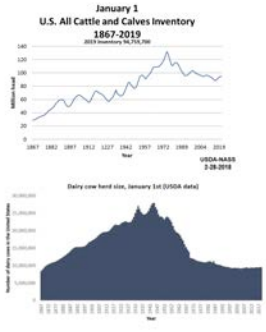
1

If herd sizes do not increase for 10 years, then additional methane is not added to the atmosphere.

UCDAVIS CLEAR Center



2

How many cows do you need to produce 30,000 lb of weaned calves?

-premise: weaning weight = 500lb
-# calves needed = 60

1st Scenario: 60% weaning rate (poor reproduction)

2nd Scenario: 90% weaning rate (excellent reproduction)

3

How many cows do you need to produce 30,000 lb of weaned calves?

-premise: weaning weight = 500lb
-# calves needed = 60

1st Scenario: 60% weaning rate: **100 cows needed**
(100 cows x 60% = 60 calves)

2nd Scenario: 90% weaning rate: **67 cows needed**
(67 cows x 90% = 60 calves)

4

How many cows do you need to produce 30,000 lb of weaned calves?

-premise: weaning weight = 500lb
-# calves needed = 60

1st Scenario: 60% weaning rate: 100 cows needed
(100 cows x 60% = 60 calves)

2nd Scenario: 90% weaning rate: 67 cows needed
(67 cows x 90% = 60 calves)

Conclusion: you may have **the same** total production with **less cows** that are **more efficient** reproductively. This means **less methane**.

5

How many females in reproduction do you need if you breed vs. don't breed yearling heifers?

-premise 1 : 100 females in reproduction
-premise 2: 20% replacement rate
-premise 3: 80% weaning rate
-Premisse 4: 500 lb weaning weight

6

How many females in reproduction do you need if you breed vs. don't breed yearling heifers?

-premise 1 : 100 females in reproduction
-premise 2: 20% replacement rate
-premise 3: 80% weaning rate
-Premisse 4: 500 lb weaning weight

Female Category	Breed yearlings	Don't breed yearlings
Mature cow	60	80
2 years-old heifer	20	20
Yearling heifer	20	20
Total females	**100**	**120**
Total breeding females	100	100
Total calf production	40,000 lb	40,000 lb

7

How many females in reproduction do you need if you breed vs. don't breed yearling heifers?

-premise 1 : 100 females in reproduction
-premise 2: 20% replacement rate
-premise 3: 80% weaning rate
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Yearling heifer	20	20
Total females	**100**	**120**
Total breeding females	100	100
Total calf production	40,000 lb	40,000 lb

Conclusion: you may have **the same** total production with **less females** if you **breed yearlings**. This means **less methane**.

8

Topics (and take-home message):

1. Reproductive efficiency.
Guiding principle: breeding early in the season is critical to maximize lifetime productivity.

2. Heifer fertility.
Guiding principle: puberty attainment prior to breeding is critical to yearling heifer fertility.

3. Reproductive technologies.
Guiding principles: Use of technology will benefit your cow-calf operation;
Apply gradually;
Have realistic expectations.

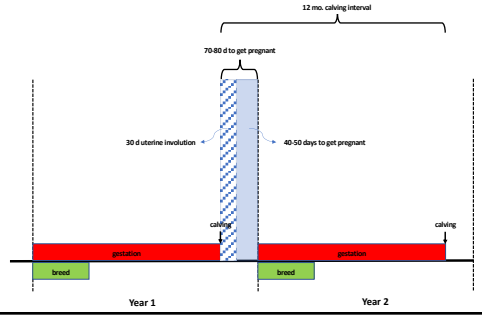
9

Increasing technological level

- Control of the breeding season
- Timed bull breeding
- AI + bull
- Timed AI + bull
- TAI + resynch +TAI
- Embryo transfer
- OPU + IVF + Embryo transfer

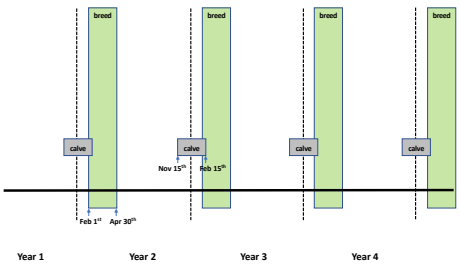
10

There is a 40-50 days window to get a cow pregnant in a 90-day breeding season, to keep a 12 mo. calving interval



