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Why Do Cows Leave the Milking Herd Earlier than in the Past?

By Dr. H. Duane Norman[1]

In 2018, U.S. Holstein cows in the Dairy Herd Improvement (DHI) program remained in the milking herd for an average of 28.4 months. Looking back to those born in 1975, they stayed an average of 34.4 months - a full half a year longer. This interval, coined *Productive Life*, runs from the day of calving in the first lactation to the day the cow left the herd. Some have suggested cows aren't staying as long because "they are subjected to more stress." But wait, is this the *real reason*? Or (maybe) it's not even a *contributing cause* at all? After all, the feed and care cows receive today is better than ever.

The question of how long cows should be kept in the milking herd is not new. During the 1960's when folks began to realize the best measure of a cow's performance was her comparison to herdmates or contemporaries instead of to her dam, there was a question of whether high yielding 2-year-olds would last. Evidence on this topic was scarce so a Penn State University study[2] determined the number of lactations cows remained in the herd when stratified by 11 first lactation milk yield groups. The results showed heifers in higher groups produced significantly more milk and fat in later life than heifers in the lower first record groups. This advantage held true for each individual lactation. Heifers in higher first-lactation groups remained in the herd longer than lower producers. The high-yielding cows either had the ability to stay longer, or the producers chose to keep them longer than their lower-producing contemporaries.

Averages of Productive Life (PL) are calculated by cows' birth years and posted on the Council on Dairy Cattle Breeding (CDCB) website. Annual changes can then be calculated. Fortunately procedures on how to estimate genetic trends have been available for decades also. Even though genetic values for the traits cannot be observed, all can be estimated with a high degree of accuracy. For example, genotyped Holstein bulls have an accuracy (Reliability) for Productive Life of 71% at birth. The bulls with daughters are even considerably higher (often from 75 to 99% Reliability). To estimate genetic trend, one treats all genetic predictions as if they were the true genetic values. The average predictions are close to the true genetic value because some animals are predicted too high and others too low. Thus, individual differences between estimated and actual genetic values are averaged out and usually differ by only a couple percent.

The phenotypic and genetic changes taking place for "productive life" are probably the more interesting ones of the 48 traits we calculate evaluations for. Table 1 shows the number of months that producers kept Holstein and Jersey cows in the herd across time. The table also demonstrates the cows' genetic capability for staying if the same culling practices had been in place.

Productive Life is unique as it shows that – even though dairy producers are turning cows over more quickly – the cows actually have the capability to stay much longer. For example, producers kept the Holsteins born in 2016 six fewer months in the milking herd than they did for those born in 1975 (28.4 vs 34.4 months). Producers kept the Jerseys 8.5 fewer months (29.1 vs. 37.6 months). It seems ironic since today's Holstein cows actually have the genetic capability (breeding value) to stay in the herd 13.6 months longer than those born in 1975. Likewise, Jerseys could stay 17.5 months longer if producers followed the same culling practices of earlier decades. It seems producers just choose to turn the herds over more quickly to take advantage of the superior genetics of younger animals.

Table 1: Phenotypic and Genetic Values of Productive Life (PL) in Holsteins and Jerseys by selective birth years.

Birth Year[1]	Holstein Cows	PL (mo.)	BV (mo.)	Jersey Cows	PL (mo.)	BV (mo.)	Birth Year[1]
2016	419,518	28.40	4.38	62,538	29.13	3.57	2016
2015	960,696	28.09	3.72	123,346	28.59	3.03	2015
2010	910,130	25.04	0.00	85,175	29.16	0.00	2010
2005	766,879	26.97	-1.83	53,391	32.37	-1.23	2005
2000	644,935	28.27	-2.72	41,157	34.48	-2.41	2000
1995	665,344	28.63	-3.25	34,232	35.86	-2.88	1995
1990	694,427	28.58	-4.30	38,356	34.69	-5.28	1990
1985	612,226	29.85	-5.36	32,394	35.11	-8.05	1985
1980	538,590	31.94	-7.37	28,662	37.33	-11.00	1980
1975	314,353	34.39	-9.22	18,299	37.57	-13.88	1975
1970	246,489	35.19	-11.08	18,606	36.57	-17.85	1970
1965	187,603	35.77	-12.12	18,407	36.78	-20.43	1965
1960	135,548	36.50	-12.78	16,577	38.23	-21.72	1960

[1] 2016 is a partial year

I will not be surprised if some readers are skeptical of this unique depiction. I don't believe there is another trait with quite as interesting of a picture.

How could one go about convincing skeptics that these unique numbers are legitimate? This was done on one previous occasion with a different trait (milk) just to illustrate that the genetic improvement predicted would actually be realized over a few decades. Researchers at the University of Minnesota initiated a study to convince breeders that selection gains would occur as predicted. They kept one Holstein group (a control line) maintaining the 1950's genetic levels by constant breeding to bulls of the original era, and a second line with top genetics for each current year. However, no one (to my knowledge) has done a similar study for productive life; i.e., split their herd with multiple lines following different culling practices. That would likely be the most convincing way to show that today's cows have the genetic ability to stay two or three years longer than their ancestors could have in 1960 (assuming the same culling practices had been followed).

A breeder recently suggested a genetic index using lifetime yield would be superior to the lifetime merit indexes currently available. When the evaluation for lactation yield is available along with an evaluation for productive life, one essentially has accounted for the same things. Breed associations on both national and state levels have been strong supporters of lifetime productivity in their recognition programs, providing awards to owners of the animals with the highest lifetime milk, fat or protein yields. The primary weakness to lifetime figures is that it ignores how long it takes to obtain the yields, so by itself, lifetime yield is not a reliable measure of economic return. If a cow produces 80,000 pounds of milk during the first two 305-day lactations, that's worth more than getting the same quantity in four lactations; I simply use these numbers to illustrate a point. There are cows on such lists with nearly equal lifetime yields, but some take twice as many lactations to accomplish compared to others.

It is a dairy producer's decision on how to structure their culling practice. Producers seem to be far more active today in making voluntary culling decisions, in contrast to when decisions were more likely to reflect the cows' biological and/or physical conditions (termed involuntary culling). The farm press occasionally produces an article about a herd that has a high percentage of cows 10 years and older; however, other herds turn their cows over faster because they strive for high genetic indexes. I personally would feel uncomfortable advising a producer on structuring a culling program because there are different farm business models and different factors that influence both income and costs. Nevertheless, there is no question that the herd replacement program and culling practices have a large impact on herd income.

Cows' actual tenure in the milking herd is shorter than it used to be due to management decisions, but they have the potential to stay significantly longer than they used to because they have been selected directly for longer productive lives and received selective improvement in a number of other traits that also support longer life (e.g., daughter pregnancy rate).

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[2] *J. M. White and J. R. Nichols. 1965. Relationships between First Lactation, Later Performance, and Length of Herd Life in Holstein-Friesian Cattle. J. Dairy 48 (4): 486-474.*