

Cow-calf profitability – what drives variability?

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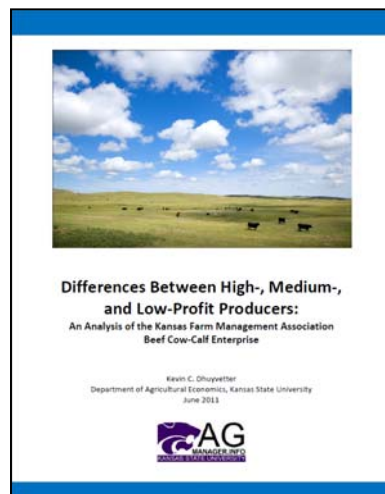
Presented at BIVI Territory Manager Beef Training, College of Veterinary Medicine, Kansas State University, Manhattan, KS. Aug 30 – Sept 1, 2011.

Factors Impacting Profitability (KFMA beef cow-calf enterprise data)

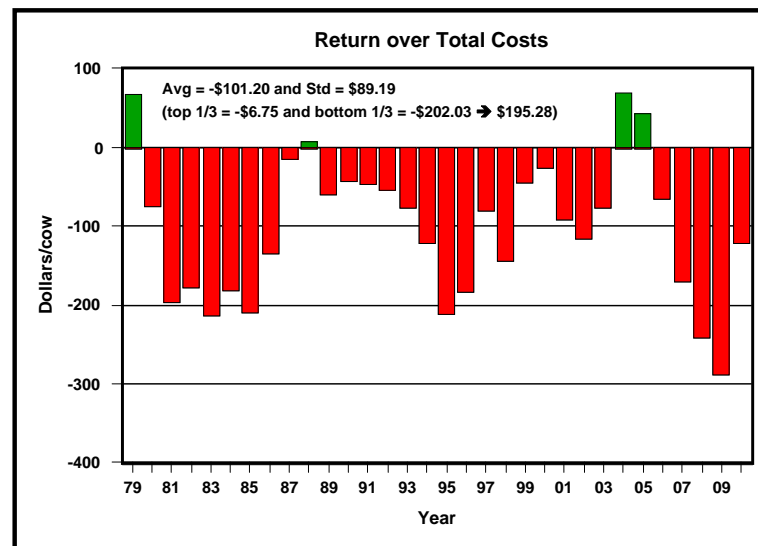


Cow-calf profitability drivers...

- Analysis of KFMA cow-calf enterprise analysis returns
 - 1979-2010 all operations (examine time effect)
 - 2006-2010 operations with at least three years of data (examine producer effect)
- Paper available on web (www.agmanager.info)



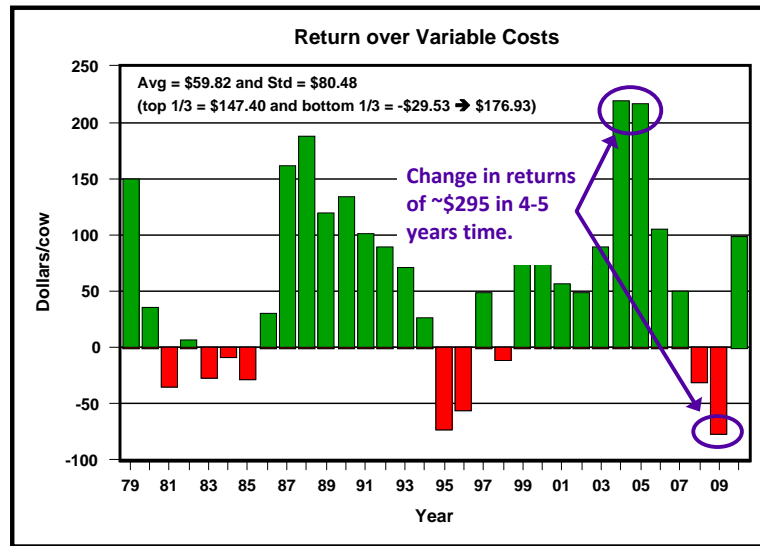
Average returns are highly variable over time...



