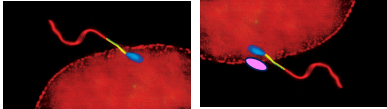


Use of Sexed Semen in Commercial Beef Operations



J. B. Hall and J.B. Glaze, Jr.
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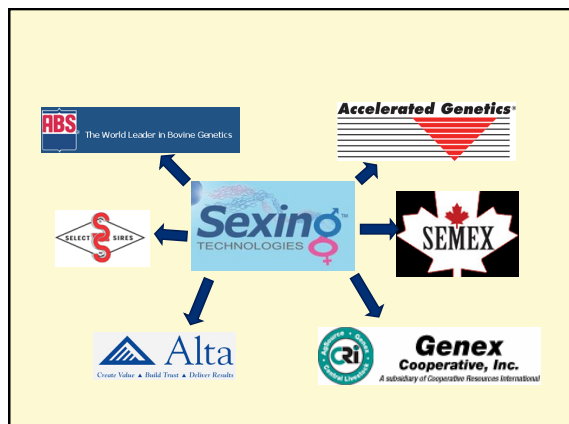
2013 Range Beef Cow Symposium

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35%-40% Fixed time AI pregnancy rate

55%-65% Fixed time AI pregnancy rate



Introduction

- Gender selected semen is currently being used in the dairy industry to produce replacement heifers with reasonable pregnancy rates.
 - 35-40 % heifers - Weigel, 2004
 - Approx. 50% in heifers and 29% in cows – DeJarnette et al., 2008

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Figure 1. Typical ultrasound images of cattle pregnancies at various stages of gestation. A) 30 day pregnancy. Fetus in the uterine horns is evident (black portion indicated by arrow). B) 50 day pregnancy. Fetus (calves) and fluid (amniot) are evident. C) 70 day pregnancy. Fetus (calves) and legs (arrow) are well defined. D) 100 day pregnancy. Legs (arrow) are well defined.

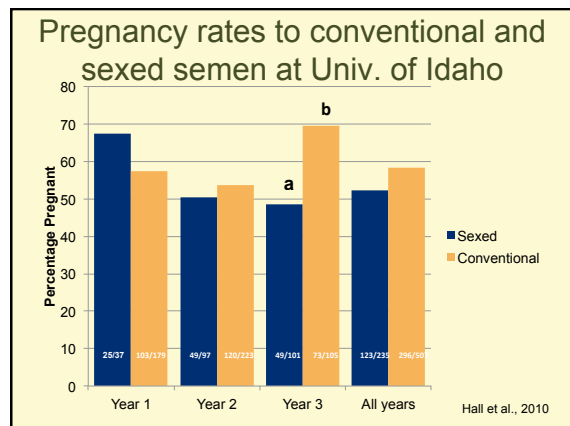
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Beef Heifers

- Early studies indicated a 3% to 13% decrease in pregnancy rates in heifers bred with sexed semen. (Deutscher et al., 2002)
- Rhinehart and coworkers observed a 4% to 38% decrease in pregnancy rates in heifers

| Group | Pregnancy Rate (%) |
|--------------|--------------------|
| Conventional | ~60 |
| Sexed | ~40 |

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Postpartum cows

- A Southeastern study reported a 33% decrease in pregnancy rates for cows bred with sexed semen.
- Sexed semen performed similarly in postpartum beef cows and heifers.

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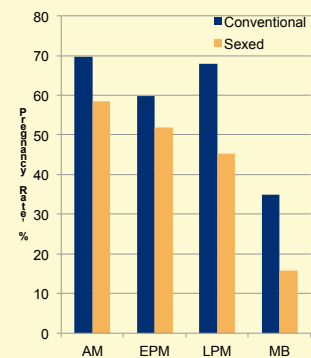
FACTORS AFFECTING SUCCESS WITH SEXED SEMEN

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Impact of estrus and semen type on AI pregnancy rates

| Semen Type | Estrus status by AI | | |
|--------------|---------------------|-----------------|----------------|
| | In Heat | Not in Heat | Questionable |
| Sexed | 50.0 (28/56) | 39.4 (13/33) | 62.5 (5/8) |
| Conventional | 60.0 (69/115) | 46.7 (42/90) | 50.0 (9/18) |

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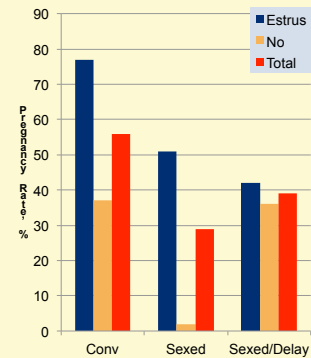
- All heifers bred 18-24 h post estrus
- AM – Estrus 0800-1400 bred next a.m.
- EPM – Estrus 1400-2000 bred next day at = 1400
- LPM – Estrus before 0800 bred late same day
- MB – Not detected in estrus mass mated

