



Western Dairy Management Conference
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Cow Culling Decisions: Costs or Economic Opportunity?

Kevin C. Dhuyvetter, Ph.D., Department of Agricultural Economics¹

Terry L. Kastens, Ph.D. Department of Agricultural Economics¹

Michael W. Overton, DVM, MPVM, Department of Population Health²

John F. Smith, Ph.D., Department of Animal Science and Industry¹

¹ College of Agriculture, Kansas State University, Manhattan, KS.

² College of Veterinary Medicine, University of Georgia, Athens, GA.

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Some background information...

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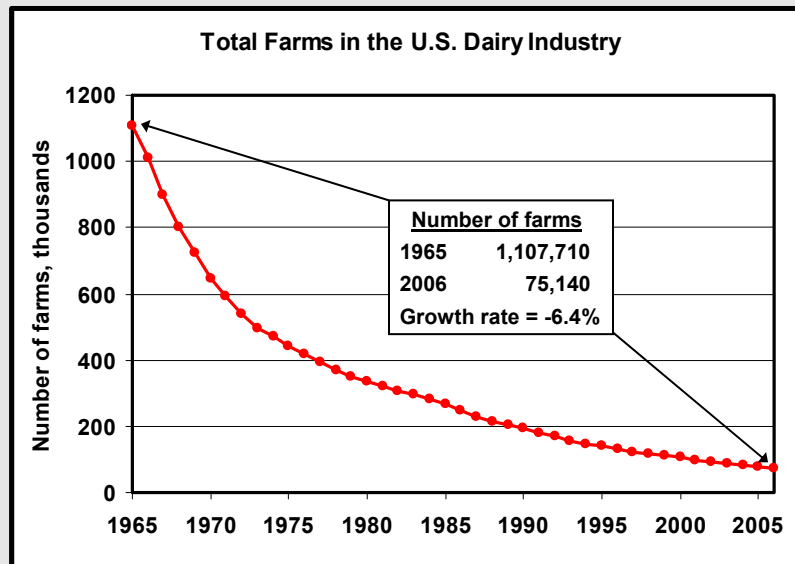
Economic characteristics of dairy industry

- Competitive industry, which implies average economic profits will be close to zero in the long run.
- Tremendous variation in profitability across producers (opportunities exist for positive profits).
- It is critical to identify key factors that drive profitability differences between producers.
- Failing to recognize what drives profitability will likely lead to a business failing to compete in the long run and eventually force the business to exit the industry.

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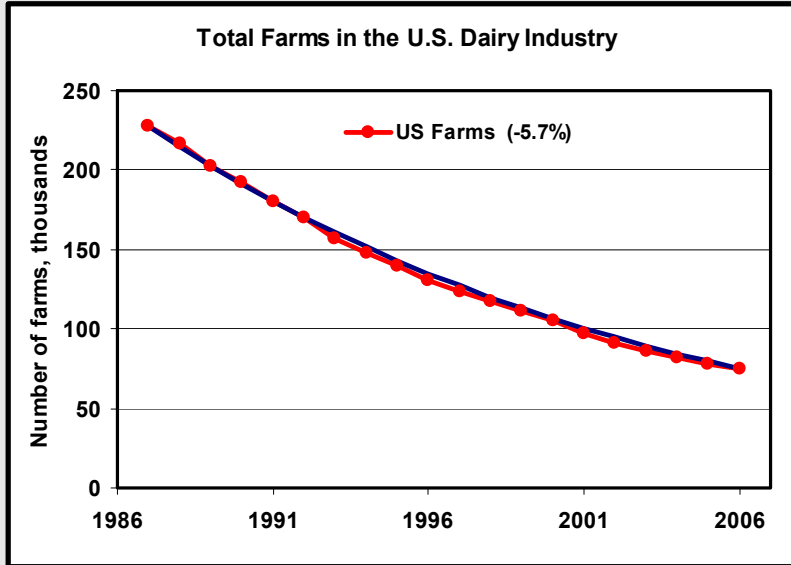
Dairies have been disappearing for 40+ years



