



## Preconditioning Beef Calves: An Economic Analysis



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Presented at 2004 Beef Management Meetings  
Concordia (Nov. 30), Tonganoxie (Dec. 1), Junction City (Dec. 2)



## Preconditioning – what is it?

- Preparing calves to enter a grazing/backgrounding program or go directly into a feedlot for finishing
- A health protocol consisting of various vaccinations and other management practices (e.g., weaning, dehorning, castration, implanting, etc.)
- Not a new concept -- Tindall (*Animal Nutrition & Health / July-August 1983*)
  - OSU hosted national conference in 1967
  - Iowa had first preconditioned calf sale in 1965
  - ND: 1979 to 1982 (10,000 – 47,500 – 72,500 – 100,000)



## Adoption of preconditioning . . .

- **Why are we talking about it today?**
  - If it “works” → it should become an industry standard
  - If it “fails” → it will leave the scene
- **Industry-wide adoption has been slow and the topic is often controversial (Lalman and Smith)**
  - Research is often contradictory (Cole, 1984)
  - Research is often “less than scientific”
  - Tremendous variability within cow-calf sector (breeds, weaning weights, size of herd, facilities, etc.)
- **Used by 70% of Kansas cow-calf producers**  
(Cattle-Fax/KLA survey, Kansas Stockman, Sept. 2003)



## Adoption of preconditioning . . .

- **Current trends/issues in the beef industry**
  - Value-based marketing
  - Food safety concerns
  - Source verification
  - Individual animal identification
  - Consolidation (at the cow-calf level)
- **Trends/issues are generally compatible with management practices such as preconditioning**
- **But, preconditioning will only be adopted if it is economical to do so (no different than 30-40 years ago)**



## Profitability of preconditioning . . .

- **Projected budgets**
  - Expected returns of preconditioning vs. “something else”
  - Partial budget can be used that focuses on differences
  - Quantifying “differences” is the biggest challenge
  - Sensitivity analysis around key factors
- **Actual budgets**
  - Analysis of returns “after the fact”
  - Questions to ask ...
    - Are side-by-side comparisons appropriate?
    - Are returns representative / repeatable?



## Value of preconditioned calves . . .

- **Cow-calf producer**
  - Precondition calves vs. sell calves directly at weaning
- **Partial budget *differences* to quantify ...**

### Costs

- Vaccinations, etc.
- Feed
- Interest
- Death loss
- Labor/equipment
- Marketing

### Revenues

- Selling weight
  - ADG, days, shrink
- Price at weaning
  - Seasonal adjustment
  - Weight adjustment
  - Discounts
  - Premiums



## Profitability of preconditioning calves . . .

Table 1. Economic Analysis of Cow-Calf Producer Preconditioning Calves

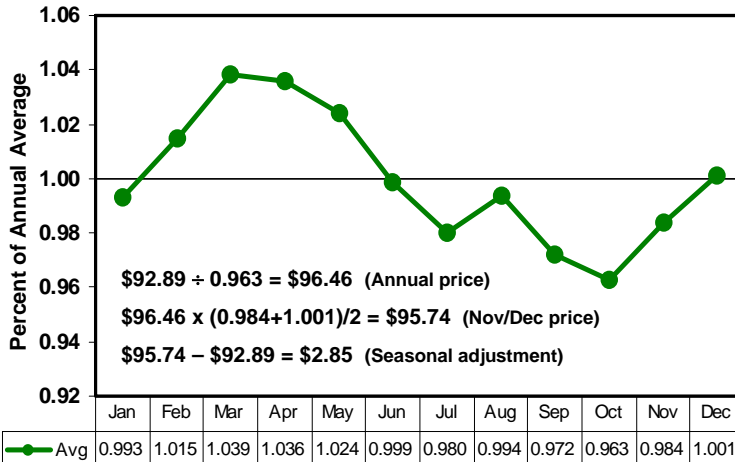
<b>A. Traditional Management Income</b>		<u>Baseline</u>
1	Weaning weight, lbs	550
2	Shrink, %	4.0%
3	Sale weight, lbs	528.0
4	Weaning price, \$/cwt*	\$92.89
5	Gross revenue, \$/head	\$490.46
<b>B. Preconditioning Management Income</b>		
6	Beginning (weaning) weight, lbs	550
7	Days from weaning to marketing	45
8	ADG, lbs/day	1.33
9	Ending weight, lbs	610.0
10	Shrink, %	2.5%
11	Death loss	0.25%
12	Sale weight, lbs	594.8
13	Weaning price, \$/cwt	\$92.89
13a	Price adjustment for seasonality, \$/cwt	2.85
13b	Price adjustment for weight, \$/cwt	-5.52
13c	Price adjustment for fleshiness, \$/cwt	0.00
13d	Preconditioning premium, \$/cwt	4.00
14	Final price (\$/cwt.)	\$94.22
15	Gross revenue (\$/head)	\$560.37

