'sub-herd', or 'herd'.

The herd management group shall be recorded for each group or herd of animals. The herd management group may be identified using:

- a sequential number allocated by the assessor, specific to the herd and BCS event on the day; or
- the date and time stamps for the start and end of BCS event, specific to the herd, on the day for the assessor.

7.2.3.3 Measurement discrepancy code

Accounting for all animals expected to be present in a herd management group at a BCS event is an important metric for maintaining data quality for animal evaluation. Measurement discrepancy code are used to indicate the reason for the absence of an animal from a herd for an event.

There are three reasons for an absence of a BCS score from an animal expected to be in a herd management group:

1. the biological status of the animal (such as sick or injured), or
2. farm management anomalies which have caused animals to miss the BCS event (such as the animal accidently left in paddock, or the animal moved itself to an adjacent herd), or
3. a processing issue with submitting data to DIGAD (such as the animal is not enrolled with DIGAD).

All data are submitted to the DIGAD with the data linked to each animal's DIGAD unique identifier (animal durable key).

7.2.4 Summary of data elements required to submit Body Condition Score data to DIGAD

Tables 1 - 4 summarise the data elements required for submitting BCS data to the DIGAD. The tables describe the data elements, requirements, format, and verification for BCS data submitted to the DIGAD.

Table 1: Participant code and the eligible animal identifiers (at least one animal identifier is required) for obtaining an animal durable key.

Data Element	Required	Format and Verification
Participant code	Yes	Alpha – 3 to 5 characters **Verification:** shall link to an existing Participant code
Animal identifiers		
Birth ID	Yes*, and/or NAIT RFID Tag and/or	This option is typically used for dairy cattle. String of up to 8-13 characters, includes: • Participant code (3 to 5 characters excluding vowels, 's' and 'z') • year of birth (4 digits)

	Herd Management Number and/or NAIT Visual ID	• birth identification number (1 to 4 digits) Examples: ABC-2015-1, or ABCDF-2015-1, or ABCDF-2015-1234 The Birth ID is truncated (without the century component) when used in on an animal ear tag. Examples: ABC-15-1, or ABCDF-15-1, or ABCDF-15-1234 **Verification**: shall link to the animal durable key
Herd Management Number	Yes*, and/or NAIT RFID Tag and/or Birth ID and/or NAIT Visual ID	Numeric – up to 5 digits Valid values 1 to 99999 **Verification**: shall link to the Birth ID or the RFID and the animal durable key
NAIT animal identifiers		
NAIT RFID Tag	Yes*, and/or Herd Management Number and/or Birth ID and/or NAIT Visual ID	16-character string that is the decimal representation of the binary ISO 11784 code, includes: • ICAR registered manufacturer code (3 digits) • separator • animal identification (12 digits) Example: 981-018285778231 **Verification**: shall link to the animal durable key
NAIT Visual ID codes printed on a NAIT RFID tag	Yes*, only if another Animal Identifier is not available or the NAIT RFID cannot be read.	There are three formats for NAIT Visual IDs: 4. NAIT number (2 formats); or 5. NAIT birth tags and duplicate birth tags (2 formats); or 6. NAIT replacement tags (2 formats). **1. NAIT number** • NAIT number–year–sequence number String of up to 18 characters includes: • NAIT number (location) (2 to 6 digits or 8 digits) • separator • year of birth (2 digits) • separator • sequence number (animal number) (up to 6 digits) Examples: 12345678-15-1 or 12345678-15-123456 or • NAIT number–sequence number String of up to 15 characters includes: • NAIT number (location) (2 to 6 digits or 8 digits) • separator • sequence number (animal number) (up to 6 digits) Examples: 12345678-1 or 12345678-123456

