Alberta Dairy Management
PREPARED FOR AND DISTRIBUTED BY THE DAIRY EXTENSION ADVISORY GROUP

Milk, Standard Milk and BCA

What are the first numbers you look at when you receive your DHI Monthly Herd Summary Report? Are you primarily interested in the actual production level of your herd (MILK/DAY KG), your CURRENT BCAs, or have you become accustomed to looking at your herd's STANDARD MILK/DAY KG? These numbers represent valuable information if you interpret them correctly. Here's a brief explanation of what they mean and how they are related.

MILK/DAY KG is the average yield for all cows with valid milk weights (MILK KG) on the Cow Production Monthly Report. MILK/DAY KG pays the bills and it will vary from test to test depending on :

- changes in season, weather, temperature and humidity;
- changes in feed intake;
- the proportion of 'fresh' versus 'stale' cows in the herd as indicated by AVE DAYS IN MILK;
- milk component variations resulting from changes in rations, feeding schedules and stage of lactation;
- the changing mix of heifers and older cows in the herd.

Days in milk (DIM), milk composition and cow maturity have predictable effects on milk yield. The calculation of STANDARD MILK/DAY KG removes the influence of these predictable effects, making it possible to focus on other factors affecting changes in output.

The first step in the calculation of STANDARD MILK is the *adjustment* of MILK KG values for individual cows to an equivalent 150 DIM yield and *correction* to an energy output equivalent to milk containing 3.5% fat and 3.2% protein. These individual adjusted, energy-corrected milk (AECM) values are then averaged within each lactation group (1st, 2nd, 3rd+). Finally, STANDARD MILK/DAY KG is calculated, representing the equivalent average AECM production level of your herd if it contained 30% 1st, 20% 2nd and 50% 3rd+ lactation cows. Your DHI Monthly Herd Summary Report user guide contains a detailed explanation of the calculations used. Simply stated, changes in STANDARD MILK are more indicative of changes in nutrition, management and environment than are changes in MILK/DAY KG.

Breed Class Averages (BCAs) are based on the projected or actual 305-DAY PRODUCTION values reported on the Cow Production Monthly Report. BCAs are calculated by comparing these values with production standards for cows of the same breed, calving at the same age in the same month of the year. As described in the DHI Breed Class Average infosheet, BCAs may not be calculated for all lactating cows. CURRENT BCAs reported in the TEST DAY SUMMARY section of the Monthly Herd Summary Report are the averages of those calculated for individual cows, both milking and dry.

CALVING DATE ..... 94AUG04 LACT NO 2
AGE AT CALVING ..... 03-01 BREED ..... HOLSTEIN

TEST	DIM	MILK KG	FAT %	PROT %	BCA MILK	BCA FAT	BCA PROT	AECM
1	5	28.9	4.7	3.9				29.7
2	35	37.8	3.4	3.0	187	172	174	29.7
3	65	36.6	3.3	3.0	191	179	187	29.7
4	95	34.3	3.3	3.1	195	185	193	29.7
5	125	31.7	3.4	3.2	198	187	197	29.7
6	155	29.2	3.5	3.3	199	189	199	29.7
7	185	26.8	3.6	3.3	199	190	201	29.7
8	215	24.6	3.7	3.4	200	192	202	29.7
9	245	22.6	3.8	3.5	201	194	204	29.7
10	275	20.8	3.8	3.5	203	195	206	29.7
11	305	19.3	3.9	3.5	203	195	205	29.7

The table on the left is a lactation record for the average 2nd lactation Holstein from the Alberta DHI database. As expected, milk peaks at 35 DIM (see article **6L1**) and declines steadily thereafter. Fat and protein levels move in the opposite direction. Notice that all BCA values rise steadily as the lactation progresses. AECM (adjusted, energy corrected milk) is exactly the same at every test for this cow.

