

DHI GLOSSARY

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DAIRY RECORDS MANAGEMENT SYSTEMS

www.drms.org

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The following explanation of terms, although not exhaustive, defines the more common terms associated with dairy production testing and DRMS reports.

\$: The Merit value (Net, Cheese or Fluid) that estimates the additional net profit that an offspring of an animal will provide during its lifetime. The measure makes adjustments for both income and expenses for a typical dairy operation to produce a measure of overall net profit. The primary difference between the three formulas for merit is the emphasis that is placed on the components. Producers should select the index that is closest to the milk payment in their area. More information about Net Merit may be found at the USDA website: aipl.arsusda.gov.

\$\$: If \$\$ appears in the due date column the calf from this breeding is calculated to be in the US. DHIA top 5% genetically, based upon the dam and sire PTA \$.

1st Service: The first breeding of an animal.

305-2X-ME: The lactation record for a cow with a minimum of 50 days in milk that is extended to 305 days in milk, adjusted for location, age and season of calving to a mature cow basis and adjusted to twice a day milking basis if milked more than twice a day.

305 Day Actual: The actual production in the first 305 days of a cow's lactation.

305 Projected Actual: Estimate of what a cow with a minimum of 50 days in milk will produce in the current lactation in the first 305 days based upon current lactation to date and current test weights. Projected lactation records printed on the DHI-200, 210 or 220 monthly reports can be calculated as actual 305-day or as standardized, 2X, ME records.

Abortion: Delivery of an offspring 30 or more days prior to the expected calving date, whether in milk or dry. If a cow aborts while in milk and has carried a calf less than 152 days, her current record will continue without interruption. If a breeding date is not available, and the cow aborts while in milk for less than 200 days, her current record will continue without interruption. Except for these situations, the current record will end and a new lactation will begin.

Action Code / Action Needed: Codes that refer to a management decision to be made by the dairy farmer relating to each individual cow. The following codes are used:

- B** - Breed cow next heat period or date listed which is after voluntary waiting period.
- D** - Turn cow dry based on desired length of the dry period, usually 60 days, and expected due date.
- F or G** - Lead feed or begin grain feeding cows. Date recorded is 21 days prior to due date, but this may be altered to match management practices.
- N** - Cow has been open 100 days or more.
- P** - Check for pregnancy. Date is based upon the desired time after last bred date and is usually 45 - 60 days, but can be modified.

Actual Abortion: An observed abortion that is properly coded.

Age: Age in months as of last calving date considering only month and year born and month and year calved sometimes expressed in years and months. For heifers, age in months = number days / 30.4 rounded. If a cow enters a herd with no birth date reported, it is estimated based on breed and lactation number (*see table 1, page 26*).

Age Group: Categorizing animals based on their current age for heifers and age at freshening for cows.

A.I. Progeny Tested: Bulls that have PTAs from USDA that are based upon information from their daughters. They may or may not have genomic information available.

A.I. Genomic Tested: Bulls that have PTAs from USDA that are based solely upon genomic information. They have no daughter information available.

All Other A.I. Bulls: Bulls that do not have PTAs from USDA and they have no genomic information. These bulls will have Parent Averages (PA) which are averages of their parent's PTAs.

American ID: This identity includes an animal number plus a 3-character country code and can be either eight digits or nine digits (with check digit). 8-digit numbers are 50,000,000 to 59,999,999 and can be in sequence by the last digit. 9-digit numbers are 100,000,007 to 359,999,994 or 380,000,009 to 399,999,998 and can be in sequence by the next to last digit.

Average Linear SCC Scores: This is a mathematical average of a group of cow's somatic cell scores. It is not weighted based upon individual milk weights.

Average Age: The current average age in months of a group of heifers or the average age at freshening for a group of milking animals.

Average Age at First Breeding: The average age in months of the heifers when they are first serviced.

Average Days to 1st Service: This is calculated by summing the days to first service for all cows which have been bred at least once. The sum is divided by the number of those cows.

Average Number of Breedings: The average number of times a group of animals have been serviced during a certain period of time.

Average Milk/Day: The average amount of milk that a cow has produced in her lifetime divided by the total number of days since she was 24 months of age.

Average SCC Actual: A weighted average of the actual somatic cell counts for a group of animals based upon the individual cow's milk weight and actual somatic cell count.

Average SCCs for Lactation: The average linear score for each test day during a cow's lactation.

Apparent Abortion: Result of a cow rebred or diagnosed open following a diagnosed pregnancy.

Avg. Daily Bulk Tank Wts (LBS): The calculated daily production for the herd based on the most recent three milk shipments reported.

Avg. Percentile Rank (Net Merit): The average percentile rank of the animals based upon net merit.

Barn Name: Name given to a cow; limited to seven positions and can be alpha, numeric or any combination.

Base Relative Value (BRLV): The current 305-2X-ME herd average. This is used as a comparison to calculate the % of Herd ME for a cow.

Batch: A temporary grouping of cows representing location on test day (i.e. pen or milking group).

Birth Difficulty: Score recorded based upon the ease of calving, also referred to as calving difficulty score. Scores are 1= no problems; 2 = slight problem; 3 = needed assistance; 4 = considerable force used and 5 = extreme difficulty.

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B'Fat Differential: A factor which determines how much the milk price changes with each tenth percentage unit change of fat test.

Blend Price of Milk: Average price per hundred pounds for all milk sold.

Blend Price: Total dollars received for milk minus total lbs. of milk sold multiplied by 100. Hauling is usually subtracted before reporting price.

Blended Rations: Combining a variety of feeds to develop a total mixed ration.

Body Condition Scores: A number assigned to an animal to reflect her condition. The numbers range from 1.0, very thin to 5.0, over conditioned. The score depends upon visual appraisal along the animal's topline from the loin to the tailhead including the hips, pin bones and tailhead.

Body Condition Score 1: Deep cavity around tailhead. Bones of pelvis and short ribs sharp and easily felt. No fatty tissue in pelvic or loin area. Deep depression in loin.

Body Condition Score 2: Shallow cavity around tailhead with some fatty tissue lining it and covering pin bones. Pelvis easily felt. Ends of short ribs feel rounded and upper surfaces can be felt with slight pressure. Depression visible in loin area.

Body Condition Score 3: No cavity around tailhead and fatty tissue easily felt over whole area. Pelvis can be felt with slight pressure. Thick layer of tissue covering top of short ribs which can still be felt with pressure. Slight depression in loin area.

Body Condition Score 4: Folds of fatty tissue are seen around tailhead with patches of fat covering pin bones. Pelvis can be felt with firm pressure. Short ribs can no longer be felt. No depression in the loin area.

Body Condition Score 5: Tailhead is buried in thick layer of fatty tissue. Pelvic bones cannot be felt even with firm pressure. Short ribs covered with thick layer of fatty tissue.

Body Weight: The body weight of a cow expressed in 100 pounds, usually recorded at time of calving. If no body weight is recorded when a cow enters a herd, it is estimated based on lactation number (*see table 3, page 26*). Weight can be estimated by measuring the length of an animal's heart girth (*see table 4, page 26*).

Born Dead: An animal dead at birth.

Bred Date: The date the animal is mated with a bull either by natural service or artificial insemination.

Breed: One of the recognized breeds of dairy animals. If the breed of the sire and dam are different, the animal is designated a crossbreed.

Breed Codes: A two character alphabetic code used to identify each animal's breed. Dairy breed codes are:

Cows: AN - Red Angler	JE - Jersey	MO - Montbeliarde	RP - Red Poll
AY - Ayrshire	JM - Jamaica Hope	MS - Milking Shorthorn	SM - Simmental
BS - Brown Swiss	KY - Kerry	NO - Normande	SR - Swedish Red
DL - Dutch Belted	LD - Am Lineback	NR - Norwegian Red	& White
GU - Guernsey	MD - Milking Devon	RD - Red Dane	WW - Red & White
HO - Holstein	MI - Netherlands MRY	RE - European Red	XD - Crossbreed

Goats: AI - Alpine	EX - Experimental	NU - Nubian	TO - Toggenburg
CC - Sable	LN - La Mancha	OH - Oberhasli	XX - Mixed
EN - Saanen	ND - Nigerian Dwarf	PY - Pygmy	blank - Unknown

Breed of Herd: The breed code that represents the breed of 75% or more of the cows in the herd. Herds less than 75% of any one breed will be designated breed X (crossbred or other).

Breeding Herd: Cows in the herd that have passed the voluntary waiting period, have been bred but currently are diagnosed open, or have a breeding date that is too recent to assume or confirmed pregnant.

Bred Date: The date an animal was reported bred. This date will be used to estimate various action dates such as next expected heat date, date to preg check, date to dry, and due date.

