DHIoption

Western Canadian Dairy Herd Improvement Services

COW PRODUCTIVITY REPORT

Purpose of option

The DHI **Cow Productivity Report** ranks individual cows according to the value of the milk produced. Amount of fluid quota, MSQ, utilization (end use of the milk), the cow's milk production and fat test are used in determining the milk value. The Report uses current Alberta blend milk prices, and is updated when necessary.

Explanation and interpretation of output

On the **Cow Productivity Report**, cows in the herd are grouped according to the number of their current lactation: FIRST, SECOND and THIRD PLUS. The following information is listed on the report, for each cow in the herd:

- COW IDENTIFICATION : this is the same identification used on the Cow Production Monthly Report;
- LACT NO. : lactation number;
- AGE AT CALVING YR MO : the age of the cow at the beginning of the current lactation in years and months;
- DAYS IN MILK: the number of days the cow has been milking in the current lactation;
- 305 DAY PRODUCTION (KG) of MILK, FAT and PROTEIN (projected if less than 305 days in milk);
- MILK VALUE IN DOLLARS :
  - for 305 DAY LACTATION yield;
  - PER DAY OF LIFE;
  - PER DAY FROM 2 YEARS of age;
  - PER DAY FROM 1ST CALVING.

HERD NUMBER | SERVICE LEVEL | NAME

TEST DATE

DHI COW PRODUCTIVITY REPORT

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COW IDENTIFICATION	LACT NO.	AGE AT CALVING YR MO	DAYS IN MILK	305 - DAY PRODUCTION			MILK VALUE IN DOLLARS			
				MILK KG	FAT KG	PRO KG	305 DAY LACTATION	PER DAY OF LIFE	PER DAY FROM 2 YEARS	PER DAY FROM 1ST CALVING
FIRST LACTATION GROUP										
							$	$	$	$
FIONA	1	2 00	39							
CONSUELA	1	2 09	104	10135	321	328	4764	3.63	8.20	15.62
ALITA	1	2 06	329	8965	340	295	4514	3.62	8.75	14.80
KIWI	1	2 02	99	8278	358	258	4398	3.95	11.51	14.42
FRANCY	1	2 04	187	8522	319	272	4269	3.68	9.93	14.00
SUSHI	1	2 02	84	8742	300	269	4230	3.77	10.82	13.87

Milk price calculations

The quantity of fluid quota, MSQ, milk production, % fat, and utilization determine the price that producers in Alberta are paid for their milk. The milk values in the DHI **Cow Productivity Report** are based on the previous month's quota and over-quota milk prices, the butterfat differential, the actual fluid quota and MSQ holdings for each farm, and each cow's milk and fat production. Quota holdings may be updated by the producer when necessary.

Cows ranked by milk value

The cows within each lactation group are ranked according to the 305 DAY LACTATION milk value for their current lactation (projected if less than 305 days in milk). MILK VALUE is calculated for each cow that has been tested twice or has been in milk for more than 44 days.

Group and provincial averages

For each lactation group, averages for the various categories (ie. AGE AT CALVING, DAYS IN MILK, MILK KG, FAT KG, etc.) are listed in the report (GROUP AVERAGE). The provincial breed averages (eg. HOLSTEIN) for each lactation group are also provided for comparison purposes. In the case of a multi-breed herd, although all cows would be listed in the report, only the averages of the predominant breed would be recorded. Each lactation group is divided horizontally (by a dotted line) to show whether a cow falls above or below the group average 305 DAY LACTATION milk value. Immediately below the section of the report entitled THIRD PLUS LACTATION GROUP, the total HERD AVERAGE and the provincial breed average (eg. PROV. HOLSTEIN) are listed.

Milk value for 305 day lactation

305 DAY LACTATION MILK VALUE is calculated from the 305 DAY PRODUCTION MILK KG and FAT KG figures given for each cow. These are the same figures found in the Cow Production Monthly Report. When DAYS IN MILK are fewer than 305, production is projected; otherwise it is actual. PROTEIN KG is currently not used since there is no value placed on protein in the current Alberta milk price calculations.

305 DAY LACTATION MILK VALUE allows comparison of the economic value of cows within lactation groups, since it accounts for the value of fat as well as milk volume. As mentioned above, this is the value used to rank cows on the **Cow Productivity Report**.

Milk value per day of life

Milk value on a PER DAY OF LIFE basis is calculated as follows:

$$\frac{\text{Milk Value for lifetime production to day 305 of current lactation}}{\text{Days of life to day 305 of current lactation}}$$

Days of life include days to first calving, all dry days and lifetime days in milk to day 305 of the current lactation. Production per day of life therefore reflects age at first calving, and the production and reproduction history of each cow.

A comparison of 5 first lactation animals with varying age at first calving is shown in Table 1 below.

Table 1. Effect of age at first calving on milk value per day of life.