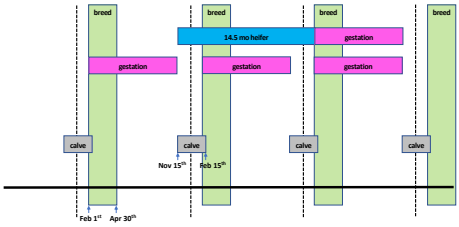
11

A multi-year scenario



12

A multi-year success scenario: dam and yearling heifer pregnant at the beginning of breeding season year 4



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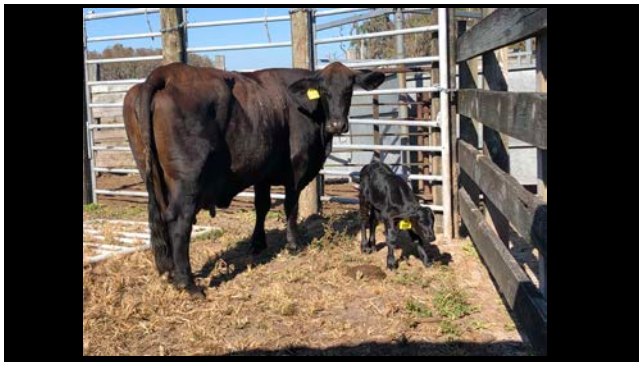
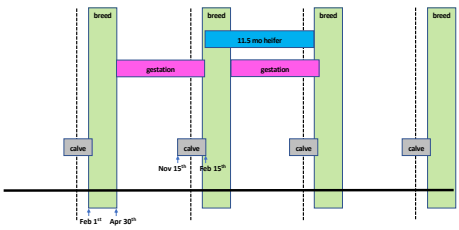


14

A multi-year challenging scenario: dam and yearling heifer not pregnant at the end of breeding season year 4



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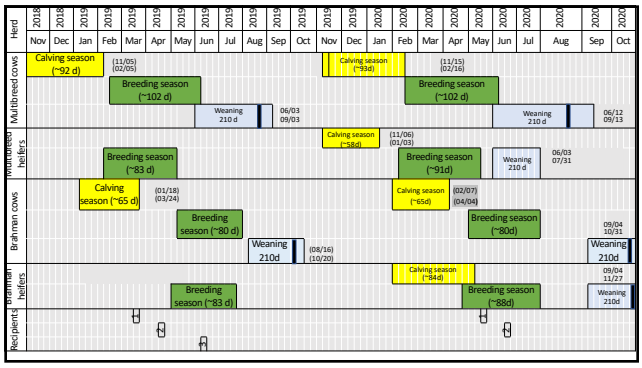


16

Control of the breeding season

Increasing technological level

Timed bull breeding

AI + bull

Timed AI + bull

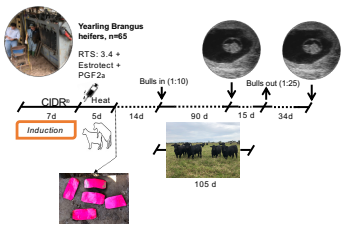
TAI + resynch +TAI

Embryo transfer

OPU + IVF + Embryo transfer

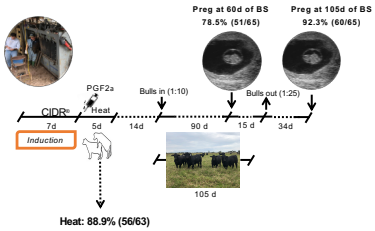
17

San Marino Ranch, Okeechobee, FL (2018-2019)



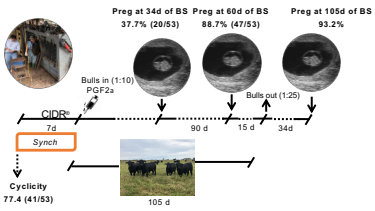
18

San Marino Ranch, Okeechobee, FL (2018-2019)



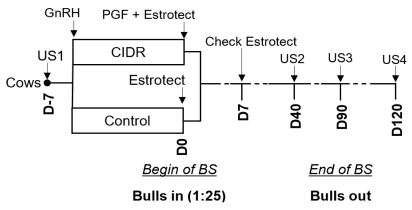
19

San Marino Ranch, Okeechobee, FL (2019-2020)



20

Using Timed Natural Breeding to increase early conception in the breeding season



21

Crossbred multiparous cows (n= 119 animals; Ona)

Obs: Pregnancy check at 90d was not performed (COVID).

