GENDER SORTED SEMEN IN COMMERCIAL BEEF OPERATION UTILIZING A 5 DAY CO-SYNCH PROTOCOL

WEST ALABAMA PROJECT

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- Artificial Insemination
- Estrus Synchronization
- Sexed Semen/ Gender Sorted Semen
- West Alabama Project

Artificial Insemination

- Artificial insemination (AI) provides the availability of outstanding bulls to optimize genetic improvement.

The use of AI allows seedstock producers to rapidly and cost effectively propagate superior genetics.

Purchasing and maintaining fewer bulls when AI is used can decrease costs and bull management headaches as well.

Use of a tighter breeding season and proven calving ease bulls as part of an AI program can also result in lower labor costs.

Artificial Insemination

- Genetic differences between animals can be more rapidly and accurately identified, since AI allows sires to potentially produce more offspring in more environments.
- The accuracy of EPDs on heavily used AI bulls is much higher than natural service sires because more information is going into the calculation of EPDs.
- The performance information on these high accuracy bulls is more reliable. This can accelerate genetic progress.
- Record keeping is also often improved when AI is used, since someone must be present at breeding.

AI advantages in commercial operations include:

- Heavier calves due to earlier average birth dates
- Improved genetics in calves for market and females raised for replacement
- Increased calf crop uniformity with use of fewer sires and a shorter breeding season.
- Purchasing and maintaining fewer bulls when AI is used can decrease costs and bull management headaches as well.

Artificial Insemination… "must haves…"

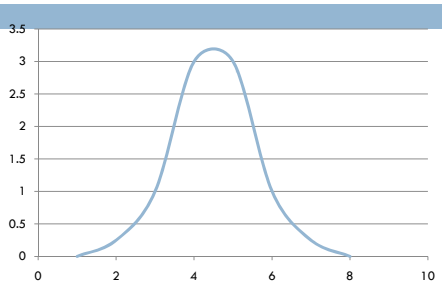
- Artificial insemination takes advance planning.
- Cattle must be in good nutritional and health status for acceptable AI conception rates.
- Adequate facilities need to be in place prior to beginning an AI program as well.
- Effective heat detection is critical for a successful AI program.

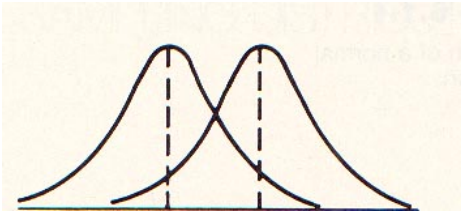
Estrus Synchronization

- Estrus synchronization is manipulation of the bovine estrous cycle to result in the majority of animals exhibiting standing estrus in a short period of time.
- It is a very effective method to increase the proportion of animals that are bred at the beginning of the breeding season.
- Reproductive failure is a major source of economic loss in the beef industry. The majority of this loss occurs because cows do not become pregnant during a defined breeding season.

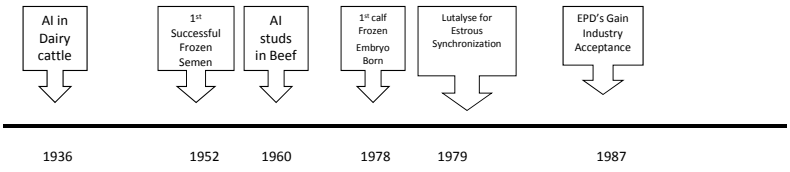
Estrus Synchronization

- Research demonstrates estrous synchronization in cows can improve calving distribution and progeny value.
- Synchronizing estrous is a tool that can be used to concentrate when animals exhibit estrus and potentially concentrate calving distribution.
- Shortened calving periods result in more efficient use of labor inputs for calving and vaccinations and increased returns on feed inputs.
- Cow nutrition can be optimized by grouping cows according to stage of gestation and feeding each group accordingly.