Source: Kansas Farm Management Association (KFMA) Annual Enterprise Analysis Reports



Big changes can occur quite rapidly...

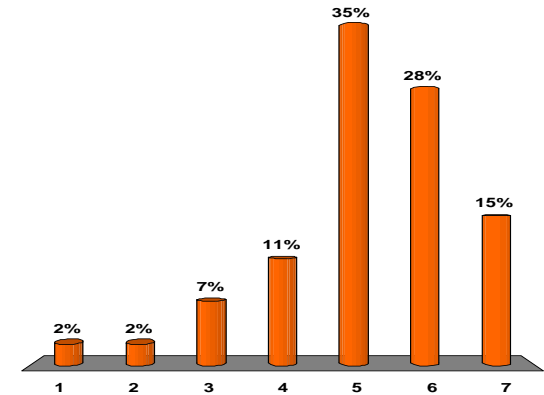


Source: Kansas Farm Management Association (KFMA) Annual Enterprise Analysis Reports

Variability over time versus across KFMA producers...

The difference in average returns across time (best 1/3 vs. worst 1/3 years) is ~\$200 per head, what is the difference between the top 1/3 and bottom 1/3 of producers at a point in time?

1. \$50
 2. \$100
 3. \$150
 4. \$200 (same)
 5. \$250
 6. \$300
 7. \$350
- less
- more



Returns are more variable across producers...

Beef Cow-calf Enterprise, 2006-2010 (min of 3 years)*						
	All Farms	Profit Category			Difference between High 1/3 and Low 1/3	
		High 1/3 Head / \$	Mid 1/3 Head / \$	Low 1/3 Head / \$	Absolute	%
Number of Farms	88	29	30	29		
Labor allocated to livestock, %	36.9	47.3	32.0	31.5		
Number of Cows in Herd	134	187	131	85	103	121%
Number of Calves Sold	122	173	118	77	96	126%
Weight of Calves Sold	576	587	570	573	14	3%
Calf Sales Price / Cwt	\$105.99	\$107.19	\$105.07	\$105.73	\$1.46	1%
Gross Income	\$517.70	\$561.41	\$525.20	\$466.24	\$95.16	20%
Feed	\$353.91	\$306.48	\$361.24	\$393.76	27.6%	-87.28
Interest	\$123.81	\$106.20	\$124.66	\$140.53		-\$34.33
Vet Medicine / Drugs	\$18.99	\$18.25	\$17.92	\$20.84		-\$2.60
Livestock Marketing / Breeding	\$13.01	\$10.86	\$13.24	\$14.93		-\$4.07
Depreciation	\$34.39	\$25.53	\$33.96	\$43.71		-\$18.18
Machinery	\$71.05	\$56.93	\$72.72	\$83.46		-\$26.54
Labor	\$107.81	\$86.28	\$91.21	\$146.52		-\$60.24
Other	\$36.20	\$25.87	\$40.22	\$42.38		-\$16.50
Total Cost	\$759.19	\$636.40	\$755.16	\$886.14	72.4%	-\$249.74
Net Return to Management	-\$241.48	-\$74.99	-\$229.97	-\$419.89		\$344.90

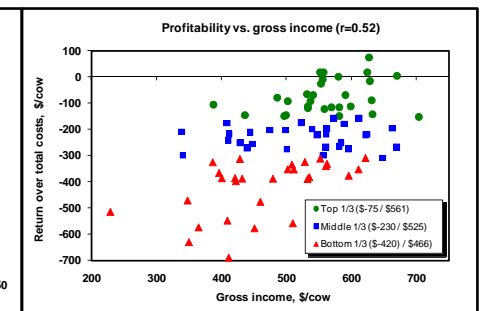
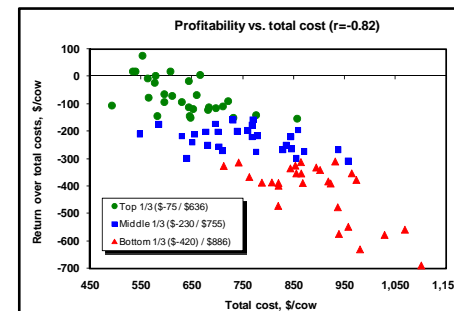
* Sorted by Net Return to Management (Returns over Total Costs) per Cow

Compared to \$195 between top and bottom third years.