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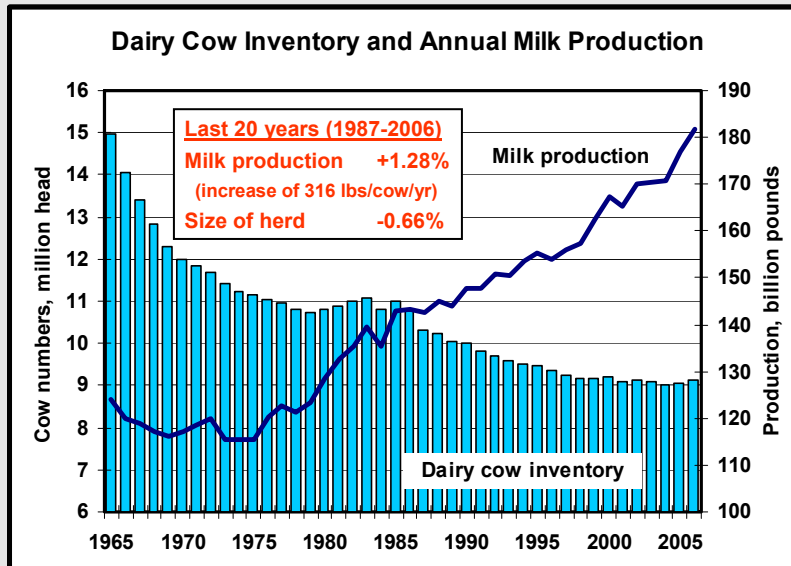
Current rate of decline less than 60's and 70's



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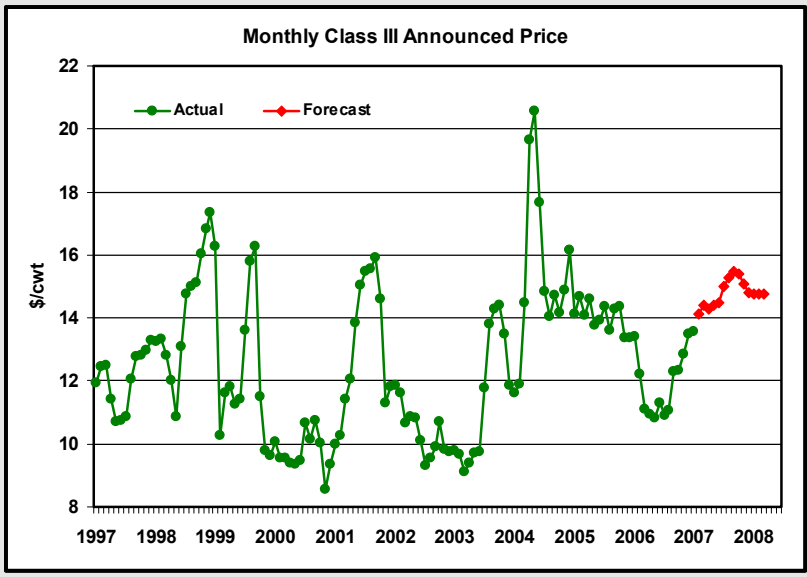
A slightly different story for cows and milk



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Tough times recently, but prices are recovering...



Forecast is Feb 28, 2007 closing futures price

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2007 looks good from milk price perspective...



Forecast is Feb 28, 2007 closing futures price

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But, not so good from corn price perspective...

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Futures Detail Refresh ↻

DAY CORN (C) [10 minute delay] [Future Symbol Search](#) | [Symbol Lookup](#)

More Info	Month	Last	Chg	Open	High	Low	Volume	Open Int	Trade Time
chart options	Mar-07	424'4	13'4	415'4	426'0	412'2	64830	51030	02/28/07 13:23
chart options	May-07	436'2	12'0	428'0	436'2	424'4	93105	544527	02/28/07 13:27
chart options	Jul-07	445'0	11'4	437'0	445'0	434'0	25621	272296	02/28/07 13:27
chart options	Sep-07	432'0	11'6	422'4	432'0	420'4	2688	63081	02/28/07 13:27
chart options	Dec-07	420'4	4'0	412'4	420'4	408'4	24670	287244	02/28/07 13:23
chart options	Mar-08	426'4	8'4	418'0	427'4	414'0	433	23422	02/28/07 13:26
chart options	May-08	430'0	9'4	420'0	430'0	424'0	130	5944	02/28/07 13:26
chart options	Jul-08	435'0	11'6	424'0	435'0	424'0	56	10502	02/28/07 13:26
chart options	Sep-08	400'0	5'0	395'0	400'0	393'0	64	514	02/28/07 13:26
chart options	Dec-08	386'0	3'0	383'4	387'4	383'0	1039	87932	02/28/07 13:27
chart options	Jul-09	395'0	4'0	394'0	395'0	394'0	3	306	02/28/07 12:58
chart options	Dec-09	373'0	3'0	371'0	374'0	371'0	56	10502	02/28/07 13:00
chart options	Jul-10	387'0	2'0	380'0	387'0	380'0	10	41	02/28/07 13:26
chart options	Dec-10	363'0	0'0	363'0	363'0	363'0	3	306	02/28/07 12:15