Bulk Tank Weights: The amount of milk that was shipped in each pick up is recorded along with the number of milkings in that pick up.

Bull: Male animal in cattle.

By Index Order: In numerical order from the lowest cow index number to the highest cow index number.

Calf: Young of cattle, either sex.

Calf Identity: The identification reported for the offspring of an animal.

Calf Name: The barn name reported for a calf at calving time.

Calf's Estimated Transmitting Ability (ETA): This is calculated as one half the sum of the sire PTA and dam PTA. If the dam does not have a PTA, one fourth of her ERPA is used. If the sire has no PTA or PA calculated by USDA, the non-AI breed average is used in calculating the calf's ETA. If the dam has no PTA or ERPA, the breed average PTA is used in the calculation. The calf's ETA is recalculated quarterly.

Calving: The time at which a cow gives birth. When reporting body condition codes this time period is 0 - 29 days after freshening.

Calving Ease: The difficulty at which a calf is delivered at birth, usually represented as a calving difficulty score.

Calving Date: The date the animal gave birth to a calf; also known as "fresh date."

Calving Difficulty Score: A score recorded based upon the ease of calving 1 = no problems; 2 = slight problem; 3 = needed assistance; 4 = considerable force used and 5 = extreme difficulty.

Calving Interval: Period of time from one calving until the next calving, usually measured in months.

Calving Prep Date: A date 21 days prior to due date which should be used to prepare the cow for calving. Usually this date is used to begin lead feeding in preparation for calving.

Cheese Yield: See Lactation Cheese Yield

Colostrum: First milk produced by cow after calving.

Concentrate: Feed high in energy and low in moisture and fiber, usually with TDN of 50 or higher.

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Condition Affecting Record (CAR): Codes used to provide specific information about the cow's record or the current milk weight or component test. The following codes are used when an animal is reported as leaving the herd:

1 - Sold Feet and Legs	6 - Died
2 - Sold Dairy	7 - Sold Mastitis
3 - Sold Low Production	8 - Sold Disease
4 - Sold Reproductive Problems	9 - Sold Udder
5 - Sold Injury or Other	X - Sold Reason Not Reported

The following CAR codes indicate something about the current test day's milk weight or component test and are only printed if the information is estimated.

- A - Abnormal, weights were recorded
- E - Estimated, no weights were recorded
- F - Fat % and Protein % Estimated, no sample collected by the technician
- H - In Heat on Test Day
- I - Injected Prior or During Milking
- L - Fat % and Protein % Estimated, lab unable to get results from sample

Other CAR Codes are:

- B - Record Started or Ended by an Abortion
- C - 305 Day Record Has Been Computed

Conc. Fed 1 LBS: Amount of individually fed concentrates being fed to each cow reported as a grain (GR).

Conc. Fed 2 LBS: Amount of group fed concentrates that is being fed as a top dress (TD) and reported individually for each cow.

Cost of Concentrates \$: The average cost per cow based on amounts of concentrate fed and reported cost per ton.

Cow Day: Each day a cow is in a herd.

Cow Dollar Value: evaluates the value of a cow based upon her ME milk, ME fat, ME protein and SCC. Formula is: Cow Dollar Value = $(0.016 * \text{ME Milk}) + (1.5 * \text{ME Fat}) + (1.95 * \text{ME Protein}) + (350 - \text{lactation average SCC}) * 0.00074 * \text{ME Milk} / 100$

Cow Month: The accumulation of the number of days each cow was in the herd during the test interval.

Cows Not Diagnosed Pregnant: A list of cows that are bred but not confirmed pregnant, usually accompanied with a date to preg check. This date is calculated by bred date plus days to preg check.

Cows Open: A list of cows that are confirmed open or that have not been bred since calving. The list is usually accompanied with a breeding date designation. This is based on calving date plus voluntary waiting period.

Cows to Calve: A list of cows that are due to calve within the next 60 days or within a period designated by the herd's option.

Cows to Turn Dry: A list of cows that should be dried off during the next 60 days or within a period designated by the herd's option.

Chronic Infection: A cow with a SCC Score > 4 (200,000) on two or more consecutive test dates during the current lactation. Test dates with reported SCC score that are greater than 90 days apart are not considered consecutive when making the determination of chronic infections.

Crossbred: An animal whose sire and dam are of different breeds.

Cull: An animal the owner has determined to be inferior and removed from the herd.

Cull Value Production Level: Test day value of product that is 60% of the current month's herd average test-day value product.

Culling Rate: The % of cows that are removed from a herd.

Current Actual Calving Interval: Calculated for cows with more than one calving. The interval is expressed in months and is calculated as [(Number of days between last calvings) / 30.4].

CY\$ (Cheese Yield economic Dollar) Index: See Index.

D. Pr: This heading indicates the pregnancy diagnosis of an animal will be listed.

Daily Milk Weight: Milk production in a 24-hour period. A cow may be milked from one to several times in this period of time. Milk is recorded in pounds to nearest tenth of a pound as 39.6.

Daily Income Over Feed Cost (IOFC): This is the amount of income left after subtracting test day feed cost from test day milk income.

Daily \$ Value: The value of the milk on test date based upon the milk price and the fat and protein differentials that were reported.

Dam: Mother of animal.

Data Collection Rating: Squared correlation of estimated and true yields multiplied by a factor of 104 to give monthly testing a rating of 100 and daily testing a rating of 104.

Data Collection Rating for Milk (DCR Milk): An indication of the accuracy of lactation records from a wide variety of test plans. The squared correlation of estimated and true yields is multiplied by a factor to give monthly testing a rating of 100 and daily testing a rating of 104. DCR is computed as soon as 305 days have lapsed. Herd average DCR is the average of all cows that qualify for inclusion in genetic analysis. For more details, visit the AIPL website at <http://aipl.arsusda.gov/reference/datarating.htm>.

Date Bred: See Bred Date.

Date Due: Estimated calving date computed from the bred date using normal gestation lengths for each breed.

Date Entered Herd: The date recorded when a cow was purchased or the freshening date for a first lactation animal.

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Date-of-Test: Date when the herd test was completed; when the last milk weight and sample were taken.

Date to Breed: The estimated next expected heat date, or if days in milk are less than the voluntary waiting period (VWP), the VWP date. The default VWP date is 60 days.

Date to Check: Date bred plus the herds days to check option (default is 35 days).

Date to Dry: Date Due minus the herd's goal of days to stand dry (default is 60 days).

Date to Prep: See Calving Prep Date.

Days 3X: The number of days during the lactation that a cow was milked 3X or three times a day.

Days Carried Calf: days from conception to a specific reference date such as the end of the test period; also known as "days pregnant."

Days Dry: Number of days from dry date to next calving date (Days Dry = next calving date - dry date) or if currently dry the number of days from the dry date to current date.

Days In Milk (DIM): Number of days from calving date to dry date (Days in Milk = dry date - calving date). If a cow is still milking, the days in milk is computed as the number of days from calving through the date of test (including both dates). That is, (Days in Milk = date of test + 1 day - calving date).

Days in Test Period: The number of days between tests, beginning on the day after the previous test and ending on the current test date.

Days Open: days between pregnancies; days from calving until successful breeding date if pregnant; also know as "days not pregnant."

Days to 1st Service: Days from calving until the first breeding date.

Death rate = # died * 100 / RHA number of cows

DCR Milk: See Data Collection Rating for Milk.

DHIA (Dairy Herd Improvement Association): An organization of dairy farmers who have formed a cooperative association to service a production recordkeeping system.

DHIR (Dairy Herd Improvement Registry) Records: DHIA production records recognized, published and used by the national dairy breed organizations.

Diff: The difference in fat % and protein % used to identify cows with an inverted fat-protein ratio.

Difference from Herdmates: is the number of pounds of milk, fat and protein that the current 305-day ME record is above (+) or below (-) the average of herdmates. Herdmates are all other animals of the same breed that freshened in the same herd-year-season. Seasons are monthly if sufficient (15) herdmates are available. For very small herds, the maximum season size is nine months. See pages 27-30 for more information.

D.O.B.: Date of Birth.

DRMS: Dairy Records Management Systems; DRPC with offices in Raleigh, NC and Ames, IA.

DRPC: Dairy Records Processing Center; an organization that computes dairy production records.

Dry Date: First whole day a cow is not milked.

Dry Donor Dam: A dry cow used only for embryo donor purposes. Days dry for this cow are not included in the Rolling Herd Average. No data on the Dry Donor Dam will be included in herd average or management information. Dry Donor Dams that later calve will be returned to the milking herd, and a 365-day dry period with 0 production data applied against the herd average in the current test interval.

