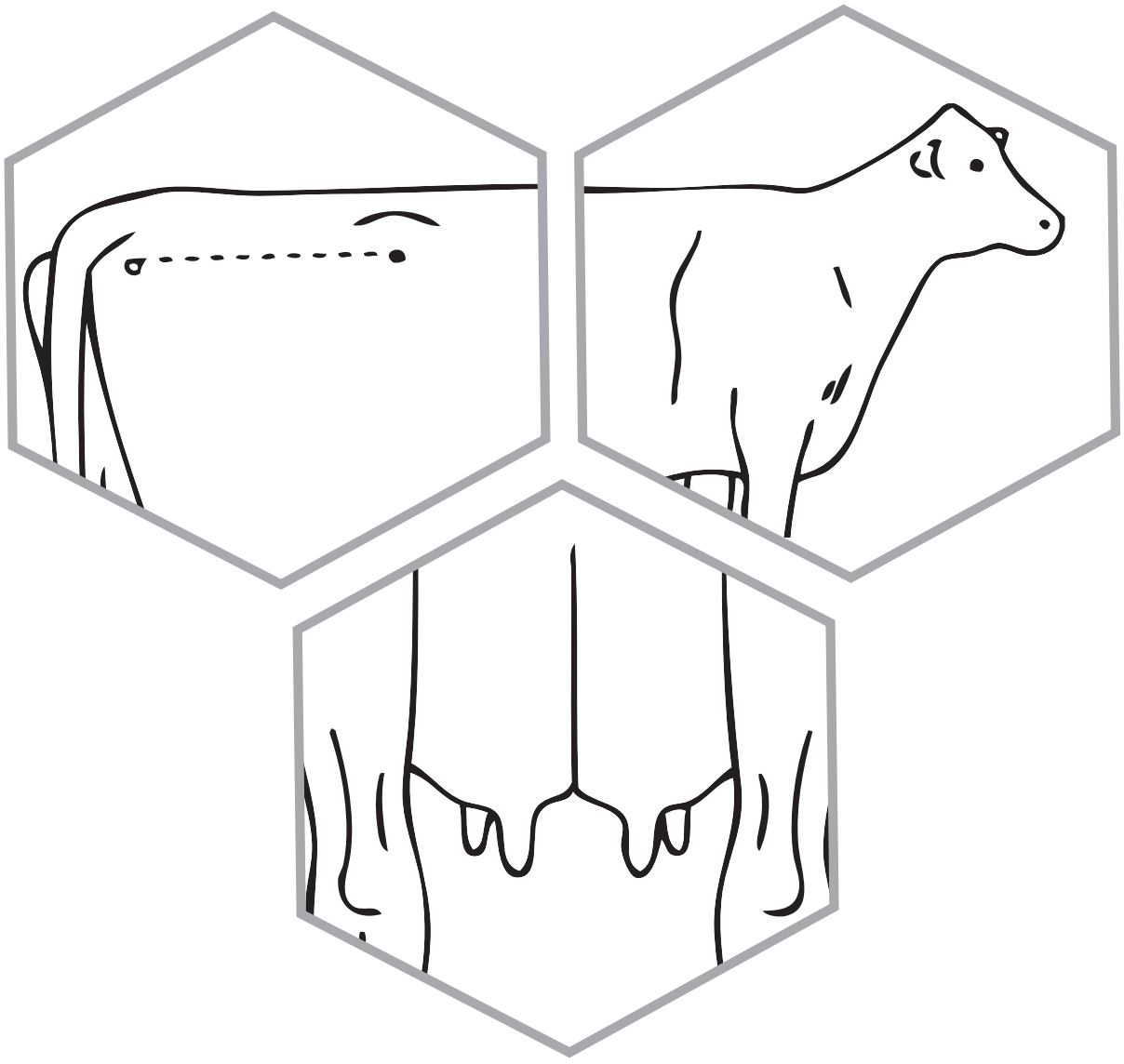
EVALUATION SYSTEM FOR TRAITS OTHER THAN PRODUCTION (TOP) FOR DAIRY CATTLE IN NEW ZEALAND



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EVALUATION SYSTEM FOR TRAITS OTHER THAN PRODUCTION (TOP) FOR DAIRY CATTLE IN NEW ZEALAND

Introduction

Yields of milk protein and milkfat are important traits for the profitability of a dairy cow. Milk volume, cow liveweight and cow survival are also directly related to the profitability of dairy animals due to their impacts on farm revenues and farm costs. These traits are included in the Breeding Worth and Production Worth indexes on which selection decisions in New Zealand dairying are primarily based.

However, there are "Traits Other than Production" (TOP) like temperament, milking speed and conformation which contribute to the overall value of any animal in a herd and any bull which transmits them. Data on some of these traits is collected and analysed. TOP trait assessments do not contribute directly to the BW or PW indexes.

Breed Associations and artificial breeding organisations are interested in the recording and evaluation of traits other than production of New Zealand dairy animals. The TOP Advisory Committee of representatives from these organisations operates an evaluation system for traits other than production. The TOP system is based on:

- linear assessment of traits
- experience from many years of conformation assessment
- current genetic and economic knowledge
- latest research results from New Zealand and overseas
- national cost effectiveness
- future requirements for dairy cattle characteristics

The main objective of the TOP system is to provide accurate and unbiased comparisons of cows and sires, thus providing cow owners and bull owners with easy-to-use information. The TOP evaluation system is directed by the TOP Advisory Committee (a sub-committee of New Zealand Animal Evaluation Limited) which comprises of three representatives from the New Zealand Dairy Breeds Federation, two from Livestock Improvement Incorporation (LIC), one from NZAEL, one from CRV AmBreed and one representing other AB companies. The committee plays a major role determining policy relating to the system, sets inspection standards and monitors the performance of inspectors.

The Basis of the TOP System

Long term economic forecasts show that the average size of NZ dairy herds will continue to increase. This means that cows will have to fit into fast milking routines. The TOP system includes adaptability to milking, shed temperament and milking speed. All these are important characteristics of cows in large herds.

Liveweight influences overall efficiency if animals are heavier than necessary for their level of production.

Udder characteristics are very important. Udders allowing easy machine milking reduce labour costs and improve milking efficiency.

Not all traits can be recorded or included in the selection objective:
Some cannot be influenced by breeding methods, and others cannot be measured accurately or are not important. The TOP system incorporates of some of the most important traits required on the New Zealand dairy farm.