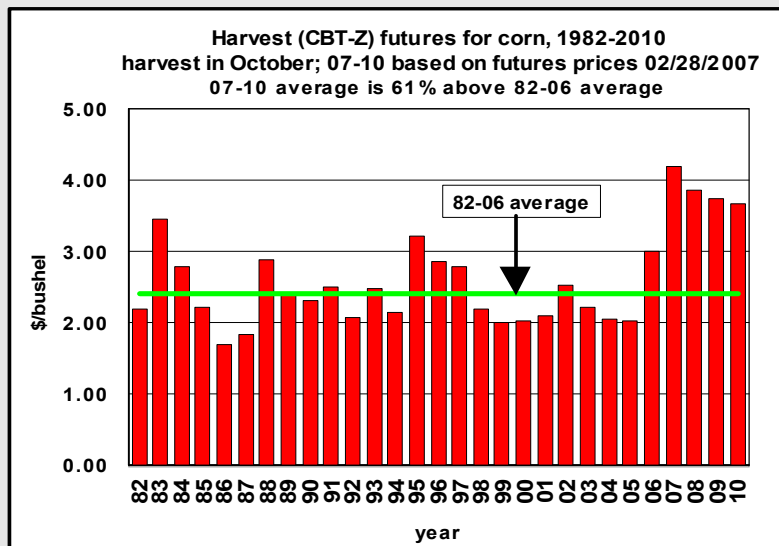
Wed, Feb 28, 2007 1:38 PM CST *Quotes are in market time

Feb 28, 2007 closing futures prices

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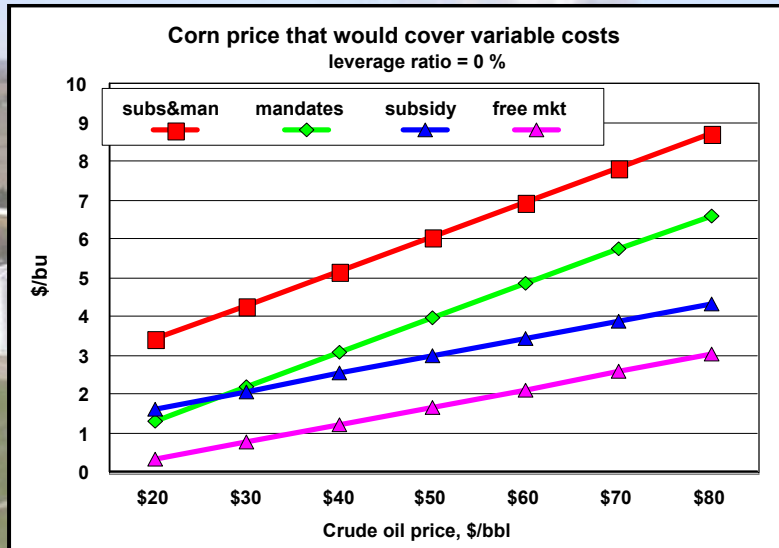
Feed prices will be high for awhile...



Unprecedented opportunity in corn production – even 4 years out!

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Ethanol Profitability...



If mothballing costs are high, effective breakeven prices are higher



Outlook for next several years...

- Consolidation trend will continue – possibly speed up due to high feed prices.
- As margins get tighter, the need for benchmarking (i.e., identifying your strengths and weaknesses) will increase in importance.



Profitability benchmarks...

- Profits are extremely variable and influenced by many factors, which makes quantifying factors difficult.
- Benchmarks or “rules of thumb” are used as proxies for financial performance (e.g., debt/cow, feed cost/cwt, milk price, milk/cow/day, preg rate, cull rate).
- Are these measures useful? That is, how well do they relate to profitability?
- Given changes that have been taking place in industry (e.g., increased milk/cow), historical benchmarks may have less meaning today – need to recognize the true relationship between benchmarks and profitability.

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Objective of this study...

- Examine the impact culling rate has on profitability
- Intent is not to identify an optimal culling rate as that will depend on many dairy-specific factors
- Intent is to quantify how varying culling rate along with other production and economic factors impacts profitability

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Method of analysis...