Effect of Select Synch + CIDR followed by bull breeding on reproductive performance of crossbred multiparous cows (1 bull : 25 cows)

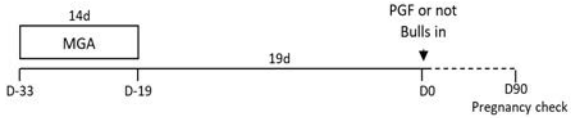
Variables	Treatments	
	No CIDR (n=59)	CIDR (n=60)
Cyclicity at beginning of BS, %	40.7	36.7
Estrus in 7d of BS, %	39.0	70.7
Pregnancy at 45d of BS, %	**28.8**	**41.7**
Presence of CL at 45d of BS, %	90.5	85.7
Pregnancy at the end of BS, %	**91.5**	**86.7**

22

How about MGA?

23

Case study 1 (WCC; Brangus heifers, n=195)



24

Case study 1 (WCC; Brangus heifers, n=195)

Effect of administration of prostaglandin analogue (Estrumate) 19 d after the end of a treatment with MGA for 14d on reproductive performance of yearling Brangus heifers serviced by bull.

Variables	NoPGF (n= 97)	PGF (n= 98)
Pregnancy at first 10 d of BS, %	38.1	33.7
Pregnancy at first 60 d of BS, %	75.30%	69.40%
Cyclicity at 90 d of BS, % (open heifer)	56.5	66.7

25

Case study 2 (Longino Ranch & Perry Cattle Co., Brangus heifers, n=135)

26

Case study 2 (Longino Ranch & Perry Cattle Co., Brangus heifers, n=135)

Table 1. Effect of administration of CIDR insertion on the protocol MGA-PG

Variables	Treatments	
	Non-CIDR	CIDR
Pregnancy to AI & TAI, %	51.1 (24/47)	46 (23/50)
Pregnancy to Bull, %	28.6 (6/21)	47.1 (8/17)
Final Pregnancy	92.6 (63/68)	89.6 (60/67)

27

Increasing technological level

Control of the breeding season

Timed bull breeding

AI + bull

Timed AI + bull

TAI + resynch +TAI

Embryo transfer

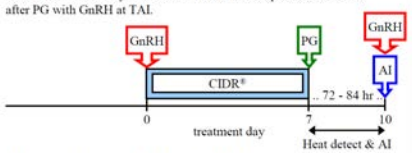
OPU + IVF + Embryo transfer

28

Protocol used at UF Gainesville Beef Units

Select Synch + CIDR® & TAI

Heat detect and AI day 7 to 10 and TAI all non-responders 72 - 84 hr after PG with GnRH at TAI.

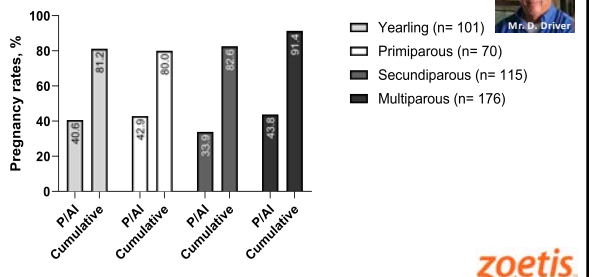


https://beefrepro.unl.edu/pdfs/Protocols%20for%20Sire%20Directories%202019.pdf

zoetis

29

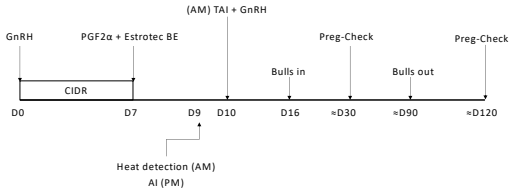
Pregnancy rates of UF-multibreed herd during breeding season 2020