Cow-calf profitability drivers...

- Returns are more variable across producers at a point in time than they are on average over time (i.e., even in "hard times" some producers are profitable)
- Cost differences explain a bigger portion of profitability differences across producers than does income differences





Considerable variability unexplained...

Regression Results for Profit and Cost Models

Variable	Profit (\$/cow)		Cost (\$/cow)	
	Coefficient	p-value*	Coefficient	p-value*
Intercept	-4776.64	(0.059)	3441.48	(0.130)
Cows	0.9704	(0.032)	-0.6963	(0.084)
Cows ²	-0.00126	(0.109)	0.00080	(0.254)
Weight	0.2954	(0.272)	0.5233	(0.020)
Price	1.6046	(0.454)	n/a	n/a
Feed%	6.1424	(0.008)	-4.2328	(0.041)
Labor	1.7289	(0.025)	-1.1505	(0.094)
Years	934.585	(0.141)	-692.726	(0.220)
Years ²	-57.981	(0.141)	44.597	(0.203)
R-square**	0.3569		0.2765	

* p-values associated with hypothesis test that coefficient is significantly different from zero. A value of 0.05 implies we are 95% confident that value is significantly different from zero.

** R-square represents the proportion of variability in the dependent variable (*Profit* and *Cost*) that is explained by variation in the independent variables.



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Gross income is highly significant
(R-square increases to ~0.46)



Returns are more variable across producers...

Beef Cow-calf Enterprise, 2006-2010 (min of 3 years)*

	All Farms	Profit Category			Difference between High 1/3 and Low 1/3	
		High 1/3 Head / \$	Mid 1/3 Head / \$	Low 1/3 Head / \$	Absolute	%
Number of Farms	88	29	30	30		
Labor allocated to livestock, %	36.9	46.2	39.0	25.3		
Number of Cows in Herd	134	165	124	114	51	45%
Number of Calves Sold	122	153	114	101	51	51%
Weight of Calves Sold	576	595	570	565	29	5%
Calf Sales Price / Cwt	\$105.99	\$106.24	\$106.95	\$104.74	\$1.51	1%
Gross Income	\$517.70	\$567.55	\$532.72	\$452.31	\$115.24	25%
Feed	\$353.91	\$307.04	\$367.32	\$386.91	43.8%	-79.87 -21%
Interest	\$28.12	\$20.39	\$27.77	\$36.20		-\$15.81 -44%
Vet Medicine / Drugs	\$18.99	\$16.93	\$18.53	\$21.53		-\$4.60 -21%
Livestock Marketing / Breeding	\$13.01	\$11.18	\$11.78	\$16.13		-\$4.95 -31%
Depreciation	\$0.00	\$0.00	\$0.00	\$0.00		\$0.00 n/a
Machinery	\$71.05	\$56.61	\$74.54	\$81.89		-\$25.27 -31%
Labor	\$10.72	\$11.73	\$5.71	\$14.91		-\$3.18 -21%
Other	\$36.20	\$27.06	\$40.19	\$41.22	56.2%	-\$14.16 -34%
Total Variable Cost	\$532.02	\$450.94	\$545.85	\$598.78	\$147.85	-25%
Return over Variable Costs	-\$14.31	\$116.61	-\$13.12	-\$146.47	\$263.08	

* Sorted by Net Return to Management (Returns over Variable Costs) per Cow

Compared to \$175 between top and bottom third years.



