DHIoption

Western Canadian Dairy Herd Improvement Services

BREEDING GUIDE PLUS

Purpose of option

Getting cows in calf is one of the most important goals of a dairy herd health program. Maintaining good fertility and reproductive health in a dairy herd is very much dependant on the use of a reliable system of records. DHI offers herd owners two reproduction management options: **Breeding Guide** and **Breeding Guide Plus**.

With the **Breeding Guide** option, the monthly report lists current reproductive information on individual cows including :

- cows to breed;
- cows to pregnancy check;
- cows to dry;
- cows to calve, and;
- cows bred more than three times.

The **Breeding Guide Plus** option aids in the evaluation of a herd's reproductive performance. Reproductive problems are among the top profit killers on most farms. One of the keys to optimum profitability is to identify these problems immediately, so that steps can be taken to correct them.

Explanation and interpretation of output

BREEDING PERFORMANCE AVERAGE TABLE

The first table on the **Breeding Guide Plus** output form shows the BREEDING PERFORMANCE AVERAGES for cows in 1ST, 2ND and 3RD+ LACTATION. All cows, milking or dry, that are present on the farm on test day are included in this report. As well, the categories are broken down into TOTAL HERD and PROVINCIAL AVERAGE. Suggested GOALS for each category are given on the bottom line. The table is divided into two sections:

- COWS NOT BRED are those cows that do not have a breeding date recorded, and have not been identified as cows that are not to be bred;
- COWS BRED are those cows that have had at least one breeding date recorded during their current lactation.

BREEDING PERFORMANCE AVERAGE	COWS NOT BRED			COWS BRED						
	COWS		DAYS IN MILK	COWS BRED		DAYS TO 1ST BREEDING	DAYS TO LAST BREEDING	BREEDINGS PER PREGNANCY	1ST BREEDING CONCEPTION RATE	PROJECTED CALVING INT.
	#	%		#	%					
1ST LACTATION	14	45	62	17	55	107	123	1.5	58	13.3
2ND LACTATION	2	13	166	14	88	108	130	1.6	64	13.8
3RD+ LACTATION	12	39	64	19	61	118	166	1.7	69	15.1
TOTAL HERD	28	36	70	50	64	112	141	1.6	64	14.2
PROVINCIAL AVERAGE		30	76		70	91	124	1.6	61	13.3
GOALS		20	35		80	55-75	85-110	< 1.8	> 60	12.0-13.0

COWS NOT BRED SECTION

The following information is listed for each lactation group and the total herd :

- # of COWS NOT BRED;
- % of the total number of COWS in each group which are NOT BRED;
- the average number of DAYS IN MILK of the COWS NOT BRED.

If the calving pattern in a herd is uniform (ie. the same number of calvings each month of the year), then about 20% of the cows in the herd would be represented in the COWS NOT BRED section. The **Breeding Guide** option lists these cows in the Cows To Breed listing.

The average number of DAYS IN MILK for COWS NOT BRED can be an important indicator of reproductive efficiency. Ideally, only fresh cows would be represented in the COWS NOT BRED section, and the average number of days in milk for these cows would be around 35. A number lower or higher than 35 could mean that the herd has a seasonal calving pattern, or that heats are being missed. Further investigation would be appropriate.

COWS BRED SECTION

The following information and calculations are provided for cows that have been bred at least once:

- # of COWS BRED: those with at least one breeding date recorded;
- % of the total number of COWS in each group which are BRED;
- DAYS TO FIRST BREEDING: the average number of days between the most recent calving and the first breeding date recorded;
- DAYS TO LAST BREEDING: the average number of days between the most recent calving and the last breeding date recorded;
- the average number of BREEDINGS PER PREGNANCY: a cow is considered pregnant if she is reported pregnant, or if the number of days between the current test date and the last recorded breeding date is greater than 64 days;
- 1ST BREEDING CONCEPTION RATE: % of cows pregnant after one breeding;
- PROJECTED CALVING INTERVAL: the average number of days between the most recent calving and the projected calving date, expressed in months for all cows with at least one breeding date.