\* 1999-2003 average October price for 500-600 lb steer calves



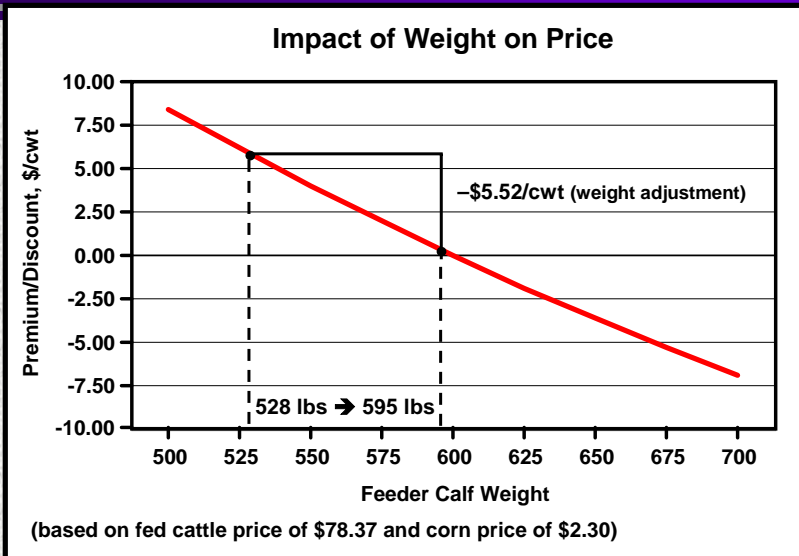
## Seasonal price patterns

Seasonal Price Index for 500-600 Lb. Feeder Steers  
Kansas Auctions, 1994-2003





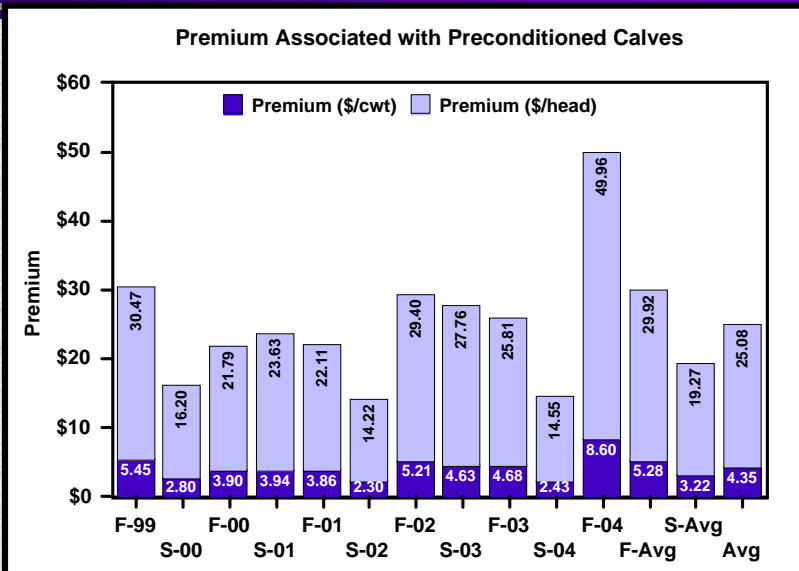
## Price adjustment for weight



Source: Price slides.xls – available at [www.AgManager.info](http://www.AgManager.info)

