IMPLEMENTING PROFITABLE REPRODUCTIVE TECHNOLOGIES

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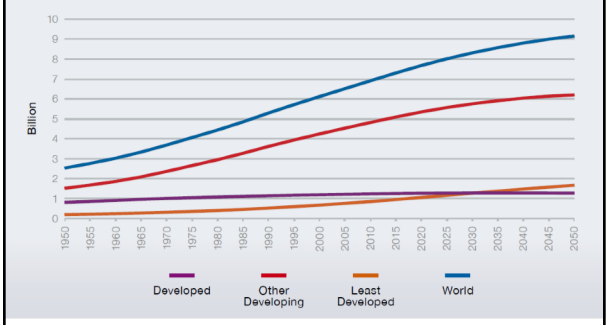
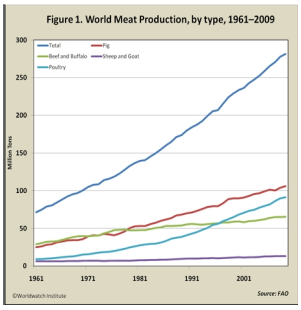
Population growth



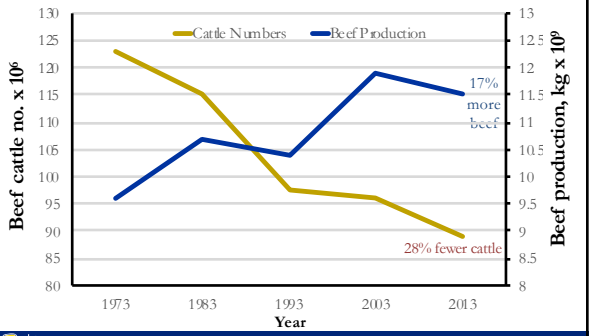
Source: UN Population Division, from van der Mensbrugghe et al. 2009

WORLD MEAT PRODUCTION

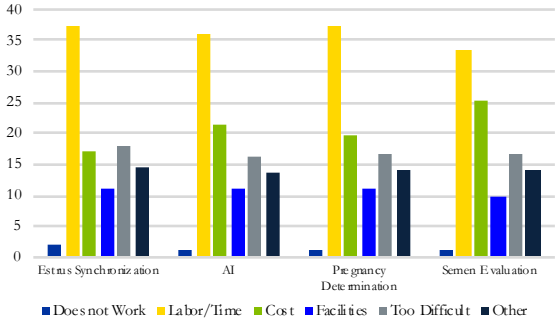


- Beef is currently 22% of the world meat production.
- In 2050 World meat production is estimated to be 455 million tons (2x what it is now).
- How will beef double it production?