If the calving pattern in a herd is uniform (ie. the same number of calvings each month), about 80% of all the cows in the herd would have been bred at least once during their current lactation.

Days to First Breeding Column

DAYS TO 1ST BREEDING will vary greatly between herds. The average is determined by any or all of the following three factors:

- the onset of ovarian activity;
- the number of unobserved heats, and;
- a management decision of when the 1st breeding will occur (voluntary wait period).

Most cows will show their first heat by 30 - 35 days after calving. It is recommended that a veterinarian palpate cows prior to 45 days postpartum to diagnose reproductive problems (ie. metritis, or other uterine infections). Cows with reproductive disorders should not be bred until the problem is eliminated or corrected, and the reproductive system is healthy.

Some cows can be bred safely as early as 40 days postpartum. However, good fertility levels are not usually reached until 60 days or more after calving.

In general, producers should consider breeding cows at their first heat after 45 - 50 days postpartum. Research has shown that the level of milk production decreases significantly in the lactation following breedings earlier than 45 days postpartum. With very high producing cows, some producers will delay the first breeding until the first heat after 60 - 70 days postpartum.

Breeding cows at the first heat past 45 days postpartum would result in an average DAYS TO 1ST BREEDING of between 55 and 60 days. If it is between 65 - 70 days, at least one heat on about half the cows has been missed. If it is between 75 - 80 days, (on the average) one heat cycle per cow, or two or more heat cycles on about half the cows in the herd, has been missed. A goal of 55-75 days is suggested.

If heats are being missed the following questions should be asked:

- do cows have sound, healthy reproductive systems?
- is there a problem in the herd with cystic ovaries?
- are dry and lactating cows receiving adequate and well-balanced rations?
- is adequate time being spent on heat detection?

Days to Last Breeding Column

This is a measure of overall reproductive performance for the previous 12 months. Both fertility problems and heat detection problems will increase DAYS TO LAST BREEDING. Even a small number of cows with high days will usually inflate the herd's average. A guide for interpreting DAYS TO LAST BREEDING is given in the table to the left.

Days to Last Breeding	Interpretation
under 85	too low
85 - 110	optimum
111 - 120	slight problem
121 - 145	moderate problem
over 145	severe problem

Breedings per Pregnancy Column

BREEDINGS PER PREGNANCY is the average number of services for all pregnant cows, and is a measure of fertility in those cows. It is calculated as follows:

$$\frac{\text{total number of breedings for all pregnant cows}}{\text{total number of pregnant cows}}$$

Provided all breeding dates are reported, the BREEDINGS PER PREGNANCY should be fewer than 1.8. Herds experiencing more than 2.0 have problems. The table below shows the relationship between BREEDINGS PER PREGNANCY and the fertility level in a herd.

Breedings per pregnancy	Interpretation
under 1.8	good level
1.8 - 2.0	adequate level
2.0 - 2.3	moderate problem
over 2.3	severe problem

High BREEDINGS PER PREGNANCY may result from :

- improper heat detection;
- incorrect timing of insemination;
- poor semen handling techniques;
- flawed insemination techniques;
- reproductive system infections;
- inferior semen quality, or;
- unbalanced rations.

1st Breeding Conception Rate Column

1ST BREEDING CONCEPTION RATE is the percentage of pregnant cows that were only bred once:

$$\frac{\text{total number of pregnant cows bred only once}}{\text{total number of pregnant cows}} \times 100$$

A realistic goal would be 60%. This would mean that 60% of the cows in the herd would become pregnant with only one breeding. If the 1ST BREEDING CONCEPTION RATE is lower than 60% the BREEDINGS PER PREGNANCY will go up and the reproductive efficiency will be reduced.

Projected Calving Interval Column

The Average Calving Interval for the herd is listed in the PREVIOUS 12 MONTHS PRODUCTION section of the **Monthly Herd Summary Report** as shown below. This is the average period between two successive calvings and it can be a very accurate indicator of what has happened from 9 months to 2 years prior to the current date. Average Calving Interval does not indicate current reproductive efficiency status.