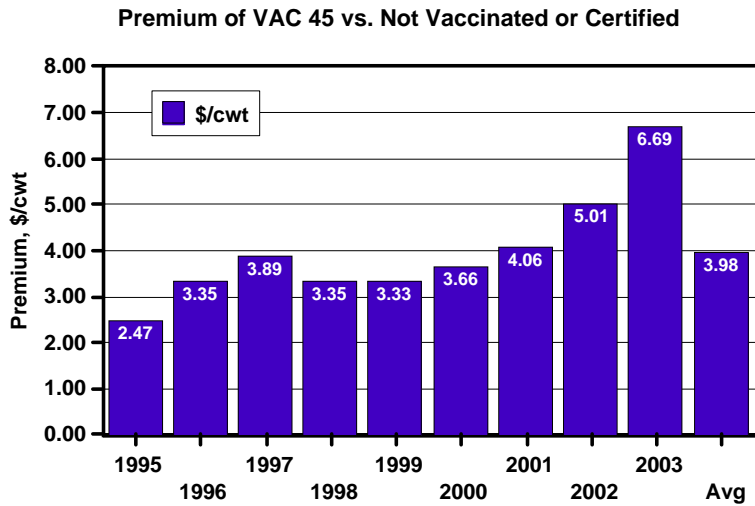


## Preconditioning premium





## Preconditioning premium

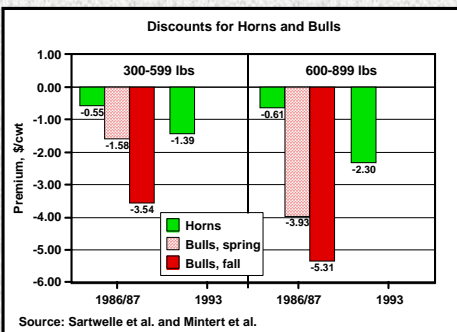
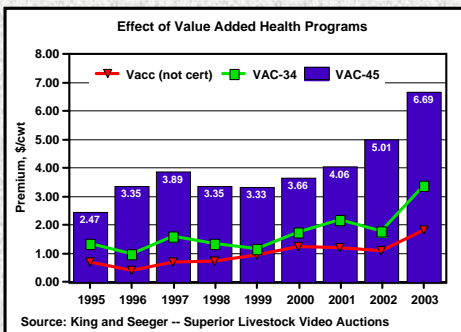


Source: King and Seeger -- Superior Livestock Video Auctions



## Preconditioning is a continuum . . .

- Premiums/discounts will vary depending on the “level” of preconditioning





## Profitability of preconditioning calves . . .

Table 1. Economic Analysis of Cow-Calf Producer Preconditioning Calves

A. Traditional Management Income	Baseline	Alternative scenarios			Cost (+)
		ADG (-)	ADG (+)	D.L. (+)	
1 Weaning weight, lbs	550	550	550	550	550
2 Shrink, %	4.0%	4.0%	4.0%	4.0%	4.0%
3 Sale weight, lbs	528.0	528.0	528.0	528.0	528.0
4 Weaning price, \$/cwt*	\$92.89	\$92.89	\$92.89	\$92.89	\$92.89
5 Gross revenue, \$/head	\$490.46	\$490.46	\$490.46	\$490.46	\$490.46
<b>B. Preconditioning Management Income</b>					
6 Beginning (weaning) weight, lbs	550	550	550	550	550
7 Days from weaning to marketing	45	45	45	45	45
8 ADG, lbs/day	1.33	1.00	1.67	1.33	1.33
9 Ending weight, lbs	610.0	595.0	625.2	610.0	610.0
10 Shrink, %	2.5%	2.5%	2.5%	2.5%	2.5%
11 Death loss	0.25%	0.25%	0.25%	1.00%	0.25%
12 Sale weight, lbs	594.8	580.1	609.5	594.8	594.8
13 Weaning price, \$/cwt	\$92.89	\$92.89	\$92.89	\$92.89	\$92.89
13a Price adjustment for seasonality, \$/cwt	2.85	2.85	2.85	2.85	2.85
13b Price adjustment for weight, \$/cwt	-5.52	-4.31	-6.74	-5.52	-5.52
13c Price adjustment for fleshiness, \$/cwt	0.00	0.00	0.00	0.00	0.00
13d Preconditioning premium, \$/cwt	4.00	4.00	4.00	4.00	4.00
14 Final price (\$/cwt.)	\$94.22	\$95.43	\$93.00	\$94.22	\$94.22
15 Gross revenue (\$/head)	\$560.37	\$553.60	\$566.84	\$560.37	\$560.37

\* 1999-2003 average October price for 500-600 lb steer calves



## Profitability of preconditioning calves . . .

Table 1. Economic Analysis of Cow-Calf Producer Preconditioning Calves

C. Preconditioning costs, \$/head	Baseline	Alternative scenarios			Cost (+)
		ADG (-)	ADG (+)	D.L. (+)	
16 Interest (cattle, feed, supplies) @ 8.0%	\$5.11	\$5.11	\$5.11	\$5.11	\$5.18
17 Health supplies and medicine	8.00	8.00	8.00	8.00	12.00
18 Death loss	1.36	1.34	1.37	5.43	1.35
19 Labor and equipment	4.50	4.50	4.50	4.50	4.50
20 Feed, hay, and pasture	35.00	35.00	35.00	35.00	40.00
21 Marketing costs (tags, comm, etc.)	3.00	3.00	3.00	3.00	5.00
22 Total cost	\$56.97	\$56.95	\$56.98	\$61.04	\$68.03
23 Cost per day	\$1.27	\$1.27	\$1.27	\$1.36	\$1.51
24 Cost of gain, \$/cwt	\$85.35	\$109.26	\$69.90	\$91.45	\$101.91