Benefits of the TOP System

The TOP system offers the following features:

- It improves and facilitates sire selection
- It gives the breeder an objective assessment of the animal
- It is easy to use
- It is compatible with electronic data processing
- It is easily understood
- It is accepted by dairy cattle breeders as well as commercial dairy farmers

Collection of data

Linear assessment

The accuracy of any system depends on the accuracy with which data is collected. This is also true when assessing the conformation of an animal.

The method of linear assessment is the most accurate method of conformation evaluation and for this reason is widely used. The TOP system is based on linear assessment of animals.

A detailed guide which explains the method of scoring and the definition of the traits recorded is given on pages 5-11.

Traits recorded

The following traits are recorded:

Information supplied by farmer:

1.	Adaptability to milking	(slowly-quickly)
2.	Shed temperament	(vicious-placid)
3.	Milking speed	(slow-fast)
4.	Overall opinion	(undesirable-desirable)

Information supplied by inspector:

1.	Stature	(<105 cm - >140 cm)
2.	Weight	(<250 kg - >600 kg)
3.	Capacity	(frail-capacious)
4.	Rump angle	(pins high-pins low/sloping)
5.	Rump width	(narrow-wide)
6.	Legs	(straight-sickled/curved)
7.	Udder support	(weak-strong)
8.	Front udder	(loose-strong)
9.	Rear udder	(low-high)
10.	Front teat placement	(wide-close)
11.	Rear teat placement	(wide-close)
12.	Udder overall	(undesirable-desirable)
13.	Dairy conformation	(undesirable-desirable)
14.	Body condition score	(undesirable-desirable)

Any additional characteristics of the animal not described by these traits can be recorded as farmer's or inspector's comments.

Inspectors

Inspectors must pass a practical examination in order to qualify as TOP inspectors. They are nominated by participating organisations and are required to attend Certification Days organised and administered by the TOP Advisory Committee to ensure uniform standards. Breed Associations organise additional workshops on the granting of their respective breed awards.

Inspections

All TOP inspections of animals are organised by breed associations on behalf of all participating organisations. The TOP records from two-year-old animals are used for sire evaluations. To achieve valid comparisons between sires, two-year-old animals in a herd may not be inspected selectively: if any two-year-old is to be inspected they all must be.

However, selected older cows can be re-inspected at the cow owner's request.

TOP Breeding Value Analysis

Best Linear Unbiased Prediction (BLUP) under an animal model has been used to evaluate New Zealand dairy cattle for linear type traits. The animal model allows simultaneous sire and cow evaluation which prevents certain classes of selection bias and increases the accuracy of prediction compared to sire maternal grandsire models.

The statistical model for analysis includes effects for

- herd-season contemporary group
- stage of lactation when scored
- age at first calving in months (nested within breed)
- heterosis
- genetic group
- animal genetic merit and
- the random residual

A grouping strategy in which a genetic group for each animal is derived from the genetic group effect of the animal's ancestors is used. For each animal with unknown ancestors, phantom parents without records are created. The phantom parents are assigned to appropriate genetic groups. The genetic group effects represent the average genetic contribution of the phantom parents. Genetic groups were assigned by sex (male or female missing parent), birth year, country of origin and breed. The genetic merit of the animals is defined as the breeding value which is the sum of the addictive animal genetic effect and the genetic group effect.

Administration

Sire Registration

To enrol a sire for the TOP evaluation system, the sire must be enrolled for Animal Evaluation. As well as the registration fee the enrolee will be charged a herd fee for each herd nominated by the sire owner for daughter inspections.

Inspections

Applications for TOP inspections from cow owners are processed by the breed associations. Applications from bull owners who have enrolled sires for Animal Evaluation and TOP evaluation are processed by LIC.

According to the applications received, TOP lists are downloaded to an electronic data recorder or preprinted, with the identification of the animals to be inspected.

TOP Farmer Lists are sent to the herdowner to complete.

Data Processing
The completed TOP inspections are uploaded to LIC and entered onto the National Dairy Core Database. The raw data and the results of the analytical procedures are stored on the Livestock Improvement National Database.

The organisation and distribution of TOP publications is the responsibility of LIC. Breed Associations receive TOP cow listings for herds whose inspection was requested through them. Bull owners receive cow listings for herds which they requested to be inspected.

Charges
A current schedule of charges for TOP inspections and bull enrolments is available from LIC. The charges cover travel, accommodation and labour of the inspector, data entry, editing, analysing and reporting of the data.

Publications

TOP Cow listings
The TOP inspection results for their herd are sent to all farmers who had cows inspected for TOP Part of a cow listing is shown on pages 12-13. Besides the herd information the TOP results for each cow evaluated are shown. In addition the two-year-old average, herd average and the national breed average for each trait is printed. For pedigree cattle the TOP evaluations are also published in the Breed Association Cow Production Register, which are available from breed societies.

New Zealand Dairy Sire Summary
This book is the official publication for sire evaluation of the production traits. It provides information about sire breeding values for production traits and traits other than production; ranks sires according to their genetic merit within each trait; and gives a comprehensive ranking of sires for all traits evaluated. The criteria for sires to be included in this publication are: enrolment for Animal Evaluation and 75% reliability or greater on Breeding Worth. The New Zealand Dairy Sire Summary is published in June, and is available on request from LIC, for a nominal charge.

Other Reports
The TOP information for an animal is incorporated in numerous other reports such as the *Individual Animal History, Three Generation Pedigree* and *Sales Catalogue*.

LINEAR ASSESSMENT FOR TRAITS OTHER THAN PRODUCTION (TOP)

The ability to evaluate dairy cattle more accurately for their traits other than production initiated the introduction of the method of linear assessment on which the TOP system is based. The increase in accuracy of sire and cow evaluations using linear assessment is brought about by two main factors:

- The objective description of the animal as it ranks between the biological extremes
- The scale with nine scores allows more of the variation present to be recorded

The main advantage of the TOP system is that inspectors describe the animal, rather than how closely the animal resembles an imagined “ideal” animal.

The description of the animal given by the inspector can then be interpreted and used by different people for their specific purposes. Thus the main objective of the assessment under the linear system is the objective description of the animal, its ranking between the two biological extremes, no matter which ranking is considered “ideal”.

Linear assessment as the base of the TOP system offers the following advantages:

- It allows a more accurate description of traits other than production for daughters of progeny tested sires, dams of bulls and pedigree cows
- It describes an animal objectively and is used to produce sire evaluations which give the animal breeder a more objective assessment of the value of the animal
- It agrees closely with evaluation systems used overseas and therefore will allow comparisons between different populations
- It allows efficient electronic data processing and computing, which increases the use and value of the recorded information

Assessing the animal:

Each trait is scored separately on a scale from 1 to 9 represent the possible biological extremes.