		2. NAIT birth tags and duplicate birth tags • Participant code–year–sequence number String of up to 15 characters, includes: • Participant code (alpha 3 to 5 characters (excluding vowels, 's' and 'z') • separator • year of birth (2 digits) • separator • sequence number (animal number) (up to 6 digits) Examples: ABC-15-1, or ABCDF-15-123456 or • Participant code–sequence number String of up to 12 characters, includes: • Participant code (alpha 3 to 5 characters (excluding vowels, 's' and 'z') • separator • animal sequence number (up to 6 digits) Examples: ABC-1, or ABCDF-123456 **3. NAIT replacement tags** • RFID number–NAIT number String of up to 25 characters, includes: • RFID number (16 digits) (see RFID above) • separator • NAIT number (2 to 6 digits or 8 digits) Example: 951-000123456789-12345678 or • RFID number–Participant code String of up to 22 characters, includes: • RFID number (16 digits) (see RFID above) • separator • Participant code (alpha 3 to 5 characters (excluding vowels, 's' and 'z') Example: 951-000123456789-ABCDF **Verification**: shall link to the animal durable key

*Using more than one animal identifier strengthens the process of matching an animal to its animal durable key.

Table 2: Static identifiers required for a BCS event.

Data Element	Required	Format and Verification
Certified Data Provider Identifier	Yes	Alphanumeric – 1- 255 characters

		Verification: Shall link to an existing Certified Data Provider Identifier
Farm location where the event occurs	Yes	NAIT location number. Up to 8 alphanumeric characters (usually digits). **Verification**: a valid NAIT number
Location where the BCS assessment occurs	Yes	01 Vet race 02 Rotary with elevate platform 03 Herringbone with elevate platform 04 Yard 05 Feedpad

Table 3: Herd management group data elements required for a BCS event.

Data Element	Required	Format and Verification
Date and time – start of BCS[1]	Yes, if the date and time stamps **are not** provided for each animal weight. Optional if the date and time stamp are provided for each animal weight.	Date and time – YYYY-MM-DDTHH:MM:SS.
Date and time - end of BCS[2]		Date and time – YYYY-MM-DDTHH:MM:SS.
Herd management group (HMG)	Yes	Numeric – 2 digits (sequential number specific to the weighing event) or the date and time stamps for the start and end of BCS event.
Number of animals expected in HMG	Yes	Numeric

[1]Time when the first animal in the herd management group was BCS scored.
[2]Time when the last animal in the herd management group was BCS scored.

Table 4: Data elements required for each animal for a BCS event.

Data Element	Required	Format and Verification
Date and time stamp for each BCS	Required if start and end times are not recorded for the herd management group	Date and time – YYYY-MM-DDTHH:MM:SS.
Animal durable key	Yes, required to submit with data	Numeric – integer
NAIT RFID Tag	Optional, or Birth ID	See Table 1
Birth ID	Optional, or NAIT RFID Tag	See Table 1
BCS score	Yes, or provide a measurement discrepancy code if null	Number – 1 to 10

Measurement discrepancy code	Yes, where there is no BCS	01 Farm anomaly[3] 02 Animal sick or injured 03 Processing issue[4]
Milking regime	Yes, for cows in a HMG where milking regimes are not all the same, or the HMG has a distributed milking system	OAD Once-a-day milking[5] TAD Twice-a-day milking[5] DRY Cows are in the HMG but dry[5] 3AE Thrice-a-day milking 3in2 Three milkings in two days 10in7 Ten milkings in seven days DMS Distributed milking system

[3]Farm anomaly means issues, errors, or events occurring on the farm that prevent a BCS score occurring. Includes animals missing from the expected group of animals to be weighed.

[4]Processing issue means that the data for the animal was not able to be submitted to DIGAD. This includes, for example, animals that have not been enrolled with DIGAD and therefore have not been issued with an animal durable key. Their data can be submitted once the animal has been enrolled and an animal durable key issued.

[5]The milking regimes most typically found in a HMG where milking regimes are not all the same.

Note: The animal durable key and the date and time stamp for the BCS can be included in a participant's herd management system via their HRP.

8 Submitting Body Condition Score data

8.1 Accessing the animal durable key

The animal durable key for animals included in a BCS event shall be sourced from the DIGAD before submitting data to DIGAD. It is used when submitting BCS scores and associated data fields.

The animal durable key is only available for animals enrolled with the DIGAD. CDPs need to enrol animals into the DIGAD through their Herd Record Provider.