### Other studies – costs/head

Lalman and Smith (OK): \$35-\$60

Bailey and Stenquist (UT): \$56

Lane (TN): \$38

Rawls (TN): \$48-\$62

Pate (FL): \$30-\$35 (4-week program)

St. Louis, et al. (MS): \$28-\$45 (30 day program)



## Profitability of preconditioning calves . . .

Table 1. Economic Analysis of Cow-Calf Producer Preconditioning Calves

	Baseline	Alternative scenarios			Cost (+)
		ADG (-)	ADG (+)	D.L. (+)	
<b>A. Traditional Management Income</b>					
5 Gross revenue, \$/head	\$490.46	\$490.46	\$490.46	\$490.46	\$490.46
<b>B. Preconditioning Management Income</b>					
8 ADG, lbs/day	1.33	1.00	1.67	1.33	1.33
11 Death loss	0.25%	0.25%	0.25%	1.00%	0.25%
15 Gross revenue (\$/head)	\$560.37	\$553.60	\$566.84	\$560.37	\$560.37
<b>C. Preconditioning costs, \$/head</b>					
22 Total cost	\$56.97	\$56.95	\$56.98	\$61.04	\$68.03
23 Cost per day	\$1.27	\$1.27	\$1.27	\$1.36	\$1.51
24 Cost of gain, \$/cwt	\$85.35	\$109.26	\$69.90	\$91.45	\$101.91
<b>D. Comparison: Traditional vs Preconditioning</b>					
25 Traditional gross revenue, \$/head	\$490.46	\$490.46	\$490.46	\$490.46	\$490.46
26 Preconditioning gross revenue, \$/head	\$560.37	\$553.60	\$566.84	\$560.37	\$560.37
27 Increased revenue, \$/head	\$69.91	\$63.14	\$76.38	\$69.91	\$69.91
28 Less preconditioning costs, \$/head	\$56.97	\$56.95	\$56.98	\$61.04	\$68.03
29 Net return from preconditioning, \$/head	\$12.94	\$6.19	\$19.40	\$8.87	\$1.88
30 Return on costs (line 29 / line 22)	22.7%	10.9%	34.0%	14.5%	2.8%
31 Breakeven price, \$/cwt	\$92.04	\$94.36	\$89.81	\$92.71	\$93.90
32 Breakeven premium, \$/cwt	\$1.82	\$2.93	\$0.81	\$2.49	\$3.68



## Profitability of preconditioning calves . . .

Table 1. Economic Analysis of Cow-Calf Producer Preconditioning Calves

	Baseline	Alternative scenarios			Cost (+)
		ADG (-)	ADG (+)	D.L. (+)	
<b>A. Traditional Management Income</b>					
4 Weaning price, \$/cwt*	\$125.00	\$125.00	\$125.00	\$125.00	\$125.00
5 Gross revenue, \$/head	\$660.00	\$660.00	\$660.00	\$660.00	\$660.00
<b>B. Preconditioning Management Income</b>					
13a Price adjustment for seasonality, \$/cwt	3.83	3.83	3.83	3.83	3.83
13b Price adjustment for weight, \$/cwt	-7.51	-5.86	-9.17	-7.51	-7.51
14 Final price (\$/cwt.)	\$125.32	\$126.97	\$123.66	\$125.32	\$125.32
15 Gross revenue (\$/head)	\$745.35	\$736.56	\$753.74	\$745.35	\$745.35
<b>C. Preconditioning costs, \$/head</b>					
18 Death loss	1.82	1.80	1.84	7.28	1.81
22 Total cost	\$59.10	\$59.08	\$59.12	\$64.56	\$70.16
23 Cost per day	\$1.31	\$1.31	\$1.31	\$1.43	\$1.56
<b>D. Comparison: Traditional vs Preconditioning</b>					
29 Net return from preconditioning, \$/head	\$26.25	\$17.48	\$34.61	\$20.79	\$15.19
30 Return on costs (line 29 / line 22)	44.4%	29.6%	58.5%	32.2%	21.7%
31 Breakeven price, \$/cwt	\$120.90	\$123.95	\$117.97	\$121.79	\$122.76
32 Breakeven premium, \$/cwt	(\$0.42)	\$0.98	(\$1.69)	\$0.47	\$1.44

\* 1999-2003 average October price in Kansas

Budget developed based on prices on October 15, 2004



## Value of preconditioned calves . . .

- **Cattle feeder**
  - Buy preconditioned calves vs. non-preconditioned calves
  - What is the “full value” of preconditioning
  - Value in feedlot phase → premiums possible on calves
- **Partial budget differences to quantify ...**

### Costs

- Feedlot performance
  - ADG
  - Feed efficiency
  - Morbidity/mortality
- Vaccination costs
- Labor, interest, etc.