Meyer et al., 2012

Effect of timing of FTAI in 5 day CIDR protocol on pregnancy rates to sexed semen

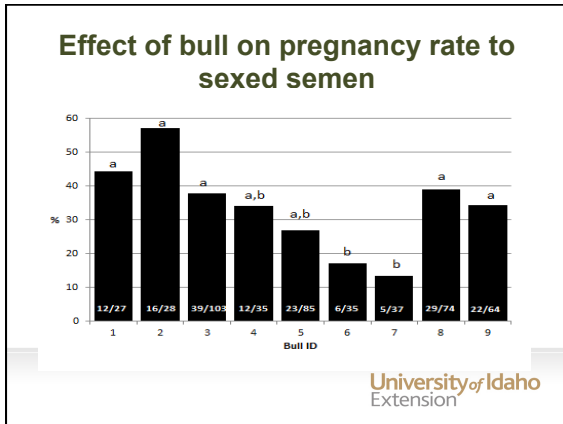
| Time of FTAI | Head | #AI | %AI |
|--------------|------------|------------|-------------|
| 72 | 424 | 156 | 36.8 |
| 80 | 345 | 118 | 34.2 |
| Total | 769 | 274 | 35.6 |

P > .30



- FTAI after CO-Synch + 7 d CIDR
- Delay group non-estrus cows were bred with sexed semen 20 hours after GnRH

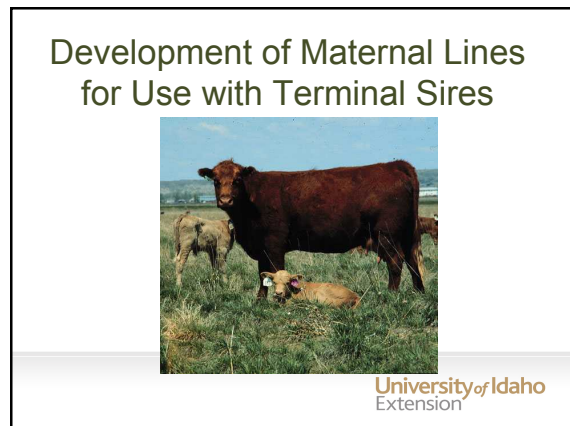
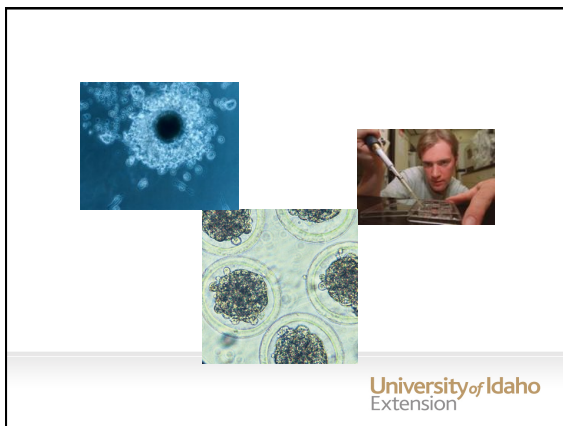
Thomas, 2013



AI with sexed semen

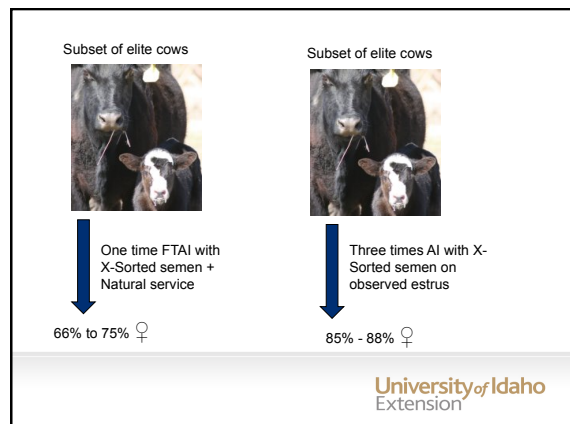
- Breeding after estrus best; FTAI feasible.
- 10% to 20% decrease in pregnancy rates compared to conventional semen.
- Greater variability in success.
- Similar fertility in postpartum cows and heifers.
- Calves perform the same as calves from conventional AI

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Compared to other meat animals true use of maternal lines mated to terminal sires is limited in beef cattle.