If a CDP does not have an animal durable key at a BCS event they should enter the measurement discrepancy code 03 to identify the data processing issue. The BCS data will not be able to be submitted to DIGAD until the animal has been enrolled through an HRP and the relevant animal durable key is available.

8.2 Data submission to DIGAD

The CDP shall use the format files provided by NZAEL to upload data or engage with NZAEL and produce the message interface with DIGAD as set out in the DIGAD CDP Interface Specification for Herd Recorders (this may be updated from time-to-time following consultation with CDPs).

A copy of the format files can be obtained from Support.NZAEL@DairyNZ.co.nz .

A copy of the DIGAD CDP Interface Specification for Herd Recorders can be obtained from Support.NZAEL@DairyNZ.co.nz .

8.3 Body Condition Score data scores submitted as a single event

A consistent recording approach is required for data submitted to the DIGAD so the data can be used correctly in animal evaluation. BCS data shall be submitted as a single measurement. If a second assessor completed BCS assessments on the same day the scores for each assessor shall be submitted as two single events separated by the time of the BCS event on the day. The BCS

measurements shall not be submitted as a mean of two or more BCS scores. A single data score and a mean score are not treated the same in animal evaluation[6].

9 Certified Data Providers for Body Condition Score Data

For a list of CDPs for BCS for AE contact Support.NZAEL@DairyNZ.co.nz .

[6] Combining the data as a mean result is a completely different estimate of the residual of the means. A mean data measurement submitted as a single data point has a significant effect on the AE outputs and reliability estimates.

Appendix 1: BCS Assessor Certification Assessment Criteria (Informative)

Assessment Criteria for a calibration session

An overview of the assessment for BCS Assessor Certification Assessment Criteria is provided for context[7].

The BCS Assessor Certification Programme assessed participants on three criteria at a calibration session:

- the first two involve visual body condition score (BCS) assessment of a mob of cows in a paddock;
- the third involves hands-on BCS assessment of eight cows in a race.

Note: Participants must pass all three parts to become a Certified BCS Assessor

Paddock scoring of a mob of cows

A minimum of 200 mixed age cows are available for scoring. All cows have been scored by two members of the BCS Calibration Team. These scores are the 'model' scores. Participants must record scores against ear tags (herd management numbers) for a minimum of 70 unique cows. The participant's BCS assessment scores are compared against the model scores in two parts:

a) Difference between participant mob average BCS and the model mob average BCS. A minimum score of 4 is required for a pass. Points are allocated based on the following table:

Participant mob average BCS within range of model standard	Points
<0.04	8
<0.09	7
<0.14	6
<0.21	5
<0.24	4
<0.29	3
<0.40	2
≤0.50	1
>0.50	0

b) Comparison of participant scores for individual cows and model scores. The percentage of participant scores within 0.5 and 1.0 BCS of the model scores are considered. Points are allocated per the following table:

[7] The BCS Assessor Certification Assessment session and this appendix are intended to be aligned. However, should there be any discrepancies, the BCS Assessor Certification Assessment programme information takes precedence.

Percentage within 0.5 BCS	Points
>95	4
>90	3
>85	2
≥80	1
<80	0

Percentage within 1.0 BCS	Points
=100	4
>99	3
>97	2
≥95	1
<95	0

Hands-on scoring of 8 individual cows

The participants score eight individual cows in a vet race and allocate a BCS to each of the eight important body parts. Each individual body part is to be scored to the nearest 0.5. An average of the eight-body part sub-scores will be calculated for each cow to the nearest 0.1. Two members of the BCS Calibration Team have scored each animal prior to participant scoring on the assessment day. These scores are the “model score” (and “model average”). A maximum of 8 points is available based on comparison of participant average to model average for each of the eight cows. For each cow, points are allocated per the following table:

Participant cow average BCS within range of model standard	Points
<0.2	1
<0.5	1/2
<0.8	0
≤1.0	-1
>1.0	-2

Body Condition Scoring Calibration Summary

An example of a Body Condition Scoring calibration summary is shown below.