### Revenues

- Selling weight
- Carcass quality (price)
  - Live-weight pricing
  - Grid pricing



## Value of preconditioned calves . . .

“Although theoretically sound, the practice of preconditioning will not, in general, reduce sickness sufficiently to repay the cost of the program.” – 1984 article summarizing preconditioning trials of the 70’s and early 80’s (Cole).

- Results of controlled experiments and surveys were often contradictory. However, producers need to make decisions and thus they need to rely on “less than controlled research” at times.
- Economics of preconditioning programs are likely different today than 20 years ago due to changes in management styles, vaccines, etc.
- **Due to the many assumptions required and interactions between variables of interest, projected budgets are not used here.**



## Value of preconditioned calves . . .

- **CSU study (Roeber and Umberger)**
  - Compared returns of two groups of preconditioned calves from KY to auction market calves from the same region
  - Net returns to feeding (NRTF) were \$46.83 and \$49.54 per head greater for preconditioned calves
  - Based on 550 lb feeder calf, increased values of \$8.53 and \$9.00 per cwt



## Value of preconditioned calves . . .

- **Midwest feedlot simulation (Nyamusika et al.)**
  - Vaccination combined with treatment for bovine respiratory disease (BRD) increased returns \$44 per head
  - Based on 600 lb feeder calf, increased value of \$7.33 per cwt
  - Considerably less variability in net returns with “preconditioning” health program



## Value of preconditioned calves . . .

- **Ranch/feedlot study (Cravey)**
  - Compared returns of 380 preconditioned calves and 1,600 “weaned and shipped” calves
  - Preconditioning added \$60.72 value per head
  - Based on 550 lb feeder calf, increased value \$11.04 per cwt
- **Ranch/feedlot study (Cravey)**
  - Compared returns of 15 lots of preconditioned calves (1685 hd) to 15 lots of similar non-preconditioned calves (1492 hd)
  - Preconditioning added \$55.93 value per head
  - Based on 579 lb feeder calf, increased value of \$9.66 per cwt

Cattle were marketed on a live weight basis in both studies – i.e., carcass quality differences are not reflected in results



## Value of preconditioned calves . . .

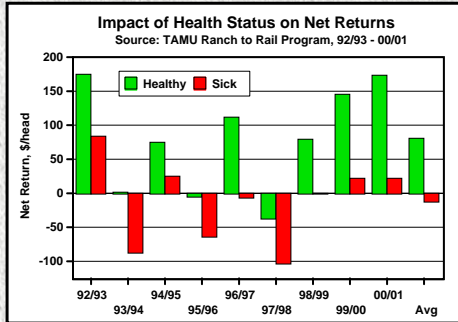
- **Based on limited data, value of preconditioning appears to be ...**
  - between \$40 to \$60 per head in the feedlot
  - Maximum price premiums of \$7 to \$11 per cwt
- **Feedyard managers survey (Avent, Ward, and Lalman)**
  - Preconditioned calves were worth \$5.25/cwt more than non-preconditioned calves
  - Why is this lower than the \$7-\$11?
    - Managers recognize risk that exists?
    - Value based on larger numbers of cattle?



## Value of preconditioned calves . . .

- TAMU Ranch-to-Rail program

- Data from 92/93 to 00/01 (nine years) on 17,000+ head of cattle
- Summarized by “healthy calves” and “sick calves”
- Sick calves those receiving at least one vaccination for BRD
- Average of 22.6% of calves classified as sick (14.0% – 34.1%)



Difference in net income per head:

Average = \$91.77

Minimum = \$49.55

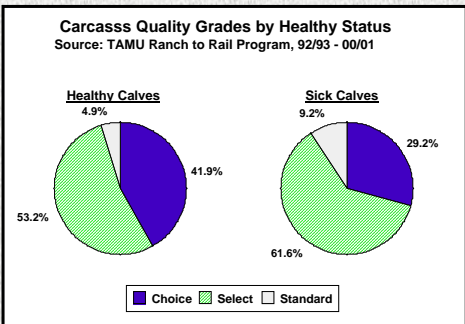
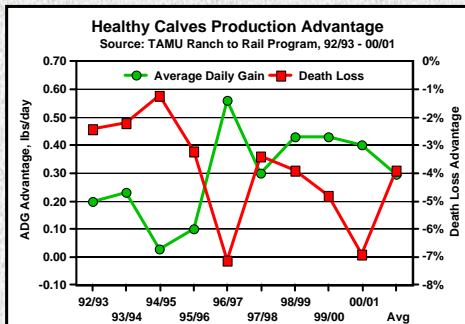
Maximum = \$151.18

Average difference divided by the in-weight of the cattle = \$15.09/cwt (discount required for sick cattle)



## Value of preconditioned calves . . .

- Healthy calves have higher net returns due to differences in costs and income ...