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How Many Cows Needed to Create Replacements

Traditional System

- 300 cow herd
- 15% replacement rate
- 90% weaning rate
- Need 45 replacements
- Breed 100 cows to maternal bulls

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Takes up 1/3 of the herd and produces 45 steers that may not excel in market place

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X-Sorted Systems

| FTAI + Natural Service | 3x estrus detection + AI |
|---|--|
| <ul style="list-style-type: none"> • 15% replacement rate • 90% weaning rate • 66% ♀ • 75 cows → 45 heifers • 22 steers • 25% of herd | <ul style="list-style-type: none"> • 15% replacement rate • 90% weaning rate • 83% ♀ • 60 cows → 45 heifers • 9 steers • 20% of herd |

Gender ratios and performance of female calves

| Semen Type | Year 1 | | Year 2 | | Year 3 | |
|--------------------------|--------|-------|--------|-------|--------|-------|
| | GSS | CON | GSS | CON | GSS | CON |
| Female to Male Ratio | 78:22 | 47:53 | 68:31 | 50:50 | 62:38 | 56:44 |
| Growth Performance (kg)* | 259.8 | 258.7 | 277.7 | 273.2 | 277.0 | 271.8 |

GSS = gender-selected semen; CON = Conventional semen.
* Growth performance = 205 d adj wt.

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Increased Value of Using Sexed Semen to Develop Maternal Lines

- Some increase in value of progeny from terminal sires and SS dams
- **Increased productivity of maternal line**
 - Increased selection pressure (20% vs 30%)
- May need to retain ownership to capture full value

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Heifer-Heifer System



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Current and future techniques in genetic evaluation in commercial herds including EPDs and gene markers may soon make selection of replacement heifers at a very early age possible.

Heifer-Heifer

- All replacement heifers bred to X-sorted semen with desired maternal traits.
 - Reduced dystocia
 - Decreased generation interval
 - Replacement heifers older at breeding (Kill et al., 2012; 340P)
- Some use currently in dairy industry

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Shifting Gender Ratios



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Shifting Gender Ratios

- Seedstock application produce more of the desired sex
 - Commercial bull producer = Y-sorted
 - Replacement heifer operation = X-sorted
 - Creating female lines = X-sorted
- Commercial application
 - Marketing advantage
 - Meeting specific customer needs

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Single AI with Sexed Semen Followed by Natural Service

| No. cows bred | No. calves born | No. male calves | % male | Calving rate, % |
|---------------|-----------------|-----------------|--------|-----------------|
| 488 | 431 | 278 | 64.5 | 88.3 |

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Impact of various sex ratios on value of calves from NMCREEC

| Increased cost of GSS | \$0 | \$5 | \$10 | \$15 | \$20 |
|------------------------------|-----|--------|---------|---------|----------|
| Increased cost /300 units | \$0 | \$1500 | \$3000 | \$4500 | \$6000 |
| Value of change in sex ratio | | | \$4,320 | \$8,640 | \$12,960 |

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The greatest value in shifting gender ratios for cow/calf operations may be in enabling smaller operations to sell full tractor trailer loads of steers.

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Potential Impact of Shifting Gender Ratios

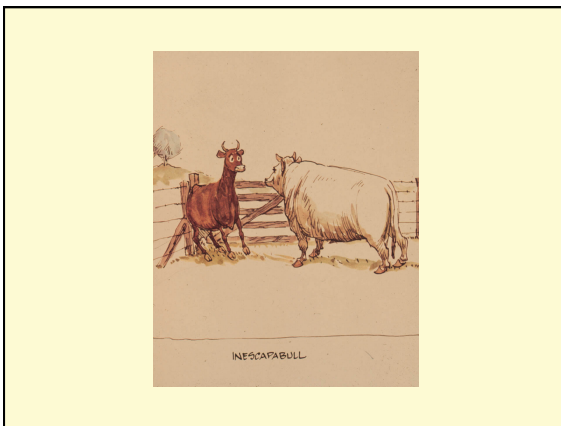
| | Steers/ Heifers (hd) | Wt. (lbs) | Price (\$/cwt) | Value | All Steer Impact |
|-----------------------|----------------------|-----------|----------------|----------|------------------|
| S p l i t load | 55/35 | 580/520 | 160/150 | \$78,340 | |
| W h o l e load | 90 | 580 | 160 | \$83,520 | \$5,180 |
| W h o l e load | 90 | 580 | 163 | \$85,086 | \$6,746 |

- Need to AI already
- Bull selection
- Increased cost \$2000-\$3000

Summary/Conclusions

- FTAI pregnancy rate with GSS varied from 35% to 50%
- A single AI to sexed semen followed by natural service can successfully alter gender ratios.
- Depending on cost of GSS ratio, shifts of 60:40 male:female may be profitable; 70:30 ratio is a goal.
- A better understanding of the impact of bull as well as timing of AI on fertility to GSS is needed.

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The Future

- Fertility of sexed semen will improve
 - Decreased sorting damage
 - Synchronization systems
 - Bull selection
- Applications will continue to develop
- Sexed semen will not “ruin” the industry

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Sexed semen is a technology whose time has come in the beef industry; however, producers need to understand the risks and limitations.

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Research support provided by



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