Dry Off: The act of discontinuing milking of a cow.

Due-Date: Estimated calving date computed from the bred date plus average gestation length for the breed.

Duplex Print: Printed on both sides of a sheet of paper.

Early Lactation: When reporting body condition scores this time period is generally 30 - 59 days after calving.

Eartag Number: A uniform series eartag number consisting of a unique combination of 2 numbers, 3 letters and 4 numbers (example, 64WAD1796) used in identifying grade animals.

Eligible cows: Cows that are past the Voluntary Waiting Period and able to be bred and are contributing to estrous cycle days in the test period.

Embryo Transfer: The process of transferring an embryo from a donor cow to a recipient female via the process of in vitro fertilization. Typically, the dam is super-ovulated, the embryos are harvested on day 7 post breeding, and, embryos are transferred to the recipient females on day 7 after a standing heat. Therefore, the due date of the recipient female will be 7 days less than the normal gestation period for the breed of the recipient.

Energy Corrected Milk (ECM): Determines the amount of energy in the milk based upon milk, fat and protein and adjusted to 3.5% fat and 3.2% protein. ECM formula = $(0.327 \times \text{milk lbs.}) + (12.95 \times \text{fat lbs.}) + (7.65 \times \text{protein lbs.})$. See page 31 for more information on how this formula was derived.

ERPA (Estimated Relative Producing Ability): An estimate of a cow's genetic and permanent environmental effects on a cow's production, expressed as a deviation from herdmates. Deviating the cow's production record from herdmates' production corrects for season of calving differences. Herdmates are cows of the same breed calving in the same season. All records on a cow are used, including records in progress. The difference between her production and her herdmates' production for each lactation involved is weighted according to the number of lactations the cow has on file and the number of days in milk for the current lactation.

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Weights for each lactation are:

<u>Lactation Number</u>	<u>Weight</u>
1	.50
2	.67
3	.75
4	.80
5	.83

The formula to calculate the weight is:

$$\frac{N}{N + 1} \quad \text{where N is the number of lactations}$$

The record-in-progress (RIP) weighting factors are:

Days in Milk	1st Lactation	2nd+ Lactations
001-045	0.72	0.60
046-075	0.83	0.74
076-105	0.88	0.82
106-135	0.92	0.86
136-165	0.94	0.91
166-195	0.96	0.93
196-225	0.97	0.96
226-255	0.98	0.98
256-285	0.99	0.99
286-305	1.00	1.00

The formula to calculate an ERPA is:

ERPA = Lactation Weight X RIP Factor X Herdmate Deviation where:

Lactation Weight = weight for number of lactations

RIP Factor = record-in-progress weighting factor

Herdmate Deviation = average of the cow's records minus the average of the herdmates adjusted for records n progress and state breed-season average

ERPA \$ Deviation: The milk price and fat and protein differentials reported on the most recent test date is applied to the ERPA for milk, fat and protein to calculate the ERPA deviation.

Error Codes: Condition codes recorded based upon previous test information. The codes are as follows:

1. Bred date removed
2. Calving date missing
3. Dry date missing and was estimated.
4. Milk weights missing and were estimated.
5. Milk weights abnormal
6. Cow ID missing
7. Reported sire of cow is invalid
8. Calving date is less than 200 days apart
9. New cow ID is invalid

Estrous Cycle Days: The number of days during the test period that are accumulated for eligible cows. For cows with no service date or cows diagnosed open, eligible days are calculated as the number of days past the VWP in the test period. For cows bred but not yet diagnosed pregnant or open, eligible days in the test period are calculated as: Eligible days = days in test period through the last service + [days in test period

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Gestation Period: Time from conception (animal becomes pregnant) until young is born. Average is 280 days with a range of 258 to 306 days in dairy cows. For milk goats the average is 150 days with a range of 145 to 157 days. The gestation for various breeds are as follows: Ayrshire 282 days, Brown Swiss 290 days, Guernseys 286, Holstein 280 days, Jersey 279 days and other 282 days.

Grade Animal: An animal that is not a registered animal.

Group (GRP): A temporary grouping of cows representing location on test day (i.e. pen or milking group).

Group Fed Concentrate: An average amount of grain that is fed to a group of cows usually in a bunk situation.

Heat Interval: Time between normal heat periods; average is 21 days with a usual range from 18 to 26 days.

Heat Date: A date reported when the animal showed estrous. This date will be used to record the next expected heat date as a notification when to possibly breed the animal.

Heifer: Female animal that has never calved.

Herd Avg SCC Count: The average somatic cell count for the herd. This is a weighted average based on individual cow's milk weight and actual somatic cell count.

Herd Code: An 8-digit number used to identify each dairy herd; Example 55-27-0012.

Herdmate Deviation: The difference between the cow's ME production for milk, fat, and protein and the average of her herdmates. See [Difference from Herdmates](#) for further information.

Herd Merit \$ Option: See definition for [Index](#).

Herdmates: Cows of the same breed that calved during the same season of the year.

Inbrd: The inbreeding coefficient for the animal and is a measure of the relationship of the parents as compared to the rest of the population. An inbred animal ($\text{Inbrd} > 0$) results from the mating of animals more closely related than the average relationship within the breed. An inbreeding coefficient of 6.25 (6.25 percent of the genes are in common) can result from mating animals that are as related as second cousins, 12.5 results from a mating as closely related as first cousins and 25 results from mating two animals such as an uncle and a niece. Keep in mind that there can be multiple ancestors in a pedigree that have genes in common. Typically, reasonable recommendations are to avoid inbreeding coefficients greater than 6.25.

Income Over Feed Costs (Herd): The difference between Value of Product and Total Feed Cost.

Income Over Feed Cost: Each cow's net return above feed cost since beginning the previous dry period. Feed cost is estimated for each cow for each test period using the cow's body weight, and the feed quantities and prices reported.

Index: Economic values assigned by USDA to predicted transmitting abilities (PTAs) in the milk and fat dollars index (MF\$) and in the milk, fat and protein dollars index (MFP\$) are currently based on a milk price of \$12.20 per hundredweight of milk with 3.5 % fat and 3.2 % protein and differentials of 8 cents for fat and 20 cents for protein.

MF\$ (Milk and Fat Dollars) index = \$.095 (PTA Milk) + \$.80 (PTA Fat)

MFP\$ (Milk, Fat and Protein Dollars) index = \$.031 (PTA Milk) + \$.80 (PTA Fat) + \$2.00 (PTA Protein)

CY\$ (Cheese Yield economic Dollar) index for Ayrshires, Brown Swiss, Holsteins, Milking Shorthorns, and Red and Whites = \$.002218 (PTA Milk) + \$1.9960 (PTA Fat) + \$1.7299 (PTA Protein); for Guernseys and Jerseys = \$.002218 (PTA Milk) + \$.80 (PTA Fat) + \$3.1876 (PTA Protein).

NM\$ (Net Merit Dollars) index is based on MFP\$ discounted for feed cost as well as on PTAs for productive life (PL) and somatic cell score (SCS). $NM\$ = .7 (MFP\$) + \$11.30 (PTA PL) - \$28.22 (PTA SCS) - \text{breed avg. SCS}$.

Index Number: A five digit number used by Dairy Records Management Systems to identify each cow within a herd. The index number is unique to each cow in that herd.

Individually Fed Concentrate: A grain that is fed individually in varying amounts to each cow. The amount is reported individually by cow.

Interval Days: The number of days between two periods. The number of days between the current and previously reported heat or breeding date is listed as Intvl. Days.

Lactation Cheese Yield: the maximum amount of cheese of satisfactory composition that can be obtained from a given quantity of milk. This is directly dependant on the concentration of casein and fat in the milk. Total milk protein is presumed to be 80% casein. True protein must be converted to Total protein. True Protein became the industry standard in 2001, but the equation from VanSlyke* was developed in 1910 which was prior to the common use of true protein, so an additional adjustment (*1.063) in the casein factor is necessary.

* VanSlyke, L. L., and C. A. Publow. 1910. *The Science and Practice of Cheese Making*. Orange Judd Company, NY.

Lactation Cheese Yield = $((.93 * (305 \text{ day actual fat percent}) + ((305 \text{ day actual protein percent} * 1.063 * .80) - 0.1)) * 1.09) / 64) * 305 \text{ day actual milk}$. *Example: 25,160 = 305 day actual milk; 867 = 305 day actual fat; 732 = 305 day actual protein* - Lactation Cheese Yield = $((.93 * ((867 / 25,160) * 100) + (((732 / 25,160) * 100) * 1.063 * .80) - 0.1)) * 1.09) / 64) * 25,160 = 2391$.