The traits included in the TOP system are the traits currently considered most important in dairy cattle. They include four traits scored by the farmer, three of which describe how well the animal fits into the milking routine. These traits are scored by the farmer on a separate form called *TOP Farmer List* (see page 14).

Thirteen conformation traits and body condition score is scored by inspectors using an electronic data recorder (see page 15). As the assessment is a description of the animal the scoring is carried out across breeds. Any additional characteristics of the animal not described by these traits, are noted in the Comment Codes column using codes shown on pages 16 and 17.

Up to ten comments per animal can be recorded.

Further information is available from:

Animal Evaluation Unit
Livestock Improvement Corporation Limited
Private Bag 3016, Hamilton 3240

A. Information supplied by the herd owner

1. ADAPTABILITY TO MILKING
   This trait describes how soon the animal settled into the milking routine after calving. (eg. How many milkings before milk let down was spontaneous. How many milkings before milking was completed without extra attention.)

1	2	3	4	5	6	7	8	9

Slowly < Average > Quickly

2. SHED TEMPERAMENT
   This trait describes the temperament of the animal in the shed while being handled and milked. It is a different trait to adaptability to milking and should be assessed once animals have settled into the milking routine.

1	2	3	4	5	6	7	8	9

Vicious < Average > Placid

3. MILKING SPEED
   This trait describes the milking speed of the animal, i.e. the time from putting cups on to the time flow stops or cups are taken off.

1	2	3	4	5	6	7	8	9

Slow < Average > Fast

4. OVERALL OPINION
   This trait describes the farmer's overall acceptance of the animal as a herd member.

1	2	3	4	5	6	7	8	9

Undesirable < Average > Desirable

B. Information supplied by the inspector

Note: All diagrams in this booklet are based on two-year-old animals.

5. STATURE
   This trait describes the height at the shoulders of the animal

1	2	3	4	5	6	7	8	9
<105	105-109	110-114	115-119	120-124	125-129	130-134	135-140	>140cm

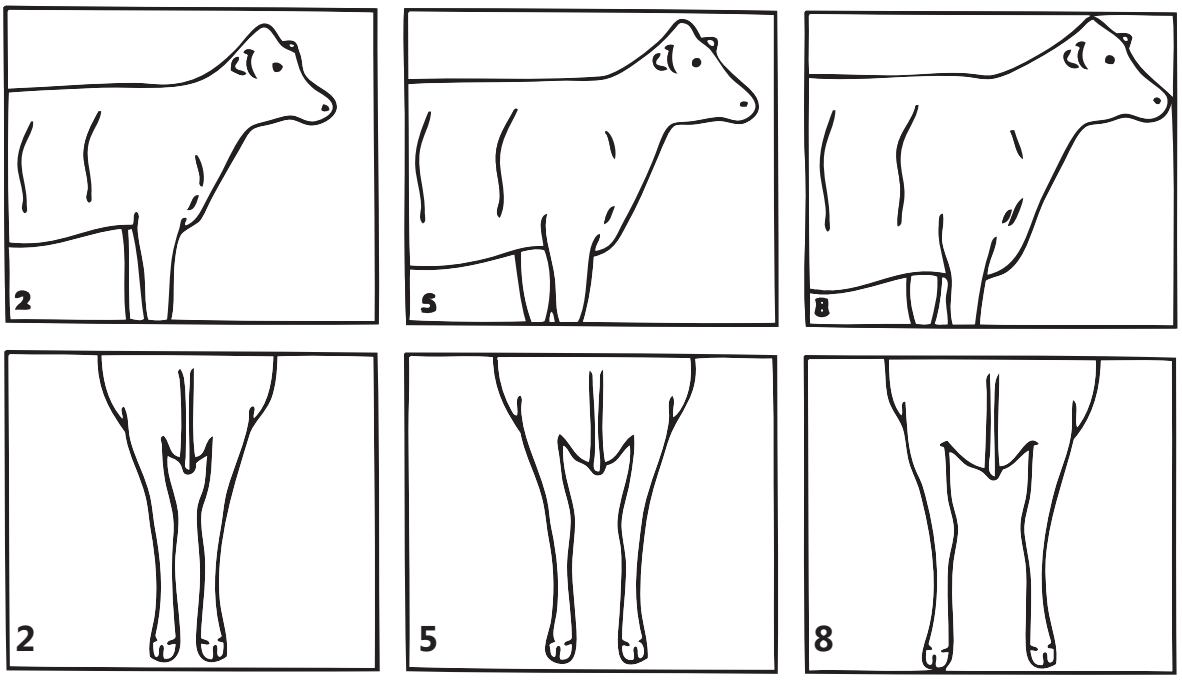
6. WEIGHT
   This trait describes the estimated liveweight of the animal.

1	2	3	4	5	6	7	8	9
<250	250-299	300-349	350-399	400-449	450-499	500-549	550-600	>600kg

7. CAPACITY
   This trait describes the capacity of the animal as a combination of strength and depth of chest and body as viewed from side, rear and front in relation to the physical size of the animal.