zoetis

30

Protocol used at UF NFREC Beef Unit



31

Pregnancy rates of UF-NFREC herd during breeding season 2020

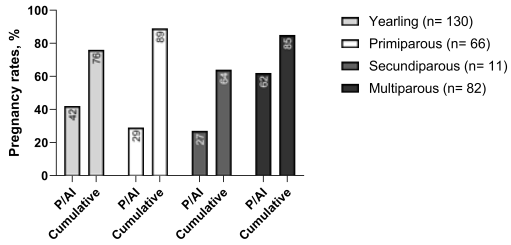


Fig 4. Pregnancy rates NFREC herd during breeding season 2020

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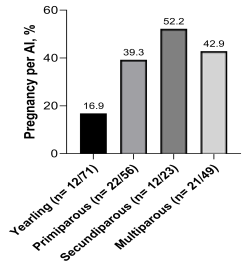
Pregnancy rates of UF-Brahman herd during breeding season 2020



zoetis

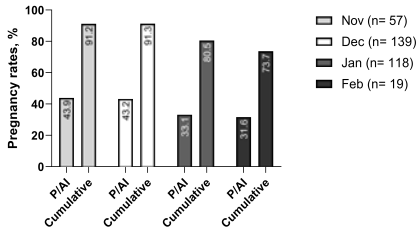
33

How well do cows that calved early in the calving season, do in the subsequent breeding season?

34

How well do cows that calved early in the calving season, do in the subsequent breeding season?

- *Data set: Multibreed herd 2020*



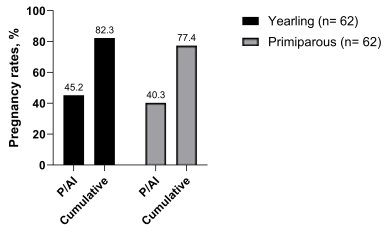
35

How well does a heifer that was bred as a yearling do as a first calf-heifer in terms of pregnancy?

36

How well does a heifer that was bred as a yearling do as a first calf-heifer in terms of pregnancy?

- Data set: Multibreed herd 2019/2020



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How much better do calves born early in the calving season do (weaning weight and fertility as heifer)?

38

How much better do calves born early in the calving season do (weaning weight and fertility as heifer)?

- Data set: Multibreed herd 2019 and 2020

Calving month	Age (d)	Weight (lb)	Reproductive performance	
			P/AI	Overall
Nov-Dec	411.9 ± 14.0	762.0 ± 89.5	40.1 (59/147)	80.3 (118/147)
Jan-Feb	366.7 ± 15.6	680.7 ± 81.4	40.0 (20/50)	76.0 (38/50)

39

Increasing technological level

Control of the breeding season

Timed bull breeding

AI + bull

Timed AI + bull

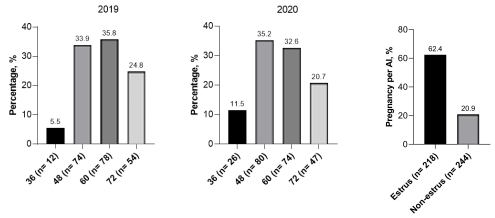
TAI + resynch +TAI

Embryo transfer

OPU + IVF + Embryo transfer

40

What is the moment of estrus after CIDR removal? Is split timed-AI viable?



41

Increasing technological level

Control of the breeding season

Timed bull breeding

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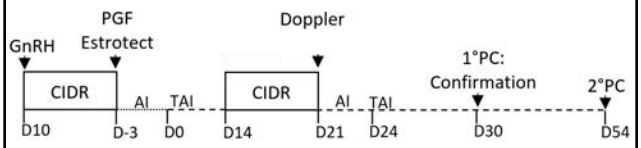
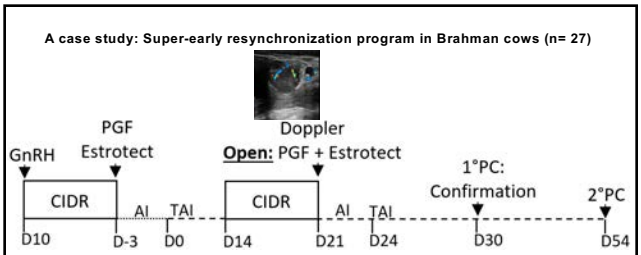
42

A case study: Super-early resynchronization program in Brahman cows (n= 27)