- **Culling decisions impact current and future income and costs so it is important to account for time value of money**
- **Net present value (NPV) analysis was used, where income and costs are considered on a daily basis over the course of seven lactations**
- **Interpretation of NPV is current value of cow in herd (higher NPV values are preferred to lower values)**
- **Analysis is based on a representative herd, not on an individual cow basis → results are useful for making decisions for an operation as opposed to whether or not a specific cow should be culled**

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Baseline production factor assumptions...

Table 1. Production assumptions (for base scenario)

	Lactation							Average ¹
	1	2	3	4	5	6	7	
Parity distribution	36.1%	26.0%	17.7%	11.0%	5.8%	2.4%	1.0%	100.0%
Milk production, 305 ME, lbs	24,866	26,657	25,939	25,939	25,939	25,939	25,939	25,738
Expected future cull rate, %	28.0%	32.0%	38.0%	47.0%	58.0%	58.0%	58.0%	35.7%
Marketable culls, %	83.9%	84.4%	78.9%	81.9%	85.3%	85.3%	85.3%	83.0%
Pregnancy rate, %	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Voluntary wait period, days	50	50	50	50	50	50	50	50
Dry period, days	60	60	60	60	60	60	60	60
Lactation length, days	402	402	402	402	402	402	402	402
Milk production (assuming no culls)³								
Entire lactation	26,694	27,992	29,517	29,517	29,517	29,517	29,517	28,102
Pounds/day	70.2	73.6	79.1	79.1	79.1	79.1	79.1	74.4
Milk production (accounting for culls)³								
Entire lactation	22,638	24,272	23,855	22,514	20,875	20,875	20,875	23,101
Pounds/day	66.4	70.6	74.6	75.0	75.5	75.5	75.5	70.7

¹ Parity-weighted average (value in Parity distribution row is a total)

² Any cows remaining in herd at end of seventh lactation are sold following the last day of milking

³ Milk production is for a lactating cow (i.e., it does not account for dry cows)

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Baseline production factor assumptions...

Table 1. Production assumptions (for base scenario)

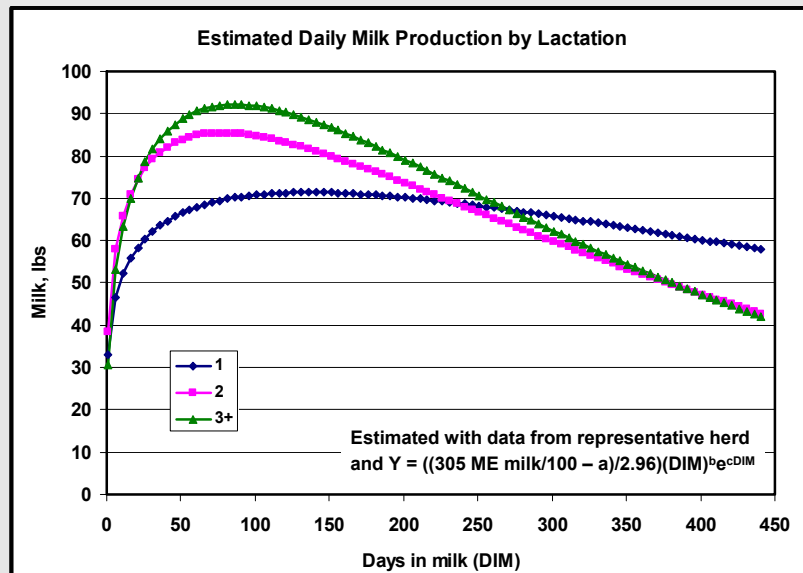
	Lactation						
	1	2	3	4	5	6	7
<u>Culling risk by 30-day time period</u>							
0-30	7.3%	4.1%	7.4%	9.1%	11.3%	11.3%	11.3%
31-60	2.6%	2.0%	3.2%	3.9%	4.8%	4.8%	4.8%
61-90	1.3%	1.7%	2.3%	2.9%	3.5%	3.5%	3.5%
91-120	1.0%	1.4%	2.2%	2.7%	3.4%	3.4%	3.4%
121-150	1.1%	1.5%	2.1%	2.6%	3.2%	3.2%	3.2%
151-180	0.9%	1.5%	1.8%	2.3%	2.8%	2.8%	2.8%
181-210	0.8%	1.6%	2.2%	2.7%	3.3%	3.3%	3.3%
211-240	1.1%	1.7%	1.7%	2.1%	2.6%	2.6%	2.6%
241-270	1.0%	1.9%	2.2%	2.8%	3.4%	3.4%	3.4%
271-300	1.1%	2.1%	1.6%	2.0%	2.4%	2.4%	2.4%
300+	9.9%	12.5%	11.3%	14.0%	17.3%	17.3%	17.3%
Total	28.0%	32.0%	38.0%	47.0%	58.0%	58.0%	58.0%
Remaining in herd	72.0%	68.0%	62.0%	53.0%	42.0%	42.0%	42.0%
Remaining in herd, cumulative ²	72.0%	49.0%	30.4%	16.1%	6.8%	2.8%	1.2%

² Any cows remaining in herd at end of seventh lactation are sold following the last day of milking

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Lactation curves used in analysis...