Kansas State UNIVERSITY

Department of Agricultural Economics

Impact of reproductive efficiency on cow/calf economic returns

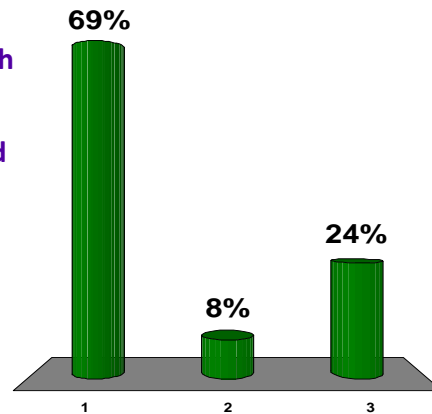
- Open cows
- Weaning age/weight
- Percent calf crop, cull rate, weaning weight



Open cows ...

Typically, the best thing to do with an open cow (that is sound) is to...

1. Cull her and replace with bred heifer/cow
2. Hold her over and breed following year
3. It depends...



Open cows...

- Main problems in beef cattle reproduction are low calf crop and long calving season. Another concern is how long female stays in herd (often conflicts with first two issues)

Income Gained by Culling Rather than Keeping Open (but otherwise sound) Cows, \$/cow in herd

First service conception rate	Length of Breeding Season, days		
	45	70	120
50%	\$44.64	\$22.59	\$9.27
60%	\$41.61	\$17.45	\$2.95
70%	\$21.75	\$8.06	\$7.80
80%	\$10.61	\$5.44	\$0.67

Source: Pfeiffer et al., 1990

"... the tradition of culling open cows is usually sound."

Open cows...

- Most studies suggest to cull open cows regardless of age, and condition (results have varied with two calving seasons)...

NPV Analysis of Optimal Feeding and Culling Policy for Beef Herd*

Calving Period**	Cow Age										
	2	3	4	5	6	7	8	9	10	11	12
Open	---	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull
7-12	---	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull
6	High	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull
5	High	Cull	High	High	High	High	Cull	Cull	Cull	Cull	Cull
4	High	Med	Med	Med	Med	Med	High	High	High	Cull	Cull
3	High	Med	Med	Med	Med	Med	High	High	High	High	Cull
2	Med	Low	Low	Low	Low	Low	High	High	High	High	Cull
1	Med	Low	Low	Low	Low	Low	Low	High	High	High	Cull

*High, Med, and Low refers to winter feeding level.

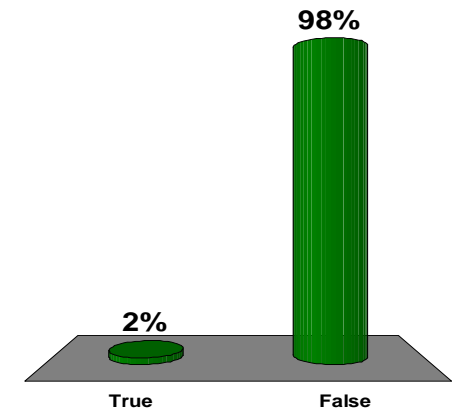
** Calving period is ten-day intervals (120 day calving season)

Source: Frasier and Pfeiffer, 1994

Age of calf and weaning weight ...