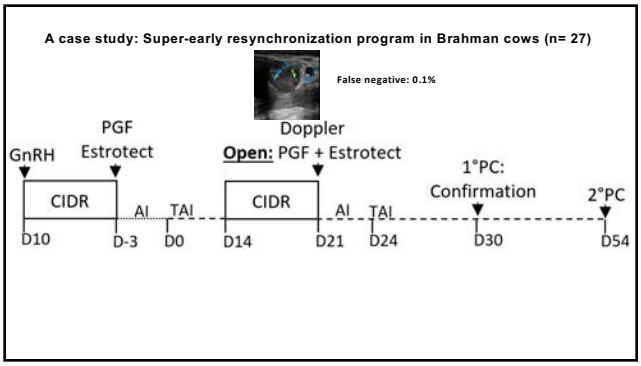
43

A case study: Super-early resynchronization program in Brahman cows (n= 27)



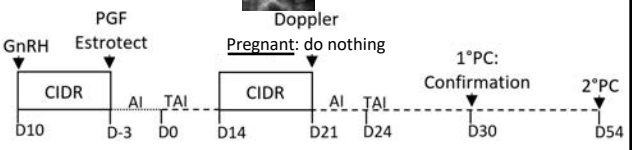
44

A case study: Super-early resynchronization program in Brahman cows (n= 27)



45

A case study: Super-early resynchronization program in Brahman cows (n= 27)



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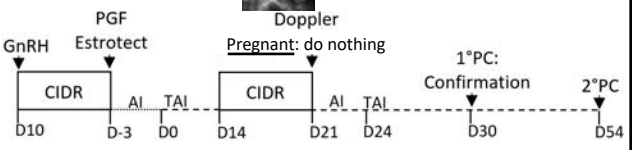
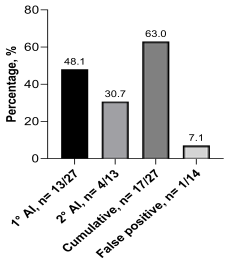
A case study: Super-early resynchronization program in Brahman cows (n= 27)

False positive: 10%



47

A case study: Super-early resynchronization in Brahman cows (n= 27)



Conclusion: 63% of cows were pregnant in first 24 days of the breeding season.

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Increasing technological level

- Control of the breeding season
- Timed bull breeding
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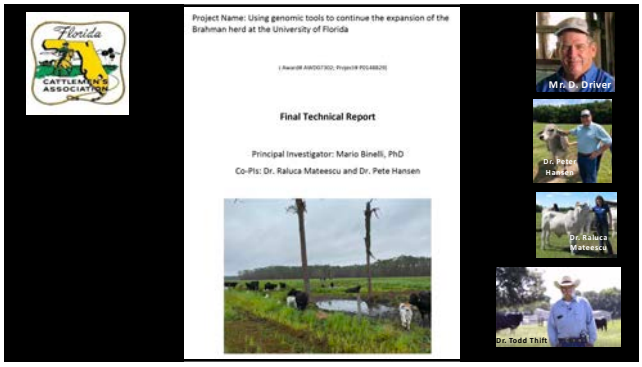
- Timed AI + bull
- TAI + resynch +TAI
- Embryo transfer
- **OPU + IVF + Embryo transfer**

49



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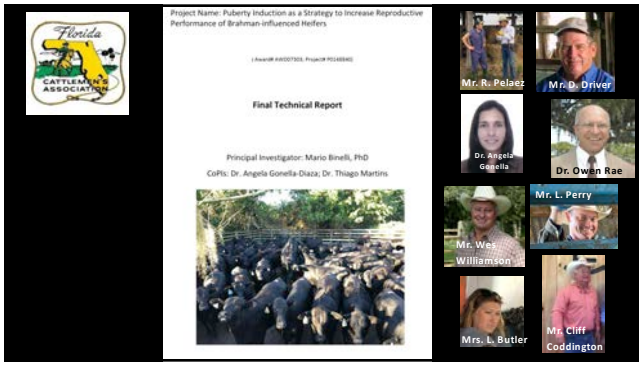

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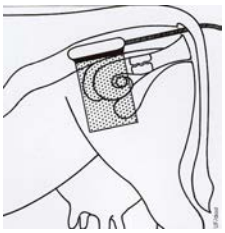
Pre-breeding heifer evaluation: Reproductive Tract Scores (RTS)