Beef Reproduction Timeline



Sexed Semen

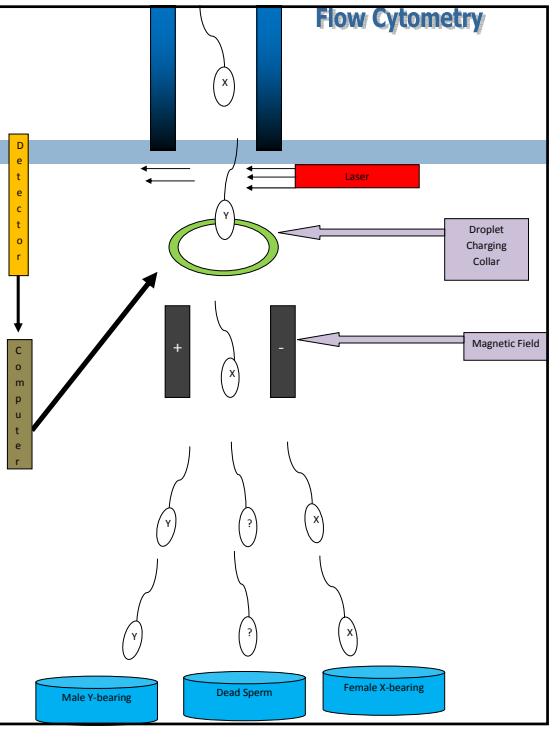
- In the late 1980s, the flow-cytometry sorting method developed by USDA showed major promise that male and female sperm could be sorted effectively.
- While the method to sort sperm cells by gender was reliable, the process was inefficient and caused damage to sperm cells resulting in compromised conception during field use.

Gender Sorted Semen

- In the late 1990s, Select Sires initiated studies with XY Inc., Fort Collins, Colo., official USDA patent licensee, to assist in research and development trials aimed at bringing sexing technology to the point of successful commercial application.
- In October of 2005, after years of extensive research, Select Sires became the first major A.I. company in North America to market sexed semen.

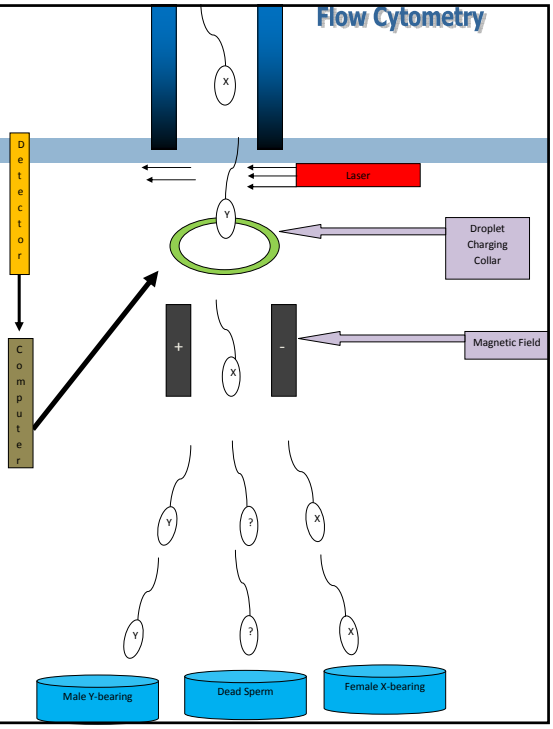
- In 2005, Select Sires and Sexing Technologies conducted additional field trials focused on fertility and market acceptance.
- These trials were conducted in a random sample of herds with average or better reproductive efficiency in order to accurately assess product performance for the "average producer."
- Trial results along with commentary from participating herds made it clear that it was time to move forward with marketing the *gender* SELECTed product.

- The semen has to be stained with a fluorescent dye and sent through the flow-cytometer at 60mph, under 40-60 psi of pressure.
- The X-chromosome is 3-4% larger than the Y-chromosome, so it emits more light.
- A laser detects the gender of the sperm, and the X and Y chromosomes are separated by assigning either a positive or negative charge to the sperm as they pass through the flow cytometer as single droplets of liquid.
- The sperm are then split into three different groups: positively charged sperm containing one sex go one way, negatively charged sperm containing the other sex go another way, and anything of undefined sex passes straight through.
- This procedure is determined to be about 90% accurate.



Flow Cytometry

- However, there are limitations to flow cytometry.
- The process is slow, and only about 30% of the sperm are properly oriented to pass through the machine. Of the 30%, only half are females.
- Therefore, only 15% of the sperm passing though the machine can be used for a marketable product.
- Due to slow sorting speed, sperm numbers per straw are lower.
- Also, the cost of the flow cytometry machine is about $250,000, making the straws of semen more expensive as well.
- Reduced conception rates are expected when using gender-sorted semen because sperm can be slightly damaged during separation.
- Herds that normally run 60-65% conception in virgin heifers should expect a conception rate of 35-45% with sexed semen.



