

# Profitable Pregnancy Rates

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Colorado State University



Range Beef Cow Symposium XXI  
Casper, Wyoming  
December 1-3, 2009

- ▶ “We have all heard the saying, ‘Money isn’t everything’, and then we have also heard the reply, ‘It is if you haven’t got it’. I’m sure the same is true about beef cow fertility.”

John J. Winninger, Winninger Ranch, Meeteetse, WY  
Speaker at the 2<sup>nd</sup> Range Beef Cow Symposium  
December 1971, Cheyenne, WY



## Disclaimer:

- ▶ I am not an economist and I do not ....
- ▶ Biology and interactions...



## The Profitability Formula (Taylor, RBCS XIV 1995)



- ▶ **Profit** = Income – Costs
- ▶ **Income** = Number X Weight
- ▶ **Costs** = Many, many variables that are very dependent on each enterprise

**Pregnancy Rates**



## Pregnancy Rates

- ▶ Nutrition
- ▶ Genetics
- ▶ Management
- ▶ Unknown



## Range Beef Cow Symposium I (1969) and II (1971):

- ▶ Forty years ago, in 1969, the first Range Beef Cow Symposium (RBCS) was held in Chadron, NE.
- ▶ Two years later, in 1971 the second was held in Cheyenne, WY.



## Forty Years of Change....

- ▶ 1969 John Wayne played Rooster Cogburn in True Grit



## Forty Years of Change....

- ▶ Neil Armstrong and Apollo 11 landed on the moon!

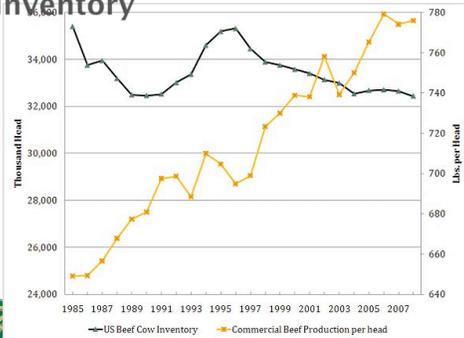


## Forty Years of Change....

- ▶ Woodstock happened



## Beef Production and Cow Inventory



## RBCS 1969 - Chadron, NE

Dr. Jim Wiltbank



## Recommendations from RBCS Forty Years ago

### ▶ Nutrition and Reproduction

1. Level of **energy intake** has more direct impact on **estrous cycles and pregnancy rates** than does protein level in the diet. However in order to have optimal digestion of forage diets, adequate protein intake is necessary.
2. Level of **energy prior to calving** primarily impacts the **length of the anestrus period** following calving. Precalving nutrition is reflected in the **body condition of the cow or heifer at the time of calving.**



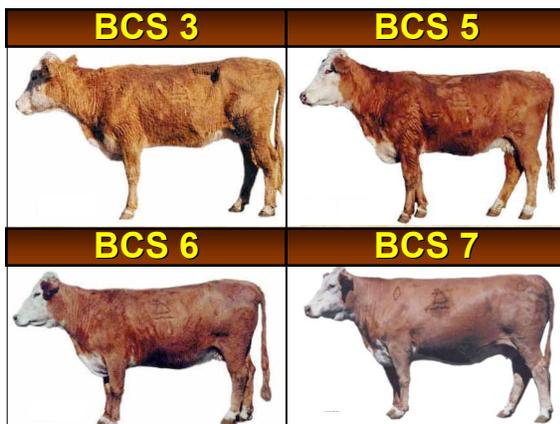
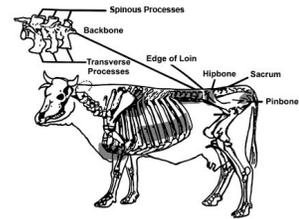
## Recommendations from RBCS Forty Years ago

3. **Postcalving nutrition** primarily impacts the **fertility or conception rate** of cows at the time of breeding. **Body condition at the start of breeding** is a reflection of postcalving nutrition.
4. Management practices that allow cows and heifers to be in a **gaining condition before and after breeding** result in **higher pregnancy rates** than if there is no weight gain during these times.
5. Yearling replacement **heifers must reach puberty** (sexual maturity) before they can be bred. To insure that heifers reach puberty, they must be fed to reach a threshold or **target weight** by the start of the breeding season.