Lactation Number: The number of times a cow has calved. If no lactation number is recorded when a cow enters the herd, a lactation number is estimated based upon the age of the animal (see table 2, page 26).

Lactation Record: Accumulated production record starting with a calving date and ending with a dry or sold date.

Lactation Record, Complete: Accumulated production record from calving date to the next dry date.

Lactation Record, 305 Day: Record through exactly 305 days for cows milking more than 305 days or through the dry date or sold date if it occurred prior to 305 days in milk.

Lactation To Date Record: Accumulated production record starting with the calving date and continuing through the most recent date of test for the herd. Also known as the "record in progress."

Late Lactation: The ending period during a cow's lactation. When reporting body condition scores, this time period is generally > 179 days after freshening.

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LBS Conc Indicated: The pounds of concentrates needed to supply the energy required to supplement forages and other feeds consumed in order to maintain a cow's reported body weight and current level of milk production. The accuracy of this recommendation is dependent on the accuracy of reported feed amounts and energy values.

LBS Consumed: The amount of feed that is reported fed to a cow or group of cows.

LBS Fed: Pounds fed is the amount of concentrates reported fed individually to each cow.

Lifetime Total: The total production that a cow has produced in her lifetime or while on test. This includes the total number of days in milk and total milk, fat and protein pounds.

Livability (LIV): The condition of a calf at birth. A normal birth is blank, other dispositions are coded as follows:

- B - Died at birth
- E - Died within 24 hours of birth
- 1 - Died after 24 hours of birth
- 2 - Died after 24 hours due to respiratory problems
- 3 - Died after 24 hours due to a disease
- 4 - Died after 24 hours due to some other problem
- 5 - Sold for dairy purposes
- 7 - Sold for some other reason
- T - Calf is a result of an embryo transplant

Maltlage: A mixture of spent brewers grains, cracked corn and minerals. (Approximately 8% Crude Protein and 36 TDN as fed; approximately 50% Dry Matter).

Management [Date and Note]: Records a code and date of a management task that should take place. See [Action Code](#) for more information.

Management Level Milk (MLM): The estimated average milk production on test day if all cows in the herd were 150 days in milk, in their 2nd lactation, and producing milk that contains 4.0% fat and 3.3% protein. MLM is only calculated on cows with less than 306 days in milk. MLM is a better indicator of the effect of management changes on production than Rolling Herd Average because MLM changes more quickly.

Mastitis Infection: An inflammation of the udder. During inflammation, leukocytes or somatic cells are shed into the udder in large numbers to neutralize toxins and kill bacteria. Depending on how rapidly a cow mobilizes somatic cells to the site of the infection there may be three stages, New, Chronic, and Previous.

Maternal Grand sire (MGS): The sire of the dam of the animal.

M.E. Lactation: Mature equivalent lactation. By the use of special factors the lactation is adjusted for days in milk, milking frequency, season of calving, location and age to that of a mature cow. Unless the cow is mature or milked 3X, the M.E. Lactation will be larger than the actual 305 day lactation record.

MF\$ (Milk and Fat Dollars) Index: See definition for [Index](#).

MFP\$ (Milk, Fat and Protein Dollars) Index: See definition for [Index](#).

Milk Blend Price: The reported milk price and fat and protein tests. The different adjustment for fat or protein (if applicable) is included in the blend price.

Milk Loss Per Day Dollar: The dollar loss is based upon the milk price entered on test day and the pounds of milk loss according to the description under somatic cell count score.

Milk Loss Per Day LBS: The amount of milk loss due to high somatic cell counts according to the description under somatic cell count score.

Monthly Cull Rate %: The percent of cows leaving the herd on a monthly basis. This can be established by the producer or is estimated by dividing the annual % cows left herd by 12.

NAAB Code: A code for identifying semen, made up of a total maximum combination of ten characters. The three position stud code is listed first followed by a one or two position breed code and then up to five position bull code.

Naturally Polled: An animal that was born without horns or any sign of horns.

NCDHIP Handbook: The National Cooperative Dairy Herd Improvement Program Handbook is a comprehensive guide to DHI recordkeeping. It includes uniform procedures and record calculations. The handbook is a cooperative effort of dairy producers, breed associations, AI organizations, Cooperative Extension, and USDA.

N.E.: Net Energy.

New Infection: Animals with a SCC Score > 4 (200,000) for the first time during the current infection.

Net Merit Dollars (NM\$) Index: See definition for Index.

Next Mgmt Date: The next date when a management action should take place. See Action Code for more details concerning the management codes and dates.

Number Calving: The reported number of calvings that occurred during a test period.

Number Breedings: The number of times a cow was serviced during a lactation.

Number Breedings Per Conception: The number of services required in order to confirm an animal pregnant.

Number Confirm Preg: The outcome of pregnancy exams conducted during the test period. Only cows with a "P" pregnancy confirmation will be included.

Number Services: The number of times a cow was bred during a lactation or number of times breedings were reported for cows in the herd during the test period.

Nurse Cow: Cow that has a calf or calves nursing her on test day. A cow that is nursing her own calf during the first few days after calving is not considered as a nurse cow.

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Open: Not Pregnant.

Option: Choices are available or a report requires enrollment to be received.

OS: Owner Sampler. A testing method which the producer records the milk weights and takes samples.

Other Feeds: Feeds fed on a group basis that are under 50% TDN or cost under \$100 per ton. These may include blended rations.

Other Succulents: Any relatively high moisture forage feed that is not considered to be silage.

Parent Average (PA): The average PTA value of the sire and dam, which is calculated by AIPL.

Parent Average Dollars (PA\$): The gross dollar income per lactation that future daughter of bulls will earn in excess of herd mates sired by bulls having a PTA\$ or PA\$ equal to zero.

Peak: A cow's highest daily milk production within a lactation for a test day prior to 150 days in milk. Peak is determined after a cow reaches 100 days in milk and will be updated until the cow reaches 150 days in milk.

Percent Bulk Tank SCC: The % of the total somatic cells that an individual cow contributes to the bulk tank. This is based on the cow's milk weight and actual somatic cell count. This value can aid in determining the value of that cow's production to the overall quality premium or bonus that is paid.

Percent Change: The test day milk production change from the previous to current test day. Normal change should be -10 percent per month after the cow reaches peak production.

Percent CP: The crude protein % that is in the ration that is being fed to the herd. When expressed on a per cow basis it usually represents the amount that is required based on NRC recommendations for current production level.

Percent ENE: The amount of energy that is derived for different feed classes.

Percent Deviation: The % difference between Sum of Test Day Wts and Average Daily Bulk Tank Wts. The denominator is the milk shipped. A positive value indicates that more milk was recorded on test day than was shipped.

Percent Heats Obs.: The percent of the possible heats that are detected. This is calculated as:
 $\% \text{ Heats Obs.} = [\text{number of services and heats reported in the test period for eligible cows} / (\text{estrous cycle days in test period for eligible cows} / 21)] \times 100.$

Percent Herd M.E.: Compares the cow's 305-2X-ME with the current herd average 305-2X-ME. The formula is $(\text{cow's 305-2X-ME}) / (\text{Herd Average 305-2X-ME}) \times 100 = \% \text{ Herd ME}.$

Percent in Milk: A percentage of the producing females in the herd on test day that were in milk.

Percent Relative Value (%RV): A comparison of the cow's dollar value and the herd's ME dollar value. Formula is: $100 * \text{Cow Dollar Value} / \text{Herd ME Dollar Value}.$

Percent Reliability (Rel): Measure of the information in the genetic evaluation. Information from the animal, parents and progeny are considered.

Percent Herd SCC: Cow's SCC divided by the bulk tank SCC and expressed as a percent.

Percent Successful: The number of successful services divided by the total services multiplied by 100.

Percent TDN: The % Total Digestible Nutrients in the ration that is being fed. When expressed on a per cow basis it usually represents the amount that is required based on NRC recommendations for the current production level.

Percent Voluntary Culls: The percent of the cows that were sold for low production or dairy purposes.

PCTILE (NM): Percentile Net Merit is a ranking based upon the Net Merit \$ value of the animal.

Persistency Percent: An index based upon each cow's current projected 305 ME production compared to her projected 305 ME production on the previous test day. A persistency greater than 100 indicates that the cow's lactation curve is holding up better than the average for her breed, age and season of freshening. The formula is: $(\text{New Projection} / \text{Last Month's Projection}) \times 100 = \text{Persistency \%}$.

Persistency of Lactation Curve: An index based upon each cow's projected 305 ME production. The projection made on the first test day after 80 days in milk is the base for the entire lactation with a new projection calculated each subsequent test day. A persistency of 100 indicates that the lactation curve is similar to the average for animals of the same breed age and season of calving. The formula is: $(\text{New Projection} / \text{Base Projection}) \times 100 = \text{Persistency of Lactation Curve}$.