Percentage within 0.5 BCS	Value	Points	Explanatory Notes
Number Scored	77	-	Number of animals you scored in the herd.
Standard average	4.34	-	This is the herd average calculated using the model scores for the same cows the candidate scored.
Candidate average	4.33	-	Candidates herd average BCS
Average difference	0.01	8	Difference between the candidate herd average and the model herd average. Points range from 0 to 8. Minimum is 4 for a pass.
% inside 0	53.28	-	Provided for information only
% inside 0.5	96.00	4	Points range from 0 to 4
% inside 1.0	100.00	4	Points range from 0 to 4
Final Herd points	-	16	Possible total score of 16. Minimum score 11.
Hands-on points	-	5.5	Possible total score of 8. Minimum score 3.
Overall total points		**21.5**	Possible total score of 24. The candidate requires at least 11 Herd points and 3 hands-on points.
Overall result	**PASS**		

Appendix 2 Examples of Herd Management Groups (Informative)

Introduction

Herd management groups are required if accurate contemporary groups are to be formed for animal evaluation. A herd management group enables an individual animal's performance to be compared with herd mates under the same farm management conditions. Farmers may refer to a herd management group as a 'mob', 'sub-herd', or 'herd'. The principles for herd management groups are the same for livestock whether young stock or cows.

Farmers may run groups of animals separately for a range of reasons, such as:

- managing group sizes
- the animals are lighter or smaller and additional feed is required to improve their growth or body condition score;
- the heifers being kept separate from the main herd while they mature and to reduce 'bullying' by more mature cows;
- they have a health issue, such as lameness;
- the farmer prefers a group of lactating cows to be closer to the milking parlour, for example to shorten the walking distance on larger farms; or
- there are autumn and spring calving herds on the farm.

These scenarios occur as the result of sound farm management decisions. However, they will impact on the accuracy of animal evaluation outputs because the groups of animals are in separate herd management groups. For animal evaluation, the animals should all be grazing together as a group and have the same treatment as their herd mates.

Animals receiving the same treatment will have the same access to feed e.g., supplements or the feed available because of stocking rate, and the same energy outputs e.g., walk the same distance to the milking parlour and be on the same milking regime as their herd mates. These are important differences that need to be accounted for when forming accurate contemporary groups used for animal evaluation.

The simplest way to record which animals were grazed or managed together is to record the mob, herd, or group of animals that were together at the time of the measurement (the herd management group).

Examples of Body Condition Scoring events and herd management groups for lactating cows

The two examples below illustrate scenarios for BCS assessments for herd management groups containing lactating cows:

- a contemporary age group or a TOP inspection subgroup; or
- all of the animals at the farm location.

The examples use two farms with each farmer managing two herds at the same farm location.

Example 1:

Figure A2-1 shows a farm with two herd management groups, (mobs, or groups of animals) on the farm. In this example, all of the two-year-old animals graze together and form a herd management group. Each animal has an equal opportunity to obtain energy inputs; they have the same access to pasture and supplements (both in the paddock, and in the milking parlour if in-shed feeding is available). They also have the same energy outputs i.e. the same walking distances to the milking parlour and the same milking regime (once daily, twice-a-day, or variable milking).

The balance of the lactating animals on this farm are in the main herd and form the second herd management group. Each animal in the main herd also has an equal opportunity for energy inputs and outputs as their peers.

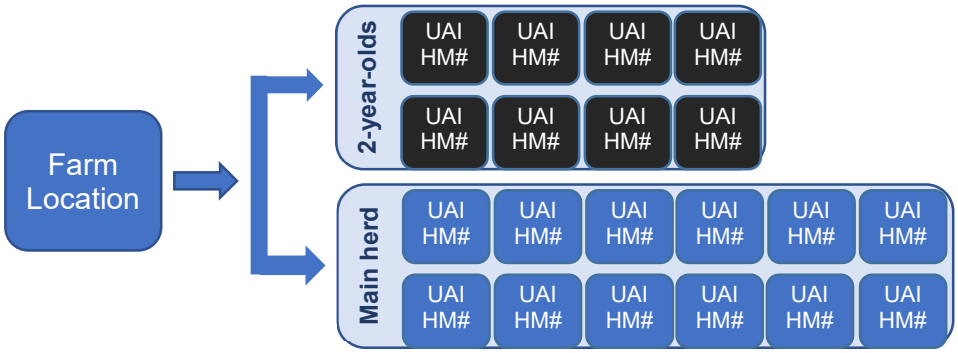

***Figure A2-1**. A farm with two herd management groups. The two-year-old animals are in one group (black colour) and the other lactating animals (main herd) are in the other group (blue colour). (Code: UAI – Unique Animal Identifier, HM# is the herd management number).*