| Score | Description   |
|-------|---|
| 1     | Severely emaciated. All ribs and bone structure easily visible and prominently weak. Animals lose difficulty standing or walking. No exercise, fat present by sight or touch.   |
| 2     | Emaciated. Similar to 1, but not weakened.  |
| 3     | Very thin. No visible fat on the ribs or brisket. Individual muscles in the hindquarters are easily visible and spine processes are very apparent.  |
| 4     | Thin. Ribs and pin bones are easily visible, and fat is not apparent by palpation of ribs or pin bones. Individual muscles in the hindquarters are apparent.  |
| 5     | Ribs are less apparent than in 4, and there is less than 0.2 inches of fat over the others. Last two or three ribs can be felt easily. No fat in the brisket. At least 0.5 inches of fat can be palpated over pin bones. Individual muscles in the hindquarters are not apparent. |
| 6     | Smooth appearance throughout. Some fat deposits in the brisket. Individual ribs are not visible. About 0.4 inches of fat on the pin bones and on the last two or three ribs.  |
| 7     | Brisket is full. Tail head and pin bones have covering fat deposits on them. Back appears square due to fat. Substrate over the spine due to fat one inch. Between 1.0 and 1.3 inches of fat on the last two or three ribs.   |
| 8     | Chest Back is very square. Brisket is dominated with fat. Large protruding deposits of fat on the head and pin bones. Stock is thick. Between 1.2 and 1.5 inches of fat on the last three ribs. Large subcutaneous over the spine.  |
| 9     | Very obese. Descriptions similar to 8, but sides to a greater extent.   |

Wettemann, R.P., K.S. Lusby, R. T. Rasby and M. W. Richards. 1987. "Body condition at calving and post partum intake influence reproductive performance of range cows." *Anim. Sci. Res. Rep.* pp. 70, Oklahoma State University.



## What have we done well?

- Identified the crucial role of nutrition in reproduction

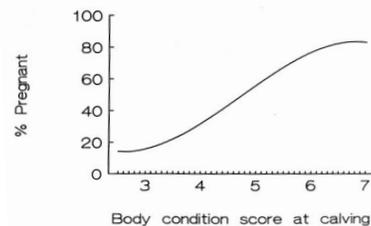


Figure 10-1. Influence of precalving body condition score on pregnancy rate of range beef cows (From Sell et al., 1988).

## Recommendations from RBCS Forty Years ago

### Genetics and Reproduction

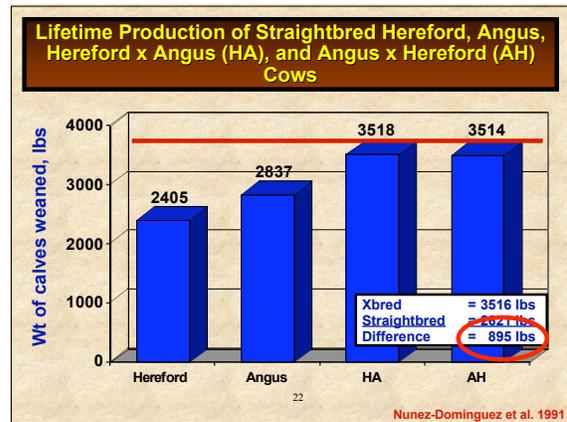
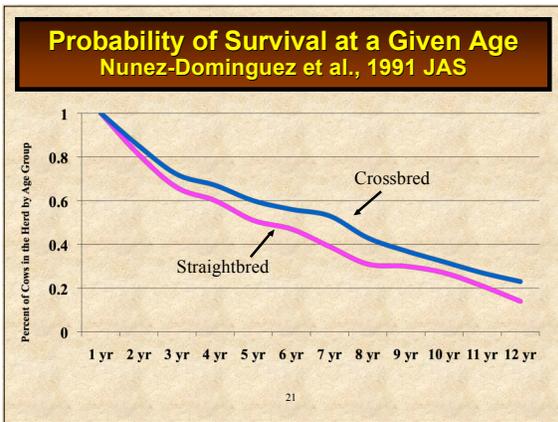
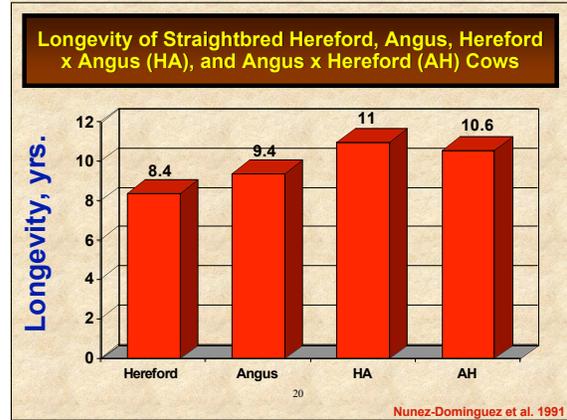
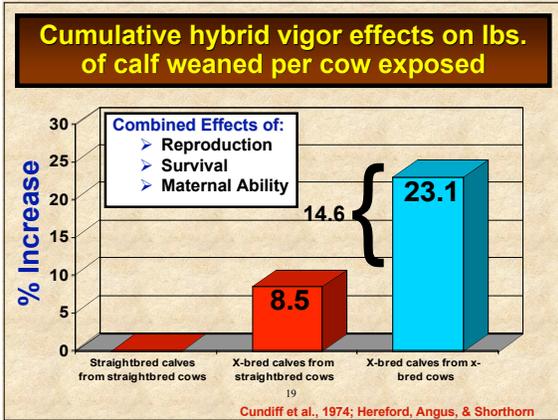
6. In a Nebraska research herd in the mid 1960's calf crop weaned was shown to be **6.4% greater for crossbred cows than for straightbred cows**. This was due to significantly **higher pregnancy rates** and first service conception rate **in crossbreds**. (Cundiff et al., 1974).
7. In the same study involving cows in Nebraska in the 1960's, **the cumulative effect of individual heterosis and maternal heterosis** by increasing pregnancy rates, survival rates in calves and actual weaning weights combined to improve pounds of calf weaned per cow in the breeding herd **by 23%**. (Cundiff et al., 1974).