Selective Use

- Because the process of gender-sorting semen is not perfect, there are limitations and recommendations for its use.
- At this time, it is recommended that sexed semen be used *in virgin heifers only*, and these herds must have greater than 60% conception rate.
- Sexed semen is not a band-aid for poor reproductive performance. Also, only highly experienced technicians should perform AI with sexed semen.
- *Lastly, sexed semen is not yet recommended for use in lactating cows, or when flushing for embryo transfer (due to already reduced conception rates with sexed semen).*

Obvious benefits of using sexed semen

- It increases the chances of heifer calves from about 50% to about 90%. More heifers being born on the farm is a fast way to grow a herd internally.
- Additionally, heifer calves are usually easier to deliver than bulls, so calving ease is another benefit.
- While each pregnancy is important, so is genetic progress. Each calf born should be genetically superior to her dam.

Stephens Farms

- Donny and Pat Stephens

- Browns, AL
- 122 Angus and Sim-Angus cross cows
- ¼ to ½ Simmental or Angus
- 90 day calving Sept.- Nov.
- 70-95 replacement heifers are developed yearly.
- Marketing heifers through Alabama BCIA, Sunshine Farms and private treaty.

• Replacement heifers failing to breed and cull feeder steers are fed out on the farm in the "Stephens Farm Freezer Beef Program" started by Donny's father in the early 1980s.

Stephens Farms

- Feeder calves are marketed through the Alabama Feeder Calf Marketing Association tele-auction sale.
- 93 % calved in the first 63 days.
- 90 Steers 25% > 920 lbs brought $1000 or more.

STEPHENS FARMS BENEFITS OF USING SEXED SEMEN

- The ability to select the gender of calves and the education of working with programs like this.
- Keeping replacement females from certain cows/bulls, or making high quality steers from a terminal cross.
- I want my best cows to all have heifers, enabling me to keep more good females and cull more deeply. This can give faster genetic progress in improving your cow herd.

- Grand Master
- B/R New Day 454
- Limelight

7SM56 SS EBONYS GRANDMASTER

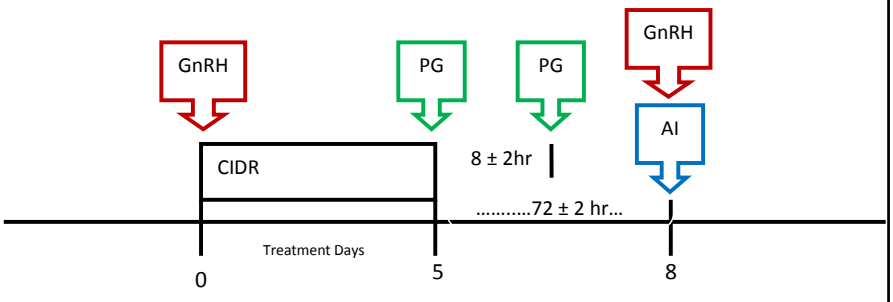
Spring 2010 ASA Sire Summary

	CE	BW	WW	YW	MCE	Milk	MWW	Stay	CW	YG	Marb	Fat	REA	API	TI
EPD	19.9	-10.4	54.6	87.8	-4.6	5.6	32.9	24.6	-1.7	0.04	-0.1	0.05	0.23	153	85
Acc	0.35	0.73	0.58	0.51	0.18	0.31	0.32	0.18	0.43	0.24	0.23	0.25	0.23		
% Rank	1	1	1	1			1	10					25	1	1

5-day CO-Synch + CIDR®

Perform TAI at 72 ± 2 hr after 1st PG with GnRH at TAI.

Two injections of PG 8 ± 2 hr apart are required for this protocol.



The Program…

- 55 Sim-Angus Cows 55 Sim- Angus Heifers
- 5-day Co-Synch + CIDR® Protocol- *ONLY RECCOMENDED FOR COWS*
- Bred on heat to 80 hours.
- GnRH @ TAI
- Treatment was alternated between conventional and gender selected semen for both cows and heifers.
- Pregnancy diagnosis on day 35 with ultrasound.
- Pregnancy diagnosis on day 90 with ultrasound.