1	2	3	4	5	6	7	8	9

Frail < Intermediate > Capacious

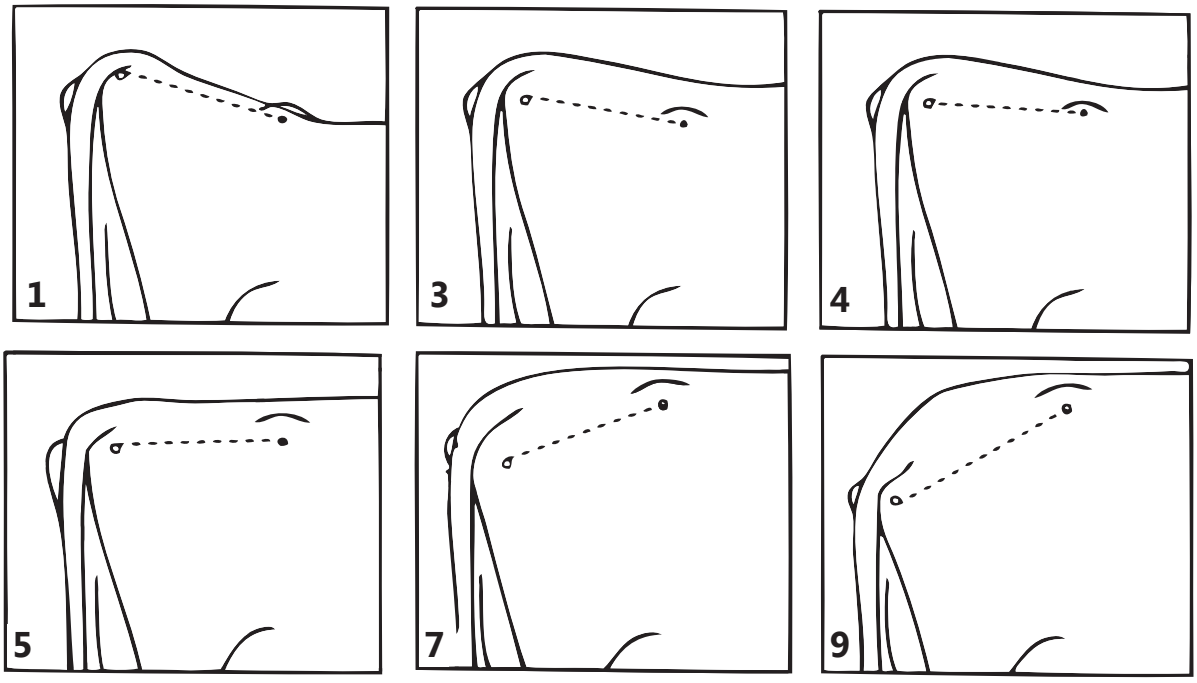


8. RUMP ANGLE

This trait describes the angle of a line between the centre of the hips and the top of the pins.

1	2	3	4	5	6	7	8	9

Pins high < Level > Pins low/sloping

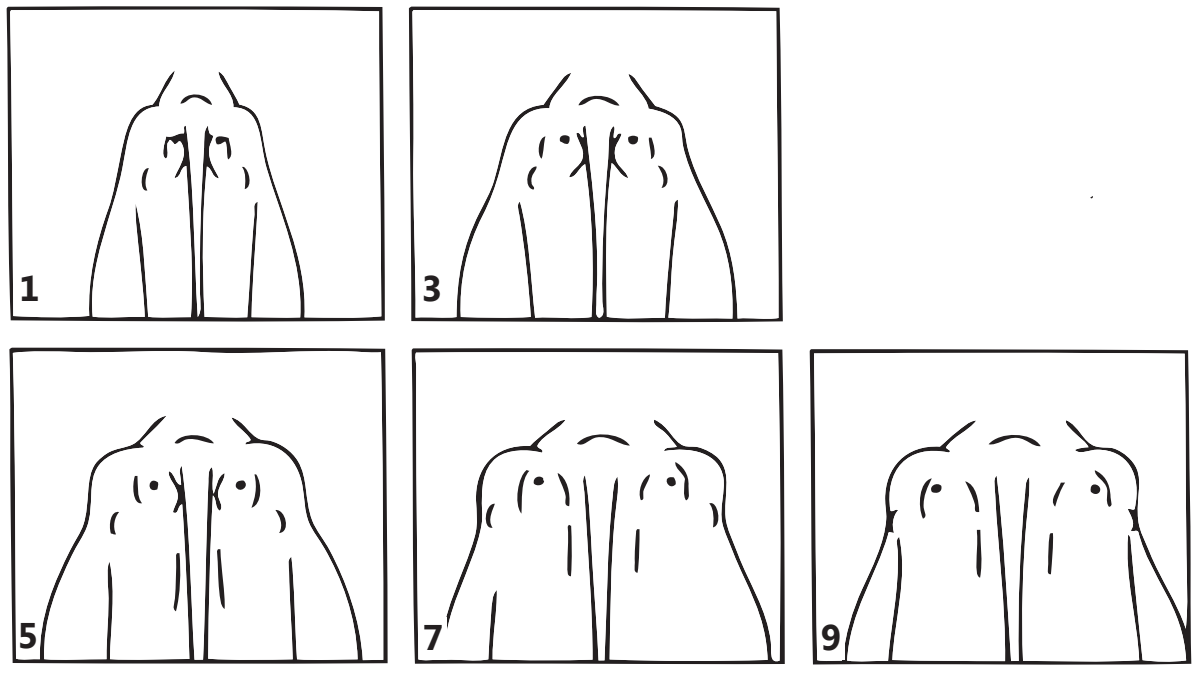


9. RUMP WIDTH

This trait describes the distance between the most posterior point of the pin bones relative to the size of the animal.

1	2	3	4	5	6	7	8	9

Narrow < Intermediate > Wide

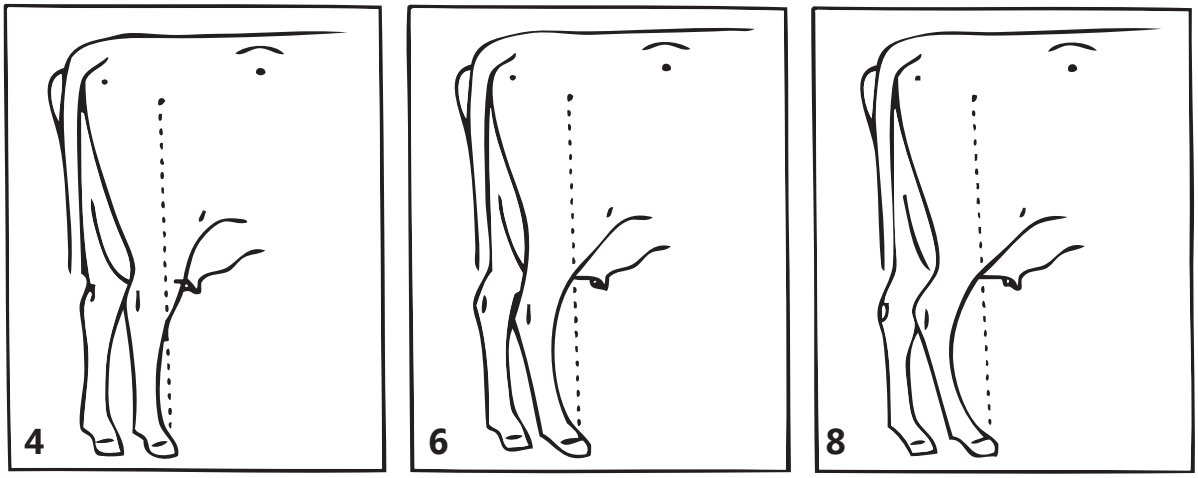


10. LEGS

This trait is an assessment of the straightness or curvature of the back legs from an imaginary line between thurls and the mid hoof while the animal is walking.

