Guess what may be eating your lunch: the hidden costs of cull rate (part 2 of 2)
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There are several important issues for dairy managers to understand and control in order to generate revenues and retain profits. However, one control point that may not be very well understood is cull rate. The previous article in this series outlined how out of control cull rates may affect the profitability of the dairy business in the form of hidden costs associated with heifer raising activities. This article will explore in greater detail how the level of cull rate directly impacts the ability of the business to hold onto dollars in the form of profits.

In order to understand this issue, dairies participating in the Dairy Business Analysis Project were sorted into three groups based on their 1998 annual cull rate. The cull rate was defined as the number of cows that died or were sold divided by the average herd size. Only those dairies providing complete and verifiable information were included in the average. The adjoining table lists selected 1998 financial performance statistics by cull rate group. While the statistics presented in the table are based on operating conditions unique to Florida and Georgia, several concepts are demonstrated that are important to any dairy business.

This article will focus on the implications of two numbers in the adjoining table, the cull rate and how it translates into the herd turnover period. The herd turnover period was calculated by dividing the cull rate for each group by one. This corresponds to the number of years it takes for the herd to completely turnover with new animals. As cull rate increases the amount of time that it takes for the herd to turnover decreases. As herd turnover period increases, this means that more replacements (either raised or purchased) are needed per year to keep the herd at a constant size. The critical assumption to keep in mind is that herd size remains constant.

As shown in the table, the 4.2 year turnover period for the low cull rate group (less than 30% cull rate) was 2.2 years higher than 2.0 year turnover period for the high cull rate group (greater than 40% cull rate). This means that for the high cull rate group, on average, cows stayed in the herd and generated revenues (i.e. produced milk) for only two years. The middle cull rate group (30-40% cull rate) posted an average herd turnover period of 2.7 years, 0.7 years below the high cull rate group but 1.5 years below the low cull rate group. These large differences in herd turnover have direct impact on the revenue and profit generating capacity of business.

To demonstrate this impact, the table contains some calculations pertinent to today's high-priced replacement market. First, it was assumed that herd size will remain constant. Second, required replacements (calculated from cull rate) were valued at $1,500 per head. This value was divided by the herd turnover period for each cull rate group to compute the 'required revenues per year for payback'. This number shows the revenues required to pay the value of the replacement back during its life span (i.e. herd turnover period). Third, the 'required revenues' were divided by the

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'available revenues' (taken from project data) to compute the percent of available revenues for each group. This represents the portion of total revenues that are required just to return the investment in the replacement animal (ignoring the time value of money).

As shown by the table, the herd turnover period dramatically affects the annual revenues required for paying back the value of the replacement animal. The low cull rate group required $354 in annual revenues or 11% of total revenues available. Conversely, the high cull rate group had a requirement twice that at $736 or a whopping 25% of available revenues. While part of this difference was explained by differences in milk sold per cow (15,554 pounds for the high cull rate group versus 17,172 pounds per cow for the low cull rate group), the contraction in the herd turnover period from 4.2 to only 2.0 years was the main driver. To see the difference 1.5 years makes, the medium cull rate group required $554 in revenues for herd replacement. This required 15% of available revenues, even though per cow (pounds milk sold) and per cwt. (total revenues) productivity was higher than other groups.

Does the herd turnover period (inverse of cull rate) really affect overall profitability? Regardless of how you acquire your replacements (raise or purchase), the per head value ($1,500 in this example) needs to be paid back in the form of revenues. This is needed to either service debt (if the money is borrowed) or return cost of raising the heifer (and the opportunity cost of selling that heifer). The percentage of total revenues required for herd replacement directly competes with expenses (purchased feed, personnel, etc.), servicing other debt, and potential profits. As the percentage increases, the pressure placed on each cow to generate revenues substantially increases. Every dollar that is not spent on replacements can be used for other business activities (i.e. operating, investing, and financing).

In other words, as cull rate increases, fewer revenues are available for profits. If replacement prices continue at their high level, this will increase the pressure on revenues to service replacement expenses and/or debt. Higher prices will also increase pressure on heifer raisers to sell their heifers, possibly eroding equity if their cull rate is too high.

While it is nearly impossible to account for all of the differences affecting cull rate and corresponding herd turnover period it is still useful to understand the implications that a high cull rate has on revenue generating capacity. This article *should not* be interpreted as prescribing an ideal cull rate. It merely outlines the wide variation among the dairies participating in the Dairy Business Analysis Project and frames the differences using common assumptions. Moreover, this should not prevent culling if there are serious underlying health problems but should instead call attention to remedying those problems.

For more information about the project, check out the project website (URL http://dps.ufl.edu/DBAP). Is a high cull rate eating your lunch? Join the project today to find out.

Dairy Business Analysis Project 1998 preliminary summary information by cull rate[1] group.

Category	Less than 30%	30-40%	Greater than 40%
Number of dairies	9	11	15
Total revenues	$19.09	$20.10	$19.09
Total expenses	$17.16	$18.01	$17.35
Net farm income from operations[2]	$1.93	$2.09	$1.74
Rate of return on assets[3]	11%	10%	8%
Operating profit margin[4]	10%	12%	7%
Asset turnover ratio[5]	1.25	0.75	1.05
Milk sold per cow (pounds)	17,172	17,799	15,554
Cull rate[1]	24%	37%	49%
Average herd turnover period[6] (years)	4.2	2.7	2.0
Required revenues per year for payback[7]	$354	$554	$736
Available revenues per cow[8]	$3,278	$3,578	$2,969
Percent required revenues of available[9]	11%	15%	25%

[1]Cull rate was defined as the total number of cows that died or were sold during the year divided by the average number of cows.

[2]Net farm income from operations was computed as accrual adjusted revenues minus accrual adjusted expenses. This represents the return to unpaid management and capital.

[3]Rate of return on assets was calculated by adding interest expense to net farm income from operations, subtracting a $50,000 charge for unpaid management, dividing the remainder by ending total assets.

[4]The operating profit margin was determined by adding interest expense to net farm income from operations, subtracting a $50,000 charge for unpaid management, dividing the remainder by gross revenues.

[5]The asset turnover ratio was calculated by dividing gross revenues by average total assets.

[6]The average herd turnover period was computed by dividing the cull rate for each group by 1.

[7]The required revenues for payback was calculated by dividing an assumed price of $1,500 for a replacement animal by the average herd turnover period for each group.

[8]Available revenues per cow was computed by dividing total revenues by average herd size.

[9]Percent required revenues was computed by dividing required revenues for payback by available revenues per cow.