

Lactation Curves

Over the past couple of years, I've spent a lot of time working on lactation curves. With my individual producer clients, I use them to diagnose problems and to identify opportunities for increased production. I've also worked with Alberta DHI on the development of their Lactation Curves option and the production of their user guides. More recently, we completed an analysis of data for 24-hour Supervised Holstein herds in the Alberta DHI database.

Many of our ideas about what 'normal' lactation curves should look like are derived from Northeastern US DHI data. We were interested in looking at our own Alberta data to see if these ideas are applicable here. Our conclusion: some are, some are not. But before discussing these, I'd like to point out a few of the characteristics of individual and group average lactation curves which I think are important to appreciate.

Curves for individual cows

Most producers will realize that the production from individual cows fluctuates up and down from one milking to the next. Figure 1 shows typical fluctuations in AM, PM and daily milk yields. Superimposed on this record are two possible sequences of DHI tests.

Notice that the shape of the DHI lactation curve depends upon when the cow calves relative to the next test date. If she calves 5 days before the next test date, her first test will be at 5 days in milk (DIM) and her peak yield will be recorded at 65 DIM. If she calves 20 days before the next test, her tests will probably begin at 20 DIM and her peak would occur at 80 DIM.

Figure 1. Typical AM, PM and daily milk yields for an individual cow. Two possible DHI test sequences are superimposed on the daily milk curve.

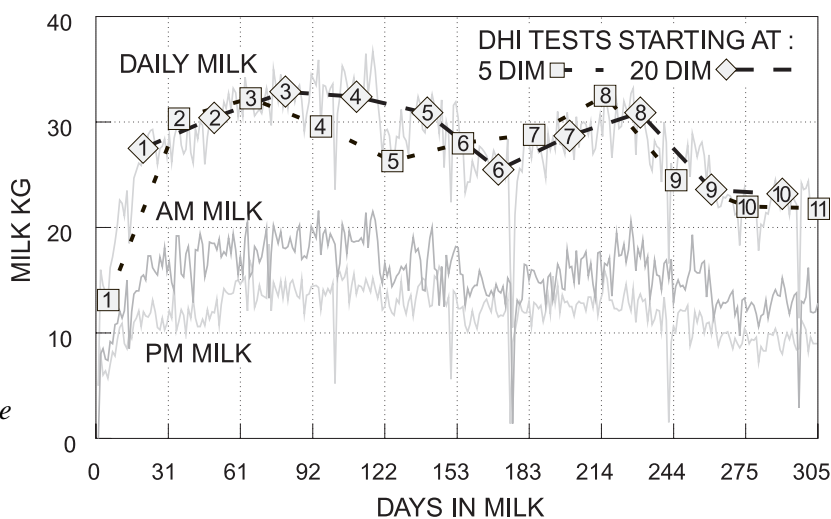
The DHI test day schedule will also affect test day persistency values. For example, current persistency at test day 6 is 106% for the sequence starting at 5 DIM but only 83% when testing began at 20 DIM.

If you appreciate the variability of daily milk output, you will also realize that a single aberrant test day result for an individual cow is not something to get very excited about. It could simply result from testing at one of her 'spikes'.

Group curves

Grouping cow test day results removes much of the variation seen in individual lactation curves. The DHI Lactation Curves option groups cows by lactation number. Yields at each test day for every cow currently in the lactation group are averaged, resulting in lactation curves like that shown in figure 2.

Even these group curves are subject to individual cow variation. The flags show on sample days 9 and 10 indicate that fewer than 5 individual milk weights were available for those tests. This is the reason for the upslope at the end of the curve. The more individual weights which are available at each test day, the less influence that a single aberrant test weight will have on the group average. Unusual looking group curves produced by some dairy management software packages (see article 6S1) often result from limited numbers of cows in the group.



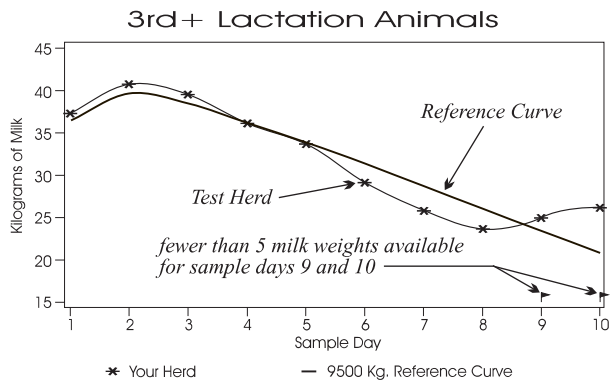


Figure 2 : Lactation curves from the DHI Lactation Curves option. Limited milk weights on test days 9 and 10 give the curve its unusual shape.

Average curves for Alberta Holsteins

Table 1 reports average peak and persistency statistics derived from Holstein herds in the ADHIS database. Here's how they compare with values we have been using, based on Northeastern US data :

Peak Milk Kg

The user guide for the DHI Lactation Curves option suggests guidelines relating peak heights for lactation groups. Table 2 compares those guidelines with the relative PEAK MILK KG values OVER ALL 305-day production levels reported in table 1. Our Alberta Holstein results are well within the range suggested earlier.

COMPARISON	DHI LC GUIDE	TABLE 1 DATA
LACT 1 : % of LACT 3+	70-73	71
LACT 2 : % of LACT 3+	92-93	92
LACT 1 : % of LACT 2	75-80	77

Table 2 : Comparison of lactation group peak milk.

Days in milk at peak

The common rule-of-thumb has been that peak milk normally occurs between 6 and 8 weeks after calving. Table 1 statistics indicate that peaks often occur earlier than this. DIM AT PEAK is later in first lactation cows and at higher production levels with little difference between second and third+ lactations.

Post-peak persistency

Results of our analysis confirm the idea that persistencies decrease with subsequent lactations. However, contrary to the belief that persistency declines as production level increases, statistics in table 1 indicate a consistent improvement in persistency as 305-day production increases for all lactation groups.

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	----- 305-DAY PRODUCTION LEVEL -----							
	OVER ALL	5000	6000	7000	8000	9000	10000	11000
		-5999	-6999	-7999	-8999	-9999	-10999	-11999
PEAK MILK KG :								
LACT 1	29.6	23.4	26.0	28.7	31.7	34.8	37.7	41.0
LACT 2	38.7	29.2	32.2	34.9	37.5	40.5	43.5	47.0
LACT 3+	42.0	30.1	33.4	36.2	39.2	42.0	45.1	48.0
DIM AT PEAK :								
LACT 1	56	39	44	48	57	64	69	76
LACT 2	35	27	27	28	32	35	38	41
LACT 3+	37	27	31	31	32	36	38	41
PERSISTENCY (66-305 DIM) :								
LACT 1	96.5	95.5	95.8	96.1	96.4	96.7	97.0	97.1
LACT 2	93.8	92.4	92.7	92.9	93.4	93.6	93.9	94.1
LACT 3+	93.5	91.8	91.9	92.3	92.7	93.1	93.3	93.7

Table 1 : Average lactation curve statistics for Alberta Holsteins. Derived from data for 24-hour supervised herds only, representing 372,383 test day records collected from October 1987 to June 1994.