1	2	3	4	5	6	7	8	9

Straight < > Sickled/curved

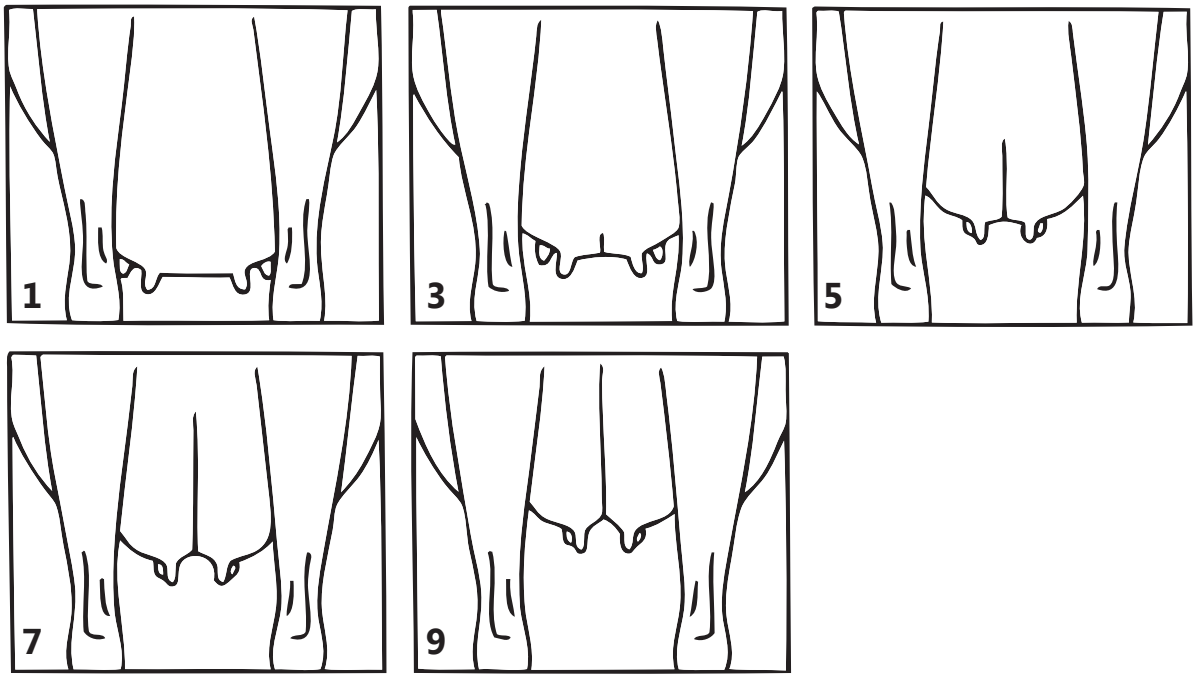


11. UDDER SUPPORT

This trait describes the strength of the suspensory ligament as viewed from the rear. It also includes the udder depth relative to the hocks. It does not include rear udder, which is a separate trait.

1	2	3	4	5	6	7	8	9

Weak < > Strong

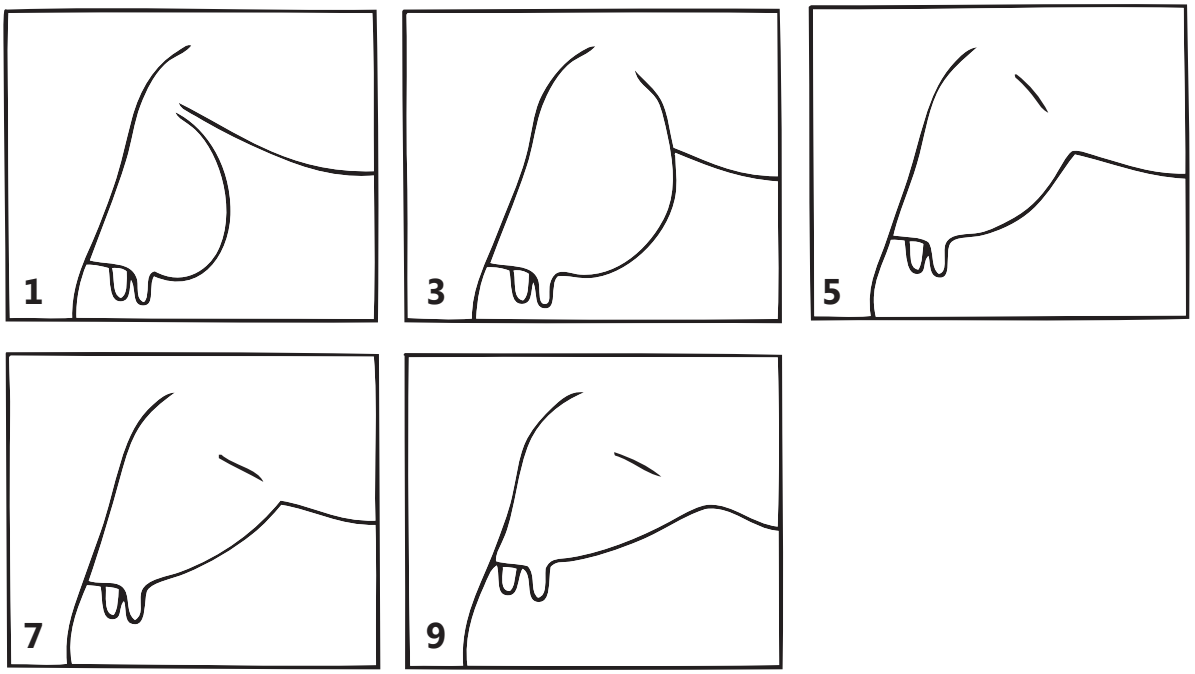


12. FRONT UDDER

This trait describes how well the front udder is attached to the body wall.