PREVIOUS 12 MONTHS PRODUCTION				
# OF COW YEARS	84			
MILK KG	8510			
FAT KG	310	FAT %	3.6	
PROTEIN KG	282	PROTEIN %	3.3	
	AVE	% OF COWS		
DAYS DRY	68	< 40 20	40 - 70 40	> 70 40
CALVING INTERVAL	12.8	< 12 43	12 - 13.5 28	> 13.5 29

PROJECTED CALVING INTERVAL is an indication of reproductive efficiency over the last nine months. It is calculated as follows:

$$\frac{\text{average days open + gestation length for a normal cow}}{\text{days/month}}$$

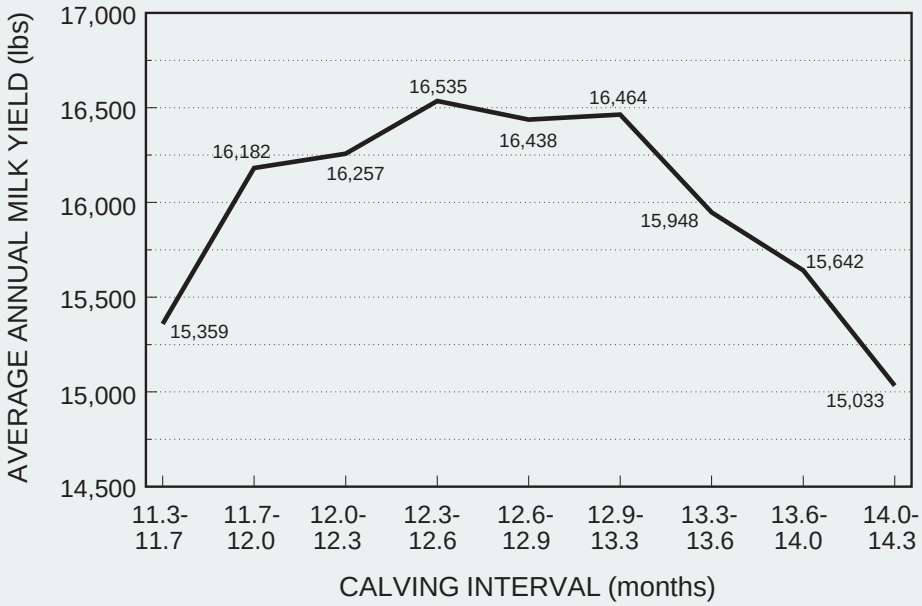
When the Average Calving Interval and the PROJECTED CALVING INTERVAL are compared, one is able to see whether the reproductive efficiency has improved, stayed the same, or deteriorated from the previous year. It should be noted that a cow's record is removed from all calving interval calculations when she is culled.

Calving interval (months)	Interpretation
under 12.0	too low
12.0 - 13.0	optimum
13.1 - 13.5	slight problem
13.6 - 14.0	moderate problem
over 14.0	severe problem

Specific recommendations for the optimum length of calving interval vary. The table to the left suggests some guidelines.

Research indicates that the milk production of herds with a calving interval of under 11.9 months is significantly less than that of herds with a calving interval of 12.0 to 12.9 months. This is demonstrated in the graph below.

This graph demonstrates the effect of calving interval on annual milk yield. Optimum calving interval in this data from Washington State was between 12.0 and 12.9 months.



DAYS TO 1ST BREEDING TABLE

In this table, the DAYS TO 1ST BREEDING given in the BREEDING PERFORMANCE AVERAGE table is broken down to show the number of cows with days open at first breeding of less than 50 days, between 50 - 70 days, between 71 - 90 days, and more than 90 days.

In an well-managed herd, one would expect to find approximately:

- 8% of cows bred before 50 days postpartum;
- 66% between 50 and 70 days;
- 26% between 71 and 90 days;
- 0% after 90 days postpartum.