Average ADG difference = +0.30 lbs

Average death loss difference = -3.9%

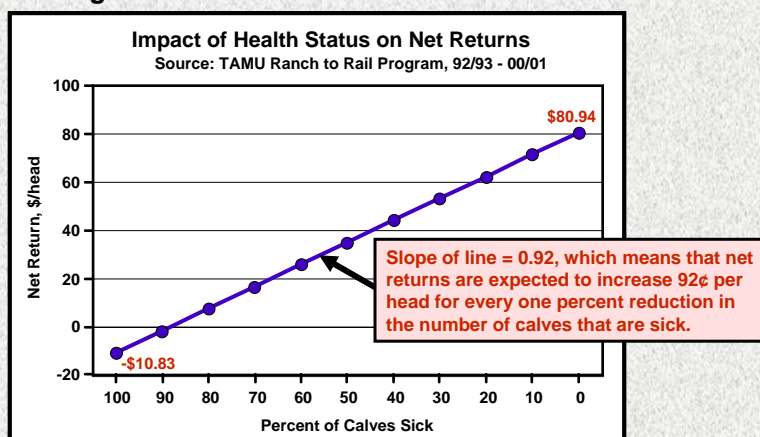
Choice advantage = 12.7%

Standard advantage = -4.3%



## Value of preconditioned calves . . .

- Average difference in net income of \$91.77 per head indicates importance of healthy calves, but not necessarily profitability of preconditioning.



## Value of preconditioned calves . . .

### How does preconditioning impact morbidity levels?

- Cole: seven preconditioning studies (70's and 80's)
  - From 26.5% to 20.4% →  $(6.1 \times 0.92) = \$5.61$  per head
- Roeber and Umberger (CSU): average of two groups
  - From 77.3% to 35.7% →  $(41.6 \times 0.92) = \$38.27$  per head
- Avent, Ward, and Lalman: feedyard manager survey
  - From 36.4% to 9.2% →  $(27.2 \times 0.92) = \$25.02$  per head
- Lalman and Smith
  - "... preconditioning does appear to results in a substantial reduction in sickness, death loss, and medicine costs."



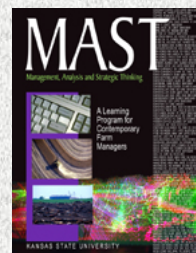
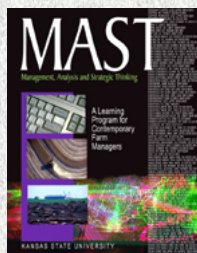
## Economics of preconditioning calves -- summary

- Current trends in the industry are likely to lead to more interest in preconditioning programs
- Well-designed research trials are lacking so interpret results with caution (but decisions do need to be made)
- Benefits are highly variable from year to year and operation to operation
- Value in the range of \$25 to \$60 per head
  - value “split” between cow/calf producer and cattle feeder
  - premiums paid will depend on integrity of seller/sale
  - if cattle feeders don’t “pass on” enough of the value, then cow/calf producers should consider retaining ownership



## Questions ???

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# Estimating Costs/Value of Replacements Heifers



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Presented at 2004 Beef Management Meetings  
Concordia (Nov. 30), Tonganoxie (Dec. 1), Junction City (Dec. 2)



# Farm Management Guide (MF-2566)

Farm Management Guide MF-2566

## Raising Beef Replacement Heifers

Department of Agricultural Economics



Kansas State University Agricultural Experiment Station and Cooperative Extension Service

**Robley Jones**  
Agricultural Economist  
Livestock Production

**Sarah Fugman**  
Agricultural Economist, SE

**Tyig Marston**  
Calf Care Management  
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Acquiring high quality replacement heifers that have the best bang for the buck has become an essential issue facing high efficiency, high quality cow-calf operations. A key decision facing cow-calf producers is whether to raise or purchase replacement heifers. This decision is based on the opportunity cost of raising or purchasing heifers. Purchasing mature cows as replacements may be an option for some operations, however, the focus of this guide is strictly on heifers. Producers need to evaluate the replacement heifer raising decision separate from the rest of the cow-calf enterprise and identify its economic strengths and weaknesses. Raising replacement heifers requires separate management, labor, facilities, feed, and other resources. Therefore, for the average producer the total cost of a replacement heifer can be quite high. Producers need to carefully weigh the advantages of home raised heifers against the advantages of purchased heifers before making any replacement decisions. The attached cost/budget format can assist producers in making more informed decisions.