1	2	3	4	5	6	7	8	9

Loose < > Strong

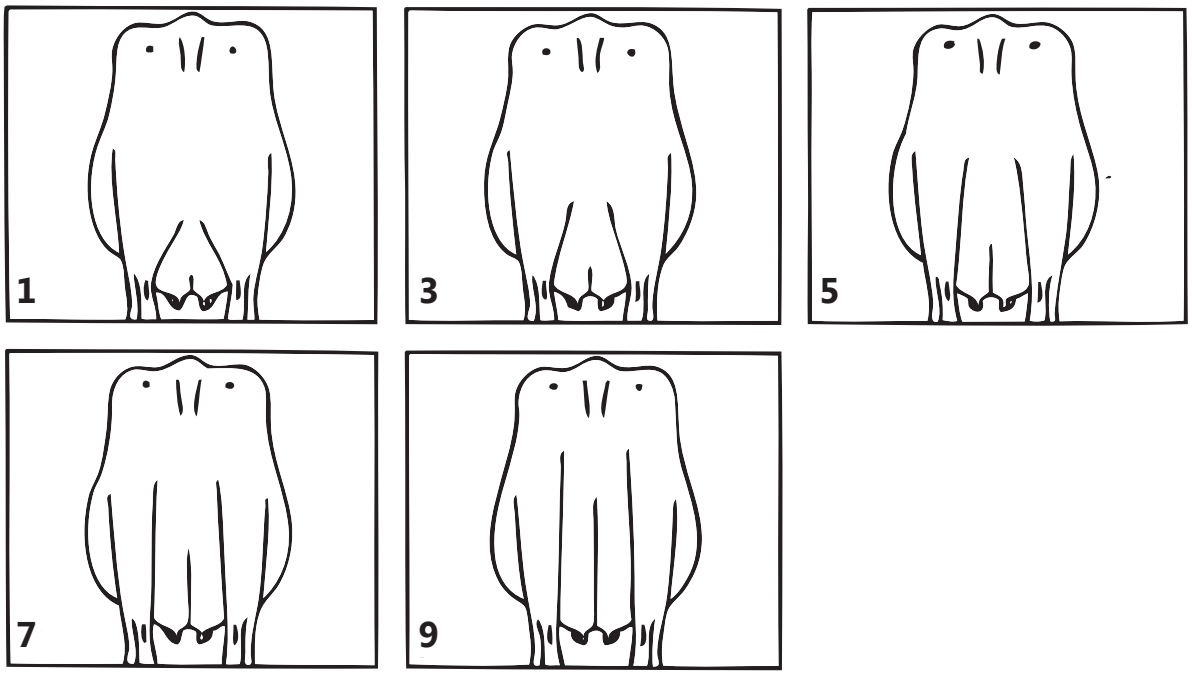


13. REAR UDDER

This trait describes the height and width of the rear udder attachment as distinct from udder support.

1	2	3	4	5	6	7	8	9

Low < > High

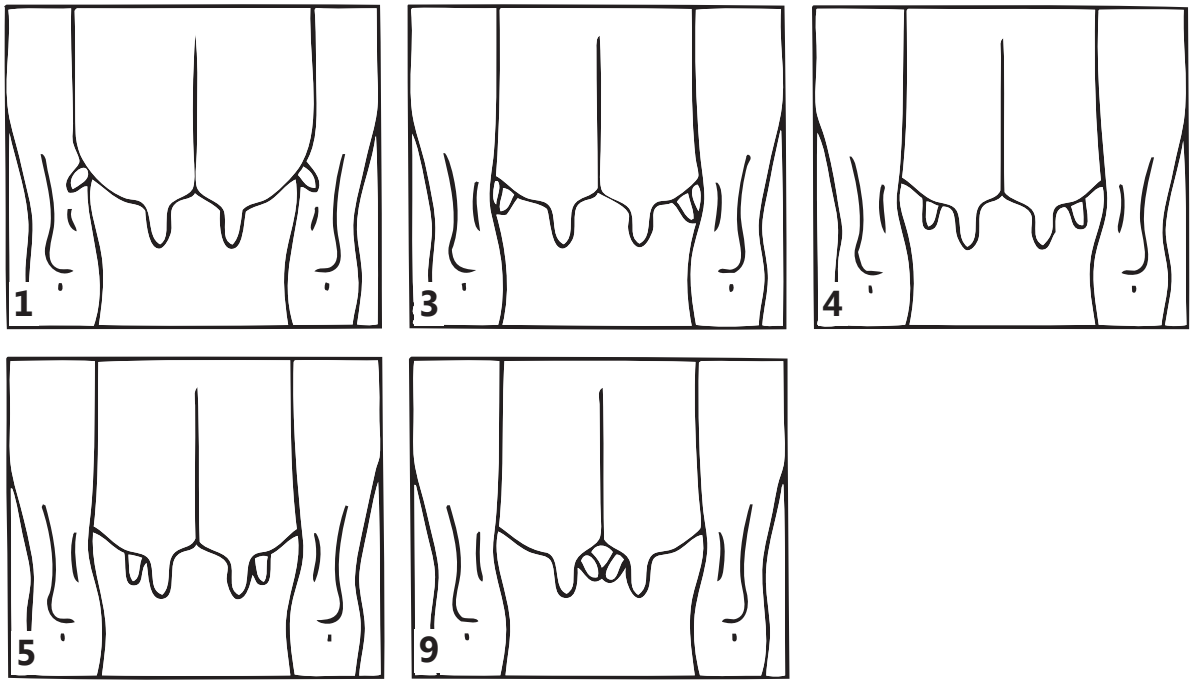


14. FRONT TEAT PLACEMENT

This trait describes the placement of the front teats (at the point of attachment to the udder) relative to the centre of the quarters as viewed from the rear.