Pounds Grain Fed: The amount of concentrates that are fed to a cow or the herd. This may be expressed as a daily or annual value.

Post Partum Check: A reproductive check of an animal after calving or in early lactation.

Predicted Producing Ability (PPA): Prediction of a cow's performance in future lactations; total of predictions for breeding value, herd-sire effect and permanent environmental effect (milk, fat, and protein).

Predicted Transmitting Ability (PTA): The predicted difference of a parent animal's offspring from average due to the genes transmitted from that parent. Each PTA is given in the units used to measure the trait. The PTA for milk is reported in pounds, the PTA for productive life is reported in months. All first lactation animals in milk 40 days or more and all second and later lactation cows properly identified by sire should have USDA PTA values.

Predicted Transmitting Ability, Dollars (PTA\$): The gross dollar income per lactation that future daughters of bulls will earn in excess of herdmates sired by bulls having a PTA\$ equal to zero.

Preg Check: Palpating a cow to determine pregnancy status; animal is then confirmed open, pregnant or pregnant needing a recheck. When reporting body condition scores, this time frame is generally 90 -179 days after calving.

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Preg Rate: The percentage of cows eligible to become pregnant that are reported pregnant within a specific period of time. Although it is not computed this way on the DHI-202 Herd Summary, an approximation of pregnancy rate is heat detection rate (Percent-Heat-Observed) multiplied by conception rate (Percent-Successful) divided by 100. Preg rates enable managers to assess both how well and how quickly cows conceive. Features that you can control to help ensure pregnancy rates on the DHI-202 are as accurate as possible:

1. Report a reproductive status of "C" for cows that you do not intend to breed.
2. Appropriately set option "62- Routine Preg Check Y/N" which controls how the *DHI-202 Herd Summary* uses reproductive data for your herd. If the box in the DHI-202 top right corner states:
COWS BRED BUT NOT DIAG. PREG (option 62=Y): you must report pregnancy results. Your pregnancy rate will be deflated if the program does not have pregnancy status.
COWS BRED SINCE (option 62=N): the program will use non-return to identify pregnant cows.

To change how the program uses reproductive data, discuss option 62 with your DHI technician. Regardless of the option you choose, you cannot compare pregnancy rates from the DHI-202 with pregnancy rates from PCDART or other onfarm systems unless you record all pregnancies ASAP after breeding.

Previous Infection: A cow with a SCC Score >4 (200,000) for two consecutive test dates during the current lactation and not above a SCC score of 4 (200,000) on the current test date.

Production Credit: Partially completed lactation record made in one herd that is officially transferred to another herd. Usually this is done when a cow is sold.

Production Index: For first lactation animals, this is calculated: Avg 305 day ME \$ for Lact 1 * 100
For 2nd and later lactation animals: Avg 305 day ME \$ for All Lact * 100

Projected (Extended) 305-2X-ME Lactation: The lactation record for a cow extended to 305 days in milk, adjusted for location, age and season of calving to a mature cow basis, and adjusted to twice a day milking basis if milked more than twice a day.

Projected Minimum Calving Interval: For cows bred, this is the time frame between current calving date and the cow's due date. For cows not bred, a projected due date is assumed.

Projected Relative Profit (PRP): A predictor of a cow's income over feed cost for the remainder of the current 305 day lactation, a nonproductive dry period and the following 305 day lactation. The projected milk production for the following lactation is based upon the current 305 day lactation. The length of time to the beginning of the next lactation is based upon due date.

Protein%: The percent of protein in the milk, calculated by protein lbs./milk lbs. X 100.

Protein \$: Predicted Transmitting Ability with an economic index combining relative value of milk, fat and protein.

Protein Differential: A factor which determines how much the milk price changes with each tenth percentage unit change of protein test.

Proven A.I. Sires: Bulls that have a PTA from USDA and are designated as AI sires.

PTA: See definition for Predicted Transmitting Ability (PTA).

PTA Fat: Predicted Transmitting Ability for fat pounds.

PTA Milk: Predicted Transmitting Ability for milk.

PTA % Fat: Predicted Transmitting Ability for fat percent.

PTA % Prot: Predicted Transmitting Ability for protein percent.

PTA Prot: Predicted Transmitting Ability for protein pounds.

PTA Rank: Animals are ranked based upon their ranking of Net Merit.

Rating: A letter rating is used to categorize cows in five production groups based on their current lactation. To determine the rating the 305-2X-ME records for all cows are adjusted to an energy corrected milk (ECM) basis. The ECM for each cow is divided by the ECM lactation average for the herd and the results are designated as follows:

A = Top Cow - more than 110% of herd average

B = Above Average - 100 to 110% of herd average

C = Below Average = 90 to 100% of herd average

D = Marginal Cows = 80 to 90% of herd average

E = Probable Cull Cows = < 80% of herd average

Breed adjustments are applied when calculating ratings for multi-breed herds. This adjustment standardizes comparisons for the breed differences in average ECM.

Reg. Top 25%: An average of what the top 25% of the herds in the DRMS or specific region average for a specific value. The top 25% is based upon rolling herd average for milk.

Registered Animal: An animal that is registered by one of the national breed registry organizations and has a registration certificate.

Registration Number: Unique number listed on a registered animal's registration certificate.

Relative Value Percent: A comparison of the cow's dollar value and the herd's ME dollar value. Formula is: $100 * \text{Cow Dollar Value} / \text{Herd ME Dollar Value}$.

Reliability (Rel): Measure of amount of information in the evaluation; information from the animal, parents and progeny are considered.

Replacement: Heifers that are kept to freshen and replace older cows in the herd.

Reproduction Codes: Codes that indicate the reproductive status of an animal:

1 - 9 - Number of Breedings

N - Confirmed Open

C - Designated Reproductive Cull

H - In Heat

K - Checked OK to Breed

P - Diagnosed Pregnant

Reproductive Efficiency: Evaluates the reproductive capabilities of the animal. The formula is: $[12 + (\text{No. of calvings} \times 12)] / \text{Age at last calving in months}$. If last calving is more than 365 days prior to last test date, age at last calving is calculated as current age minus 12 months.

Rolling Yearly Herd Averages (RHA): The average production or other variable for the last 365 days. To calculate RHA, total yearly production for the herd and total cow-days for the year are needed. These are accumulated by test intervals to obtain a production year of 365 days. When total yearly production and total cow-days for the year are obtained, total yearly production is divided by total yearly cow-days to yield the average daily production for all cows that were available during the past production year. This average daily production is multiplied by 365 to get the RHA.

Sample Number: A number that is assigned to the sample of milk that is taken for each cow on test day.

Scheduling day: The day of the month that a field technician may schedule to routinely test a herd.

Service Number: The number of times a cow was bred.

Service Sire: Bull to which animal was mated.

Services Per Pregnancy: The number of services required to confirm or assume a cow is pregnant.

Shook Factors: Adjustment factors that are applied to a cow's first second and last test day during a cow's lactation. These factors adjust the production to a normal or standard lactation curve.

Silage: Stored forage feeds, cut green and preserved by natural fermentation.

Simplex: Printed on one side of the sheet only.

Sire: Father of animal.

Somatic Cell Count (SCC): A count of the white blood cells in a milliliter of milk. A normal count is generally considered to be 100,000 or less. SCCA represents the somatic cell count expressed as the actual count to the nearest 1,000 and not a linear count. SCCS indicates the value is expressed as a linear score.

Somatic Cell Count Score (SCS): This is a linear score that is assigned based upon the raw count and has a direct relationship to milk loss. The table below shows the relationship to milk loss. The milk loss is based on second or greater lactation animals. First lactation animals would have half of the loss listed.

Relationship of Linear Score to Milk Loss			
Linear Score	SCC Range From / To	Estimated Milk Loss	
		Lbs./Day	Lbs./Lact
0	0-18	0	0
1	19-35	0	0
2	36-71	0	0
3	72 - 141	1.5	400
4	142 - 283	3.0	800
5	284 - 565	4.5	1,200
6	566 - 1130	6.0	1,600
7	1131 - 2262	7.5	2,000
8	2263 - 4523	9.0	2,400
9	4524 - 9045	10.5	2,800

Stage of Lactation: A certain time period during a cow's lactation.

Standardized 150 Day Milk: The expected production per day at 150 days in milk. It removes the variation in test day production due to stage of lactation and it allows production on one test day to be compared to production on another test day. Thirty six standard lactation curves based upon six seasons, three ages and two breed groups are used to either project forward or backward to 150 days in milk. In order to allow one to compare the production at 150 days for different cows, the values are also adjusted for age and breed.