### Budget Information

The costs and returns in the budget are on a per heifer produced basis. Costs are total economic costs and therefore include both explicit costs such as purchased feed, veterinary, utilities, etc., and implicit costs such as the opportunity cost of operator labor and owned land resources. Returns are based on 90 percent of the heifers valued as springers and ready to calve, 2.5% valued as new breeding cows, and 7.5% valued as yearlings. Death loss is assumed to be 1% of the calves raised in the replacement program.

Production dates, feed requirements, and assumed values are shown in Table 1. Labor is assumed at \$100 per heifer from weaning until 24 months of age (ready to calve). Other operating costs are included based on observed averages. Interest is charged on the average assumed facility and equipment investment for 18 months, and on half of the operating costs and the value of the heifer calf for 18 months. Depreciation on facilities and equipment is based on a 15% salvage value. Amortized facility and equipment costs (depreciation, interest, and taxes) are multiplied by 1.5 because the heifer covers an 18 month time period.

Returns are total cost for the cow-calf producer can be interpreted in the total economic opportunity cost associated with raising cow's own replacement heifers rather than purchasing heavy springer heifers at the assumed market price. The breakeven price per heifer is the dollar value per

Table 1. Factors Used for Raising Beef Replacement Heifers Cost/Budget

Item	Beginning (May)	Mid (Oct)	End (Mar)
Beginning Weight	570	750	950
Ending Weight	750	950	1,100
Days	197	151	187
Feed			2,640
Pract. Fee (\$/c)	1,800		340
Cost (\$/c)	960		340
SPM (\$/c)	240		120
Person (\$/c)	20	155	30
Manure (\$/c)			10
Beginning Value (\$/c)			107.50
Cap. Value (\$/c)			717.4
Yearling \$/c Value (\$/c)			937.5
Separate \$/c Value (\$/c)			1,800.00
Investment in facilities			\$125.00
Life of facilities			20 yrs
Investment in equipment			\$45.00
Life of equipment			10 yrs
Salvage value on facilities and equipment			35%
Interest rate on facilities and equipment			7.00%
Interest rate on facilities and equipment			6.25%
Tax rate on facilities and equipment			1.00%
Interest rate on variable costs and calf value			7.00%
Labor rate			8
Labor price per hour			\$10.00

### COST RETURN PRODUCTION—RAISING BEEF REPLACEMENT HEIFERS

	Example Total	User Form Total
<b>RETURNS PER HEAD:</b>		
1. Market Animals		
In Spring Heifer (180 lbs.)	\$,502.97	
In Calf Heifer (125 lbs.)	29.24	
In Yearling Heifer (187 lbs.)	527.1	
2. Less cost of animal	891.74	
Basis: 90 lbs.	676	
3. Less death loss (1% of total of line 1)		
4. Other Income		
<b>A. GROSS RETURNS PER HEAD:</b>	<b>374.43</b>	
<b>COSTS PER HEAD:</b>		
5. Purch. Fee	\$, 68.94	
6. Pract. Fee	1,010.00	
7. Labor Fee	0.00	
8. Gate System	427.3	
9. Cost	399.62	
10. Supplement	22.56	
11. Manure - Sale	50.00	
12. Labor	26.26	
13. Veterinary, drugs, supplies	10.00	
14. Marketing costs	25.00	
15. Breeding Cost	16.00	
16. Utilities, fuel, etc.	12.00	
17. Facility and equipment repairs	4.00	
18. Professional Fees (legal, accounting, etc.)	14.34	
19. Miscellaneous	14.75	
20. Depreciation on facilities and equipment	8.51	
21. Interest on facilities and equipment	1,972.77	
22. Interest on heifer calf and 75 operating costs	84.32	
<b>B. NET FARM</b>	<b>\$,556.29</b>	
<b>C. RETURN OVER TOTAL COW/CA - C</b>	<b>1,828.11</b>	
24. Total Cost Per Pound of Gain	1.01	
25. Total Cost Per Pound of Gain	1.02	
<b>E. BREAK-EVEN BREAK-EVEN PRICE, \$/lb.</b>	<b>\$0.208, 23</b>	
<b>F. ASSET TURNOVER (1 + 4 + 3) ÷ INVESTMENT × 1.5<sup>1/2</sup></b>	<b>80.34%</b>	
<b>G. NET RETURN ON INVESTMENT</b>	<b>101.71 + 25% DIVIDEND<sup>2</sup> = 131%</b>	
	<b>-0.91%</b>	

<sup>1</sup>Original cost of buildings and equipment plus salvage value divided by 1. times an interest rate of 7 percent.  
<sup>2</sup>Net total add to (or subtract from) equity, starting April 1.