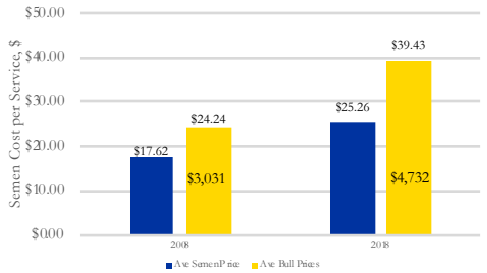
THE U.S. BEEF INDUSTRY



WHY REPRODUCTIVE TECHNOLOGIES ARE NOT USED

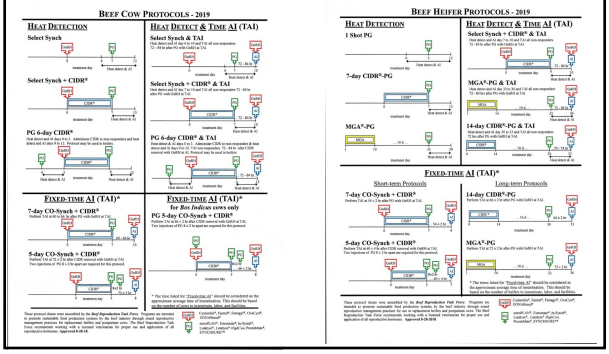


AVERAGE COST PER SERVICE

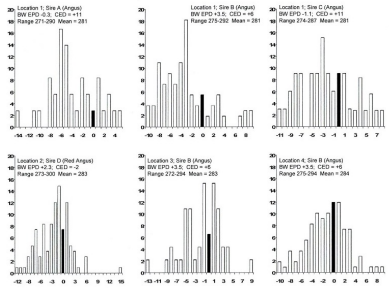


average bull price/30 cows per yr/4 yr

Estrus Synchronization and Artificial Insemination

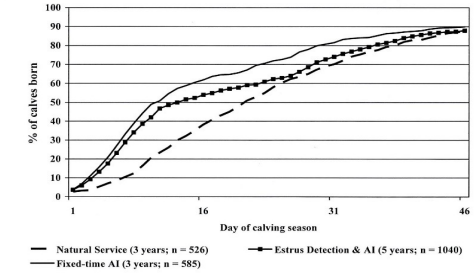


CALVING DISTRIBUTION FOR COWS THAT CONCEIVED TO FIXED-TIME AI



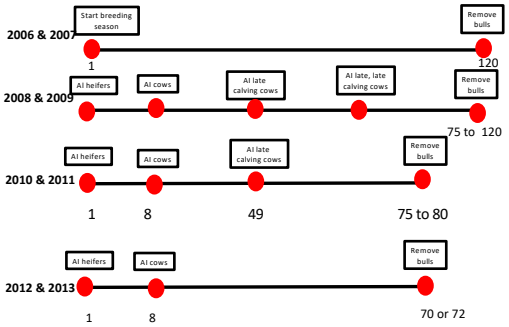
Schafer, 2005

CUMULATIVE CALF CROPS OVER 11 YEARS



Patterson, et al. 2006

UF-NFREC CASE STUDY



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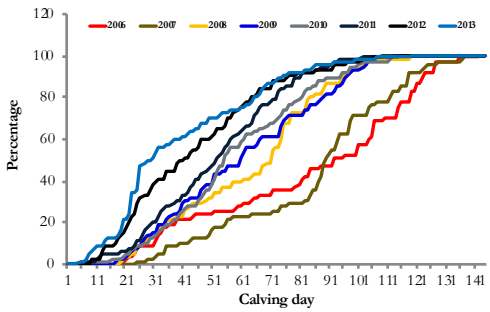


Lamb, personal communication

UF-NFREC Case Study

Breeding season pregnancy rates:

Year	2006	2007	2008	2009	2010	2011	2012	2013
PR	81%	86%	84%	86%	82%	94%	92%	93%
Mean calving day	79.2	80.9	59.2	56.2	53.7	47.2	39.5	38.7
BS length	120	120	110	88	80	75	70	72

Lamb, personal communication

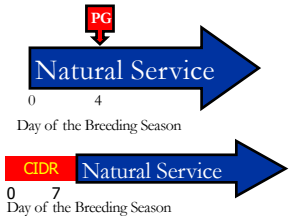
UF-NFREC Case Study

Change in calf value:

Year	2006	2007	2008	2009	2010	2011	2012	2013
Mean calving day	79.2	80.9	59.2	56.2	53.7	47.2	39.5	38.7
Difference from 2006/2007	0	0	21.7	24.7	27.2	33.7	41.4	42.2
Per calf increase in value	0	0	$87	$99	$109	$135	$166	$169
Herd increase in value	0	0	$19,100	$29,700	$32,700	$40,500	$49,800	$50,700

Lamb, personal communication

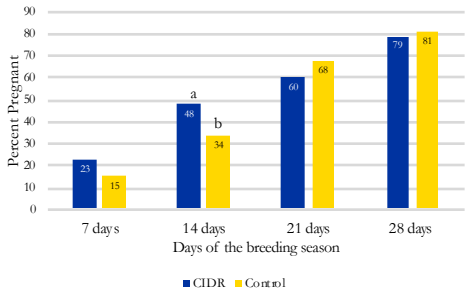
ESTROUS SYNCHRONIZATION PROTOCOLS



Serving capacity of the bull
1:10 to 1:60 – non-synchronized
1:16 to 1:25 – synchronized