## Recommendations from RBCS Forty Years ago

8. A crossbreeding study in Virginia with British Breeds during the late 1950's and early 1960's reported a 10% advantage in calves weaned from crossbred matings. This indicated **heterosis for fertility of the dam and livability of the calf** (Gaines, et al., 1966).
9. Crossing **British breeds with Brahman-type** breeds in a Louisiana study in the early 1960's caused **significant improvement in reproductive** performance compared to parental straightbred performance (Turner et al., 1968).
10. **Significant heterosis effects exist for age at puberty** in British breed crossbred heifers that are independent of heterosis for average daily gain (Wiltbank et al., 1966).





### So, what's different after 40 years?

- ▶ New breeds, crossbreeding, composites and biological types.
- ▶ New cost and income structures.
- ▶ Increased understanding of biology (nutrition/efficiency).
- ▶ Improvements in management systems.

Table 1. Breeds Grouped into Biological Types for Four Criteria\*

| Breed group          | Growth rate and mature size | Lean to fat ratio | Age at puberty | Milk production |
|----------------------|-----------------------------|-------------------|----------------|-----------------|
| Jersey (J)           | X                           | X                 | X              | XXXXX           |
| Longhorn (Lh)        | X                           | XXX               | XXX            | XX              |
| Hereford-Angus (HAx) | XXXX                        | XX                | XXX            | XX              |
| Red Poll (Rp)        | XX                          | XX                | XX             | XXXX            |
| Devon (D)            | XX                          | XX                | XXX            | XX              |
| Shorthorn (Sh)       | XXXX                        | XX                | XXX            | XXXX            |
| Galloway (Gw)        | XX                          | XXXX              | XXX            | XX              |
| South Devon (Sd)     | XXX                         | XXX               | XX             | XXX             |
| Tarentaise (T)       | XXX                         | XXX               | XX             | XXX             |
| Pingouin (P)         | XXX                         | XXX               | XX             | XXX             |
| Brangus (Br)         | XXX                         | XX                | XXXX           | XX              |
| Santa Gertruda (Sg)  | XXX                         | XX                | XXXX           | XX              |
| Sahiwal (Sw)         | XX                          | XXX               | XXXXX          | XXX             |
| Brahman (Bm)         | XXXX                        | XXX               | XXXXX          | XXX             |
| Nellore (N)          | XXXX                        | XXX               | XXXXX          | XXX             |
| Braunvieh (B)        | XXXX                        | XXXX              | XX             | XXXX            |
| Gelbvieh (G)         | XXXX                        | XXXX              | XX             | XXXX            |
| Holstein (Ho)        | XXXX                        | XXXX              | XX             | XXXXX           |
| Simmental (S)        | XXXXX                       | XXXX              | XXX            | XXXX            |
| Maisie Anjou (M)     | XXXXX                       | XXXX              | XXX            | XXX             |
| Salers (Sa)          | XXXXX                       | XXXX              | XXX            | XXX             |
| Piedmontese (Pm)     | XXX                         | XXXXXX            | XX             | XX              |
| Limousin (L)         | XXX                         | XXXXX             | XXXX           | X               |
| Charolais (C)        | XXXX                        | XXXXX             | XXXX           | X               |
| Chianina (Ci)        | XXXXX                       | XXXXX             | XXXX           | X               |

\* Increasing number of X's indicate relatively higher value.