1	2	3	4	5	6	7	8	9

Wide < > Close

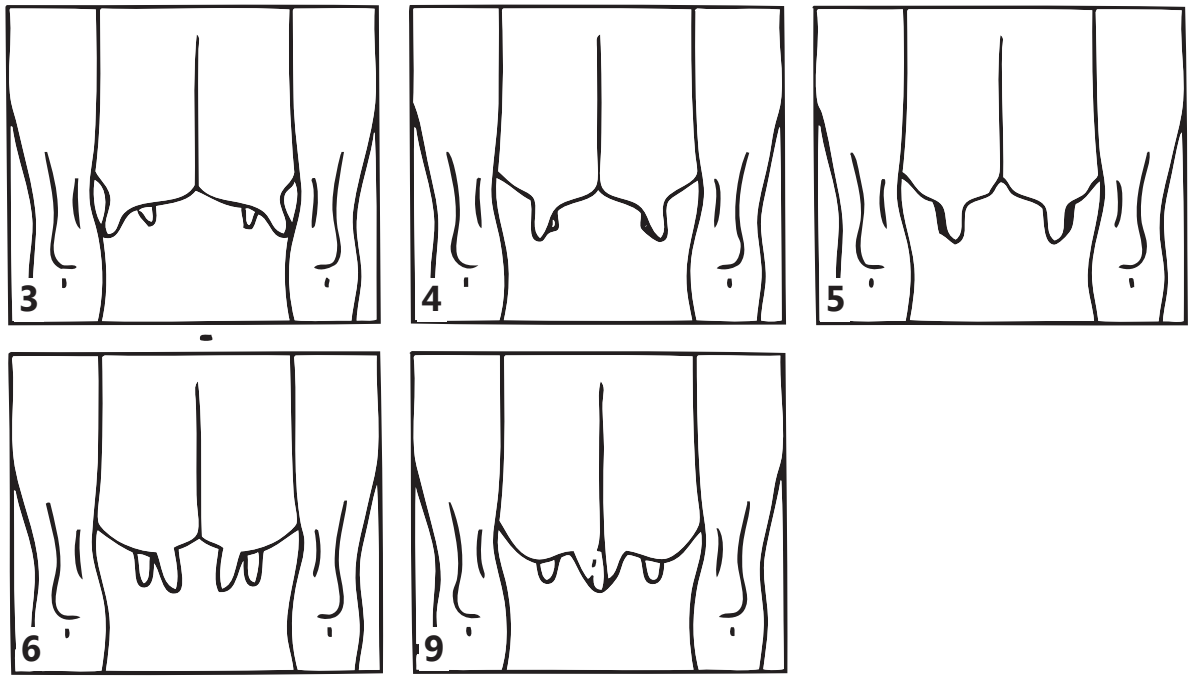


15. REAR TEAT PLACEMENT

This trait describes the placement of the rear teats (at the point of attachment to the udder) relative to the centre of the quarters as viewed from the rear.

1	2	3	4	5	6	7	8	9

Wide < > Close



16. UDDER OVERALL

All traits pertaining to the udder including those udder traits that have been linear scored.

1	2	3	4	5	6	7	8	9

Undesirable < > Desirable

17. DAIRY CONFORMATION

All traits pertaining to dairy conformation including those body traits that have been linear scored, but excluding all the udder traits.

1	2	3	4	5	6	7	8	9

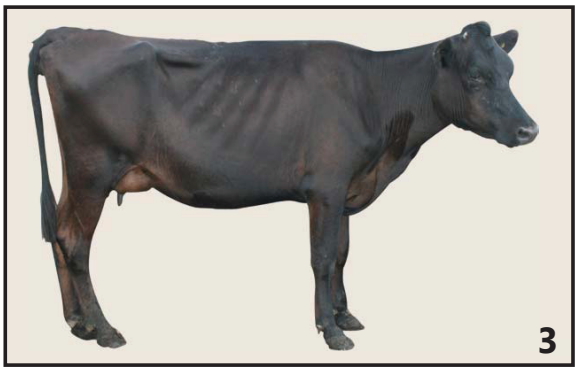
Undesirable < > Desirable

18. BODY CONDITION SCORE

This trait is a visual estimate of an animal's body fat reserves.

1	2	3	4	5	6	7	8	9

Skinny < Desirable > Obese



Photos from Dairy NZ publication: Body Condition Scoring Made Easy: The official field guide, June 2011

Livestock Improvement

TRAITS OTHER THAN PRODUCTION RESULTS YEAR

SAMPLE COW LISTING

animal evaluation

Name
Address
Address
City

LOCATION : **N0000-000-0000/00**
PTPT/HERDCODE : **ABCD 7/1234**
AE RUN DATE :

LIVEWEIGHT DATE :
TOP INSPECTION DATE :
INSPECTOR : **Inspector Name**

DATE PROCESSED : 11/02/2010
PAGE : 4

0 = Trait Not Scored
* = Animal Changed Location

Name	Ident.	Test No.	Sire	BW ($)	AM	ST	MS	OO	S	W	C	RA	RW	L	US	FU	RU	FT	RT	UO	DC	Condition Score	Award	Comments	Liveweight (kg)
BLACK & WHITE HFR A	08 8	47	101134	54/46	4	6	7	5	6	5	5	4	6	7	6	6	6	5	6	6	6	3.5	82		
BLACK & WHITE HFR B-ET	08 24	78	101134	5/44	5	6	8	6	6	5	5	5	6	7	7	7	7	5	6	7	7	4.0	84		
BLACK & WHITE HFR C S3F	08 7	83	106514	70/44	7	8	8	8	7	6	7	5	5	6	6	6	5	5	7	6	6	5.0	82	UL MA	
BLACK & WHITE COW D	06 38	130	672213	133/52	0	0	0	0	9	8	8	5	5	6	6	7	5	5	5	6	8		84		
BLACK & WHITE COW E	03 19	109	101738	13/56	0	0	0	0	8	7	6	4	9	7	9	6	7	5	8	7	8		85		
BLACK & WHITE HFR F	08 46	104	106734	36/42	4	5	7	6	6	5	5	5	6	7	6	5	7	5	6	6	7	3.5	83		
BLACK & WHITE HFR G-TW	08 2	70	103768	52/49	6	7	7	7	7	6	7	5	7	7	6	6	5	4	6	5	6	4.5	81		
BLACK & WHITE COW H	04 57	28	103768	46/53	0	0	0	0	9	8	7	5	7	6	7	7	8	5	6	7	9		88		
BLACK & WHITE COW I	05 29	100	104732	57/55	0	0	0	0	9	8	5	4	6	7	7	6	7	4	6	7	7		84		
BLACK & WHITE COW J	05 4	37	104732	47/55	0	0	0	0	9	8	7	4	6	7	7	6	5	4	6	6	8		84		
HOLSTEIN HEIFER	EFGH 08 40 *	36	101650	143/46	6	6	8	7	6	5	5	5	6	6	6	6	4	5	6	5	7	4.0	82		
HOLSTEIN COW	EFGH 04 61 *	38	99351	93/53	0	0	0	0	8	7	8	4	6	7	8	6	8	4	6	7	8		85		
BLACK & WHITE COW K	00 39	23	95223	136/58	0	0	0	0	8	7	9	4	6	7	8	8	7	4	6	8	9		EX2		
FRIESIAN COW	IJKL 03 69 *	156	101822	46/56	0	0	0	0	9	9	8	4	6	7	8	7	8	4	6	7	8		87		
AVERAGE OF 2YR OLDS IN HERD				46/43	6.3	7.3	7.1	7.4	6.9	5.8	5.7	4.8	5.9	6.1	6.6	6.3	6.0	5.0	6.0	6.3	6.4	4.2			
AVERAGE SCORE FOR HERD 45 COWS INSPECTED				49/48	6.3	7.3	7.1	7.4	7.8	6.7	6.5	4.6	6.2	6.4	7.1	6.6	6.4	4.8	6.0	6.7	7.3	4.2			
AVERAGE SCORE (2 YR OLDS) - ALL INSPECTIONS 2009/2010																									
AYRSHIRE					6.8	6.9	7.0	7.0	5.4	4.4	6.8	5.0	6.3	6.1	6.2	5.9	5.9	4.7	5.7	6.0	6.7	4.4			
HOLSTEIN-FRIESIAN					6.1	6.2	6.2	6.5	6.4	5.3	6.0	4.7	6.1	6.1	5.9	5.6	5.6	4.5	6.0	5.6	6.2	4.2			
JERSEY					6.3	6.5	6.5	6.6	4.8	3.8	6.5	4.8	6.0	6.2	6.0	5.9	5.9	4.5	5.6	5.8	6.6	4.2			
MILKING SHORTHORN					6.5	6.7	6.5	6.7	5.6	4.8	6.2	4.8	6.5	6.0	5.9	5.6	5.4	4.6	5.4	5.6	6.2	4.4			
					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