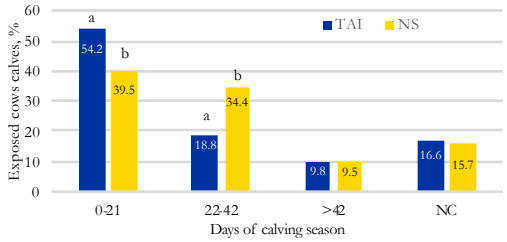
Perry, et. al

NATURAL SERVICE WITH CIDR



Perry, et. al **P < 0.05**

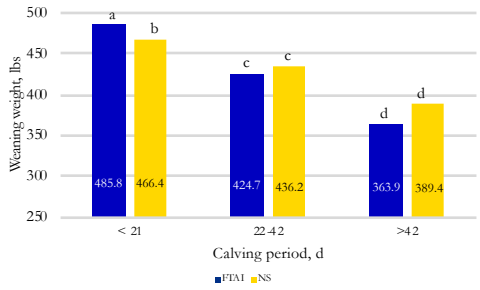
EFFECT OF NATURAL SERVICE OR FIXED-TIME AI ON CALVING DISTRIBUTION



a,b P < 0.05

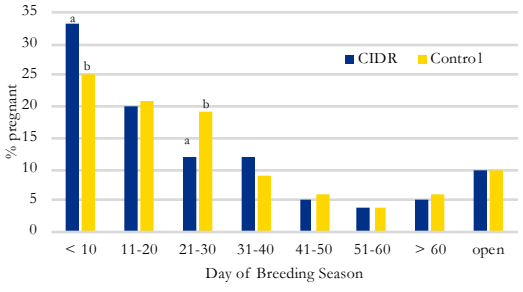
Steichen et al. 2013

EFFECT OF TREATMENT AND CALVING PERIOD ON WEANING WEIGHT OF CALVE



Steichen et al. 2013

PROPORTION OF COWS CONCEIVING AT VARIOUS INTERVALS OF THE BREEDING SEASON FOR COWS IN CONTROL OR CIDR TREATMENTS



Lamb et al., 2008

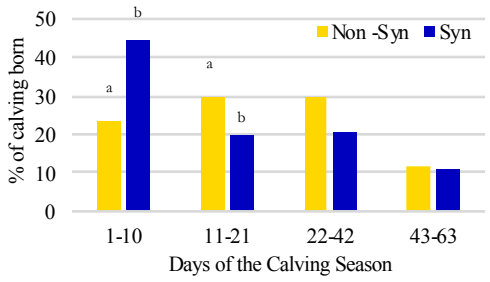
POUNDS WEANED

- The single largest factor that impacts weaning weight is pounds of calf weaned
- 2.42 pounds of calf weight is lost for each day after the start of the calving season
  - Based on 3,700 calves at US-MARC

SDSU REPRODUCTIVE TECHNOLOGIES

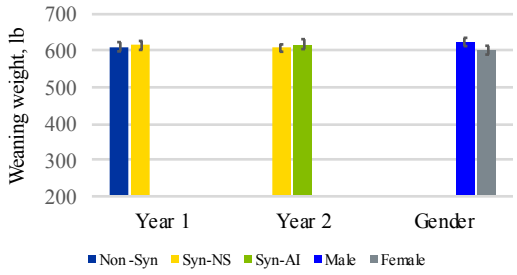
- Level 1
  - Non-synchronization – Natural Service
  - Synchronization – Natural Service
- Level 2
  - Synchronization – Natural Service
  - Synchronization – AI
- Level 3
  - Synchronization – AI
  - Synchronization – AI (Gender-sorted semen)
- Conducted at 10 locations