Keep in mind that this record represents the average 2nd lactation Holstein in Alberta. The steady rise in BCA values after peak suggests that this cow's production is more persistent (declines more slowly) than the production of cows used to calculate BCA standards. Therefore, if your cows are as persistent as average cows in Alberta, you can expect your individual cow BCAs to rise with increasing days in milk. This also implies that the CURRENT BCAs for your herd may rise as your AVE DAYS IN MILK increase even though your actual production (MILK/DAY KG) is falling.

Adjustment factors for AECM were derived from average lactation curves for Alberta Holsteins on DHI. Therefore, when these adjustment factors are applied to the average record shown on page 1, it should not be surprising that AECM remains the same across the entire lactation. Notice that the calculation of AECM has removed the variation in milk yield due to stage of lactation (DIM) and milk composition, as it was designed to do.

The table below illustrates how MILK KG, BCAs and AECM can change independently, and how these changes affect TEST DAY SUMMARY values. The first two cows both represent average 1st lactation Holstein heifers from the ADHIS database. Both produced 28.4 kg of milk at this test, although cow 1 was 34 DIM (pre-peak) while cow 2 was 94 DIM (post-peak). Peak milk for 1st lactation Holsteins on DHI in Alberta occurs at 56 DIM (see article **6L1**). Because both cows are producing on the same curve, their AECM values are also identical - if they were at 150 DIM, producing 3.5% fat and 3.2% protein, their milk yield would be 26.6 kg.

Since cows 1 and 2 are on the same curve, both cows will achieve the same 305-DAY PRODUCTION. In spite of this, notice that the BCA MILK index for cow 1 is 178; for cow 2 it is 184. There are two reasons for this :

- cow 1 was born in May while cow 2 was born in March - the BCA standard for Holsteins calving as 2 year-olds in May is 3791 kg; for March calving it is 3885 kg. BCA MILK for cow 2 should be lower, but;
- cow 2 is 60 days further into her lactation - the table on page 1 illustrated that BCAs for average Alberta Holsteins increase as lactation progresses.

Cows 3 and 4 both calved on January 4 at 37 months of age and are producing on the same 2nd lactation Alberta average curve except for cow 4's lower fat test. MILK KG, BCA MILK and BCA PROTEIN are all identical, but the lower fat test for cow 4 has lowered her BCA FAT and AECM. Notice that cow 3's AECM is exactly the same as her MILK KG because she is producing 3.5% fat, 3.2% protein milk at 150 DIM.

Cows 5 and 6 both calved on October 10 and are producing on the Alberta average curve for 3rd+ lactation Holsteins. DIM, milk production, milk composition and AECM are the same for both and 305-DAY PRODUCTION will also be identical. All BCAs for cow 5 are higher because the BCA standards for her younger calving age are lower.

Averages for milk production, milk composition and BCAs are reported in the TEST DAY SUMMARY section of the DHI Monthly Herd Summary Report. But notice that the AECM average is not the same as STANDARD MILK/DAY KG because the latter is a weighted average based on the standard herd mix of lactation groups described above.

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TEST DATE ..... 95JUN03 BREED ..... HOLSTEIN

COW	CALVING DATE	AGE AT CALVING	LACT NO	DIM	MILK KG	FAT %	PROT %	BCA MILK	BCA FAT	BCA PROT	AECM
1	95MAY01	02-00	1	34	28.4	3.5	3.0	178	170	169	26.6
2	95MAR02	02-00	1	94	28.4	3.4	3.1	184	183	192	26.6
3	95JAN04	03-01	2	150	29.7	3.5	3.2	187	179	188	29.7
4	95JAN04	03-01	2	150	29.7	3.2	3.2	187	171	188	28.3
5	94OCT10	04-02	3	236	24.4	3.7	3.4	187	177	186	31.8
6	94OCT10	06-10	5	236	24.4	3.7	3.4	174	165	177	31.8
	AVERAGES			150	27.5	3.5	3.2	184	175	184	29.1
								STANDARD MILK/DAY KG			29.7