Cow ID	Lac #	Age at calving YR	MO	305 day production Milk	Fat	Protein	Milk value per day of life
1	1	2	00	7000	250	240	$2.98
2	1	2	02	7000	250	240	2.82
3	1	2	04	7000	250	240	2.67
4	1	2	06	7000	250	240	2.54
5	1	2	08	7000	250	240	2.42

This table shows that earlier calving heifers have a higher MILK VALUE PER DAY OF LIFE than later calving heifers. Table 2 (below) shows that for each 1 month increase in age at first calving there must be a increase of 200 kgs of milk in the first lactation in order to achieve the same MILK VALUE PER DAY OF LIFE.

Table 2. First lactation production must increase by 200 kg to compensate for every 1 month increase in age at first calving.

Cow ID	Lac #	Age at calving YY	MO	305 day production Milk	Fat	Protein	Milk value per day of life
6	1	1	11	6800	243	240	$2.98
7	1	2	00	7000	250	240	2.98
8	1	2	01	7200	257	240	2.98

In the SECOND and THIRD PLUS LACTATION groups, days open and days dry will also have an effect on the MILK VALUE PER DAY OF LIFE - the higher the number of days open or dry, the lower the value.

Milk value per day from 2 years of age

The MILK VALUE PER DAY FROM 2 YEARS of age is calculated as follows:

$$\frac{\text{Milk Value lifetime production to day 305 of the current lactation}}{\text{age of cow at 305 DIM current lactation - 2 years}}$$

This calculation of milk value offers another way of comparing the productivity of cows within a herd. It should be noted that :

- for heifers calving after 24 months, the days from 2 years of age to calving are included in the above calculation;
- for heifers calving before 24 months the production (but not the days) before 2 years of age is included in the calculation.

In either instance, the MILK VALUE PER DAY is measured from 2 years of age.

Research has shown that despite decreased lactation yields, early calving heifers produce more milk per day of life than later calving heifers. MILK VALUE PER DAY FROM 2 YEARS of age is useful in the economic evaluation of age at first calving. Table 3 shows the above calculation applied to the five 1st lactation animals of Table 1.

Table 3. Effect of age at first calving on milk value per day from 2 years of age.

Cow ID	Lac #	Age at calving YY	Age at calving MO	305 day production Milk	305 day production Fat	305 day production Protein	Milk value /day from 2 years
1	1	2	00	7000	250	240	$10.12
2	1	2	02	7000	250	240	8.46
3	1	2	04	7000	250	240	7.26
4	1	2	06	7000	250	240	6.37
5	1	2	08	7000	250	240	5.66

Once again, these figures show clearly that heifers calving earlier are more profitable.

Milk value per day from first calving

The MILK VALUE PER DAY FROM FIRST CALVING is calculated over lifetime days in milk to day 305 of the current lactation plus all dry days. It provides a means of comparing the production and reproduction history of cows within a herd. The days to first calving are not included in this calculation (they are used in the MILK VALUE PER DAY OF LIFE calculation). Table 4 shows four 3rd lactation animals, all with the same production in their last two lactations and all projected to produce 7000 kg of milk and 250 kg of fat in their current lactation. They only differ in the number of days open and days dry.

Table 4. Effect of days open and days dry on milk value per day from first calving. Milk and fat production for previous and current lactations is the same for all four cows.

Cow ID	Lac #	Days open	Days dry	Calving interval	Milk value /day from 1st calving
9	3	100	60	12.4	$ 10.31
10	3	140	60	13.7	9.27
11	3	100	120	12.4	9.87
12	3	140	120	13.7	8.7

The comparison above demonstrates the dramatic effect of a cow's failure to conceive on her economic value. As well, it shows the drop in profitability caused by cows having an extended dry period. Getting cows in calf in a timely manner is one of the most important goals in any dairy operation.

Table 5 gives an example using the first lactation heifers fom Tables 1 and 3. In this case, there is no effect of age at first calving on MILK VALUE PER DAY FROM FIRST CALVING.

Table 5. Age at first calving has no effect on milk value per day from first calving.

Cow ID	Lac #	Age at calving YY	Age at calving MO	305 day production Milk	305 day production Fat	305 day production Protein	Milk value /day from 1st calving
1	1	2	00	7000	250	240	$10.12
2	1	2	02	7000	250	240	10.12
3	1	2	04	7000	250	240	10.12
4	1	2	06	7000	250	240	10.12
5	1	2	08	7000	250	240	10.12

For more information

Lin, C.Y. et al. *Production and reproduction of early and late bred heifers.* Journal of Dairy Science 69:760 (1986)

Gill, G.S. and F.R. Allaire. *Relationship of age at first calving, days open, days dry and herd life to a profit function for dairy cattle.* Journal of Dairy Science 69: 1131 (1986)

Croy, David and Karen A. Beauchemin. *Feeding to improve on quota investment.* Advances in Dairy Technology : Proceedings of the Western Canadian Dairy Seminar 113 (1992)

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