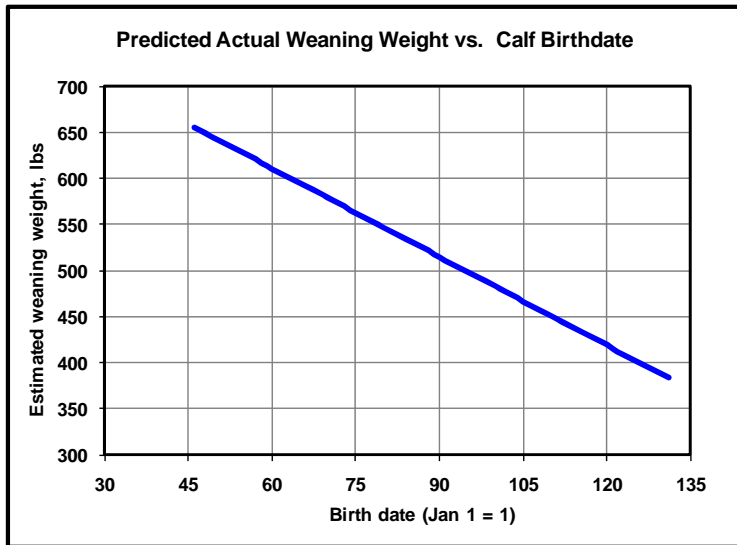
Variable weaning weights due to different age calves is not a major problem due to the existence of price slides ...

1. True
2. False



Weaning weight versus age at weaning

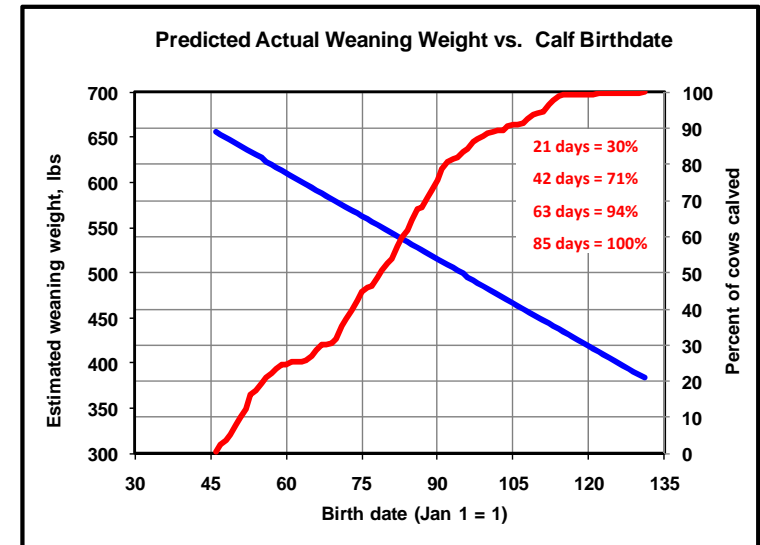
(estimated from cowherd with 213 calves, weaning date = 11/1)



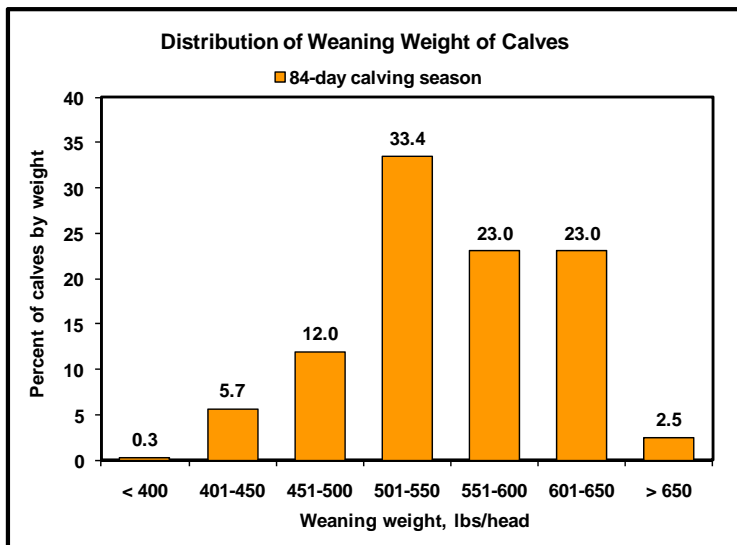
Weaning weight = f(birth weight, age of cow, sex, birth date, age of calf) $R^2 = 0.73$

Weaning weight versus age at weaning

(estimated from cowherd with 213 calves, weaning date = 11/1)