## Limousin

- ▶ “The first Limousin bulls imported permanently into the United States arrived in fall 1971.” NALF website
- ▶ “At a meeting in spring 1968 at the Albany Hotel in Denver, 15 cattle producers formed the North American Limousin Foundation (NALF).” NALF Website



## Simmental

“This year [2008] marks 40 years of innovation at the American Simmental Association (ASA), and from the beginning, ASA’s focus has been on genetic improvement. The organization’s initial requirement of performance testing and launch of the first national sire summary for any breed in 1972, established ASA as a leader in the industry.” [www.simmental.org](http://www.simmental.org)



## Charolais



- ▶ “Producers who were utilizing other beef breed cows to produce Charolais by compounding Charolais blood through successive generations, formed the International Charolais Association. In 1957, the American and International Associations merged into today’s American-International Charolais Association (AICA).” <http://battenkillmeadows.com/>



## Gelbvieh

“Leness Hall, the director of International Marketing for Carnation Genetics, first saw Gelbvieh cattle in 1969. He worked toward importing Gelbvieh semen to the U.S., and finally was able to bring 43,000 units here in 1971. In that same year, the American Gelbvieh Association was formed.” <http://www.gelbvieh.org>



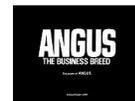
## Hereford

- ▶ “Known as the efficiency experts, the Hereford breed has been an icon of the U.S. beef industry for more than 100 years.” <http://www.hereford.org>



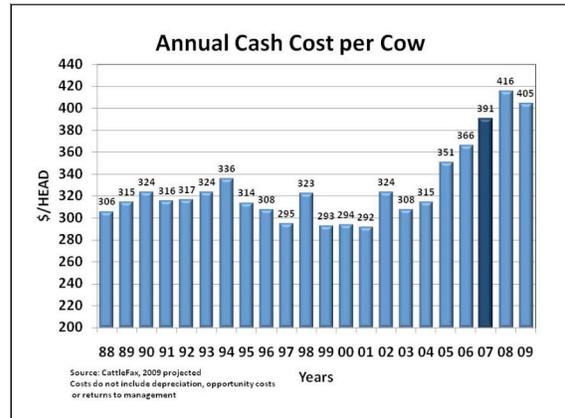
## Angus

- ▶ “When George Grant transported four Angus bulls from Scotland to the middle of the Kansas Prairie in 1873, they were part of the Scotsman’s dream to found a colony of wealthy, stock-raising Britishers.” <http://www.angus.org>



## So, what's different after 40 years?

- ▶ New breeds, crossbreeding, composites and biological types.
- ▶ New cost and income structures.



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Andy Roberts  
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**Lifetime Production Efficiency**

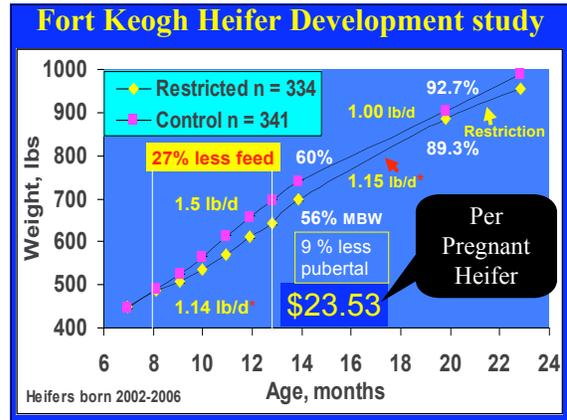
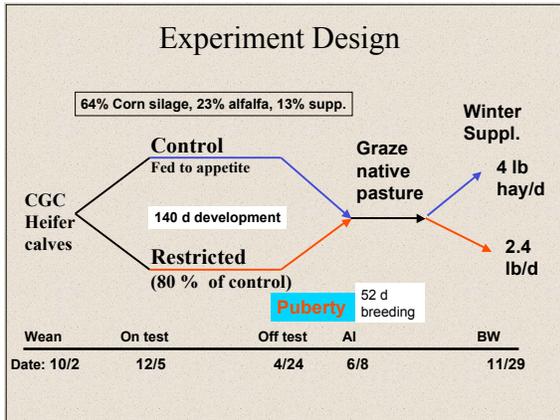
## Major Factors Affecting Lifetime Production Efficiency?