CALVING DISTRIBUTION OF SYNCHRONIZATION AND NON-SYNCHRONIZATION FEMALES



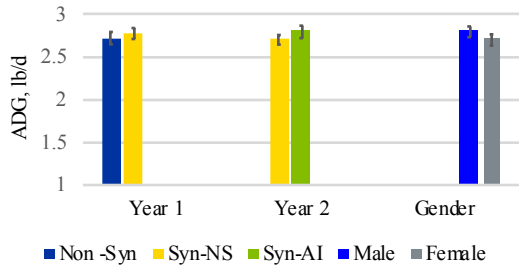
Walker et al., 2018

CALF WEANING WEIGHT BY TREATMENT AND GENDER



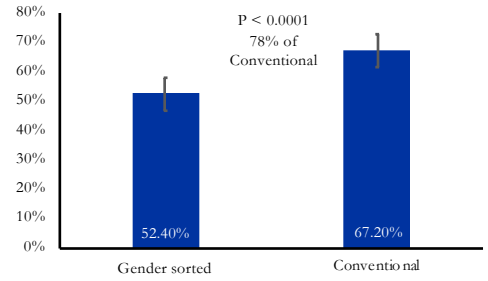
Walker et al., 2018

CALF PRE-WEANING ADG BY TREATMENT AND GENDER



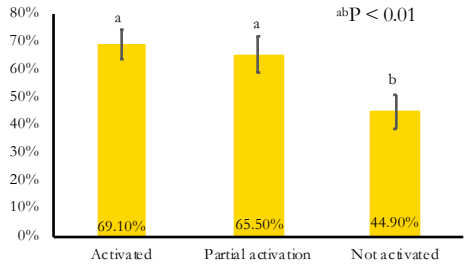
Walker et al., 2018

PREGNANCY SUCCESS – SEMEN TYPE



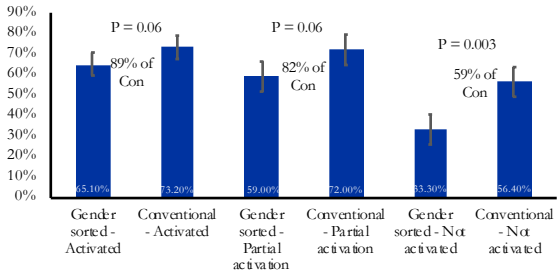
Perry, et al. 2018

PREGNANCY SUCCESS – ESTRUS



Perry, et al. 2018

PREGNANCY SUCCESS – SEMEN TYPE BY ESTRUS EXPRESSION



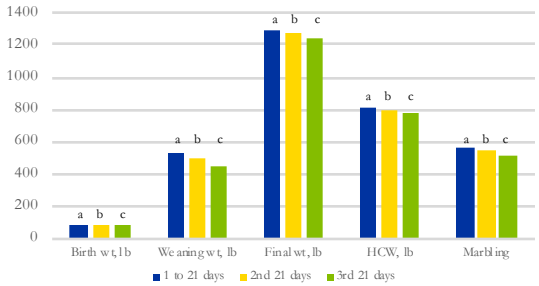
Perry, et al. 2018

INCREASE BEEF PRODUCTION

- March-born, composite Red Angus × Simmental steers (n = 771) were classified as being born in the first, second, or third 21-d period of the calving season within year.
- Steers were slaughtered at a commercial abattoir when 12th rib fat cover was visually assessed to be approximately 1.25 cm.

Funston et al., 2012.

CALVING PERIOD IMPROVED STEER (SON) PERFORMANCE



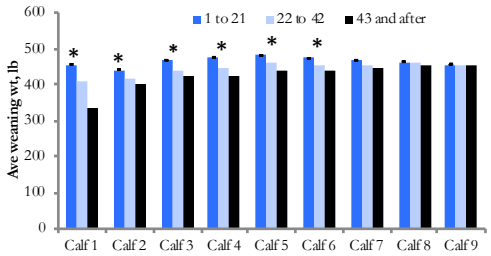
Funston et al., 2012.

CARCASS VALUE

	Calving Period 1	Calving Period 2	Calving Period 3
Carcass Value	0 ($1,114)	-$25 ($1,089)	-$74 ($1040)

Funston et al., 2012

CALF WEANING WEIGHTS BASED ON HEIFER CALVING PERIOD DURING THEIR 1ST CALVING SEASON



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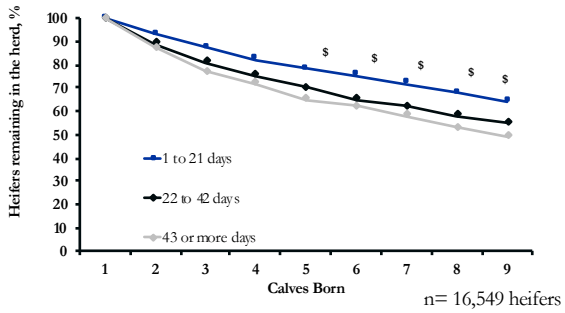
Cushman et al., 2013

ADVANTAGES OF CALVING EARLY AS A HEIFER



n= 16,549 heifers

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Cushman et al., 2013.

CONCLUSION

- Estrous synchronization with natural service or AI can allow for more calves being born early in the calving season
- AI along with sire selection of genetically superior bulls increase the quality of the product
- Using gender-sorted semen with females that are expressing estrus, will maximize conception rates and improve the skew of gender ratio
- Early born calves has potential to increase feedlot performance
- Heifers calving in the first 21days has potential to improve longevity in the herds as well as pounds of weaned calves

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