Even with relatively tight calving season considerable variability exists (avg = 554, range = 384-656)

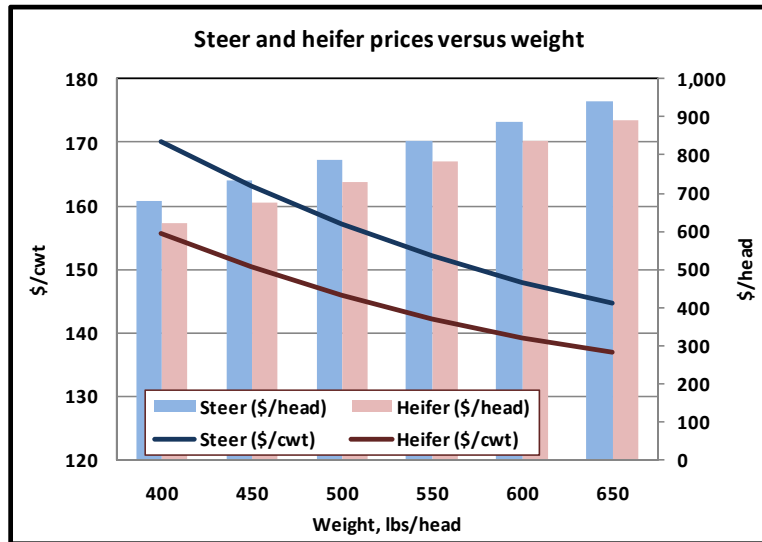


Price slide reduces effect of varying weight...



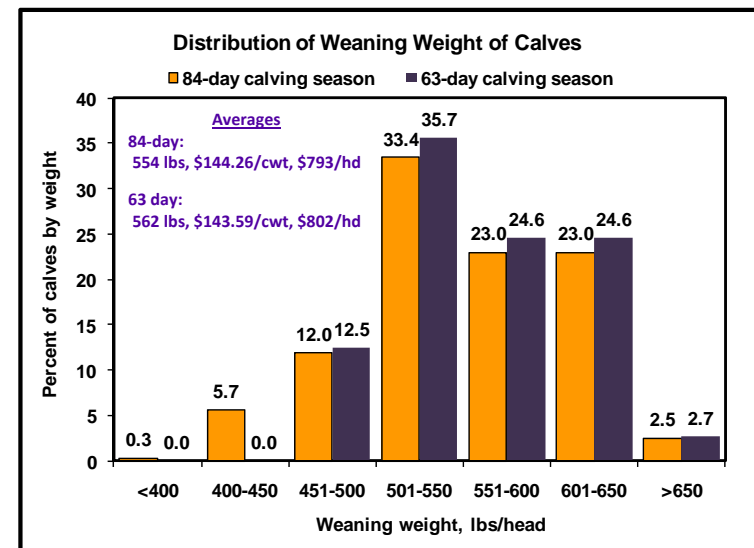
Source: www.BeefBasis.com (forecasts for 10/31/2011 based on futures prices on 7/8/11)

..., but heavier cattle are worth more per head.



Source: www.BeefBasis.com (forecasts for 10/31/2011 based on futures prices on 7/8/11)

Result of tightening up calving season...



Weight uniformity is important...

Feeder Cattle Trait	2001	2002	2003
Uniform Lot	Base	Base	Base
Uneven Lot	-1.948	-3.154	-3.174

Source: Oklahoma Quality Beef Network (OQBN) auction sales, AGECE 602

Characteristic	% of Pens	Price Change (\$/cwt)
Weight Uniformity		
Uniform lot	98.8	Base
Non-uniform lot	1.2	-2.11*