Reproduction  
&  
Feed Inputs

### CGC Composite

50% Red Angus, 25% Charolais, 25% Tarentaise

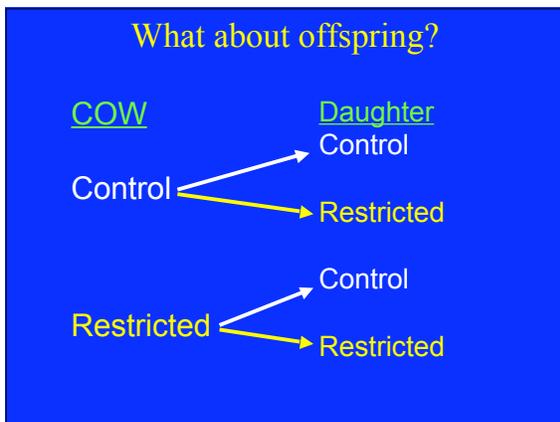




### Conclusion

- Reduced feed/pregnant heifer
- Improved efficiency

### Feeding & Longevity



### Summary

- Restricted heifer development/winter feeding improved efficiency.
- Reduced feed/pregnant heifer (\$24 savings)
- 200 to 300 lb less feed/winter (\$9-12/yr)
- Offspring out of restricted cows have greater BCS (Improved drought resistance?)
- Improved longevity (5 & older) \$\$\$
- Restricted cows out of restricted dams have lighter calves at birth and weaning
- Match genotype & environment (less milk) ?

## So, what's different after 40 years?

- ▶ New breeds, crossbreeding, composites and biological types.
- ▶ New cost and income structures.
- ▶ Increased understanding of biology.
- ▶ Improvements in management systems. (tools)



## GENETIC PARAMETERS FOR INTRAMUSCULAR FAT PERCENTAGE, MARBLING SCORE, SCROTAL CIRCUMFERENCE, AND HEIFER PREGNANCY IN RED ANGUS CATTLE

C. M. McAllister, S. E. Speidel,  
B. W. Brigham, D. H. Crews, Jr.,  
and R. M. Enns

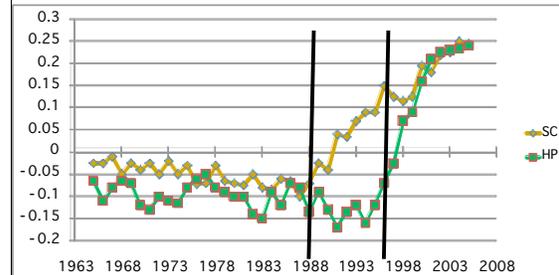
Colorado State University  
Knowledge to Go Places

## ECONOMICALLY RELEVANT vs INDICATOR TRAITS

| Indicator traits      | Economically relevant trait |
|-----------------------|-----------------------------|
| Scrotal Circumference | Heifer Pregnancy Rate       |

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## RAAA GENETIC TRENDS



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## Teeter Totter of Profitable Pregnancy Rates...