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Baseline economic assumptions...

Table 2. Economic assumptions (for base scenario)

Replacement heifer cost, \$/head	\$1,800
Days heifer is owned before freshening	21.0
Heifer feed cost prior to freshening, \$/day	\$2.50
Cull value, \$/head	\$580
Calf value, \$/head	\$221
Value of heifer calf	\$400
Value of bull calf	\$100
Percent female calves	47.0%
Liveborn female, %	93.0%
Liveborn male, %	88.0%
Feed, maintenance, lb/day	13.0
Feed, milk production, lb feed/lb of milk	0.4444
Feed cost, \$/lb	\$0.080
Dry cow feed cost, \$/day	\$1.75
Operating cost (e.g., labor, supplies) per cow per day	\$1.23
Annualized ownership cost (e.g., facilities) per cow per day	\$2.39
Net milk price, \$/cwt ¹	\$12.50
Discount rate, %	15%

¹ Net of hauling costs and promotion, coop fees

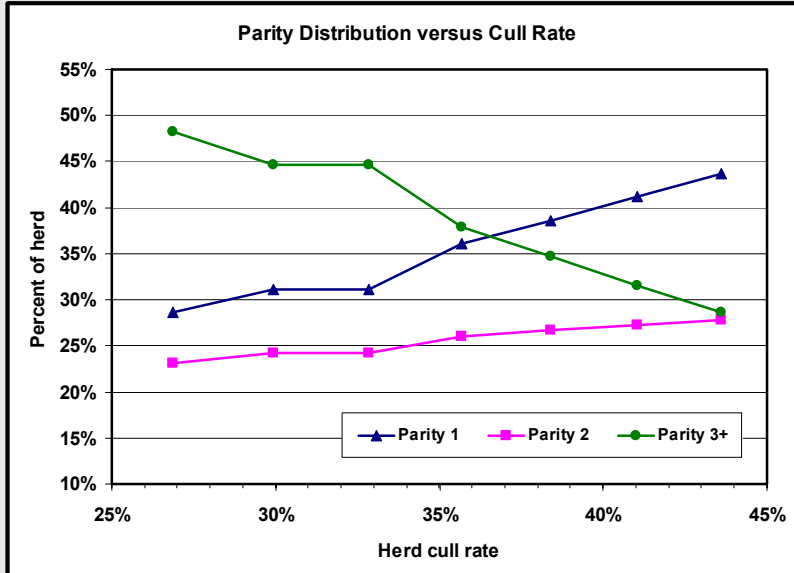


NPV results...

- **Based on production and economic assumptions, income over costs was calculated each day over seven entire lactations (3,196 days) for both a cow and a “partial cow”**
- **NPV of cow and all replacements (i.e., average cow in herd) equals \$1,821 per head – focus is on how NPV changes under alternative assumptions as culling rate changes (as opposed to absolute value)**
- **Baseline parity-weighted average cull rate = 35.7%
Alternative cull rates of 70% to 130% of baseline were considered (26.9, 29.9, 32.9, 35.7, 38.4, 41.0, and 43.6).**



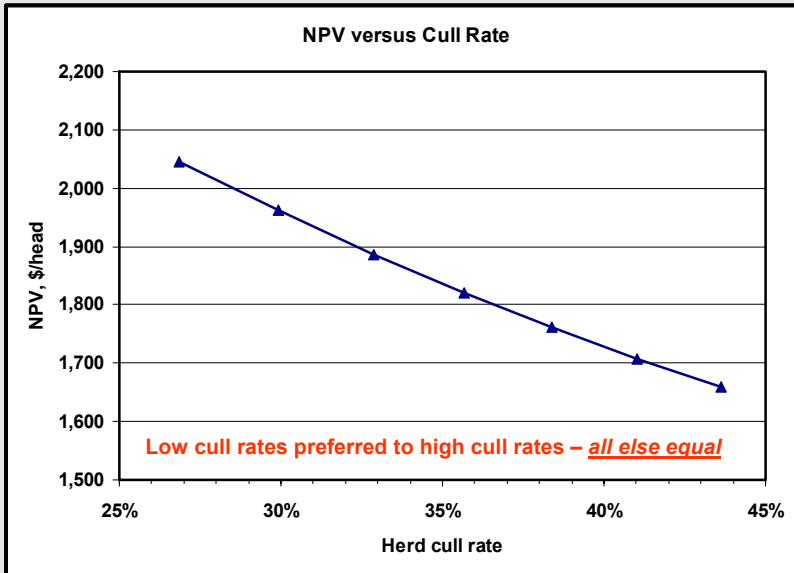
Impact of cull rate on parity distribution...