Standard curves were established for:

1. Six seasons: Jan-Feb, Mar-Jun, Jul-Aug, Sep-Oct and Nov-Dec
2. Three ages: first lactation, second lactation and third or more lactations
3. Two breed groups: Ayrshire-Brown Swiss-Holstein and Guernsey-Jersey

The following methods are used when computing standardized 150 day milk:

1. Compute only for cows that are 330 or less days in milk
2. Identify the cow's test day milk (TDMILK)
3. On the appropriate standard lactation curve, find the test day production corresponding to the cow's current days in milk (STD-MILK) and find the test day production at 150 days in milk (STD150-MILK). Add difference between these values (STD 150-MILK-STD MILK) to the cow's test day milk (TDMILK).
4. Using the factors below, adjust for age and breed so that animals in different lactations and breeds can be compared:

	Small Breeds	Large Breeds
Lactation 1	1.13	1.10
2	1.00	1.00
3+	0.93	0.954

5. Adjust 150 Day standardized test day milk for age and breed:

$$150 \text{ DAY MILK} = \text{AGE BREED-ADJ} \times (\text{TDMILK} + \text{STD150-MILK} - \text{STD-MILK})$$

Status: The current condition of a cow. Usually listed with a date and one of the following codes:

- | | | | |
|-------------|---------------|---------------------|-----------------------|
| 1 - In Milk | 3 - Dry | 6 - First Lactation | 8 - Aborted |
| 2 - Calved | 5 - Left Herd | 7 - Entered Herd | 9 - Induced Lactation |

String: A group of cows. The grouping may be by breed, ownership, stage of lactation, age or for other reasons determined by the dairyman. A separate Herd Summary is printed for each string.

Successful Breeding Date: The service date that the cow settled to which resulted in a calving.

Sum of Test Day Wts.: The total pounds of milk reported for all cows on test day. If a cow's reported weight is coded A and is adjusted, her actual weight is included in this total. Cows "Too Fresh" to test are included if weights are reported. Estimated production for cows that were not milked or milk was discarded is not included in this total.

Summit Milk: The average milk weight of the two highest of the first three tests in a cow's lactation. This value is closely correlated to overall lactation production.

Supervisor's Number: A unique number assigned to each field technician for testing purposes.

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Tattoo: An identification that is permanently embedded in an animal's ear.

TDN (Total digestible nutrients): a feed value for productive purposes expressed as therms per 100 pounds of feed.

Test: Percent butterfat or protein in milk. It is read to the nearest tenth of a percent.

Test Day Averages: The current production or other data on the cows in the herd on test day.

Test Day Data: The production information calculated for a cow on test day. This will include milk, fat %, protein % and somatic cell count information.

Test Interval: The day following the previous test day through the current test day.

Test Interval Method: The Test Interval method is used for calculating production records as described in the National DHIA Uniform Operating Procedures.

Test Period Average: The average production that occurred during the time between tests. This includes all cows in the herd during the time period. Milking and dry cows are included as well as new and left cows for the time frame they were in the herd. As an example, suppose the test interval is 30 days and a cow produced 70 lbs. on the previous test day and 60 lbs. this test day. Her test interval production is (15 days X 70 lbs.) + (15 days X 60 lbs.) = 1,950 lb. or an average (1950/30) of 65 lbs.

Test Period Persistency Index: Provides a means to determine if the herd produced as expected during the current month based on the previous month's production. Each cow's expected % change in production from last month to this month is computed as the ratio of each cow's standardized 150 day milk for the last two test days. An average ratio is computed to determine the test period persistency for the herd.

Test Plan: The record plan or type of testing procedure that occurs on test day. The various plans and descriptions are listed on page 24.

Therm: Unit of heat equal to 1,000 large calories.

Times Bred: The number of times a service has been reported for a cow since her last calving date.

Total Pregnant Cows: The total number of pregnant cows on that test day.

Total Feed Costs: This is the sum of the cost of concentrates plus all additional feeds per cow.

True Protein: Crude protein minus non protein nitrogen (NPN). The approximate difference between crude protein percent and true protein percent is 0.19, so:

$$\text{True protein \%} = \text{crude protein \%} - .19\%$$

$$\text{True protein lb.} = \text{crude protein lb.} - (.019 \times \text{milk lb.})$$

Turnover rate: # left herd * 100 / RHA number of cows

Type of Record: The method of test being conducted. See page 24 for more information and details concerning testing methods. When data are recorded using different types of record throughout a lactation, the Type of Record for the lactation will be the highest (numerically).

Value of Product: The accumulated dollar value of each cow's milk production for the current lactation. Milk price data reported each test day is used in the calculation including price/cwt and fat and protein differentials.

Voluntary Waiting Period (VWP): The desired waiting period from freshening to first service.

Yield Deviation: A weighted average across a cow's lactations of the amount that she differs from her herdmates. See the definition of Difference from Herdmates for further explanation.

DHIA TESTING PLANS

SUPERVISED DHI

Supervised DHI test conducted by certified Field Technician / Representative

<u>Code</u>	<u>Plan</u>	<u>Description</u>
00	DHI	All milkings are weighed and sampled on test day.
31	DHI-AP	Less than all milkings are weighed and sampled on test day.
02	DHI-APCS	All milkings are weighed and less than all milkings are sampled on test day.
33	DHI-MO	All milkings are weighed, but no samples are taken on test day.
34	DHI-MO-AP	Less than all milkings are weighed and no samples are taken on test day.

SUPERVISED DHIR

Supervised DHI test conducted by certified Field Technician / Representative plus adherence to Breed Association rules.

<u>Code</u>	<u>Plan</u>	<u>Description</u>
20	DHIR	All milkings are weighed and sampled on test day.
23	DHIR-AP	Less than all milkings are weighed and sampled on test day.
22	DHIR-APCS	All milkings are weighed and less than all milkings are sampled on test day.

UNSUPERVISED

Dairy Producer is responsible for weighing and sampling on test day.

<u>Code</u>	<u>Plan</u>	<u>Description</u>
40	DHI-OS	All milkings are weighed and sampled on test day.
41	DHI-OS-AP	Less than all milkings are weighed and sampled on test day.
42	DHI-APCS	All milkings are weighed and less than all milkings are sampled on test day.
43	DHI-OS-MO	All milkings are weighed, but no samples are taken on test day.
44	DHI-OS-MO-AP	Less than all milkings are weighed and no samples are taken on test day.
45	DHI-OS-AC	All milkings are weighed, but no samples are taken on test day. Breed or bulk tank average is used.
46	DHI-OS-APAC	Less than all milkings are weighed, but no samples are taken on test day. Breed or bulk tank average is used.

Acronyms Commonly Used With DHI Testing and DRMS Operations

AABP American Association of Bovine Practitioners	LTD..... Lactation To Date
ADG Average Daily Gain	ME Mature Equivalent
ADGA American Dairy Goat Association	MUN Milk Urea Nitrogen
ADP..... Automatic Data Processing (CAS Payroll)	NAAB..... National Association of Animal Breeders
ADSA American Dairy Science Association	NADMA..... National Disaster Management Agency
AI..... Artificial Insemination / Artificial Intelligence	NAIS National Animal Identification System
AIN..... Animal Identification Number	NALMA North American Lab Managers Association
A IPL Animal Improvement Programs Laboratory	NCSU North Carolina State University
APHIS Animal & Plant Health Inspection Service	NDHIA National Dairy Herd Information Association
A/R..... Accounts Receivable	NE..... Net Energy
ARS..... Agricultural Research Service	NRC..... National Research Council
BCS..... Body Condition Score	OS Owner Sample (type test)
BST Bovine Somatotropin	PA..... Parent Average
CAR. Condition Affecting Record	PCDART-I.... Independent (stand-alone) version of PCDART
CAS..... Central Accounting System (DRMS service)	PDCA Purebred Dairy Cattle Association
CDCB..... Council on Dairy Cattle Breeding	PL Productive Life
CICS Customer Information Control System (IBM)	PPA Predicted Producing Ability
CMR Custom Management Report	PR..... Preg Rate
CTAP Current Testday Analysis Program	PRP Projected Relative Profit
DBI..... Database Item	PT Progeny Testing
DHIA Dairy Herd Improvement Association	PTA..... Predicted Transmitting Ability
DHIR Dairy Herd Improvement Registry (type test; enrollment determined by breed assoc.)	QB Quick Books (CAS Ledger)
DIM Days In Milk	QC Quality Certification
DLS Dairy Lab Services (Dubuque, IA)	RAC Remote Access Code
DRMS Dairy Records Management Systems	RAS Remote Access Server
DRPC..... Dairy Records Processing Center	REL..... Reliability
ECM..... Energy Corrected Milk	RFID Radio Frequency IDentification
EID..... Electronic Identification	RIP..... Record In Progress (USDA)
ERPA Estimated Relative Producing Ability	SA..... Service Affiliate
ETA Estimated Transmitting Ability	SAFARI..... Statistical Analysis Financial Accounting Report Info (DRMS Accounting Program)
FAD..... Foreign Animal Disease	SCC..... Somatic Cell Count
FAIR..... Farm Animal Identification and Records	SCR Sire Conception Rate
FCM Fat Corrected Milk	SCS Somatic Cell Score
GEP Genetic Evaluation Program	STF Standard Transfer Format
HOA Heart of America (Manhattan, KS)	TAI Timed Artificial Insemination
ICAR International Committee for Animal Recording	TDN Total Digestible Nutrients
ID Identification	TMR..... Total Mixed Ration
ISP Independent Service Provider	USAIN..... United States Animal Identification Number
ISU..... Iowa State University	USDA..... United States Department of Agriculture
	VIP Verified Identification Program (NDHIA program)

Table 1. Estimated Age for new cows with no birth date reported.