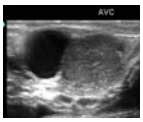


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Table 1
Uterine and ovarian measurements and descriptions for reproductive tract scores

RTS	Classification	Uterine Horn Diameter (mm)	Ovarian Length (mm)	Ovarian Height (mm)	Ovarian Width (mm)	Ovarian Structures
1	Prepubertal	<20 mm, no tone	15	10	8	No palpable follicles
2	Prepubertal	20–25 mm, no tone	18	12	10	8-mm follicles
3	Peripubertal	20–25 mm, slight tone	22	15	10	8–10-mm follicles
4	Pubertal	30 mm, good tone	30	16	12	>10-mm follicles, CL possible
5	Pubertal	>30 mm	>32	20	15	CL present

Data from Holm DE, Thompson PN, Irons PC. The value of reproductive tract scoring as a predictor of fertility and production outcomes in beef heifers. J Anim Sci 2009;87:1935.

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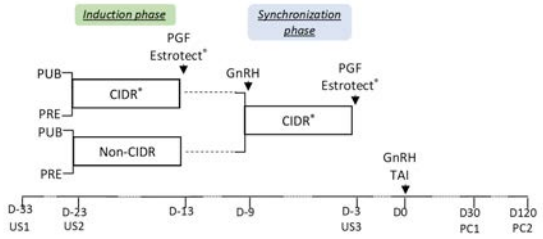

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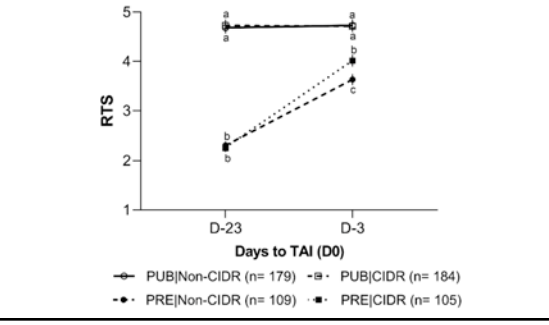

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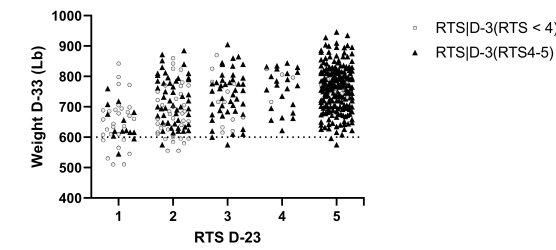
Relationship between RTS and body weight prior to the beginning of the breeding season for heifers that attained or did not attain puberty just prior to AI.



57

Relationship between RTS and body weight prior to the beginning of the breeding season for heifers that attained or did not attain puberty just prior to AI.

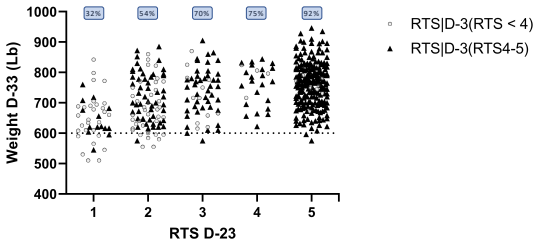


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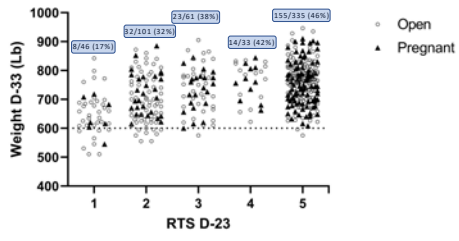
Table 1. Effect of a 10d-CIDR induction treatment on estrus response and pregnancy of *Bos indicus*-influenced heifers submitted to an estrus synchronization protocol.

Variable	PRE		PUB		P value		
	Non-CIDR	CIDR	Non-CIDR	CIDR	Status	Trt	Status*Trt
Estrus by TAI, % (n/n)	41.3 (45/109)	43.8 (46/105)	73.2 (131/179)	66.3 (122/184)	<0.001	0.54	0.22
P/AI, % (n/n)	29.4 (32/109)	30.5 (32/105)	50.8 (91/179)	42.4 (78/184)	<0.001	0.43	0.28

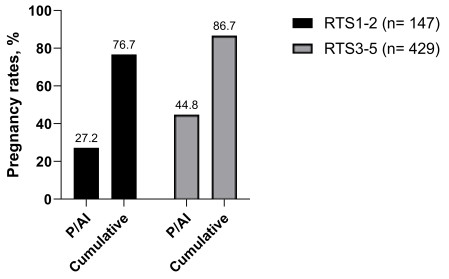
59

Relationship between RTS and body weight prior to the beginning of the breeding season for heifers that became or did not become pregnant to AI.



