



IMPACTO DA NUTRIÇÃO SOBRE A REPRODUÇÃO

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Background

- Uma das habilidades mais importantes das fêmeas é a capacidade de usar as reservas energéticas corporal durante períodos de balanço energético negativo (BEN)
- As fêmeas necessitam de reservas de energia adequadas (gordura corporal) para suprir o metabolismo basal, crescimento, lactação e função reprodutiva

(Edmonson et al., 1989; Wright et al., 1987)

Background

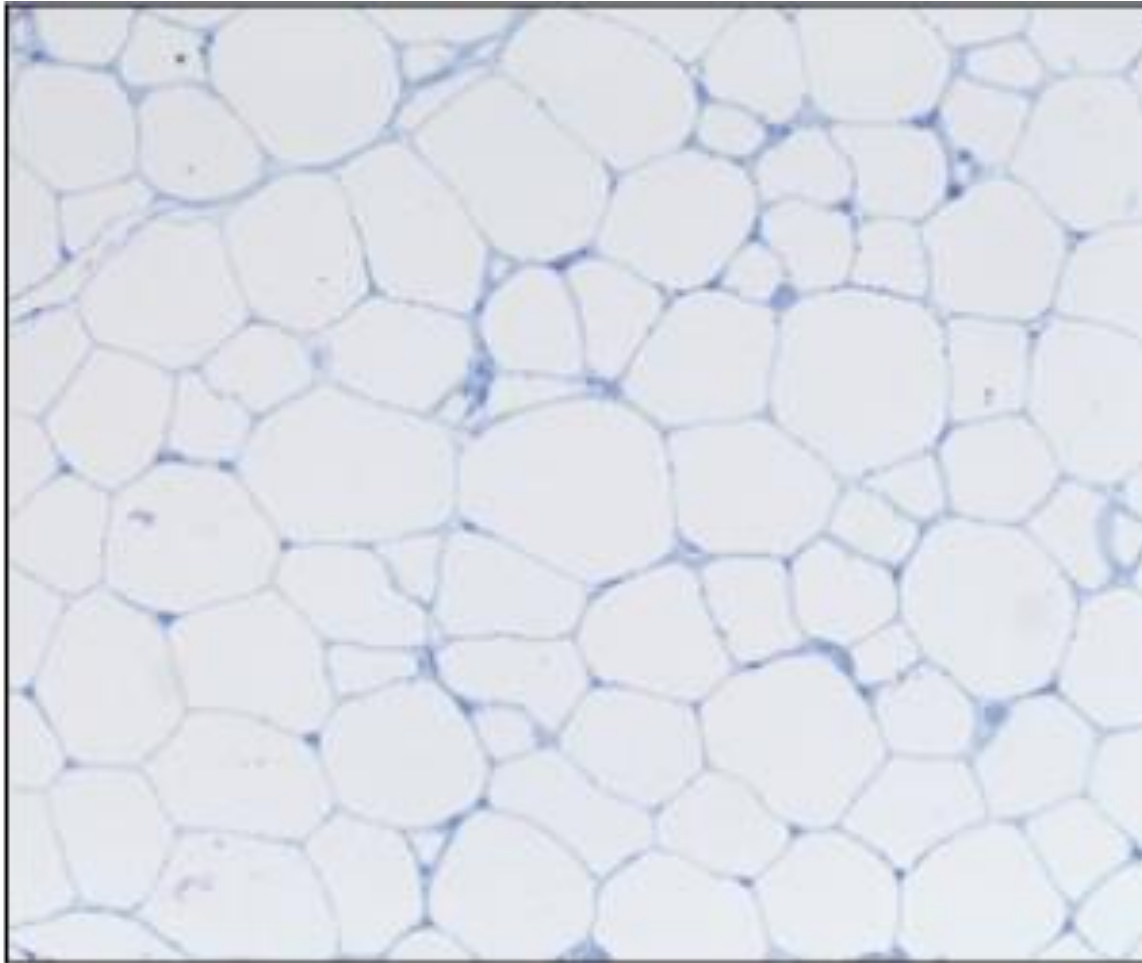
- Reservas inadequadas de energia corporal ao parto aumentam os dias para a concepção

(Richards et al., 1986; Selk et al., 1988)

- A avaliação da BCS (Body Condition Score) quantifica subjetivamente as reservas energéticas corporal, que resultam do estado nutricional

(Edmonson et al., 1989; Domecq et al., 1995; Ferguson et al., 1994)

Adipose (fat)



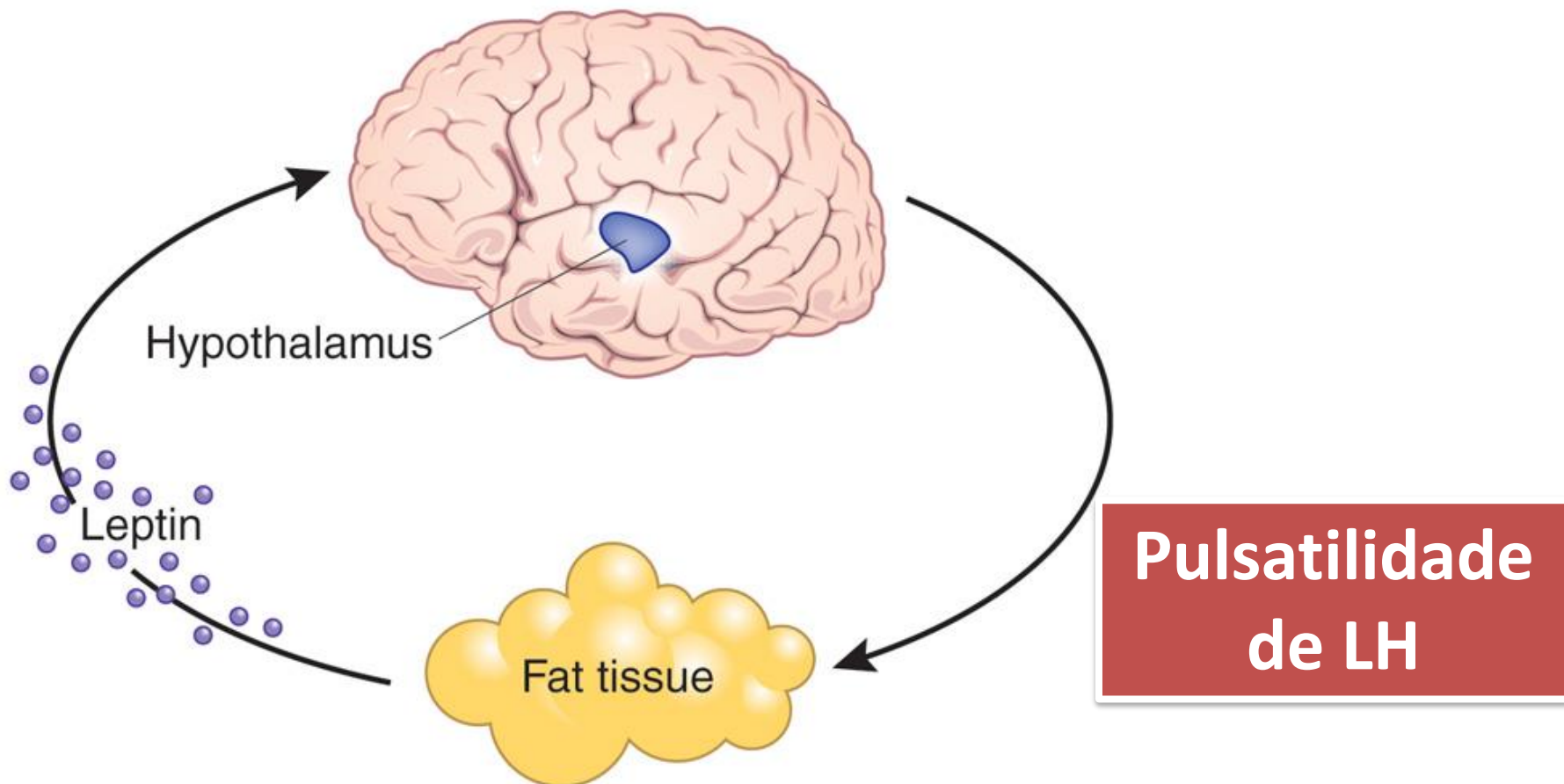
Glândula endócrina?

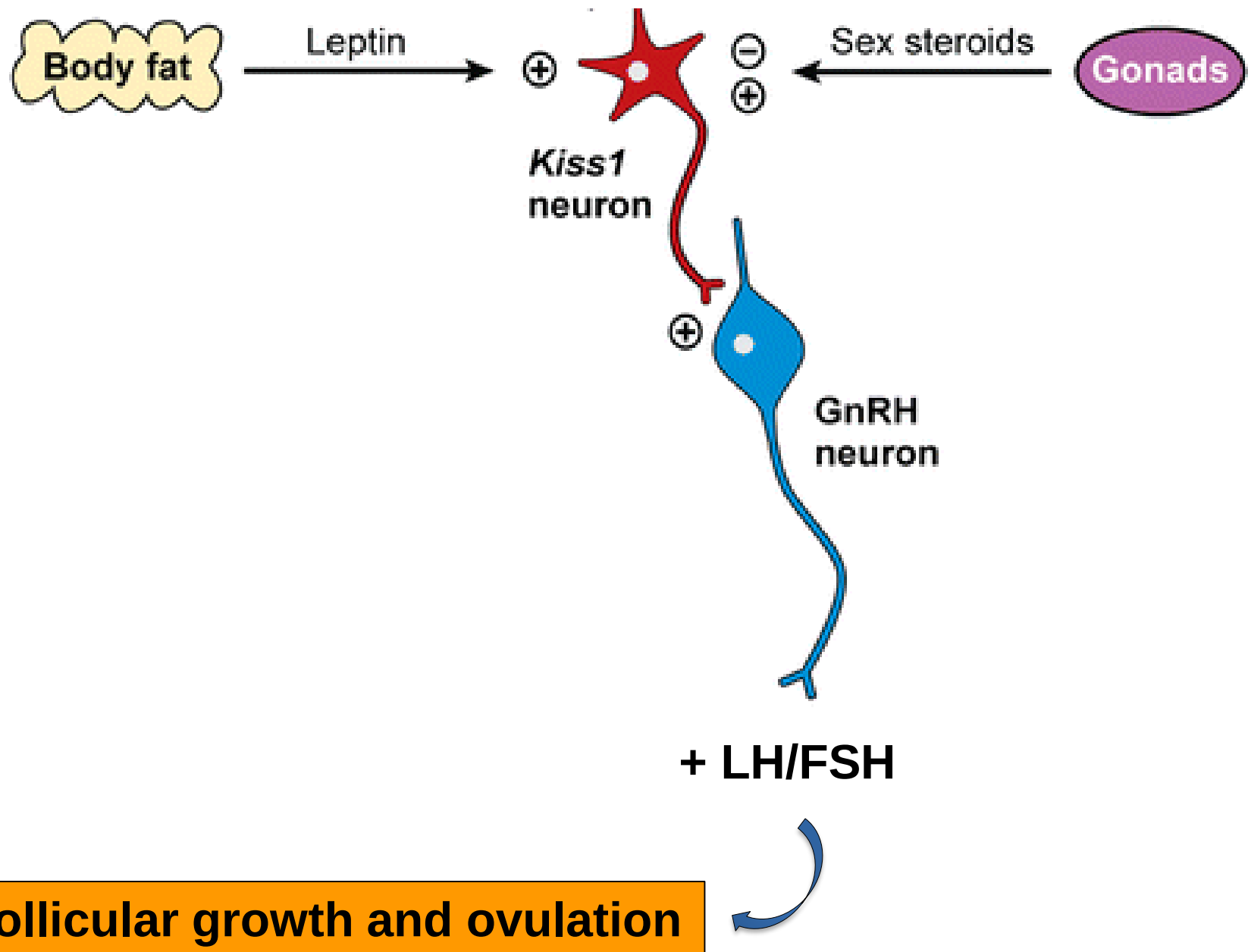
REPRODUCTION SYMPOSIUM: Hypothalamic neuropeptides and the nutritional programming of puberty in heifers

M. Amstalden, R. C. Cardoso, B. R. C. Alves and G. L. Williams

J ANIM SCI 2014, 92:3211-3222.