Breed	1st Lactation	2nd or Later Lactation
Ayrshire	30 months	60 months
Guernsey	29	60
Holstein	28	60
Jersey	27	60
Brown Swiss	31	60
Other	28	60

Table 2. Estimated Lactation Number for New Cows

Age in months	Lactation Number
37 or less	1
38-51	2
52-65	3
66-79	4
80-93	5
94-107	6
108-121	7
122-135	8
136-149	9
150-163	10

Lactation numbers estimated in error can be corrected by the DHI technician.

Table 3. Estimated Body Weight for new cows with no body weight reported.

	Lactation		
	1st	2nd	3rd or later
Ayrshire	900	990	1100
Guernsey	850	930	1050
Holstein	1100	1210	1350
Jersey	800	880	1000
Brown Swiss	1100	1210	1350
Other	1000	1100	1220

If weight is unchanged from last lactation, then calving weight = 110% of last calving weight for lactations through 3.

Table 4. Estimating Body Weight

It is recommended that the body weight of each cow be entered for cows that have calved or have been added to the herd.

As a guide to estimate body weight as accurately as possible, place a string around the animal's body at heart girth (directly back of front legs). Measure the length of this girth in inches and translate into body weight based on the following:

Length of String (inches)	Estimated Body Weight (lbs.)	Entry
65.0	800	08
66.0	825	08
67.0	850	09
67.5	875	09
68.0	900	09
68.5	925	09
69.5	950	10
70.0	975	10
70.5	1000	10
71.0	1025	10
72.0	1050	11
72.5	1075	11
73.0	1100	11
74.0	1150	12
75.0	1200	12
76.0	1250	13
77.5	1300	13
78.5	1350	14
79.5	1400	14
80.5	1450	15
81.5	1500	15
83.0	1550	16
84.0	1600	16

Difference from Herdmates:

CALCULATION OF HERDMATE DEVIATIONS AT DRMS

November 30, 2005

Dr. Ken Butcher

The system used for computing herdmate comparisons at DRMS is based on a design developed for the Mid-States Processing Center during the late 1970's (1). The system uses a rolling monthly herdmate grouping to determine the herdmates of an animal instead of the traditional five to seven month seasonal groupings. Herdmates are also cows of the same breed. The system uses nine breeds: Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, Experimental, Milking Shorthorn, Red & White and crossbreds.

The herdmate grouping system at DRMS uses the current test month and 17 previous months to group animals of the same breed according to their calving month where 1 is the current test month and 2 through 18 represent the previous 17 test months.

	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
No. of cows freshening in this category	5	4	4	2	3	2	2	2	1	1	1	1	2	4	3	5	3	1
												↑	↑					↑
												Calving Month	Calving Month					Current Month

Suppose a cow calved 6 months prior to the current month. Then she would be grouped in category 7. Each cow in the herd is grouped in the appropriate category according to her calving month in relation to the current month. This includes all active cows and any cows sold during the previous 18 months. Transfer cows that had a herdmate average calculated in the previous herd are excluded from the calculations for the first test after transferring. The program then counts the number of animals in each category.

To determine a particular cow's herdmates, the system counts cows of the same breed calving in the same month as the cow plus cows calving within plus or minus one month of the cow. If the number of cows (including the cow in question) calving within this three month interval is >14, then these become the cow's herdmates. If this number is <15, then the system counts all cows of the same breed calving within plus or minus two months of the cow. If this number is >14, then these become the cow's herdmates. If this number is still <15, then the system counts the number of cows calving within plus or minus three months of the cow. This continues until the system has counted all cows (including the cow in question) calving within plus or minus 5 months of the cow. If this number >3, these animals become the cow's herdmates. In other words, if there are at least 3 other cows calving within 5 months of the cow in question, these become the cow's herdmates. If the number of cows of the same breed calving within plus or minus 5 months of the cow <3, then a herdmate average is not calculated. The brackets represent categories or months that could potentially be used for a cow calving in category 7.

Once the herdmates are determined, the system calculates an adjusted herdmate average using the 2X-305 day lactation Mature Equivalent for each herdmate. 2X-305 day ME's are calculated using regional factors for age and month of calving as reported in (3).

2X-305 day ME's for those animals that have been milking less than 286 days are also multiplied by a record-in-progress (RIP) factor. The RIP factors used are:

Age > 35 months				Age <= 35 months			
DIM	RIP	DIM	RIP	DIM	RIP	DIM	RIP
< 46	.60	<196	.93	< 46	.72	<196	.96
< 76	.74	<226	.96	< 76	.83	<226	.97
<106	.82	<256	.98	<106	.88	<256	.98
<136	.86	<286	.99	<136	.92	<286	.99
<166	.91	>285	1.0	<166	.94	>285	1.0

Rules for Estimating Lactation Number, Calving date and Age in Months

- Rule 1.** If calving date is missing, use date of test as the effective calving date.
- Rule 2.** If birth date is missing and the lactation number is zero, subtract two years from the calving date to get the effective birth date. If the birth date is missing and the lactation number is not zero, add one to the lactation number and subtract this number of years from the calving date to get the birth date.
- Rule 3.** To calculate age in months, use the method described in (2). Subtract the year, month and day of birth from the year, month and day of calving. Discard the difference in days if they are positive. If the difference in days is negative, add -1 to the difference in months. Then, if the difference in months is positive, multiply the difference in years by 12 and add the difference in months to estimate the age in months. If the difference in months is negative, add 12 to the difference in months and add -1 to the difference in years. Multiply the difference in years by 12 and add the difference in months to estimate age in months.
- Rule 4.** Age must be between 18 and 200 months.
- Rule 5.** If age>35 months, change lactation 1 to 2 to determine the correct RIP factor table. If age<36 months, use the recorded lactation number.

The system accumulates RIP adjusted ME's of all cows in each calving month category along with the sum of their RIP factors in the prior pass through the herd. To calculate the herdmate average for an individual cow, her RIP adjusted ME is subtracted from the accumulated RIP adjusted ME for the calving month categories considered her herdmates and her RIP factor is subtracted from her herdmates's accumulated RIP factor. Then, the accumulated, adjusted ME's for her herdmates are divided by the sum of their RIP factors. To calculate her Herdmate Deviation, the program subtracts her herdmate average ME from her ME and multiplies the difference by her RIP factor.

Example Calculations for the Herdmate Deviation

A cow with ME 17,000 and a RIP factor of .76

Four Herdmates

ME's	RIP's	ME x RIP
20,000	.6	12,000
20,000	.6	12,000
16,000	.8	12,800
16,000	.8	12,800
	2.8	49,600

$49600/2.8 = 17,714.29 = \text{adjusted herdmate average}$

$(17,000-17,714.29) * .76 = -542.64 = \text{Herdmate Deviation}$

References

- 1 Author Unknown. 1977. A new System for Computing Herdmate Comparisons and Other Changes in the DHIA-203. Mid-States Dairy Records Processing Center Publication, Iowa State University.
- 2 Empet, N.B. 1986. Official Dairy Herd Improvement Rules. National Cooperative Dairy Herd Improvement Program Handbook.
- 3 Norman, H.D., P.D. Miller, B. T. McDaniel, F. N. Dickinson and C. R. Henderson.1974. USDA-DHIA Factors for Standardizing 305-Day Lactation Records for Age and Month of Calving. USDA Publication ARS-NE-40.