<sup>3</sup>Investment equal value of heifer calf and value of buildings and equipment

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Kansas State University, Agricultural Experiment Station and Cooperative Extension Service  
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Livestock II — Revised October 2004



## Cost of beef replacement heifers (MF-2566)

COSTS PER HEAD:	
5. Pasture .....	\$ 64.94
6. Prairie Hay.....	103.05
7. Alfalfa Hay .....	0.00
8. Grain Sorghum .....	0.00
9. Corn .....	62.23
10. Supplement .....	39.92
11. Mineral - Salt.....	22.50
12. Labor.....	50.00
13. Veterinary, drugs, supplies.....	26.00
14. Marketing costs.....	10.00
15. Breeding Cost .....	25.00
16. Utilities, fuel, oil.....	16.00
17. Facility and equipment repairs .....	12.00
18. Professional Fees (legal, accounting, etc) .....	2.00
19. Miscellaneous .....	4.00
20. Depreciation on facilities and equipment .....	14.38
21. Interest on facilities and equipment <sup>1</sup> .....	14.75
22. Ins and Taxes on facilities and equipment .....	5.51
B. SUBTOTAL .....	\$ 472.27
23. Interest on heifer calf and ½ operating Costs.....	84.32
C. TOTAL COSTS PER HEAD: .....	\$ 556.59
D. RETURNS OVER TOTAL COST (A - C): .....	\$ -182.11
24. Total Cost Per Head Per Day.....	1.04
25. Total Cost Per Pound of Gain .....	1.07

Excel spreadsheet available at: [www.agmanager.info/livestock/budgets/projected/](http://www.agmanager.info/livestock/budgets/projected/)



## Economic value of replacements

- Another way to consider the economic value of replacements (buying or retaining) is to look at the stream of income and costs over the life of the replacement.
- When considering future income and costs it is important to take into account the time value of money.
- Net present value (NPV) method of analysis brings all future dollars into today's dollars.



## Time Value of Money

$$V_n = V_0 * (1 + i)^n$$

where,

$V_n$  = future value ( $FV_0$ )

$V_0$  = present value ( $PV_0$ )

$i$  = interest rate

$n$  = years in the future



## Time Value of Money

$$FV_0 = PV_0 * (1 + i)^n$$

rearranging terms gives ...

$$PV_0 = \frac{FV_0}{(1 + i)^n}$$

where,

$1 / (1 + i)^n$  = discount factor (rate)



## Time Value of Money

$$FV_0 = PV_0 * (1+i)^n$$

rearranging terms gives ...

$$PV_0 = \frac{FV_0}{(1+i)^n}$$

substituting yearly cash flows ( $CF_n$ ) for  $FV_0$  gives ...

$$PV_0 = \sum_{n=0}^{n=N} \frac{CF_n}{(1+i)^n}$$



## Present Value

$$FV_0 = PV_0 * (1+i)^n$$

$$PV_0 = \frac{FV_0}{(1+i)^n}$$

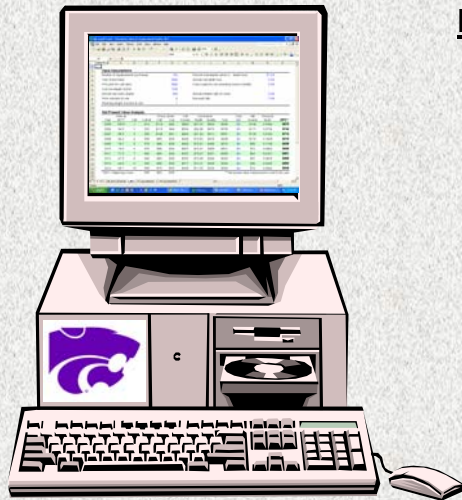
$$PV_0 = \sum_{n=0}^{n=N} \frac{CF_n}{(1+i)^n}$$

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example using flows ( $CF$ ): 2, 4, 3 and  $i=10\%$

$$PV_0 = \frac{2}{1.10^0} + \frac{4}{1.10^1} + \frac{3}{1.10^2} = 2 + 3.64 + 2.48 = 8.12$$



## Calculating NPV of replacement with Excel spreadsheet ...



### Information required:

1. Revenue stream
  - prices, weights
  - calf crop, culls
2. Costs
3. Discount rate
4. Time horizon

**Go to Excel**



## Questions ???

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