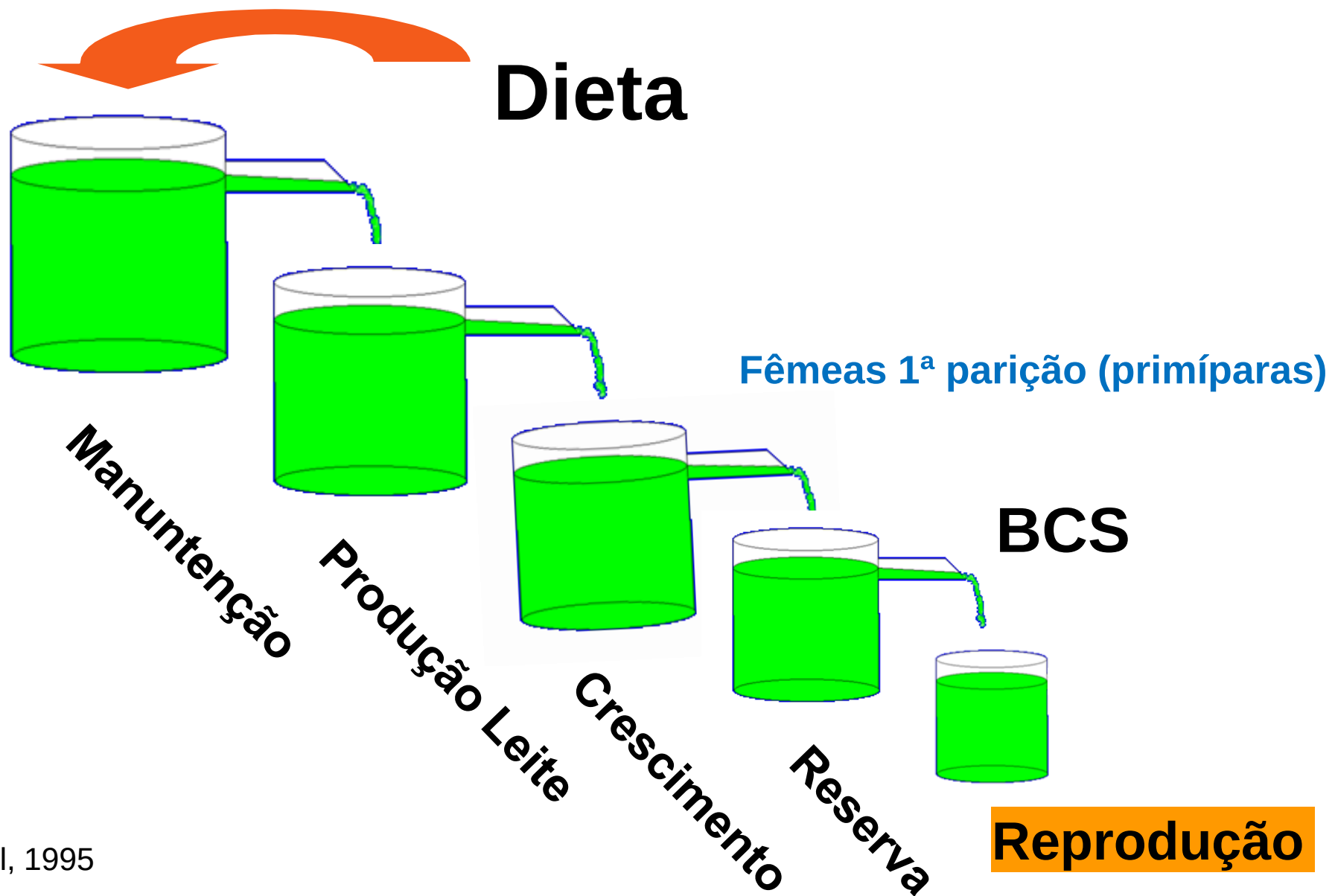
doi: 10.2527/jas.2014-7808 originally published online June 3, 2014