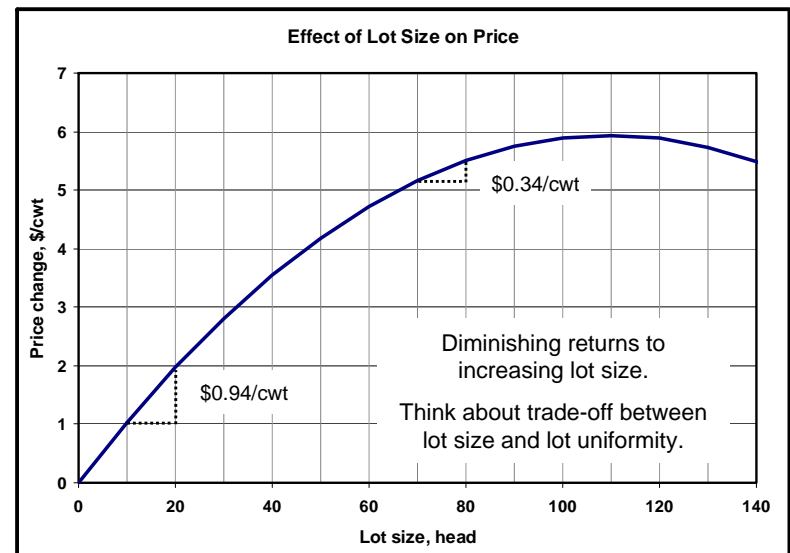
Source: KS/MO Sale Barn Study (Schulz et al., 2009)

Characteristic	Steers	Heifers
Weight Variation		
Even to fairly even	0.529*	1.352*
Uneven	Base	Base

Source: Superior Livestock Video Auction Study (Zimmerman, 2010)



Lot size is important...



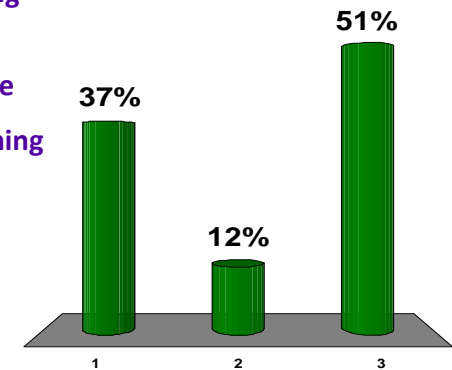
Beef cow-calf – Length of breeding season

- Short breeding season increases returns by
 - Increasing weight of calves
 - Increasing ability to have larger lots of uniform calves
 - Increase probability of cows getting bred back

Impact on cow/calf returns ...

Which has the biggest impact on returns to cow/calf enterprise?

1. 1% change in weaning percentage
2. 1% change in cull rate
3. 20 lb change in weaning weight



Projected livestock budget used in analysis...

Farm Management Guide MF-266

Beef Cow-Calf Enterprise

Department of Agricultural Economics — www.agmanager.info

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Animal Scientist, NW

Values from MF-266 used as starting point, focus is on changes in net returns due to various assumptions related to reproductive traits.

Reproductive trait	Change	Current calf prices*	75% of current prices (5-yr avg)
		\$/cow in herd	
Weaning percentage [^]	1% chg	\$8.10	\$6.08
Culling rate [^]	1% chg	\$4.17	\$3.94
Weaning weight	+20 lbs	\$15.22	\$11.41
Weaning weight	-20 lbs	-\$15.22	-\$11.41

At current prices, a 100 head cow herd with 4% higher weaning percentage, 3% lower culling rate, and 20-lb heavier weaning weight will have a \$61.66 per cow advantage.

* 560 lbs steer = \$151.39/cwt and 540 lb heifer = \$143.08/cwt (BeefBasis.com)

[^] Impact will be linear for small changes, but for large change will become nonlinear.

Summary...

- More variability in returns between producers at a point in time than on average for an industry over time
→ management is more important than “cycles”
- Costs of production (per unit of output) are generally lower at higher levels of production
→ reproductive efficiency is needed for high production
- When reproductive efficiency is “low,” high cull rates are not necessarily bad economically
→ cull rate is less important than production economically