DAYS TO 1ST BREEDING	COWS BRED		PERCENTAGE			
	#	%	< 50	50-70	71-90	> 90
1ST LACTATION	17	34	2	0	6	26
2ND LACTATION	14	28	0	0	8	20
3RD+ LACTATION	19	38	0	2	2	34
TOTAL HERD	50	100	2	2	16	80

DAYS TO LAST BREEDING TABLE

This table breaks down the DAYS TO LAST BREEDING from the BREEDING PERFORMANCE AVERAGE table. It gives the number of cows with days open at last breeding of less than 60 days, between 60 - 120 days, between 121 - 140 days, and more than 140 days.

In an ideal situation, one would expect to find about:

- 25% of cows open less than 60 days to the last breeding;
- 65% open between 60 and 120 days;
- 10% open between 121 and 140 days;
- 0% open more than 140 days to the last breeding.

DAYS TO LAST BREEDING	COWS BRED		PERCENTAGE			
	#	%	< 60	60-120	121-140	> 140
1ST LACTATION	17	34	0	22	4	8
2ND LACTATION	14	28	0	16	4	8
3RD+ LACTATION	19	38	0	18	2	18
TOTAL HERD	50	100	0	56	10	34

NUMBER OF TIMES BRED TABLE

In this table, the number of cows bred 1, 2, 3, and 4 or more times are listed. The table is divided into two sections: COWS ASSUMED NOT PREGNANT and PREGNANT COWS. % BRED >= 3 is the number of cows in that section bred 3 or more times, expressed as a percentage of all cows in that group.

NUMBER OF TIMES BRED	COWS ASSUMED NOT PREGNANT						PREGNANT COWS					
	# OF COWS	1	2	3	4+	% BRED >= 3	# OF COWS	1	2	3	4+	% BRED >= 3
1ST LACTATION	5	5	0	0	0	0	12	7	4	1	0	8
2ND LACTATION	3	3	0	0	0	0	11	7	1	3	0	27
3RD+ LACTATION	3	3	0	0	0	0	16	11	3	1	1	13
TOTAL HERD	11	11	0	0	0	0	39	25	8	5	1	15

A high incidence of cows requiring 3 or more services is reason for serious concern. The need for repeat services may be caused by:

- hormonal imbalances;
- endometritis;
- embryonic or fetal mortality;
- errors in heat detection;
- poor quality semen;
- excessive blood urea nitrogen;
- Ca, P, vitamin A, D, E and β-carotene imbalances;
- poor body condition or a rapid loss of condition.

The repeat breeder cow is one of the most frustrating reproductive management problems in a dairy herd. All cows with 3 or more inseminations should be palpated thoroughly to determine the reason for conception failure. It is good to keep in mind that, occasionally, pregnant cows may still exhibit signs of heat.

CALVING PATTERN TABLE

This table summarizes historical and projected calvings. The month of the current test date is the sixth month listed in the table. The information for the first five months is calculated based on actual calving dates for the herd. The information for the current test date month is calculated on actual and projected calvings for the month. The information for the last six months is based on projected calvings only.

CALVING PATTERN	MONTH	# COWS	# HEIFERS	TOTAL CALVINGS	% OF HERD CALVING THIS MONTH
ACTUAL	AUG	5	2	7	10
	SEP	2	1	3	4
	OCT	5	5	10	14
	NOV	4	5	9	12
	DEC	4	4	8	10
CURRENT	JAN	4	2	6	8
PROJECTED	FEB	2	0	2	3
	MAR	7	0	7	9
	APR	5	0	5	6
	MAY	5	0	5	6
	JUN	3	0	3	4
	JUL	5	0	5	6

- # COWS includes all cows that are in, or will begin (ie. will calve), their second or greater lactation during the month listed.
- # HEIFERS includes all animals that are in, or will begin, their first lactation during the month listed. Producers wishing to receive projected heifer calving dates must also to subscribe to the DHI Heifer Management Option.
- TOTAL CALVINGS is the sum of the number of cows and heifers that have calved or are projected to calve during the month listed.
- % OF HERD CALVING THIS MONTH is the total number of calvings for the month divided by the total number of cows (milking and dry) in the herd during the month, multiplied by 100.

