Are You Making "Profitable Culling" Decisions?

By Donna M. Amaral-Phillips

Culling decisions definitely impact the profitability of a dairy business. These decisions are not always straight-forward and depend on various factors; some under one's control and others that are not controllable. Nonetheless, one needs to make these decisions based on current herd and cow data and current market prices. Prices received for milk and cull cows, rearing costs or price and/or availability of replacements/springers, and an individual cow's health, reproductive status and milk production are an integral part of this decision process. Some cows make this decision easier on management than others, such as reproductive problem or high SCC cows. Besides which cows should be replaced, one needs to determine the timing of the culling which is impacted by whether a replacement heifer is available to replace the culled cow. All of these factors enter into one's decision if a cow should continue her productive life or if she should entertain a career change and become a beef cow.

"Keep the Stalls Full"

One should strive to "keep the stalls full at all times". By keeping the "barn" full (but not too full which can lead to overcrowding), one can spread the costs associated with fixed assets (buildings and equipment) and general expenses (electricity or chemicals for cleaning milking equipment), over more productive units or cows. This management philosophy helps increase the potential for dairy farm income to help cover these types of monthly expenses. To accomplish this objective, one needs to estimate the number of heifers or replacements needed to replace the normal number of cows culled. One needs to remember that breeding decisions made today impact potential culling decisions 3 years from now in herds raising their own replacements. Farms purchasing replacements are not immune either; as breeding decisions within the industry 3 years ago impact springer availability for purchase and their price.

For Holstein herds in KY, MI, NY, OH and PA on DHI test (3868 herds), culling rates averaged 38% (DRMS-Dairy Metrics accessed 6-14-2022). Culling rates for Jersey herds were at 34%, lower than Holstein herds, but this metric should be interpreted with caution as it reflects a limited number of herds on test (162 herds). To raise the appropriate number of replacements for cows being culled, one needs to take into account death and culling losses during the heifer rearing program, expected number of heifers per pregnancy, and cow pregnancy rates. These calculations and the implications on numbers of replacements needed were covered in a previous article, "Dairy Replacements- A Necessary, but Costly Investment". For a culling rate of 38%, approximately 50 heifer calves would need to be born per 100 cows to account for reproductive culling in virgin heifers and calf and heifer death losses. Less or more heifers being born would be needed if death losses or the number of heifer reproductive culls were reduced or increased from the average values used in these calculations.

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Yearly cull rates are a retrospective indicator; indicating what has occurred over the past 12 months. As such, they do need to be used with caution and trends noted may or may not be continuing to occur. However, these data do give an indication about past culling decisions and can point to areas of concern and, as such, should be monitored.

Watch for Changes in Number of Cows Exiting

For culling rates within the herd to be the most profitable, cow death losses and unplanned exits need to be kept in check. On average, death losses represent about 5 to 6% of the total number of cows within the herd (NAHMS and DRMS Dairy Metrics). Rates outside this range are concerning, not only from an animal welfare standpoint, but also represent a financial burden as they do not generate income to help fund their replacement. These cows often exit the herd during early lactation, the most profitable timeframe within a given lactation. Reviewing one's on-farm records and summary reports on a routine, on-going basis allows one to detect changes/problems shortly after they start occurring and allow for quick implementation of management changes to correct the underlying health and performance issues. By plotting the number of days in milk when cows exit a herd (see figure 1), one can quickly detect at what point in lactation cows are leaving the herd. As shown in this example, a high percentage of cows are exiting the herd in early lactation, pointing to issues with both heifers and cows transitioning from the dry lot back into the milking herd.

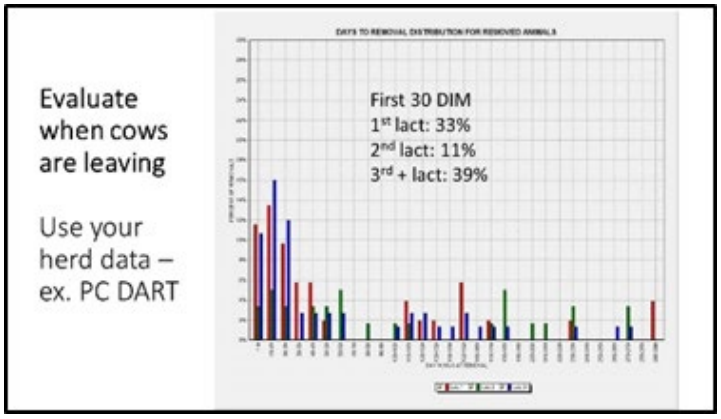

Figure 1. Graph showing the number of days in milk when cows are exiting an example herd. Graph like this can be generated using PCDART or other management software.

Dilemma- Is it More Profitable to Replace a Cow?

Many factors impact whether replacing a particular cow with a heifer is the more profitable option. The current and future profitability of a particular cow relative to replacing her with a replacement heifer needs to be considered. Some cows make this decision process easy for managers; case in point, a consistently high SCC cow. But, for the most part, these decisions are more complicated since they involve not only if she should be replaced, but when she should be replaced. Many factors impact this decision and its timing. The performance and potential profitability of the cow in question are an integral part of this decision process. But, also whether a replacement heifer/cow is available needs to be considered.

Classically, the timing for considering when to cull a cow has been associated with the time in which her performance (usually milk production) fails to cover her feed cost. Obviously, milk prices (and its associated impacted of butterfat content on milk price in FO 5 and 7) and feed costs impact this cut off point as illustrated in table 1. As milk price increases while holding feed costs constant, the amount of milk needed to cover feed cost (plus an additional small cost) decreases. The inverse is seen when feed cost increases at a given price for milk. If this is the measure used to determine when to sell a particular cow, the target production needs to reflect current prices being received and costs paid on-farm.