60

Relationship between RTS measured prior to the beginning of breeding season (D -23) and reproductive performance of heifers.



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UF IFAS Extension UNIVERSITY of FLORIDA

The "Who's My Heifer?" Program: Optimizing Replacement Beef Heifer Development in Florida (stay tuned…)

Proponents:

Mario Binelli, PhD (Animal Sciences, IFAS, UF – **Program Leader**)
Angela M. Gonella Diaza, DVM, PhD (NFREC, IFAS, UF)
Joao H. Jabur Bittar, DVM, PhD (Large Animal Clinical Sciences, CVM, UF)
Philipe Moriel, PhD (RCREC, IFAS, UF)
Livestock Agents (IFAS, UF)

Objective:

Establish a statewide system to generate, analyze and report information on the reproductive potential and performance of replacement beef heifers.

Activities in a nutshell (reproduction):

Pre-breeding season evaluation of **reproductive potential** (RTS) and breeding season evaluation of **performance** (preg check).

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The Specific Objective of this proposal was to discover non-genomic molecular markers (from blood samples) that will be used to predict early puberty in Brahman heifers.

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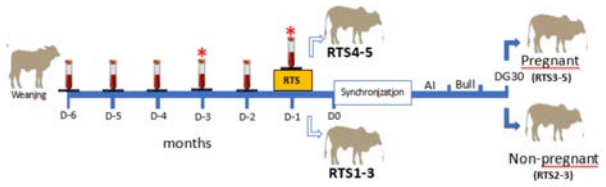

Fig. 1 – Schematic overview of the experiment. Seventy-four Brahman heifers were blood-sampled monthly from weaning to the one month before the beginning of the breeding season (D0) and submitted to an estrous synchronization protocol and artificial insemination. After a subsequent classification between Pubertal and Pre-pubertal heifers, samples collected at D-1 (10-13 months of age) and D-3 (8-11 months of age) were retrospectively submitted to metabolomics analyses to identify molecular markers of early puberty attainment.

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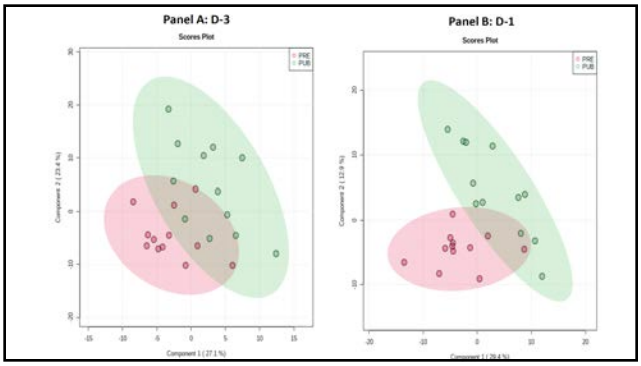

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Conclusions:

1. Reproductive and nutritional management of heifers and cows should aim to maximize pregnancies early in the breeding season.
2. Exposure to a synchronization protocol followed by natural breeding or AI increases pregnancies early in the breeding season.
3. Pre-breeding season evaluation by RTS provides a decision tool for heifer reproductive management.
4. Puberty can be induced by exposure to progesterone (or MGA).

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Come on over and visit us at UF!