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Impact of cull rate on NPV



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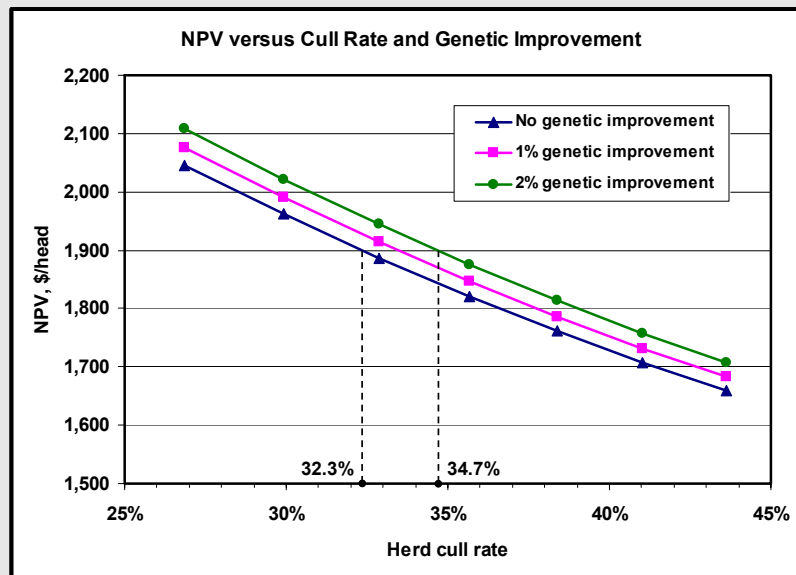
Scenarios considered to vary with cull rate

- **Genetic improvement** – increased value of heifer calf and returns over costs of replacements of +1% and +2% annually
- **Milk production** – proportionally adjusting 305 ME to 99% and 101% of baseline level
- **Operating cost** – change in operating costs from baseline of +/- 5% (approximately 6¢ to 7¢ per cow per day)
- **Replacement heifer price** – considered prices of \$2200 and \$2600 (baseline = \$1800) as well as higher price (\$2200) along with a +1% 305 ME
- **Pregnancy rate** – considered preg rates of 12, 15 (base), 18, and 21 percent as well as higher preg rate (18%) along with an increase in operating cost of 5%

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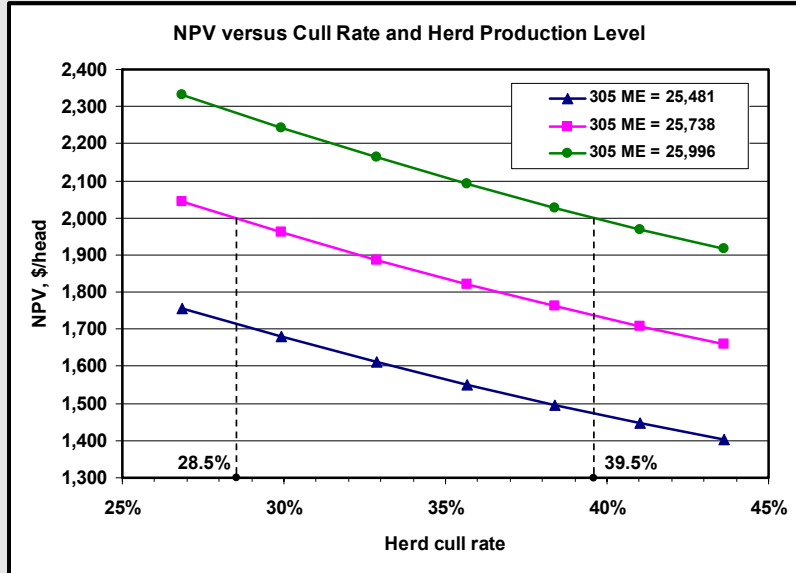
Genetic improvement vs cull rate...