Table 1. Impact of feed cost and milk price on the breakeven milk production to cover feed cost and an addition $1.00 in added cost.

Daily Feed Cost per lb DM	Total Daily Feed Cost @ 50 lbs DMI	Milk Price			
		$17.50	$21.00	$24.00	$28.00
		---lbs milk needed to cover feed cost plus $1.00 other cost---			
$ 0.11	$ 5.50	39	34	27	23
$ 0.14	$ 7.00	46	42	33	29
$ 0.17	$ 8.50	54	50	40	34
$ 0.20	$ 10.00	63	58	46	39

Many additional factors, such as pregnancy status, replacement cost, and cull cow prices, also need to be considered in culling decisions besides milk price and feed cost. All of these factors impact whether it is more profitable to replace a particular cow with a replacement animal or to retain said cow at this time. A cow's and her potential replacement's long term profitability needs to be considered. Economist calculate what they call a "retention pay-off value" which essentially compares the lifetime income potential of a replacement animal to that of the income potential of a cull cow remaining in the herd. When the retention pay-off value is negative, the more profitable option is to replace the potential cull cow with a replacement. If the value is positive, retaining the cow is the more profitable option at this time in comparison to replacing her. Dr. Victor Cabrera's research laboratory at the University of Wisconsin-Madison has developed a computer decision tool to help one calculate the retention pay-off value or value of a cow using a variety of factors, such as production, butterfat content, pregnancy status in relation to number of months after calving, feed cost, replacement cost, milk price, and cull cow price. Table 2 (found on page 4) shows a base-line scenario for a third lactation cow where it is more profitable to retain said cow at this time. The additional scenarios reflect the result generated by the computer software when one factor at a time is changed to see what impact it has on the profitability of retaining said cow or replacing her with a younger cow. As shown in Table 2, pregnancy status relative to the number of days in milk along with milk price impact the economic value of the cow in question. Replacement cost along with salvage or cull cow value and milk price also impact the value of a cow and the suggestion that she be culled and replaced. This tool allows one to change each of the variables to fit current market prices and individual farm and cow parameters. This web-based computer software program is a valuable tool for helping decide when it is more profitable to cull a mature cow and replace her with another.

Bottom Line

Culling decisions involve weighing multiple factors to determine which cows should be culled and when. The economics of these decisions are influenced by prices received for cull cows, milk, and replacement values. As these prices change over time, also the profit associated with replacing mature cows with those with a higher genetic merit also changes. Computer tools can help with these decisions so that the most profitable form of culling can be practiced.

Table 2. Various scenarios used to determine the economic value of retaining a cow versus replacing her. If the value of the cow is positive it makes economic sense to retain her at this time. If the value is negative, replacing her is the more economical solution based on the assumptions used.		**$ Value of Cow**
Base line Scenario: 3rd lactation cow, 2 months pregnant, 6 months after calving, avg. production Herd data: 25,000 lb RHA, 3.8% BF, Milk price- $22.50/cwt, avg. BW= 1450 lbs, 38% cull rate, 20% 21-day pregnancy rate, replacement- $2000/head with 1% genetic gain or 250 lbs milk production/lactation, cow salvage value-$90/cwt live BW, feed cost $0.15/lb DM(at 50 lbs DMI= $7.50/cow/day)		+ 130
Impact a change has on the "Value of the Cow"		
Change pregnancy status of mature cow	Same 3rd lactation cow, 9 months after calving and 2 months pregnant, average (avg) milk production	- 271
	Same 3rd lactation cow, 9 months after calving and 2 months pregnant, 10% above avg milk production	+ 906
	Same 3rd lactation cow, 11 months after calving and 2 months pregnant, avg milk production	- 463
First lactation heifer vs mature cow	1st lactation heifer, 6 months after calving and 2 months pregnant, avg milk production	+ 143
	1st lactation heifer, 9 months after calving and 2 months pregnant, 10% above avg milk production	+ 1335
	1st lactation heifer, 11 months after calving and 2 months pregnant, avg milk production	- 225
Change in cost of replacement	3rd lactation cow, 6 months in milk, 2 months bred, $2400 replacement heifer	+ 443
	3rd lactation cow, 6 months in milk, 2 months bred, $1750 replacement heifer	- 65
Changes in herd demographics	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, 45 vs 38% cull rate	+ 112
	3rd lactation cow, 6 months in milk, not bred, avg. milk production, 25 vs 20% pregnant rate	- 120
	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, replacement with heifer with higher genetic merit (+1000 lbs milk) at cost of $2600	- 259
Changes in cull cow price	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, cull cow @ $50/cwt vs $90/cwt	+ 597
Milk price changes	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, milk price $28/cwt vs $22.50/cwt	+ 43
	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, milk price $18/cwt vs $22.50/cwt	+ 201
Changes in feed cost or feed cost and milk price	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, milk price $22.50/cwt, feed cost at $0.12 vs 0.15/lb DM	+ 118
	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, milk price $22.50/cwt, feed cost at $0.18 vs 0.15/lb DM	+ 118
	3rd lactation cow, 6 months in milk, 2 months bred, avg. milk production, milk price $28/cwt, feed cost at $0.18 vs 0.15/lb DM	+ 54
Values generated using UW Dairy Management tool developed by V. Cabrera (https://dairymgt.info/tools/cow_value_resp_v2/)		