AM	Adaptability toMilking	OO	OverallOpinion	C	Capacity	L	Legs	RU	RearUdder	UO	UdderOverall
ST	ShedTemperament	W	Weight	RA	RumpAngle	US	UdderSupport	FT	FrontTeat Placement	DC	DairyConformation
MS	MilkingSpeed	S	Stature	RW	RumpWidth	FU	FrontUdder	RT	RearTeat Placement		

T.O.P. FARMER LIST

Herd Code :

Participant Code :

Location :

Requested through :

Date processed :

PREV AWARD	Cow Details				ADAPTABILITY TO MILKING	SHED TEMPERAMENT	MILKING SPEED	OVERALL OPINION	COMMENT CODES
	BREED	AGE	IDENTIFICATION	COW No	1 - 9	1 - 9	1 - 9	1 - 9	

ident. indicators
✱ : Parentage not yet checked
\# : Parentage uncertain
= : Parentage cannot be verified

Date : ____ /____ /_____ Signature _____
(Herd Owner or Manager)

Please Use Code Numbers

Adaptability to milking

1 = extremely slowly
2 = very slowly
3 = slowly
4 = slightly slowly
5 = intermediate
6 = slightly quickly
7 = quickly
8 = very quickly
9 = extremely quickly

Shed Temperament

1 = vicious
2 = very temperamental
3 = temperamental
4 = slightly temperamental
5 = intermediate
6 = slightly placid
7 = placid
8 = very placid
9 = extremely placid

Milking Speed

1 = extremely slowly
2 = very slowly
3 = slowly
4 = slightly slowly
5 = intermediate
6 = slightly quickly
7 = quickly
8 = very quickly
9 = extremely quickly

Overall Opinion

1 = extremely undesirable
2 = very undesirable
3 = undesirable
4 = slightly undesirable
5 = intermediate
6 = slightly desirable
7 = desirable
8 = very desirable
9 = extremely desirable

T.O.P. INSPECTOR LIST

Herd Code:
Participant Code:
Location:
Requested Through:
Date processed:

PREV AWARD	Cow Details				STATURE	WEIGHT	CAPACITY	RUMP		LEGS	UDDER SUP-PORT	FRONT UDDER	REAR UDDER	TEAT PLACEMENT		UDDER OVERALL	DAIRY CONFOR MATION	CON-DITION SCORE	AWARD	COMMENT CODES	Office use
	BREED	AGE	IDENTIFICATION	COW No				ANGLE	WIDTH					FRONT	REAR						

Ident. Indicators (need not inspect)
* Paternity not yet checked
# Paternity uncertain
= Paternity cannot be verified

Date Inspected: 28/10/10

Inspector Code _____ Signature_____

Inspector Code _____ Signature_____

TOP FARMER COMMENT CODES

** Each fate status MUST be followed by a cause of fate code
eg. C LP - Culled due to Low Production

FATE STATUS

C	Culled
D	Died
S	Sold

OTHER

Y	Dry
IN	Induced
LC	Late calver
R	Running with calf, not milked
O	Other (specify)

CAUSE OF FATE

PRODUCTION

LP	Low Production

ACCIDENT

IA	Injury or Accident

DISEASE

BL	Bloat
FE	Facial Eczema
MA	Mastitis
OD	Other Disease (specify)

REPRODUCTION

AB	Abortion
CT	Calving Trouble
MT	Empty
RO	Reproduction Other (specify)

MANAGEMENT

TE	Temperament

SHED BEHAVIOUR

SM	Slow Milker
SC	Kicks Cups
SK	Sucker
SH	Holds Milk
SO	Shed Other (specify)

CONFORMATION

TD	Double Teats
FT	Feet & Leg problems
LM	Lameness
TC	Teat Conformation
UB	Blind Quarter
UD	Udder Conformation
UL	Light or Dry Quarter

OTHER

RF	Red Factor
OF	Off Colour (Holstein Friesian only)

TOP INSPECTOR COMMENT CODES

FATE STATUS

C	Culled
D	Died
S	Sold

OTHER

Y	Dry
IN	Induced
LC	Late Calver
R	Running with calf, not milked
O	Other (specify)
Z	Missing inspection

CAUSE OF FATE

PRODUCTION

LP	Low Production

DISEASE

BL	Bloat
FE	Facial Eczema
MA	Mastitis
OD	Other Disease (specify)

MANAGEMENT

TE	Temperament

ACCIDENT

IA	Injury or Accident

REPRODUCTION

AB	Abortion
CT	Calving Trouble
MT	Empty
RO	Reproduction Other (specify)

CONFORMATION COMMENTS

HEAD

HJ	Weak Jaw
HU	Undershot Jaw
HW	Wry Nose
HO	Other (specify)

LEGS & FEET

LH	Hocky
LR	Overgrown rear feet
LS	Shallow angle
LO	Other (specify)
LF	Overgrown front feet
FT	Feet & Leg Problems
LM	Lameness

TEATS

TA	Angling out (rear teats only)
TB	Bunched
TD	Double or fused
TF	Angled forwards
TL	Long
TP	Pointed
TR	Angled to the rear
TS	Small/Short
TT	Thin
TX	Extra teats which interfere
TO	Other (specify)

BODY

BN	Narrow chest
BT	Low thurls
BW	Weak loin
BO	Other (specify)

UDDER

UB	Blind Quarter
UC	Collapsed, broken down
UE	Oedema
UF	Bulgy front udder
UG	Short front udder
UL	Light or dry qaurter
UQ	Quartered udder
US	Slopey udder floor
UT	Udder texture
UU	Unbalanced udder
UO	Other (specify)

OTHER

OC	Other causes
RF	Red factor
OW	Predominantly white
OF	Off colour (Holstein Friesian only)
NT	Not true to breed
ER	Eligble for registration