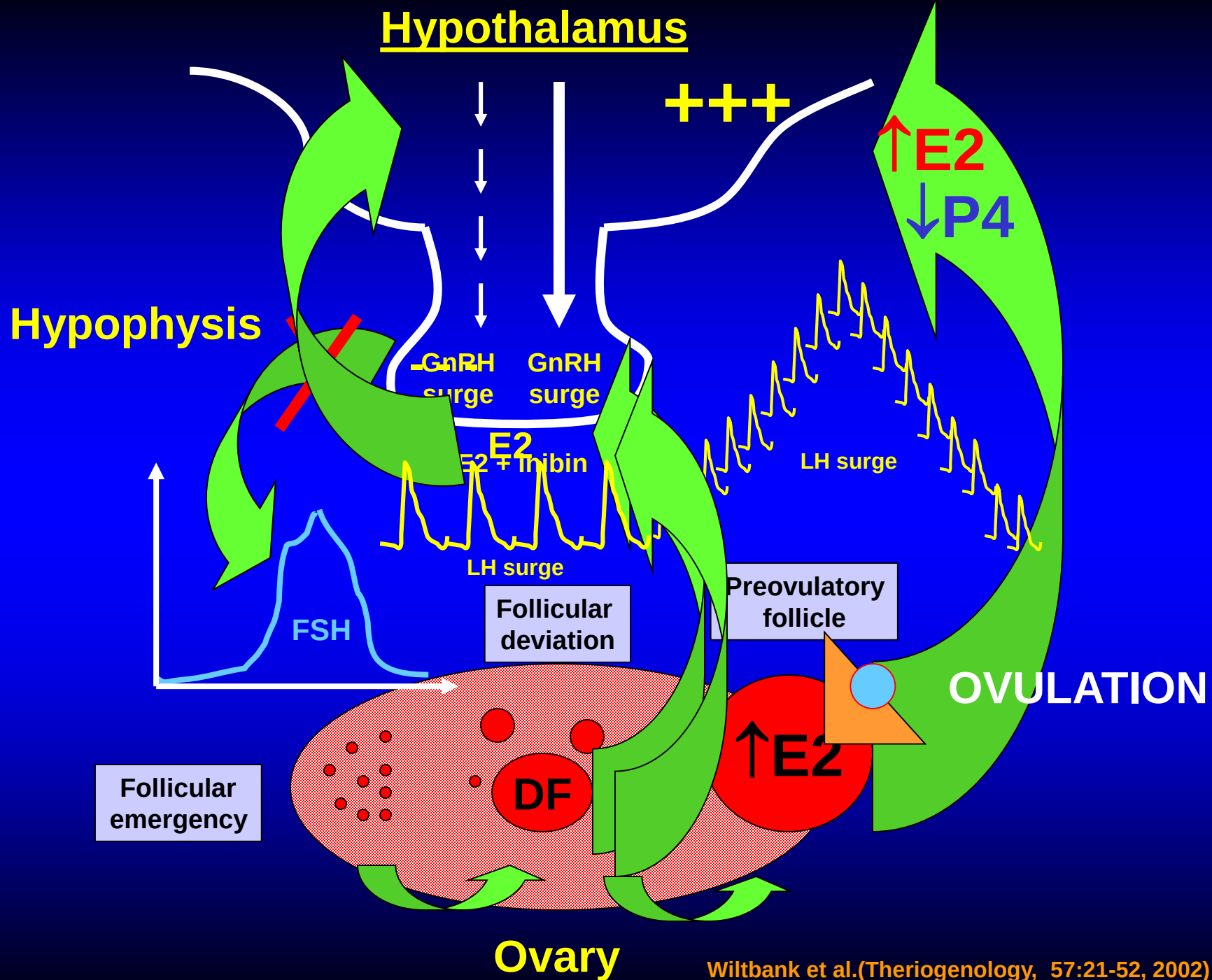


**Como a vaca direciona
o alimento ingerido
para reserva
energética corporal?**

NUTRIÇÃO E REPRODUÇÃO



Fisiopatologia do anestro pós parto

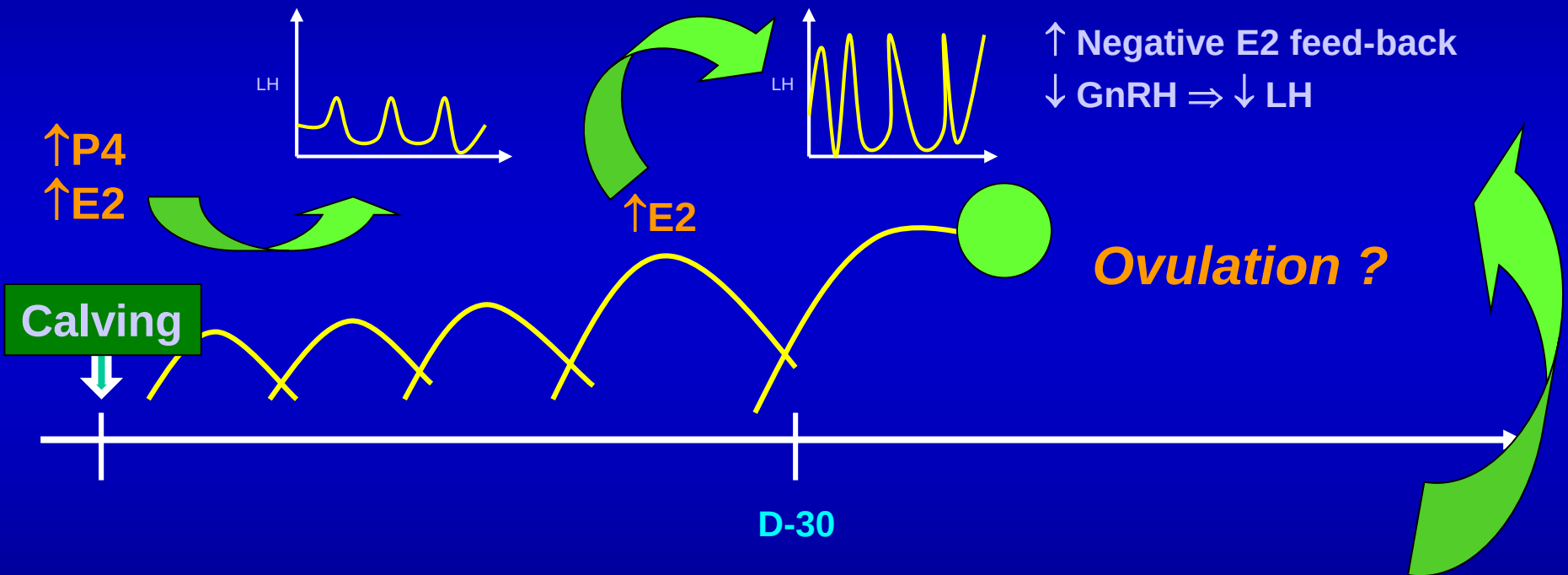


Follicular growth during reproductive life

Postpartum period

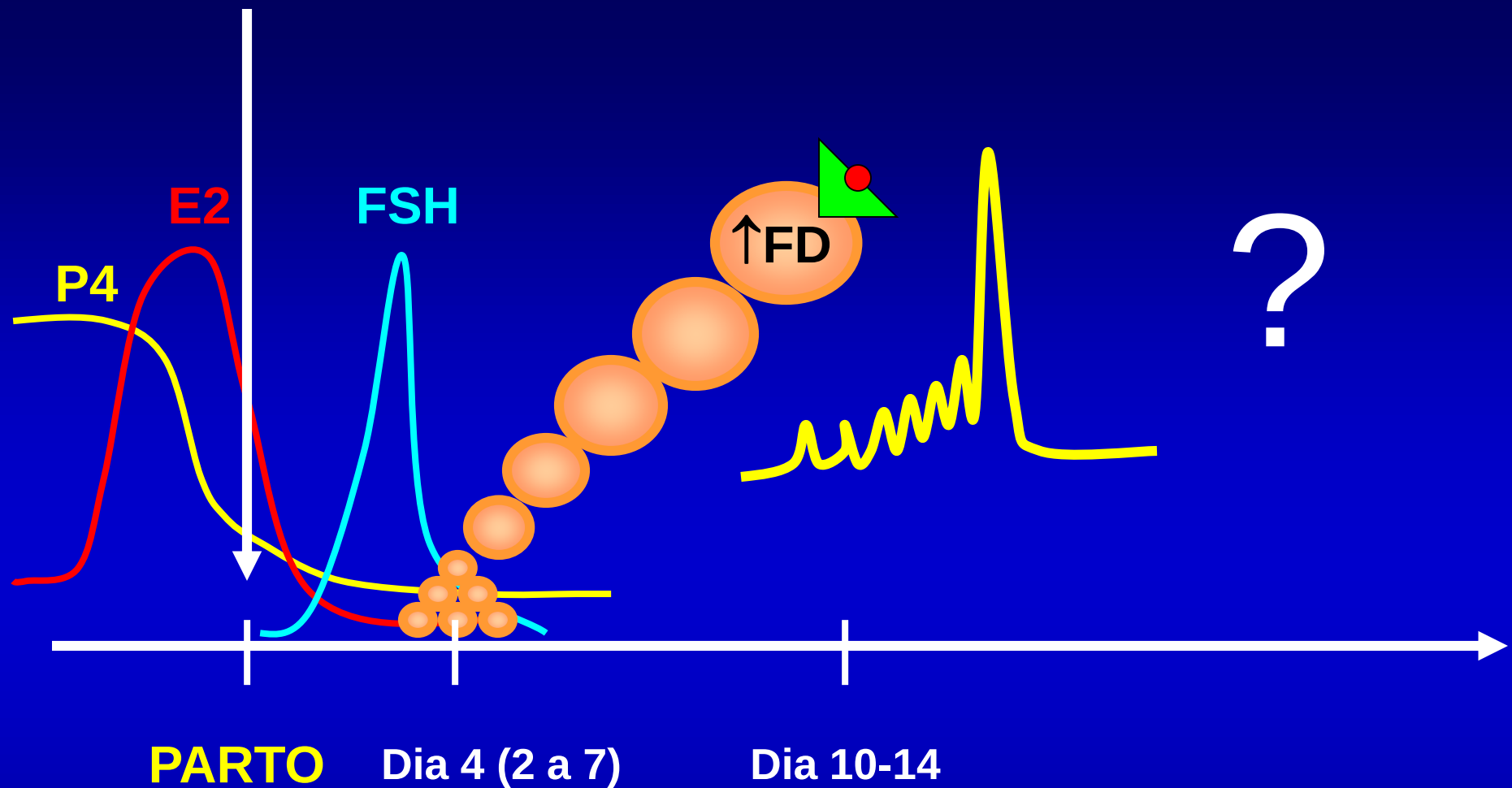
reduces pituitary stores of LH

Increase pituitary stores of LH



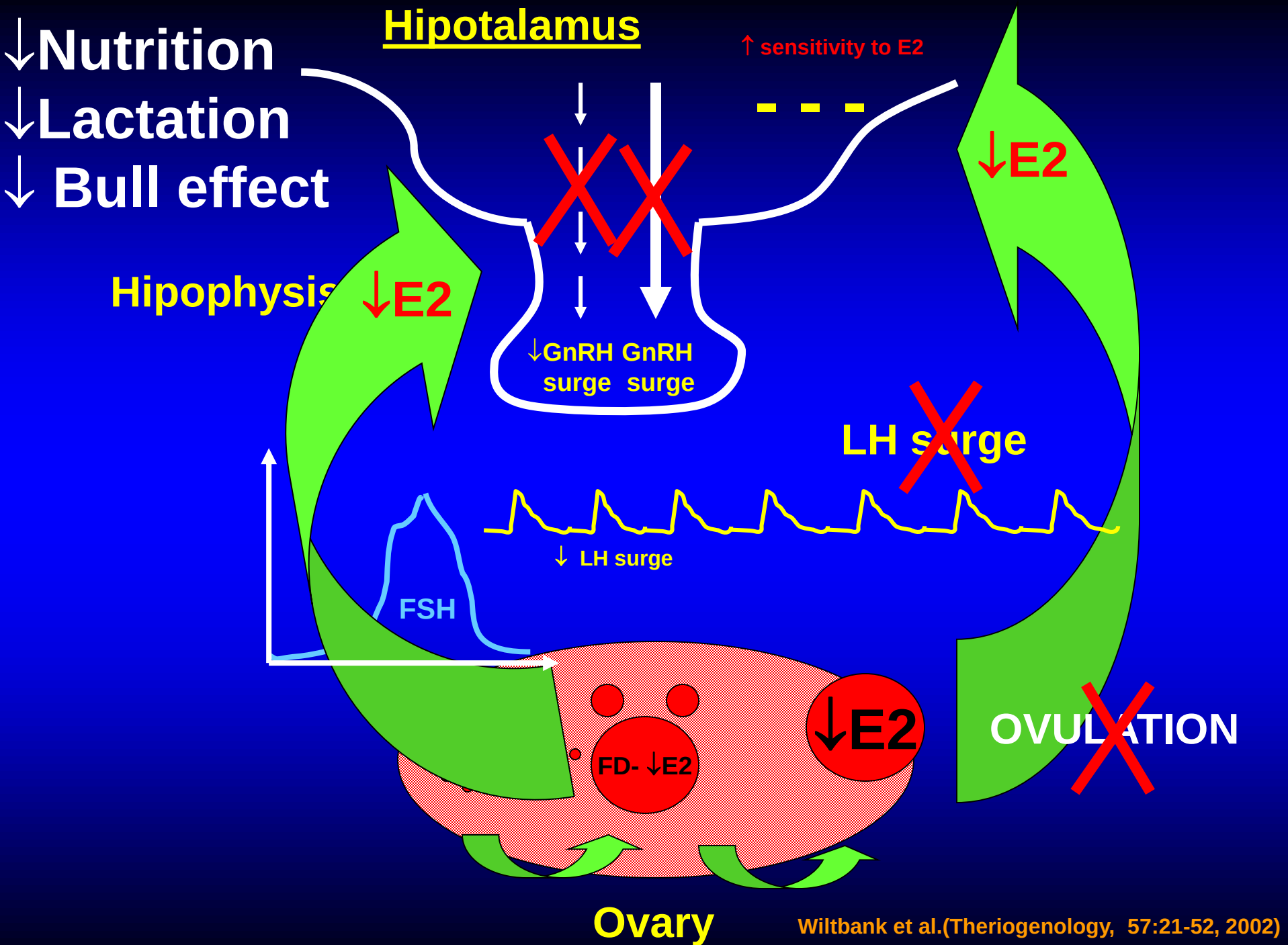
Factors related to postpartum anestrus

- Lactation
- Body condition
- Male effect



1ª OVULAÇÃO PÓS-PARTO EM BOVINOS

- Bovinos de leite USA $\Rightarrow 33,3 \pm 2,1$ dias (WILTBANK et al., 2002)
- Bovinos de leite a pasto $\Rightarrow 4,2$ ondas (McDOUGALL et al., 1995)
- Bovinos de corte amamentando $\Rightarrow$ VÁRIAS ONDAS (> 10 ; STAGG et al., 1995)



Validação do escore de condição corporal (BCS) em vacas Nelore (*Bos indicus*)





BCS 5.0



BCS 4.5



BCS 4.0



BCS 3.0



BCS 2.5



BCS 2.0



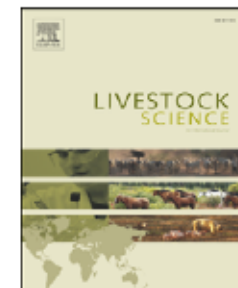
BCS 1.5



Contents lists available at [ScienceDirect](#)

Livestock Science

journal homepage: www.elsevier.com/locate/livsci



Validation of body condition score as a predictor of subcutaneous fat in Nelore (*Bos indicus*) cows

Henderson Ayres^{a,*}, Roberta Machado Ferreira^a, José Ribamar de Souza Torres-Júnior^{a,b}, Clarice Garcia Borges Demétrio^c, César Gonçalves de Lima^d, Pietro Sampaio Baruselli^a

**Body
weight
(BW)**

vs.

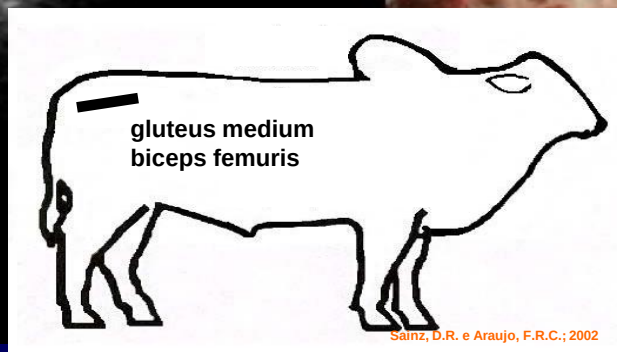
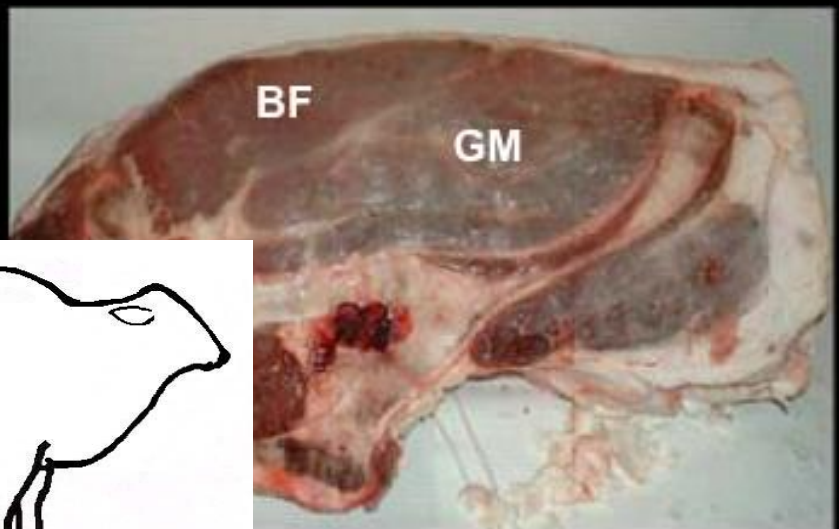
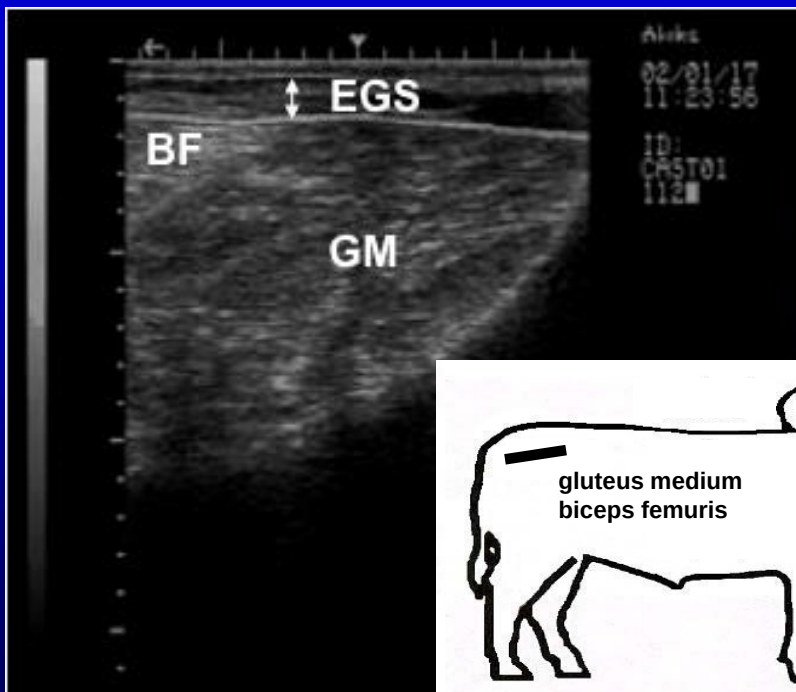
**Body condition
score
(BCS)**

vs.