Pregnancy Rates vs. Cost

Management

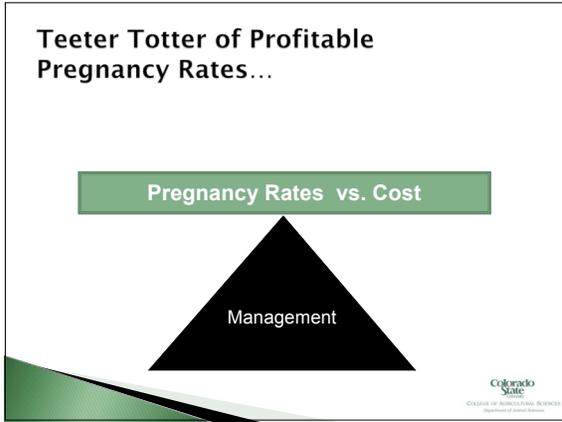
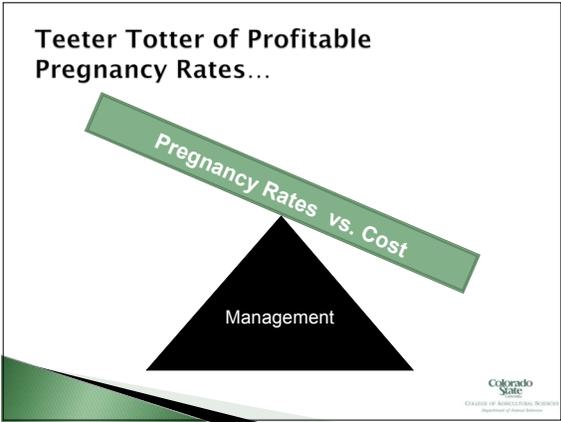
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## Teeter Totter of Profitable Pregnancy Rates...

Pregnancy Rates vs. Cost

Management

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### What Can You Afford to Pay For a Cow?

A Decision Aid for Cattle Producers v2.0  
Jeff Tranel and Rod Sharp - CSU Extension

A critical factor in determining the carrying cost of a cow is the pregnancy rate. The carrying cost is designed to determine the maximum amount a breeder can afford to pay for a breeding female.

**Or: What is a profitable pregnancy rate?**

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### What Are Your "Cow Carrying Costs?" Cow-Calf Enterprise Budget

| Assumptions                             |       |                                  |       |
|---|-------|----------------------------------|-------|
| Number of Cows (hd)                     | 130   | Avg. Weaning Wt. (lbs) - Steers  | 575   |
| Conception Rate (%)                     | 85    | Avg. Weaning Wt. (lbs) - Heifers | 525   |
| Weaning Rate (%)                        | 95    | Yearling Heifer Wt. (lbs)        | 750   |
| Heifer Retention Rate (%)               | 15    | Actual Weaning Rate (%)          | 80.75 |
| Cow Replacement Rate (%)                | 12    | Steers Weaned (hd)               | 101   |
| Cow Salvage Value (\$/cow)              | \$500 | Heifers Weaned (hd)              | 101   |
| Annual Cow Costs (\$/cow)               | \$410 | Heifers Retained (hd)            | 37.5  |
| Return on Investment (%)                | 4     | Cows Replaced (hd)               | 30    |
| Adjustment to Annual Cow Costs (\$/cow) | 50    |                                  |       |

| Outlook of Annual Calf Prices |        |         |
|-------------------------------|--------|---------|
|                               | Steers | Heifers |
| Year 1:                       | \$1.05 | \$0.98  |
| Year 2:                       | \$1.00 | \$0.95  |
| Year 3:                       | \$0.95 | \$0.88  |
| Year 4:                       | \$1.00 | \$0.95  |
| Year 5:                       | \$1.05 | \$0.98  |
| Year 6:                       | \$1.05 | \$0.98  |
| Year 7:                       | \$1.10 | \$1.05  |
| Year 8:                       | \$1.15 | \$1.08  |
|                               | \$1.04 | \$0.97  |

| Revenues - Expenses = Net Returns |      |              |                 |                  |              |
|-----------------------------------|------|--------------|-----------------|------------------|--------------|
|                                   | Head | Market Price | Average Weight  | Total Value      | Per Cow      |
| Steers                            | 101  | 1.04         | 575             | 60,578           |              |
| Heifers                           | 63   | 0.97         | 525             | 33,450           |              |
| Yrly Hftrs                        | 7.5  | 0.85         | 750             | 4,781            |              |
| Other                             | 45   | 0.50         | 1000            | 22,500           |              |
| <b>Average Annual Revenues</b>    |      |              |                 | <b>\$120,290</b> | <b>\$481</b> |
|                                   | Cows | \$ / Cow     | Total Cost      | Per Cow          |              |
| Avg. Ann. Operating Exp.          | 280  | 410          | \$100,566       | \$410            |              |
| <b>Average Net Returns:</b>       |      |              | <b>\$17,724</b> | <b>\$70.89</b>   |              |

How Much Can You Afford to Pay?