(mario.binelli@ufl.edu)

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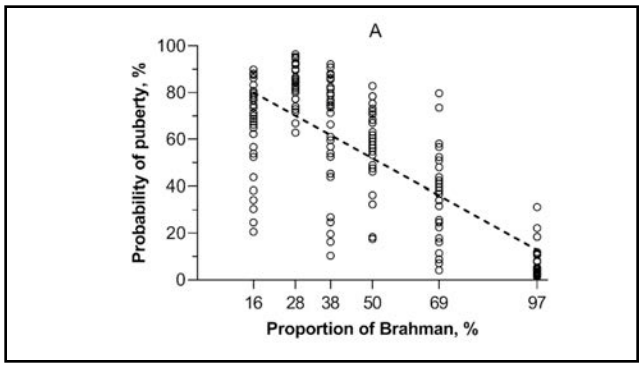
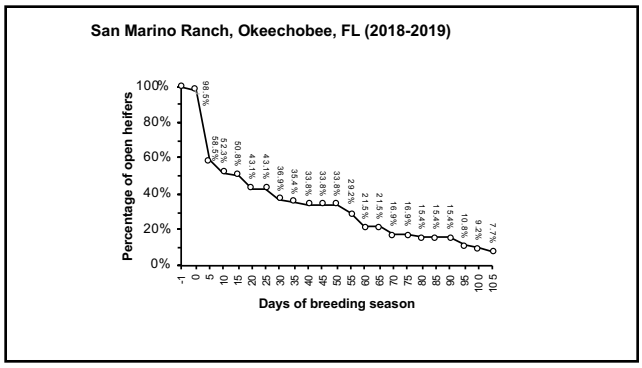
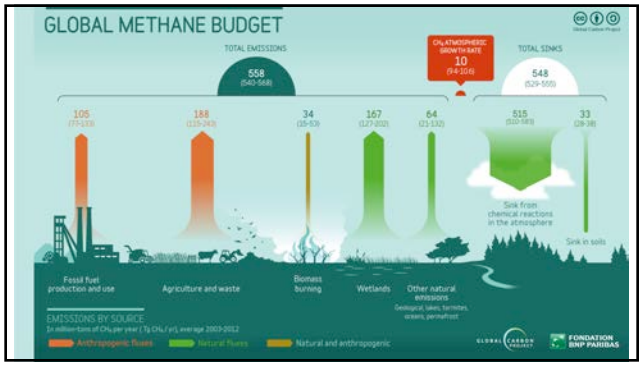

A
Probability of puberty, %
100
80
60
40
20
0
16
28
38
50
69
97
Proportion of Brahman, %

70


San Marino Ranch, Okeechobee, FL (2018-2019)
Percentage of open heifers
100%
80%
60%
40%
20%
0%
Days of breeding season

71


GLOBAL METHANE BUDGET
TOTAL EMISSIONS
558
(540-568)
CH4 ATMOSPHERIC GROWTH RATE
10
(9-10.6)
TOTAL SINKS
548
105
188
34
167
64
515
33
Sink from chemical reactions in the atmosphere
Sink in soils
Fossil fuel production and use
Agriculture and waste
Biomass burning
Wetlands
Other natural emissions
Geological, lakes, termites, oceans, permafrost
EMISSIONS BY SOURCE:
Anthropogenic fluxes
Natural fluxes
Natural and anthropogenic
FONDATION BNP PARIBAS

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Brangus heifers (n= 142 animals; WCC)

Obs: Pregnancy check at 120d was not performed (COVID).

Effect of Select Synch + CIDR followed by bull breeding on reproductive performance of yearling, Brangus heifers (1 bull : 20 heifers)

Variables	Treatments	
	Control (n=71)	CIDR (n= 71)
Cyclicity at beginning of BS, %	38.0	42.3
Pregnancy at first 10 d of BS, %	**15.5**	**22.5**
Cyclicity at 30 d of BS, %	51.7	50.9
Pregnancy at 60 d of BS, %	**60.30**	**63.40**
Cyclicity at 90 d of BS, %	51.90	69.20

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Brangus heifers (n= 142 animals; WCC)

Effect of Select Synch + CIDR followed by bull breeding on reproductive performance of yearling, Brangus heifers classified according to the RTS on the beginning of breeding season (BS)

Variables	RTS1-3		RTS5	
	Control (n= 43)	CIDR (n=41)	Control (n= 27)	CIDR (n= 30)
Weight at the beginning of BS (Lb)	758.5	754.6	816.3	796
Pregnancy at 10 d of BS, %	**2.3**	**14.6**	**37**	**33.3**
Cyclicity at 30 d of BS, %	35.7	28.6	88.2	90
Pregnancy at 60 d of BS, %	**43.9**	**46.3**	**84.6**	**86.7**
Cyclicity at 90 d of BS, %	50	63.6	60	100
Weight at 90d of BS (Lb)	781.9	773.0	849.8	834.5

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