**Rump fat thickness
evaluation
(RFAT)**



Rump fat thickness evaluation



Avaliações

1. Escore de Condição Corporal (ECC)

Escala 1 a 5

(Método Visual)

2. Espessura da Gordura Subcutânea (EGPU)

(Ultra-sonografia na garupa)

3. Peso Vivo (PV)

(Balança; KG)

FLUXOGRAMA DE ATIVIDADES

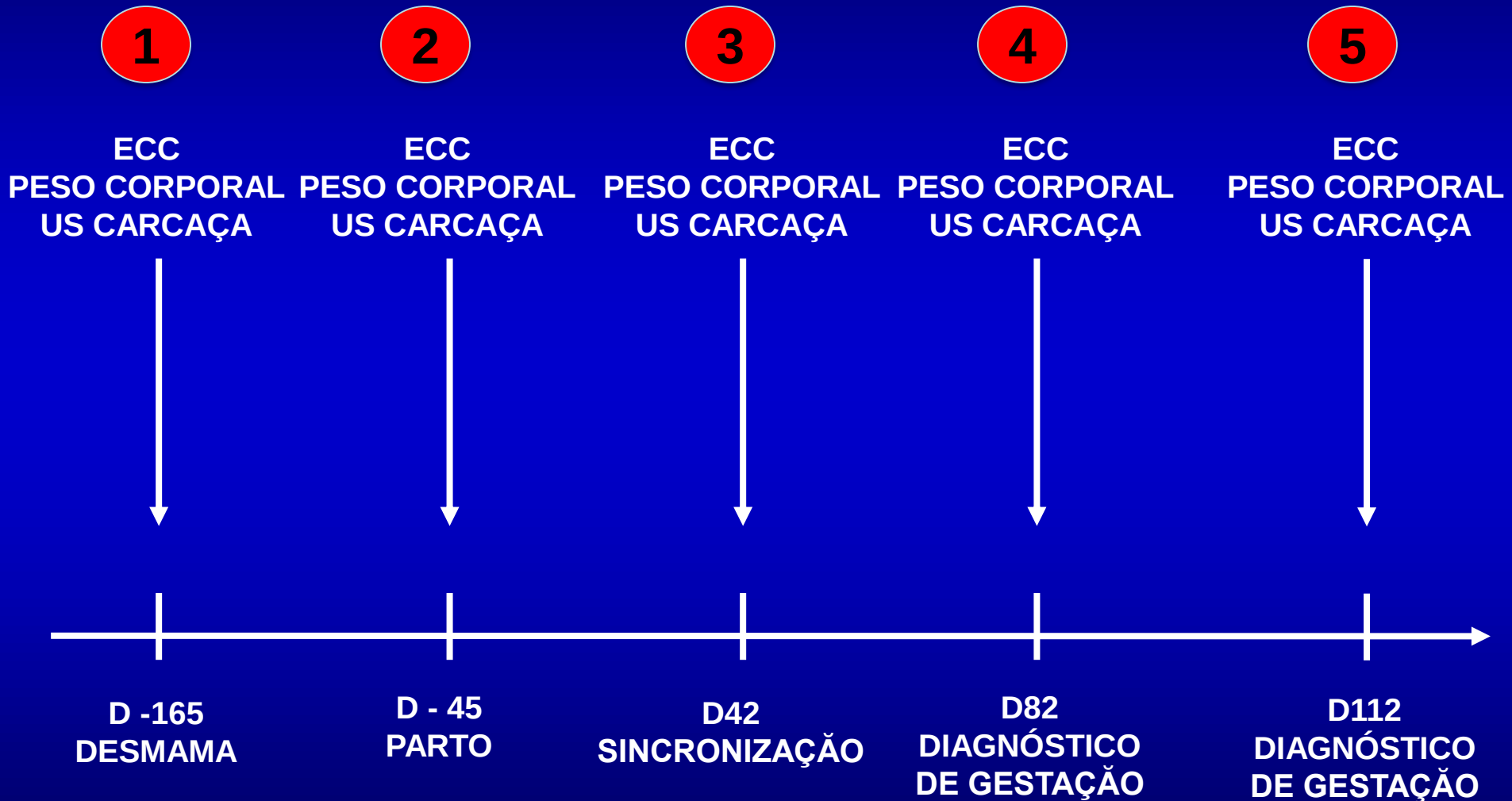


Table 2

Pearson correlation coefficients (r) between body condition score (BCS; $n = 266$).

	Weaning (– 165 days before partum)	Parturition	42 days post- partum)	82 days post- partum	112 days post- partum
Correlation between BCS and BFT	0.82 <0.0001	0.93 <0.0001	0.93 <0.0001	0.93 <0.0001	0.88 <0.0001
Correlation between BCS and weight	0.50 <0.0001	0.37 <0.0001	0.47 <0.0001	0.41 <0.0001	0.42 <0.0001
Correlation between BCS BFT and weight	0.42 <0.0001	0.38 <0.0001	0.46 <0.0001	0.41 <0.0001	0.41 <0.0001

Back fat thickness (BFT; $n = 266$) and body weight ($n = 266$) in Nelore cows (*Bos indicus*) evaluated over time (Weaning, parturition, at 42, 82 and 112 days post-partum).

BCS – body condition score; BFT – back fat thickness.

Ayres et al., 2009

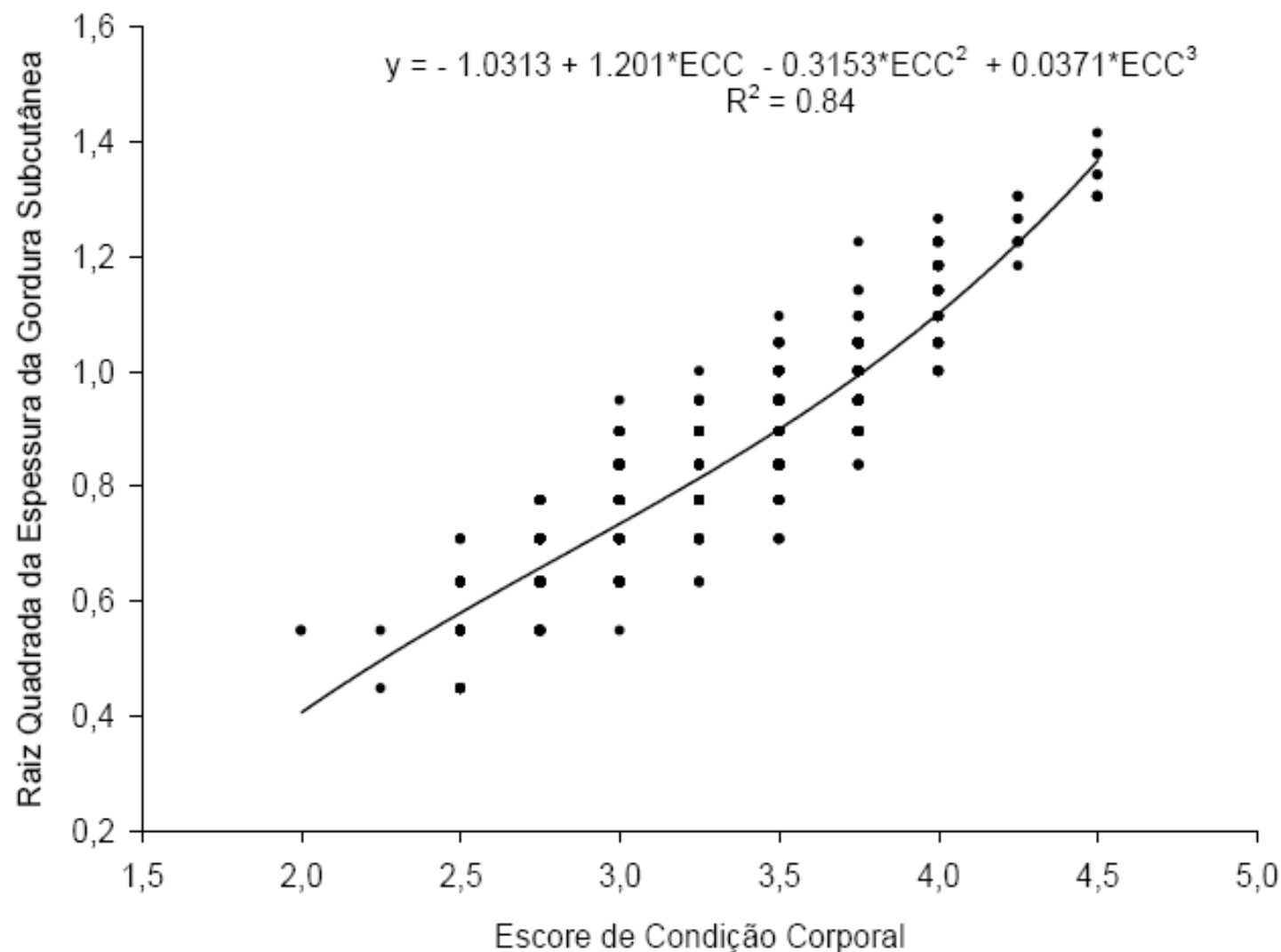


Figura 5 – Gráfico de dispersão do escore de condição corporal pela raiz quadrada da espessura da gordura subcutânea em vacas Nelore (*Bos indicus*) avaliadas em diferentes momentos experimentais (desmame, parto, sincronização, avaliação aos 82 e 112 dias pós-parto) Ayres et al., 2009

BCS vs Peso vivo

Em vacas Nelore (*Bos indicus*) 1 unidade de BCS
equivale a:
45 kg de Peso Vivo



Tabela. Escore de condição corporal e porcentagem de reserva energética corporal

ESCORES DE CONDIÇÃO CORPORAL		RESERVA ENERGÉTICA CORPORAL
(1-9)	(1-5)	
1	1,0	5,0
2	1,5	9,4
3	2,0	13,7
4	2,5	18,1
5	3,0	22,5
6	3,5	26,9
7	4,0	31,2
8	4,5	35,6
9	5,0	40,0

1 ponto na escala = 36 kg de peso vivo

(Whitman, 1975)

Conclusão

- O BCS avaliado pelo método visual (escala de 1 a 5 pontos) foi capaz de prever a espessura da gordura subcutânea (EGS) em vacas Nelore (*Bos indicus*) em diferentes momentos do ciclo de produção
- O BCS apresentou alta correlação e forte relação com a EGS
- No entanto, tanto o BCS quanto o EGS apresentaram baixa correlação e fraca relação com o peso vivo (PV)

**Efeito da condição
corporal ao parto
(BCS) na eficiência
reprodutiva**

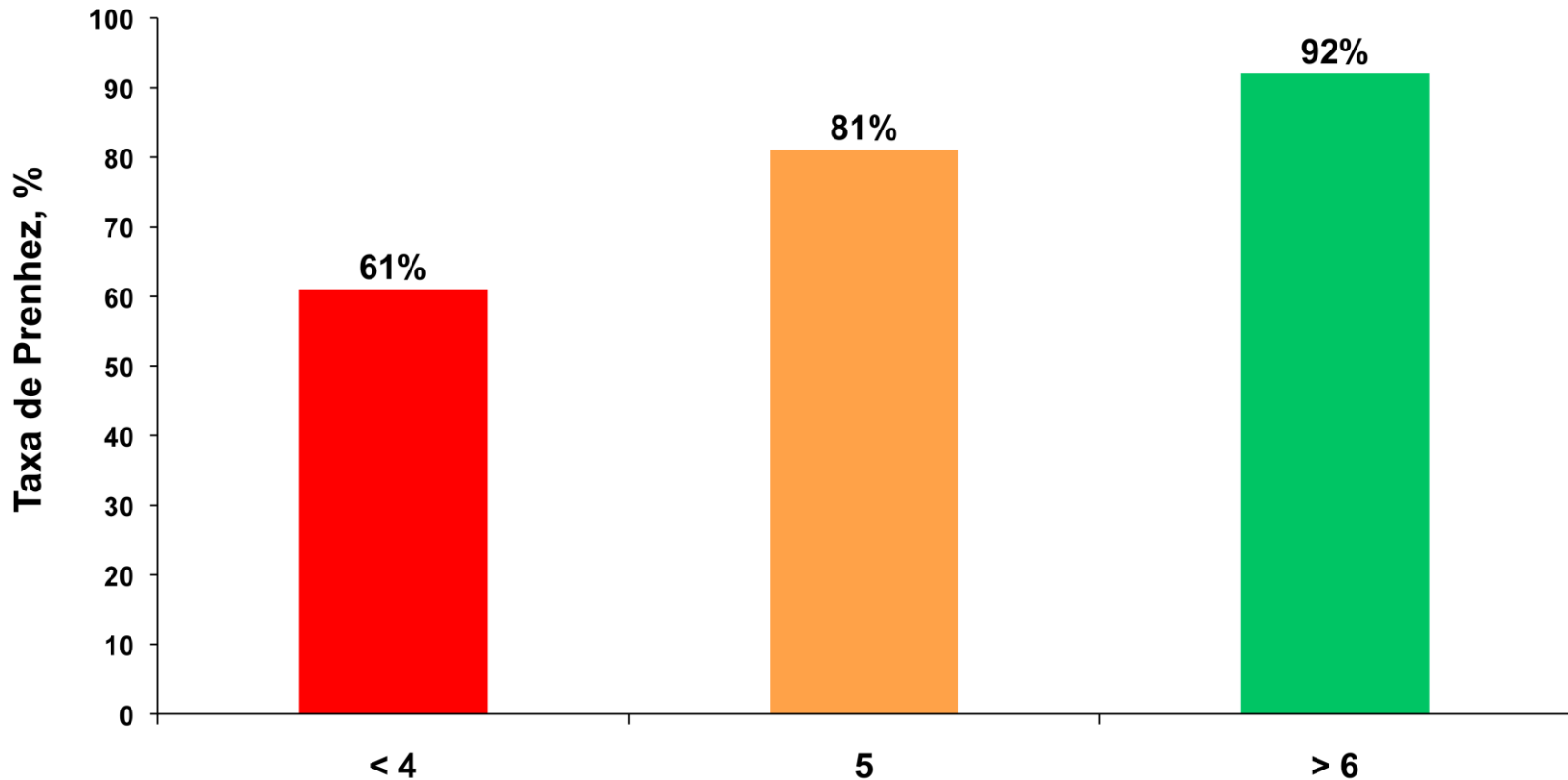
Tabela. Percentagem de vacas em cio aos 40, 50 e 60 dias após o parto, de acordo com o estado corporal ao parto.