If the BCS event covers a contemporary age group or a TOP inspection subgroup, where all the two-year-old cows are weighed are in a single herd management group, the herd management group can be identified using the start and end time of the weighing event.

If the weighing event includes all of the lactating animals at the farm location, herd management groups are required to identify the different groups. In this example, there are two herd management groups. The options for identifying them are:

- Assign a sequential herd management group number to each group. For example, the two-year-old animals could be assigned to herd management group number 1 and the animals in the main herd to herd management group number 2. The assigned herd management group number can then be recorded for each cow in the group with its weight. Or
- The BCS event can be recorded in two sessions. All of the two-year old animals can be weighed as a single event. The start and end time for the BCS session would define the herd management group. Similarly, the BCS session start and end time for the main herd would define their herd management group.

Note: If a herd management number is used to record a BCS, it is mandatory to link the animal to a Birth ID or NAIT RFID number to be able to access the animal durable key to submit data to the DIGAD.

Example 2:

Figure A2-2 shows a farm with two herd management groups (mobs, or groups of animals) on the farm. In this example each herd management group has animals with mixed age range.

As in example 1, each animal in each herd management group has an equal opportunity for energy inputs and loss of energy through outputs as their peers.

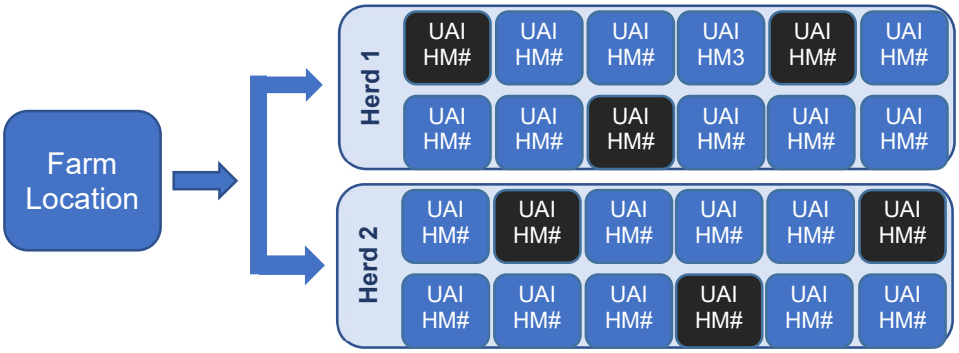

***Figure A2-2**. A farm with two herd management groups with mixed aged and two-year-old animals (identified as black) included in each herd. (Code: UAI – Unique Animal Identifier, HM# is the herd management number, black colour two-year-old animal, blue colour animals older than two years old).*

If the weighing event is a contemporary age group or a TOP inspection subgroup, as the two-year-old cows are in separate herds (i.e. Herd 1 and Herd 2), herd management groups are required to identify the different herds the two-year-old animals were in as they are drafted for the BCS event. For example, the two-year-old animals from Herd 1 could be assigned herd management group number 1 and the two-year-old animals from Herd 2, herd management group number 2. The assigned herd management group number is recorded for each cow in the group with its BCS.

If the BCS event includes all the lactating animals on the farm, the different herd management groups are required to be identified. In this example, there are two herd management groups.

The simplest way of defining each herd management group is to complete the BCS event in two sessions i.e. Herd 1 and Herd 2 separately. The start and end time for each BCS session will define the herd management group.

Note: If a herd management number is used to record the BCS, it is mandatory to link the animal to a Birth ID or NAIT RFID number to be able to access the animal durable key to submit data to DIGAD.