Real Life Example of the Calculations for Herdmate Deviations

The table on the next page illustrates actual records from Jersey cows in a mixed breed herd. Notice that, because the herdmate deviations are computed within breed, only the Jerseys are included in the chart.

The target cow in this example is 1577 who calved in March 2005. Besides cow 1577, there are only 9 cows that calved in February, March or April 2005. When the months of January and May are included, 19 herdmates for cow 1577 calved.

The Records in Progress (RIP) factors are illustrated in the table for these cows. The calculations for the herdmates for cow 1577 are:

Sum of Projected 305 Day ME Milk * RIP factor	= (12897*.99+15183*.99+ ... + 15978*.96) = 334,792
Sum of RIP factors	= (.99+.99+ ... + .96) = 18.19
Herdmate average	= 334,279 / 18.19 = 18,405
Herdmate deviation for 1577	= .98 * (24,639-18,405) = 6,109

Notice that the herdmate deviated milk, "HrdmDevM", for cow 1577 in the table is 6109. The same process can be completed for any other cow. Notice that the cow herself is always excluded from the calculations for the herdmate average.

30 Glossary

Index	Brd	LastCalv	DIM_Tst	Lact#	AgeMons_Clv	RIP	Proj305MEM	HrdmDevM
1572	J	12/27/2003	669	1	29		18026	-134
1575*	J	1/16/2004	516	1	29		21968	3558
1589*	J	4/19/2004	396	1	24		16362	-1907
1538*	J	8/18/2004	275	3	54		16770	-2820
1573*	J	9/23/2004	274	2	37		17906	-1975
793	J	10/15/2004	376	5	77		22415	1979
1576	J	10/8/2004	364	2	37		21380	883
1596	J	10/31/2004	360	1	27		20712	176
1508	J	11/9/2004	323	5	72		20364	1148
1555	J	11/28/2004	332	3	49		16911	-2499
1598	J	11/23/2004	318	1	27		16919	-2490
1601	J	11/2/2004	321	1	25		18286	-1047
1570	J	12/3/2004	327	2	41		24469	5196
1579	J	12/30/2004	300	2	37		23414	4088
1603	J	12/21/2004	309	1	26		20230	743
1606	J	12/6/2004	324	1	25		24918	5668
1507	J	1/12/2005	275	5	74	0.99	12897	-7232
1545	J	1/17/2005	270	3	55	0.99	15183	-4831
1566*	J	1/28/2005	147	2	45	0.91	14307	-5158
1569*	J	1/3/2005	256	2	42	0.99	18276	-1495
1578*	J	1/20/2005	260	2	38	0.99	20629	880
1585	J	2/14/2005	254	2	37	0.98	19807	-81
1609	J	2/17/2005	251	1	24	0.98	19953	69
1611	J	2/26/2005	242	1	24	0.98	21901	2085
1523	J	3/13/2005	227	5	69	0.98	19716	1024
1531	J	3/19/2005	221	4	65	0.96	17195	-1545
1577	J	3/9/2005	231	2	42	0.98	24639	6109
1610	J	3/28/2005	212	1	25	0.97	18711	-13
1612	J	3/14/2005	226	1	24	0.98	26234	7756
1550*	J	4/13/2005	114	3	56	0.86	11764	-7223
1613	J	4/18/2005	191	1	23	0.96	22023	2198
1522	J	5/21/2005	158	5	72	0.91	18199	-1546
1539	J	5/26/2005	153	4	63	0.91	17964	-1769
1565	J	5/8/2005	171	3	48	0.93	19811	3
1599	J	5/3/2005	176	1	32	0.96	18137	-1696
1602*	J	5/1/2005	170	1	31	0.96	15978	-3888
1583	J	6/10/2005	138	2	42		21712	2619
1586*	J	6/9/2005	15	2	41			
1591	J	6/6/2005	142	2	37		25340	6136
1593	J	6/19/2005	129	2	36		17777	-1124
1614	J	6/9/2005	139	1	25		19265	257
792	J	7/29/2005	89	6	87		20204	1318
1512*	J	7/12/2005	3	5	77			
1567	J	7/28/2005	90	3	50		18583	-87
1587	J	7/1/2005	117	2	40		22127	3129

Energy Corrected Milk

ECM determines the amount of energy in the milk based upon milk, fat and protein and adjusted to 3.5% fat and 3.2% protein. **ECM formula = (0.327 X milk lbs.) + (12.95 X fat lbs.) + (7.65 X protein lbs.)**. This formula was derived from the following:

Milk adjusted to 3.5% fat and 3.2% protein is considered to produce 314 Kcal of energy. In table 4 of J Dairy Sci 1965 48: 1215, "Prediction of the energy value of cow's milk", Tyrell, H.F. and J.T. Reid, equation 2 is:

$$\begin{aligned}
 E &= 40.72 (\%F) + 22.65 (\%P) = 102.77 \\
 \text{ECM} &= M [40.72 (\%F) + 22.65 (\%P) + 102.77] / 314 \\
 40.72 / 314 / .01 &= 12.97 \\
 22.65 / 314 / .01 &= 7.21 \\
 102.77 / 314 &= .3273
 \end{aligned}$$

Therefore: $\text{ECM} = 0.327 * \text{milk lbs.} + 12.97 * \text{fat lbs.} + 7.21 \text{ protein lbs.}$ However, this equation has been reproduced in JDS articles many times using slightly different parameters. DRMS used the following equation when the standard expression of protein in milk was "Total Protein":

$$\text{ECM} = 0.327 * \text{milk lbs.} + 12.97 * \text{fat lbs.} + 7.20 * \text{protein lbs.}$$

Since May 2000, the DHIA system has been standardized to True Protein.

To adjust the formula from Total Protein to True Protein:

It has been established that True Protein is typically 0.19 lbs less per hundredweight of milk than Total Protein. Therefore, if Total Protein = 3.2, then True Protein = 3.0. The ratio of Total to True Protein at average test is $3.2 / 3.01 = 1.063$.

So, to convert to True Protein, the formula is $7.20 * 1.063 = 7.65$.

The formula for ECM becomes: **$0.327 * \text{milk lbs.} + 12.95 * \text{fat lbs.} + 7.65 * \text{protein lbs.}$**

DHI Affiliates Serviced by DRMS

Dairy Records Management Services works with 20 DHIA Service Affiliates that are cooperative members or that contract services. Each affiliate is responsible for the administration and service of DHIA programs to dairy farmers within their area. For more information, please write or call the appropriate office.

Arizona DHIA, Inc. (480) 894-0156
2465 W. 12th St., #1
Tempe, AZ 85281

California DHIA (877) 225-3442
150 Clovis Ave., Suite 104
Clovis, CA 93612

Dairy Lab Services, Inc. (800) 747-7421
5105 Wolff Rd.
Dubuque, IA 52002-2564

Dairy One (800) 344-2697
730 Warren Road
Ithaca, NY 14850-1293

DHI Cooperative, Inc. (614) 545-0460
1224 Alton-Darby Rd., Suite A
P.O. Box 28168
Columbus, OH 43228

Heart of America DHIA (800) 698-2634
628 Pottawatomie, Box 3700
Manhattan, KS 66502

Idaho DHIA (208) 733-6372, ext 104
11182 Eastland Drive North, Suite A
Twin Falls, ID 83303

Indiana State Dairy Assoc., Inc. (800) 973-5753
Poultry Science Bldg., Room 120
125 South Russell Street
West Lafayette, IN 47907-2042

Jamaica Dairy Development Board (876) 322-7898
Ministry of Agriculture and Fisheries
Hope Gardens, Kinston 6

Lancaster DHIA (717) 665-5960
1592 Old Line Road
Manheim, PA 17545

Mid-South Dairy Records (417) 831-6931
1551 North National
Springfield, MO 65803

Minnesota DHIA (763) 682-1091
307 Brighton Ave. S.
Buffalo, MN 55313

NorthStar DHI Services (800) 631-3510
Box 23158
Lansing, MI 48909

Puerto Rico DHIA (787) 796-4500
P.O. Box 430
Dorado, PR 00646-0430

Southeast DHIA (352) 538-7059
1441 Orange Hill Road
Chipley, FL 32428

Tennessee DHIA (865) 974-7289
University of Tennessee
2640 Morgan Circle
Knoxville, TN 37996-4588

Texas DHIA, Inc. (806) 570-3137
301 23rd Street
Room 117B
Canyon, TX 79015

Tulare DHIA (559) 686-6173
800 Commercial Avenue
Tulare, CA 93274

United DHIA, Inc. (540) 552-2541
2300 Litton-Reaves Hall
Blacksburg, VA 24061

Vermont DHIA (800) 639-8067
226 Holiday Dr., STE 3
White River Junction, VT 05001