Estado corporal ao parto	Percentagem de cio		
	40 dias	50 dias	60 dias
Magra	19	34	46
Moderada	21	45	61
Boa	31	42	91

BCS ao parto e taxa de prenhez ao final da estação de monta em vacas de corte

5 estudos com 1742 vacas de corte

$P < 0.05$



Rice et al., 1991

Postpartum cow

Standard pasture

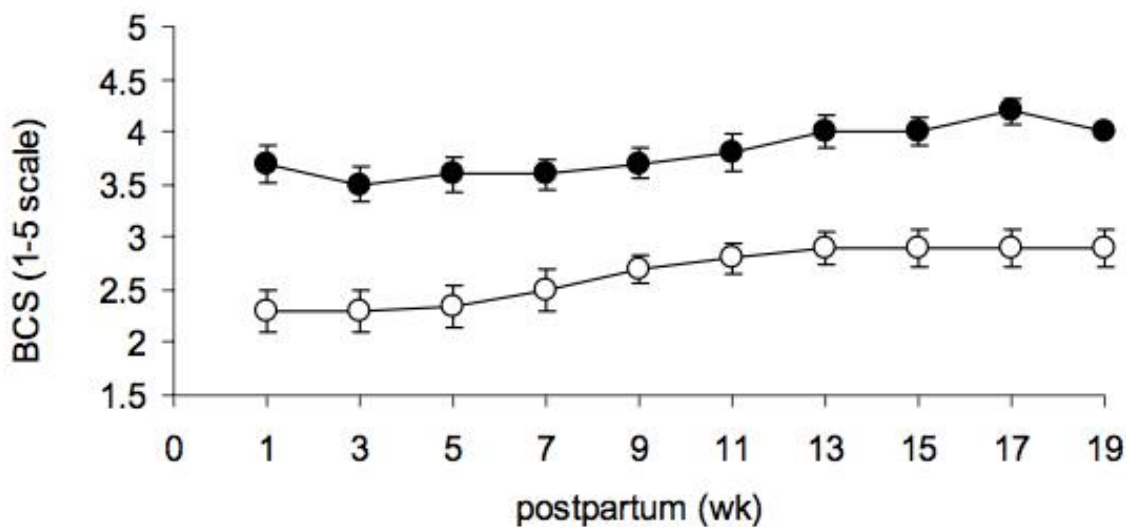
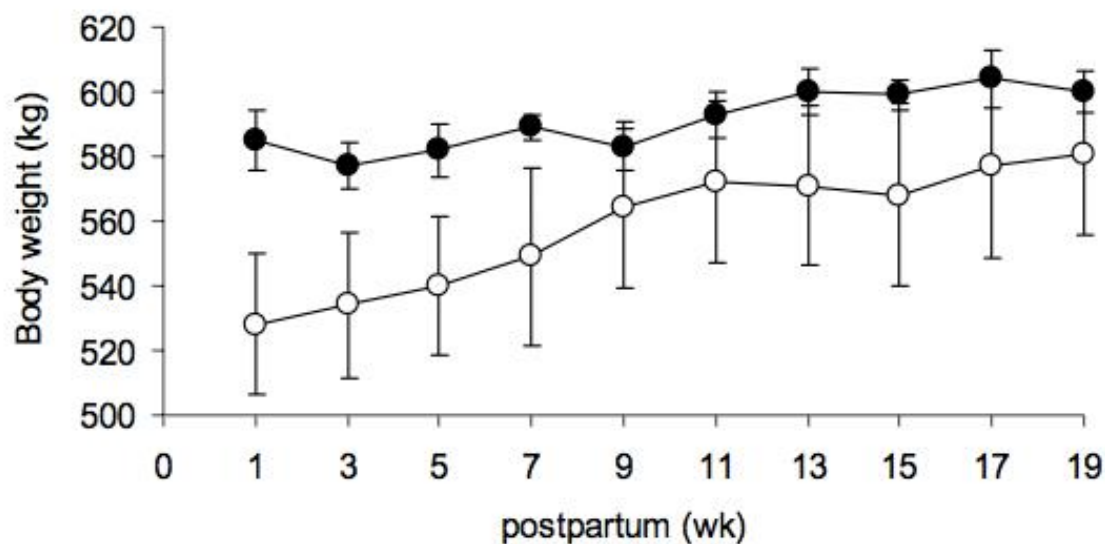