- Random design- cattle in chute bred conventional, next cattle bred with sexed.
- Technicians stayed the same at all positions- breeding, thawing, shots, etc

Results

- Pregnancy diagnosis on day 35 with ultrasound.
- Heifers conventional semen 21/29 bred -72.4%
- Heifers sexed semen 9/26 bred -34.6%
- Cows conventional semen 20/27 bred -74.1%
- Cows sexed semen 12/28 bred -42.9%

Costs of Estrus Synchronization and AI (does not include labor, technician, etc…)

	QTY		Freight	Qty Needed	Cost
Insemination Gun	1	$34.95		1	$34.95
Sheaths	50	$3.95		2	$7.90
Gloves	100	$17.95		1	$17.95
OB Lube	1	$8.95	$10.37	1	$8.95
CIDRS	10	$101.95		11	$1,121.45
CIDR Applicator	1	$14.49		1	$14.49
Lutalyse	20	$53.39		6	$320.34
Cystorelin	5	$14.45		24	$346.80
			$10.37		$1,872.83

Total **$1,883.20**

55 **Cows**
55 **Heifer**

Per Cow	$17.12	**Per Cow**	$17.12
Sexed Semen Cost	$50.00	**Conventional Semen Cost**	$20.00
Total	**$67.12**	**Total**	**$37.12**

Cost of Natural Service Pregnancy Johnson et al. 2003

- Bulls ranged in price from $1500 to $3000
- Bull to Cow ratio ranged from 1:15 to 1:50
- Assumptions included bull use of 4 seasons; 10 % death loss; 9% interest rate; 94 % pregnancy rate
- Annual Bull maintainence costs are variable and increasing feed costs by $100 increased pregnancy cost from$2.22-$7.41 for high and low bull to cow ratios.
- Cost per pregnancy ranged from $15.98 to $90.51 depending on purchase price and bull to cow ratio.

Bull Purchase Price

Cows Exposed per Year	1500	1700	2000	2300	2500	3000
15	53.27	58.24	65.69	73.13	78.10	90.51
20	39.96	43.68	49.26	54.85	58.57	67.88
25	31.96	34.94	39.41	43.88	46.86	54.30
30	26.64	29.12	32.84	36.57	39.05	45.25
35	22.83	24.96	28.15	31.34	33.47	38.79
40	19.98	21.84	24.63	27.42	29.29	33.94
50	15.98	17.47	19.71	21.94	23.43	27.15

Discussion

- Use of Estrus Synchronization and AI (ESAI) will alter cost per pregnancy.
- Implementation of ESAI can increase returns by: increasing the weaning weight of the calves, uniformity of the calf crop and improving cow productivity by enhancing the number of high quality replacement heifers.
- Alternatively, ESAI increases costs due to synchronization products and supplies, labor, technician and perhaps facilities.

Anderson et. al 2003

Discussion

- Several factors affect the cost per pregnancy of ESAI program: Conception rate, labor, semen cost.
- Incorporating ESAI *should* increase the percentage of cows calved, percent calf crop weaned, and the average weight to steer calves.

Anderson et. al 2003

We anticipate that productivity and profitability will continue to increase as the AI sired females enter the breeding herd.

We hope that gender selection can continue and pregnancy rates can improve.

- A number of new sex-sorting technologies and companies have recently appeared.
- If the sex-sorting technology is not based on flow-cytometry and the patents developed by USDA, you should ask for scientific evidence that the procedure can, in fact, sort sperm.

Keys to Success

- Gender SELECTed semen requires a breeding gun to accomodate1/4cc straws.
- Straws are to be thawed and handled identical to their 1/2cc counterparts.
- However, the smaller diameter and compromised semen quality will make them much more sensitive to cold shock and error's in semen handling.

To Maximize Potential for Success

- Thaw straws in 95 F water bath for 45 seconds.
- Semen thawing and handling environments should be warm and draft free.
- Warm all semen handling equipment including guns, sheaths, and paper towels prior to contacting straws.
- Only highly experienced technicians should use this product.
- Use in only well-managed, virgin heifers that have achieved greater than 60 percent of their mature weight by 14 months and are in moderate or better body condition.

To Maximize Potential for Success

- Inseminate heifers 8 to 12 hours after observed estrus (AM/PM Rule). Once-a-day A.I. programs are not conducive to optimum results.
- Use of estrus synchronization and breeding to observed estrus is encouraged, but use of timed A.I. in the absence of observed estrus is discouraged.