DAYS BETWEEN BREEDINGS TABLE

This table distributes cows in each group by the number of days between breeding dates. All cows with at least two breedings are included. Cows should cycle regularly, every 19 - 23 days. On most farms, fewer than 10% of the herd have a heat cycle shorter than 17 days or longer than 23 days. If a large percentage of cows are listed in the < 17 and/or > 23 days categories in this table, it is likely that cows were not in heat when bred or that a heat cycle was missed.

DAYS BETWEEN BREEDINGS	< 17	17-23	> 23	% HEATS DETECTED
1ST LACTATION	Ø	2	4	63
2ND LACTATION	Ø	2	5	51
3RD+ LACTATION	Ø	3	8	28
TOTAL HERD	Ø	7	17	47

% HEATS DETECTED is estimated from the breeding interval for a herd. Breeding interval is the average number of days between first breeding and the insemination that results in pregnancy. It can be calculated using the following formula :

$$\text{BREEDING INTERVAL} = \frac{\text{days to last breeding - days to first breeding}}{\text{(breedings per pregnancy - 1)}}$$

% HEATS DETECTED is then calculated :

$$\frac{21}{\text{BREEDING INTERVAL}} \times 100$$

where 21 days is the average length of heat cycles.

Percentage of Heats Detected	Heat Detection Efficiency Level
under 50	severe problem
50 - 60	moderate efficiency
61 - 80	adequate efficiency
over 80	excellent efficiency

The table to the left provides guidelines for interpreting the percentage of heats detected.

In some herds, there may be excellent heat detection efficiency but poor fertility (BREEDINGS PER PREGNANCY over 2.0). This indicates a possible problem in the accuracy of heat detection.

Causes of a low heat detection efficiency could be:

- missed heats due to infrequent herd observations;
- feet and leg problems, such as overgrown hooves or sore legs;
- a poor environment, such as slippery footing, overcrowding or lack of an exercise area, or;
- the cows are not cycling (due to luteal cysts, static ovaries, uterine infections, low energy rations, or a mineral deficiency).

A herd health program is a must in maintaining good herd reproductive performance, or in improving it where necessary. This program should include:

- 30 day postpartum checks;
- checking cows not observed in heat by 60 days;
- checking cows with three or more breedings;
- pregnancy checks by 40 days post breeding.

AGE AT FIRST CALVING TABLE

This table shows the distribution of heifers calving at various ages. Heifers are identified as animals in their first lactation and less than 48 months of age at first calving.

AGE AT FIRST CALVING (MONTHS)	< 20	20-22	23-25	26-29	>29
NUMBER OF HEIFERS	Ø	1	10	16	4
% OF HEIFERS	Ø	3	32	52	13
AVERAGE AGE	26.4				

Age at first calving is an important factor affecting reproduction, and production performance of cows in first and subsequent lactations. An ideal heifer rearing program would get calves off to a good start, promote maximum growth, and result in the heifers entering the milking string at 23 - 25 months of age.

Calving heifers at this age generates the maximum dollar return, as compared to calving heifers at any other age. While it is true that the older the animal, the more milk they would produce during their first lactation, income generated by this added milk wouldn't even cover the cost of feed for the non-producing heifer for one or two months. Despite decreased lactation yields, early calving heifers are more profitable as they produce more milk per day of life than later calving heifers. On the other hand, calving heifers earlier than 23 months of age can increase the risk of calving difficulties. The table on the left gives benchmarks for AGE AT FIRST CALVING.

Age at first calving months	% of heifers
< 20	0
20 - 22	5
23 - 25	90
26 - 29	5
> 29	0

For more information

Funk, D.A.; A.E. Freeman and P.J. Berger. *Effect of previous days open, previous days dry and present days open on lactation yield.* Journal of Dairy Science 70: 2366-2373 (1987)

Varner, M.A. J.L. Majeskie. *Interpreting Indexes of Reproductive Efficiency.* The University of Maryland, Western Regional Extension Publication (1988)

Grusenmeyer, D. et al. *Evaluating Dairy Herd Reproductive Status Using DHI Records.* Washington State University, Western Regional Extension Publication, WREP 0067 (1988)

Norell, R.J. *Troubleshooting Herd Reproductive Problems.* Dairy Management Workshop, University of Idaho (1988)

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