Improved pasture



Michael D Occhio

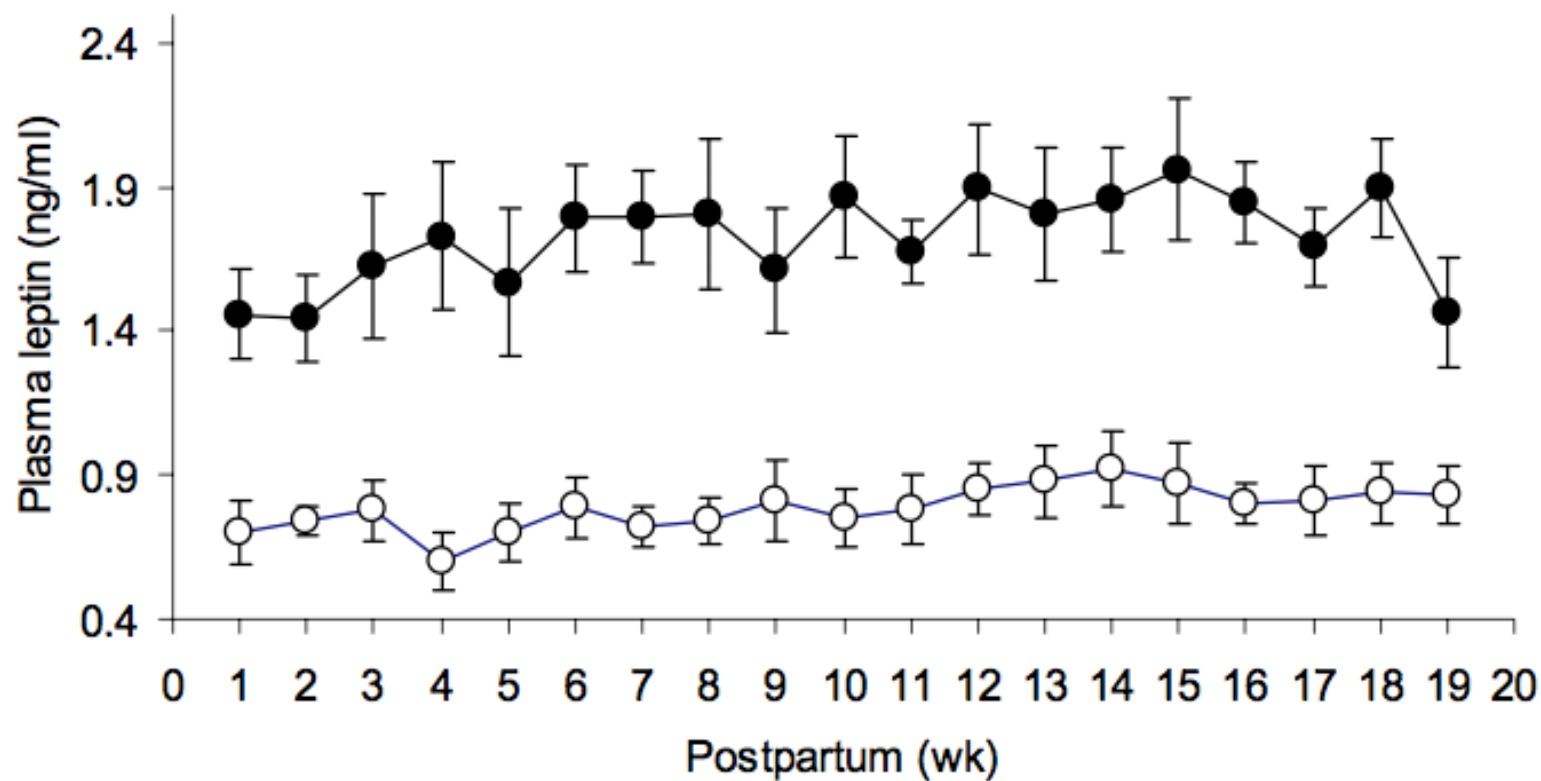
Postpartum cows - body weight



- Improved pasture
- Moderate pasture



Postpartum cows - leptin

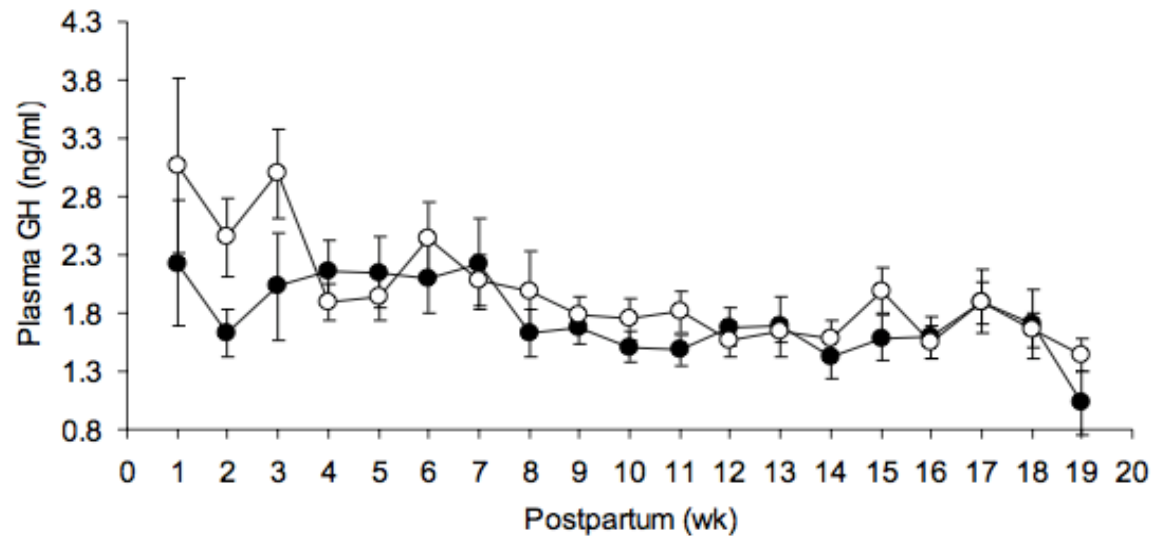


● Improved pasture

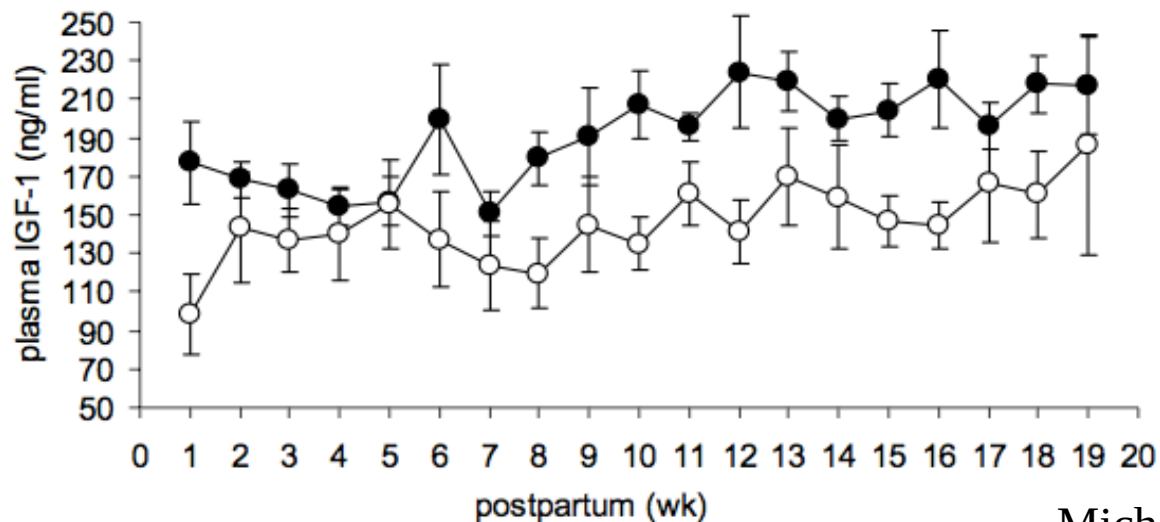
○ Standard pasture



Postpartum cows - Growth hormone



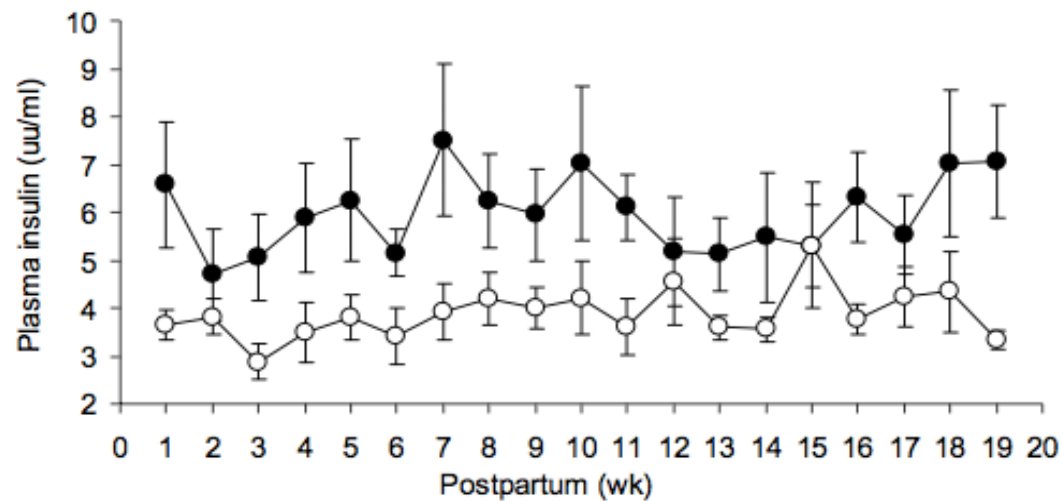
IGF-1



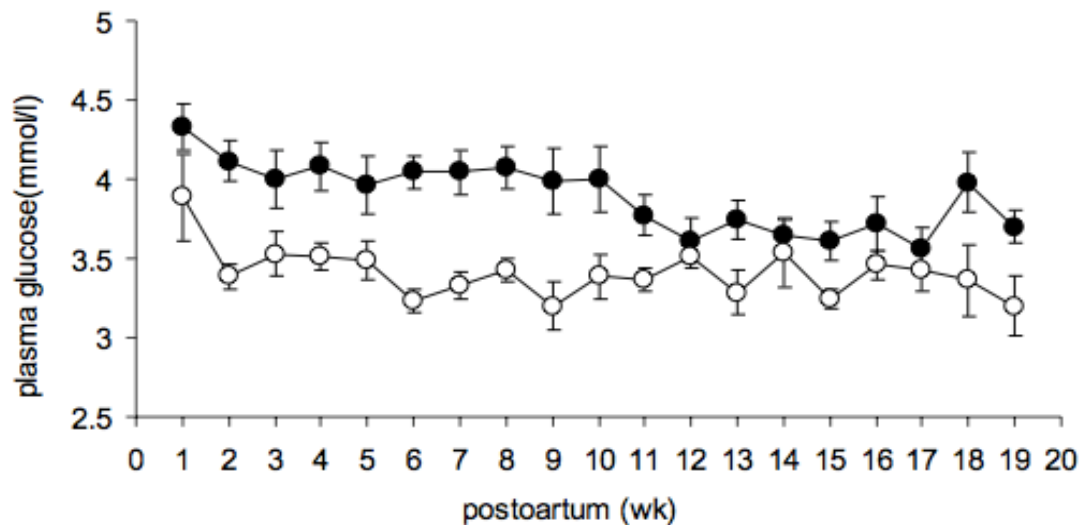
- Improved pasture
- Standard pasture



Postpartum cows - insulin



Glucose

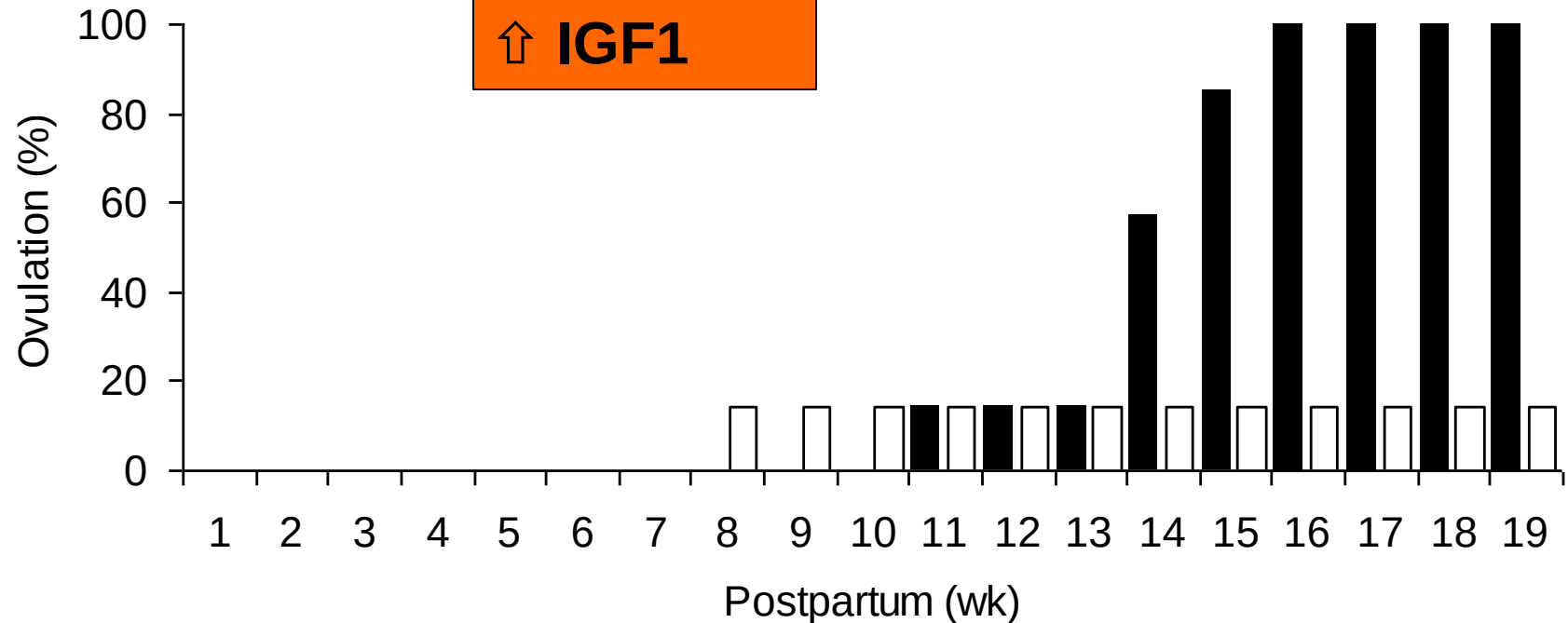


- Improved pasture
- Standard pasture

↑ BCS
↑ Leptina
↑ Glicose
↑ Insulina
↑ IGF1



**Antecipação
da ciclicidade**



■ Improved pasture
□ Standard pasture

Efeito do escore de condição corporal (BCS) na taxa de prenhez durante a estação reprodutiva



BCS < 3.0 (n = 263)

X



BCS ≥ 3.0 (n = 244)

FTAI + natural service

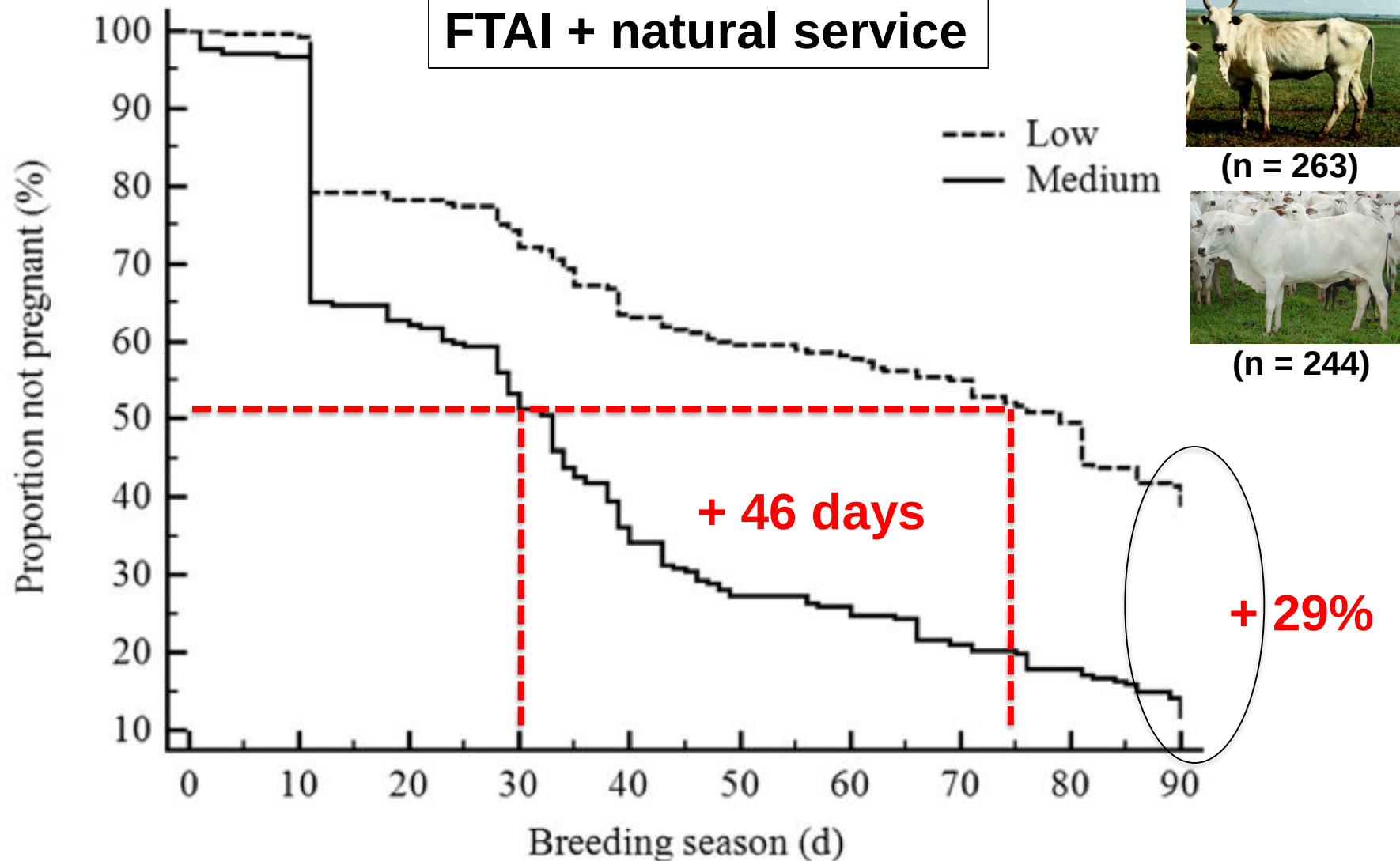


Figure. Survival curves for proportion of non pregnant cows by days of breeding season (BS) classified according to body condition score (BCS) as low (BCS < 3.0; dashed line; N 1/4 263) or medium (BCS ! 3.0; solid line; N 1/4 244) in suckled beef cows bred by natural service or timed AI at beginning of the BS, followed by natural service during a 90-day BS (experiment 2). Median intervals to pregnancy for low BCS and medium BCS cows were 79 days and 33 days (adjusted hazard ratio, 1.70; 95% confidence interval, 1.34–2.17), respectively.