- \$834 - 8-Year Productive Life
- \$672 - 5-Year Productive Life
- \$598 - 3-Year Productive Life

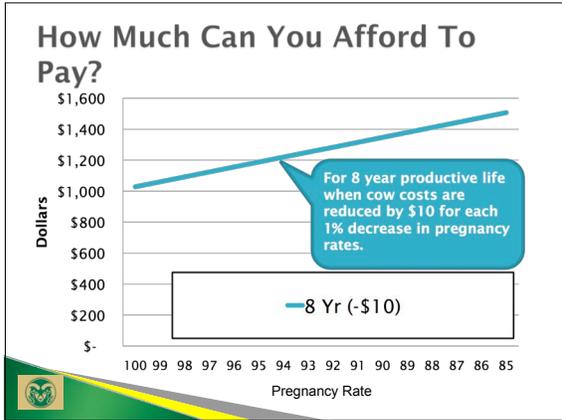
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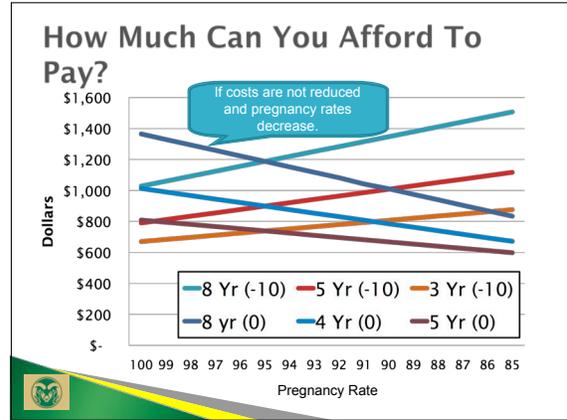
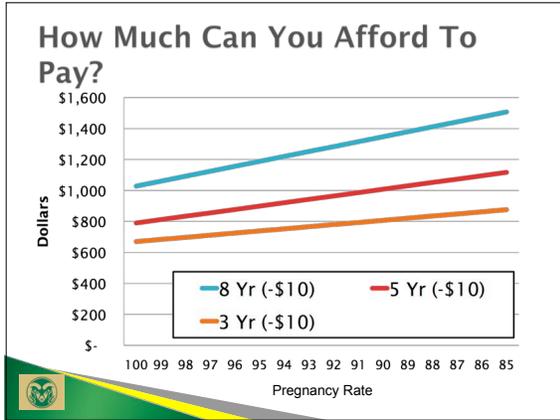
### Cow Carrying Cost

Jeff Tranel and Rod Sharp - CSU Dept of Ag and Resource Economics

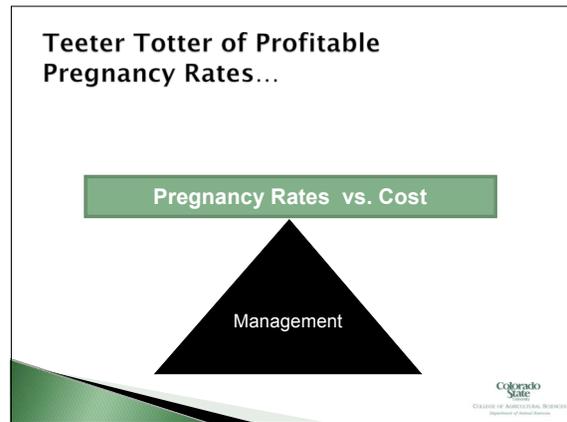
| Item                    | Dollars      |
|-------------------------|--------------|
| Feed                    | \$190        |
| Land Expenses           | \$48         |
| Veterinary and Breeding | \$25         |
| Supplies                | \$9          |
| Marketing               | \$12         |
| Machinery and Equipment | \$31         |
| Labor                   | \$9          |
| Interest                | \$86         |
| <b>Annual Cow Costs</b> | <b>\$410</b> |

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- ### Updates to 40 year old profitable pregnancy rate recommendations...
1. Cows and heifers still need energy intake – but timing and match with physiological state allows reduction in feed costs.
  2. Not incorporating breed complementarity and heterosis is NOT an option!
  3. We are just scratching the surface on efficiency – including maternal influences.



2009 Range Beef Cow Symposium

Range Beef Cow Symposium Organizers:  
Lead: Steve Hays, University of Wyoming  
Co-lead: Steve Hays, University of Wyoming  
Co-lead: Steve Hays, University of Wyoming

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Dr. Steve Hays

# Thank You!

Range Beef Cow Symposium XXI

2009 Range Beef Cow Symposium  
December 1st, 2nd and 3rd  
Casper Events Center, Casper WY