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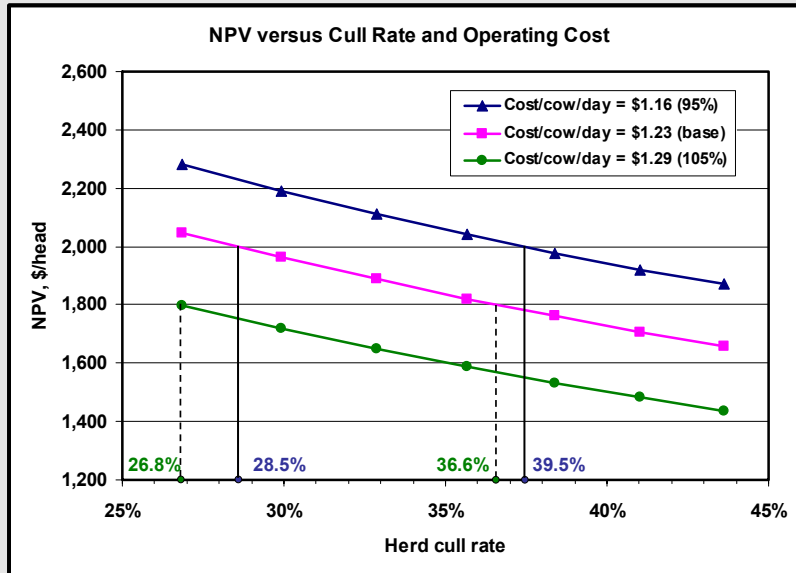
Milk production vs. cull rate...



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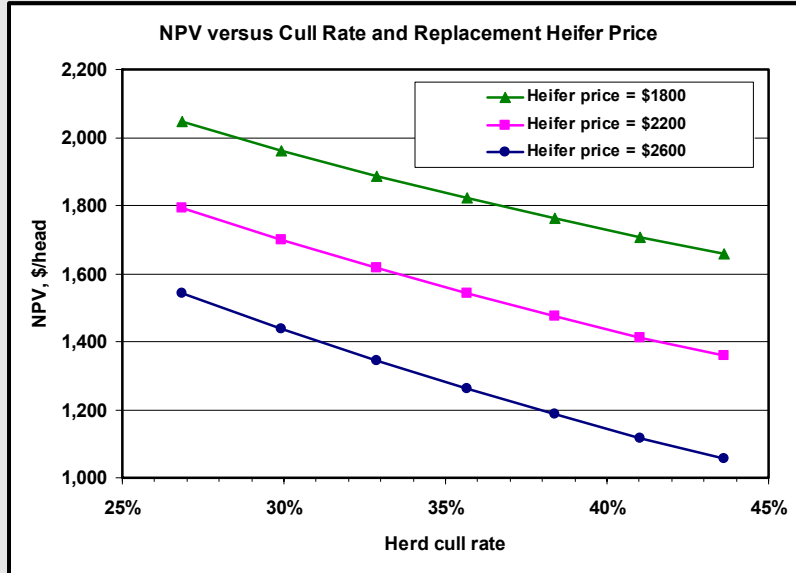
Operating cost vs. cull rate...



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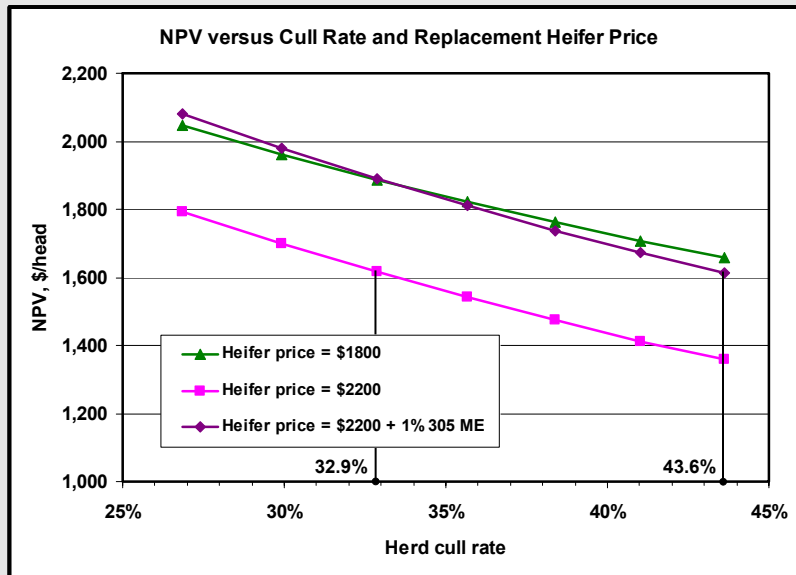
Replacement heifer price vs. cull rate...