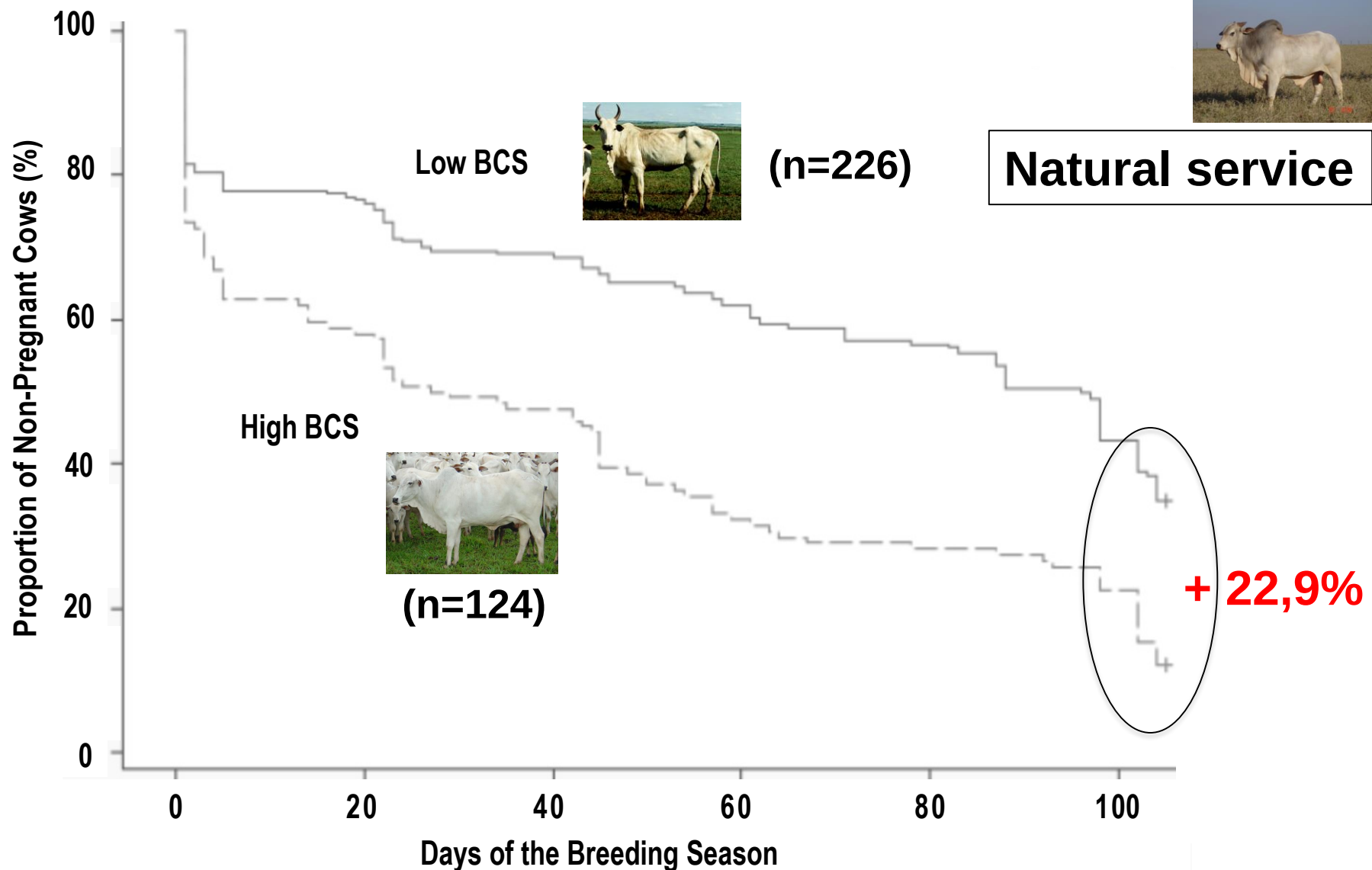


Figure. Survival curve illustrating the interval between the onset of the breeding season and conception for primiparous beef cows with low (≤ 2.75) or high (≥ 3.0) during a breeding season of 105 days.



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journal homepage: www.theriojournal.com

Inferences of body energy reserves on conception rate of suckled Zebu beef cows subjected to timed artificial insemination followed by natural mating

H. Ayres^{a,b,*,1}, R.M. Ferreira^{a,1}, J.R.S. Torres-Júnior^c, C.G.B. Demétrio^d,
M.F. Sá Filho^a, L.U. Gimenes^e, L. Penteado^f, M.J. D'Occhio^g, P.S. Baruselli^a

^a Departamento de Reprodução Animal, FMVZ/USP, Rua Orlando Marques de Paiva, São Paulo-SP, Brazil

^b MSD Animal Health, São Paulo-SP, Brazil

^c Centro de Ciências Agrárias e Ambientais, UFMA, Chapadinha-MA, Brazil

^d Departamento de Ciências Exatas, ESALQ, USP, Piracicaba-SP, Brazil

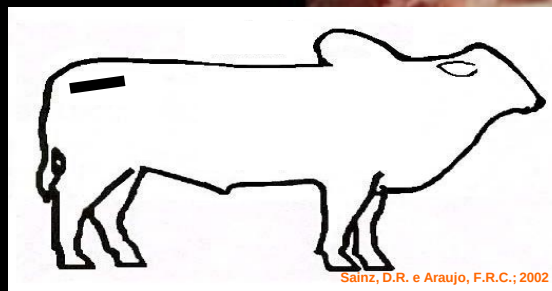
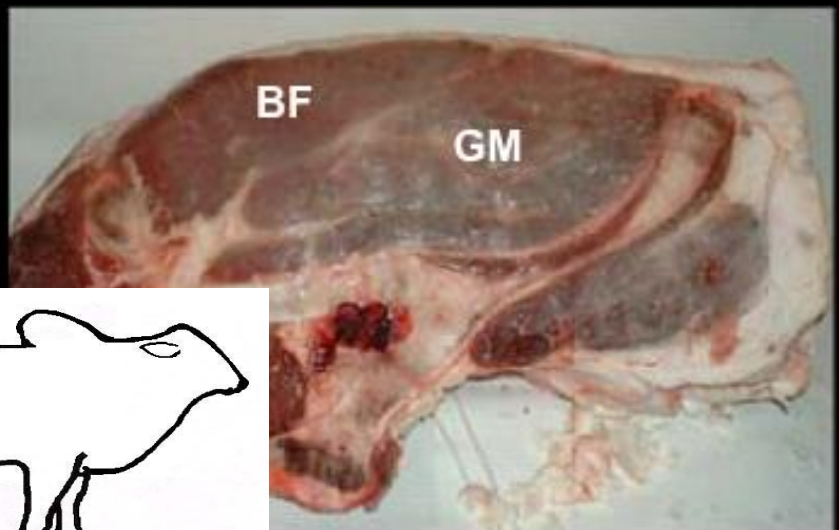
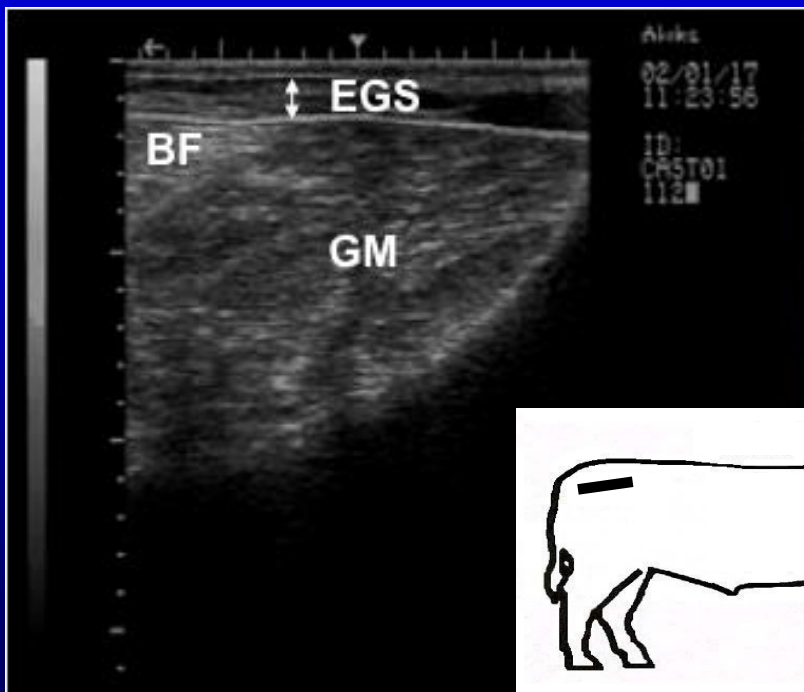
^e Departamento de Medicina Veterinária Preventiva e Reprodução Animal, FCAV/UNESP, Jaboticabal-SP, Brazil

^f FIRMASA IATF, Londrina-PR, Brazil

^g Faculty of Agriculture and Environment, The University of Sydney, Sydney, New South Wales, Australia



Rump fat thickness evaluation



Sainz, D.R. e Araujo, F.R.C.; 2002



BCS
LW
RFAT

BCS
LW
RFAT

BCS
LW
RFAT
Repro US*

BCS
LW
RFAT
Repro US*

BCS
LW
RFAT
Repro US*

**Pregnant
Nelore
cows
(n=266)**

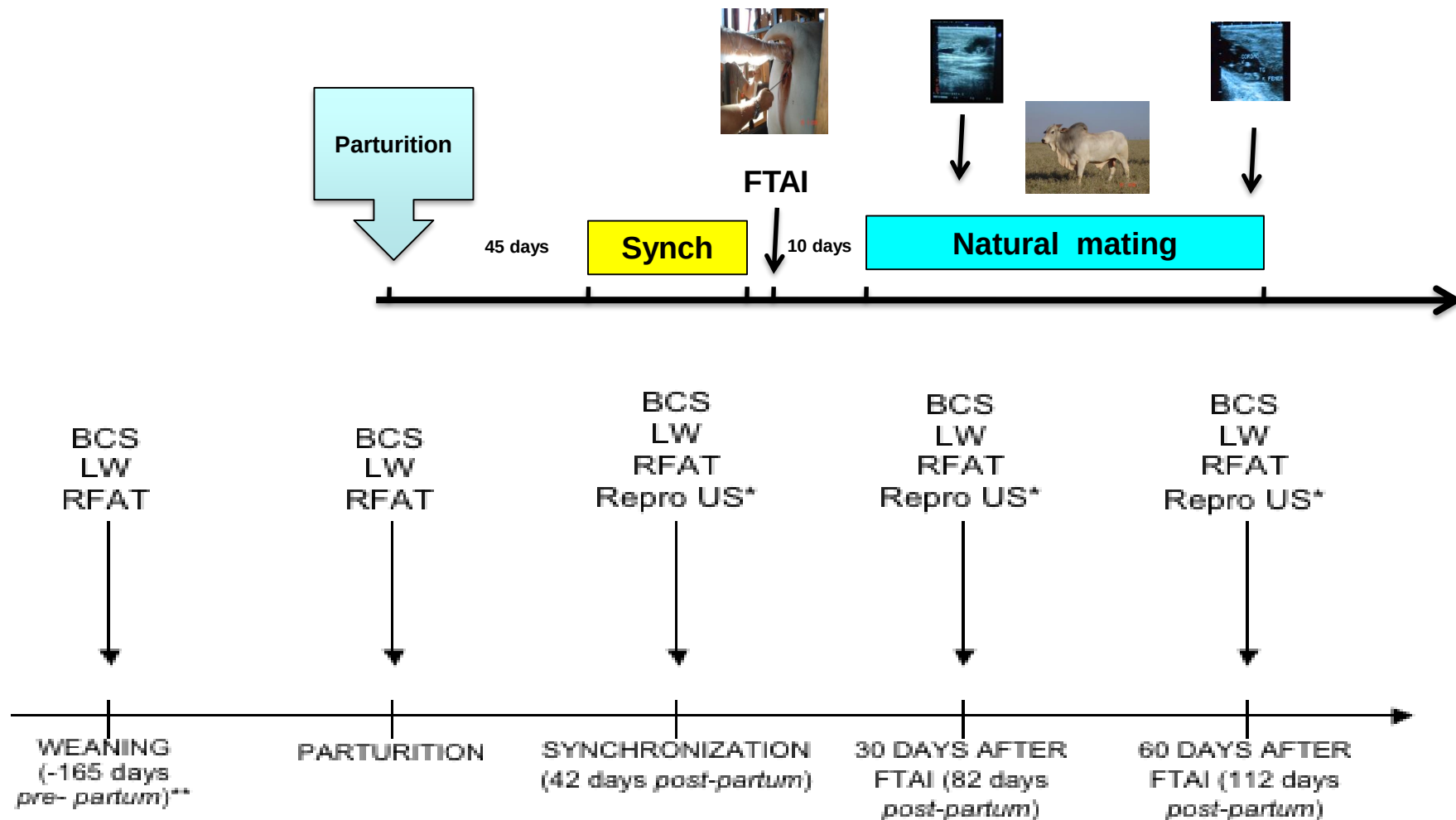


*Repro US = ultrasonographic exams to evaluate the presence of a CL or pregnancy diagnosis; BCS = body condition score; LW = live weight; RFAT = rump fat thickness evaluated by ultrasonography;

** around Day 120 of gestation

Ayres et al., 2014 (Theriogenology)

Pregnant Nelore cows (n=266)



*Repro US = ultrasonographic exams to evaluate the presence of a CL or pregnancy diagnosis; BCS = body condition score; LW = live weight; RFAT = rump fat thickness evaluated by ultrasonography;

** around Day 120 of gestation

Tabela |– Escore de condição corporal no início do protocolo de sincronização de acordo com a etapa de sincronização e o status ovariano.