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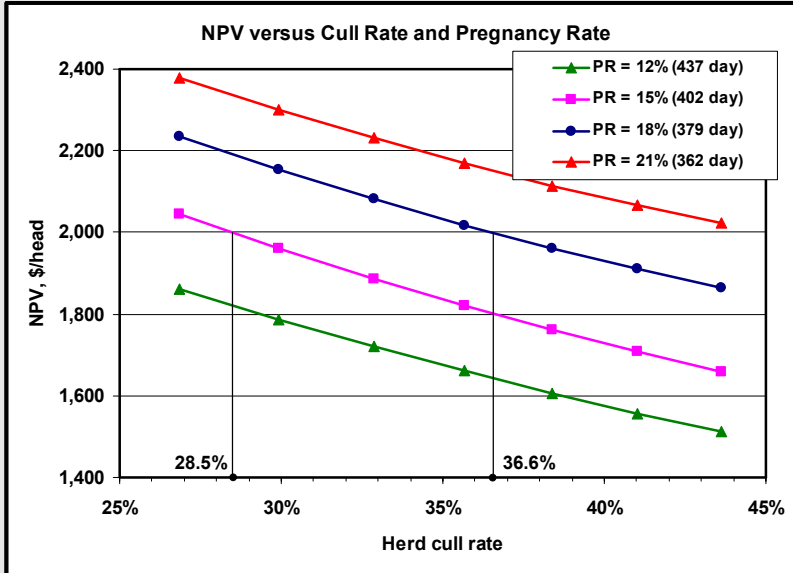
Replacement heifer price vs. cull rate...



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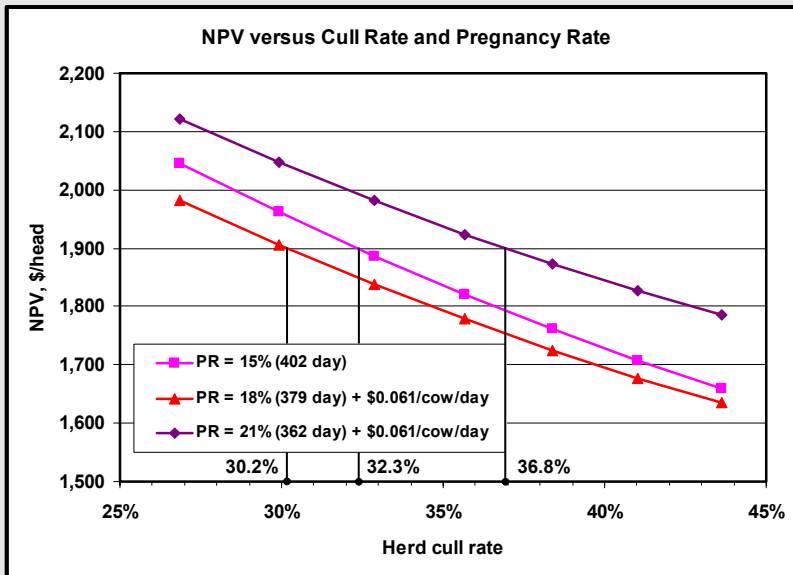
Pregnancy rate vs. cull rate...



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Pregnancy rate vs. cull rate...



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Summary

- **As consolidation continues, margins will likely become tighter, meaning it will be imperative to know your businesses' strengths and weaknesses (S&W).**
- **Benchmarking against other dairies (and yourself over time) is one method for identifying S&W.**
- **Ultimate benchmark of interest is profitability, i.e., return on assets (ROA) and return on equity (ROE). However, these measures do little for understanding why an operation was or was not successful.**

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Summary

- **Production benchmarks can be used as proxies of profitability, however, this needs to be done with caution due to the many interacting relationships.**
- **Higher cull rates lead to lower NPV (i.e., lower profitability), all else equal, but that seldom holds.**
- **Differences in factors such as milk production, non-feed operating costs, and pregnancy rate can have a larger impact on profitability than cull rate.**
- **Focusing on one factor (i.e., cull rate) when complex interactions exist can lead to production and economic decisions that are not optimal.**

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Questions?

Contact Us: Department of Agricultural Economics 342, Waters Hall, Manhattan, KS 66506 (785) 532-5823

Department of Agricultural Economics K-State Research & Extension College of Agriculture Kansas State University

Kevin C. Dhuyvetter
785-532-3527
kcd@ksu.edu