Status Ovariano	Etapa de Sincronização		P*
	Primeira	Segunda	
Anestro	↓ 3,06 ± 0,05	↓ 3,26 ± 0,05	0,02
<u>Ciclando</u>	3,22 ± 0,05	3,56 ± 0,10	0,01
P**	0,02	0,003	

* Valor de P para comparação entre primeira e segunda etapa.

** Valor de P para comparação entre vacas ciclando ou em anestro.

$$\text{Probabilidade de ciclicidade} = \frac{\exp(-2,4624 + 0,6211 \cdot ECCSinc)}{1 + \exp(-2,4624 + 0,6211 \cdot ECCSinc)}$$

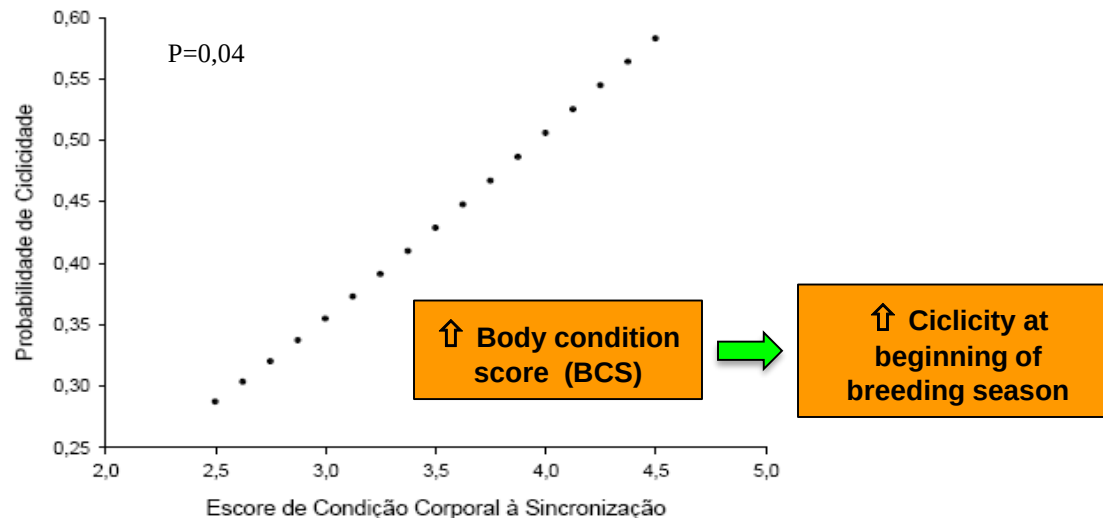


Figura 7 – Representação gráfica da probabilidade de ciclicidade no início do protocolo de sincronização em função do escore de condição corporal no momento da sincronização (P = 0,04) em vacas Nelore (*Bos indicus*)

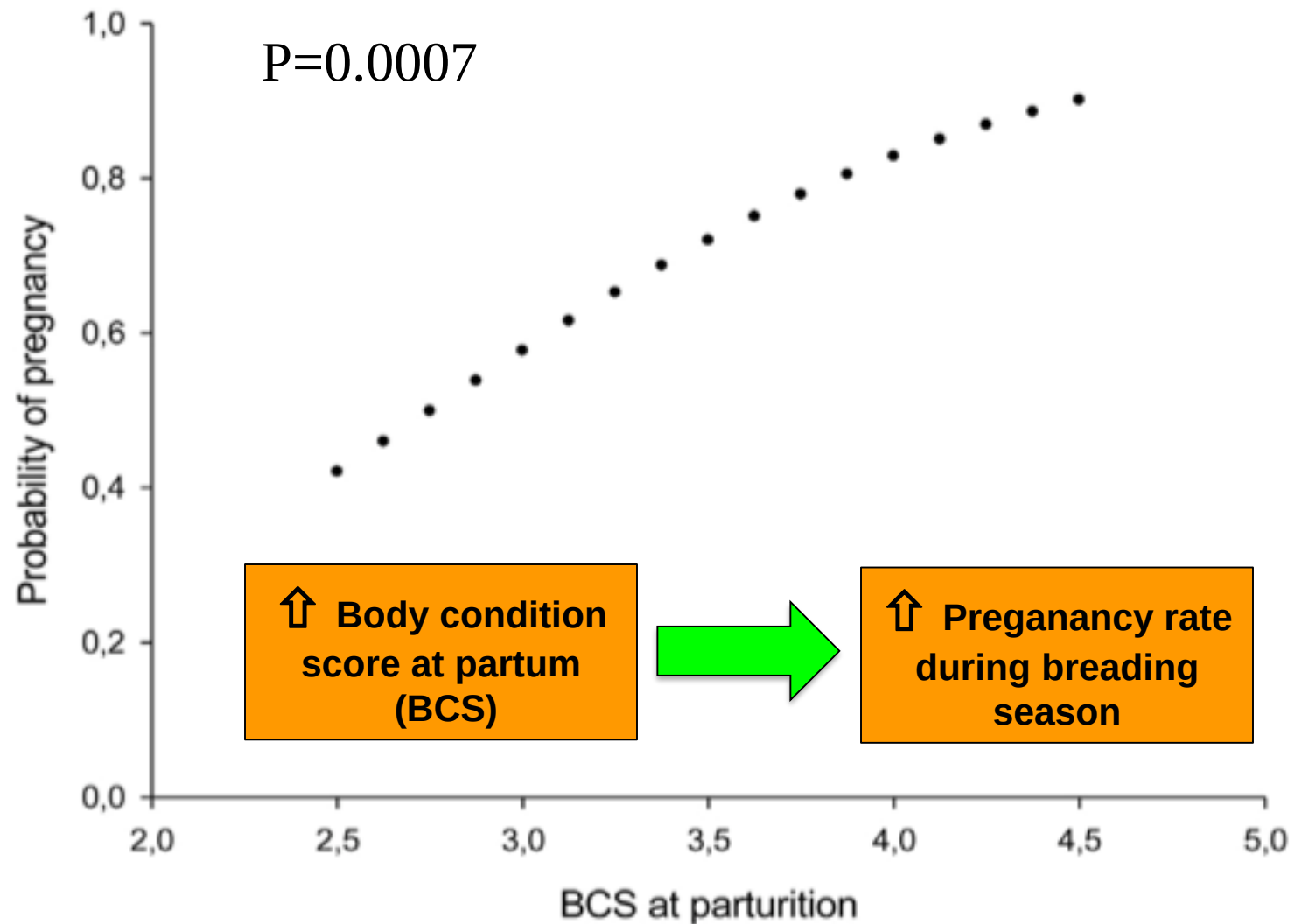
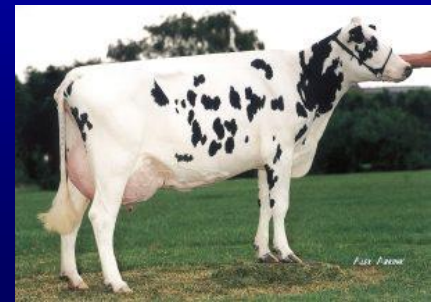


Fig. 1. Probability of pregnancy rate according to the BCS at parturition in suckled *Bos indicus* cows subjected to TAI after natural mating [probability of pregnancy = $\exp(-2.2959 + 0.9944 \times \text{BCS at parturition}) / 1 + \exp(-2.2959 + 0.9944 \times \text{BCS at parturition})$; $P = 0.0007$]. BCS, body condition score; TAI, timed artificial insemination.

Fertilidade

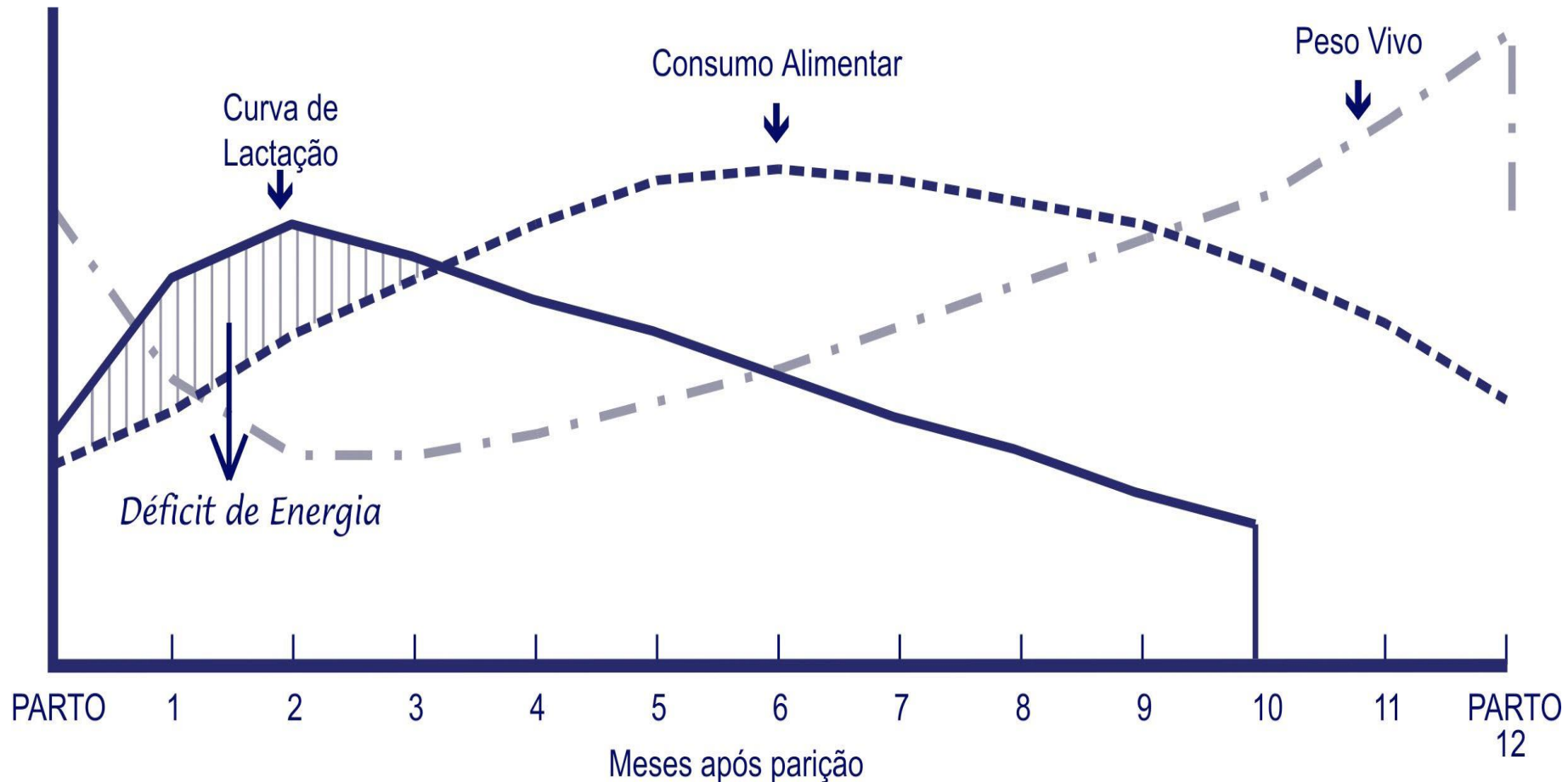
X

Escore de condição corporal (BCS)



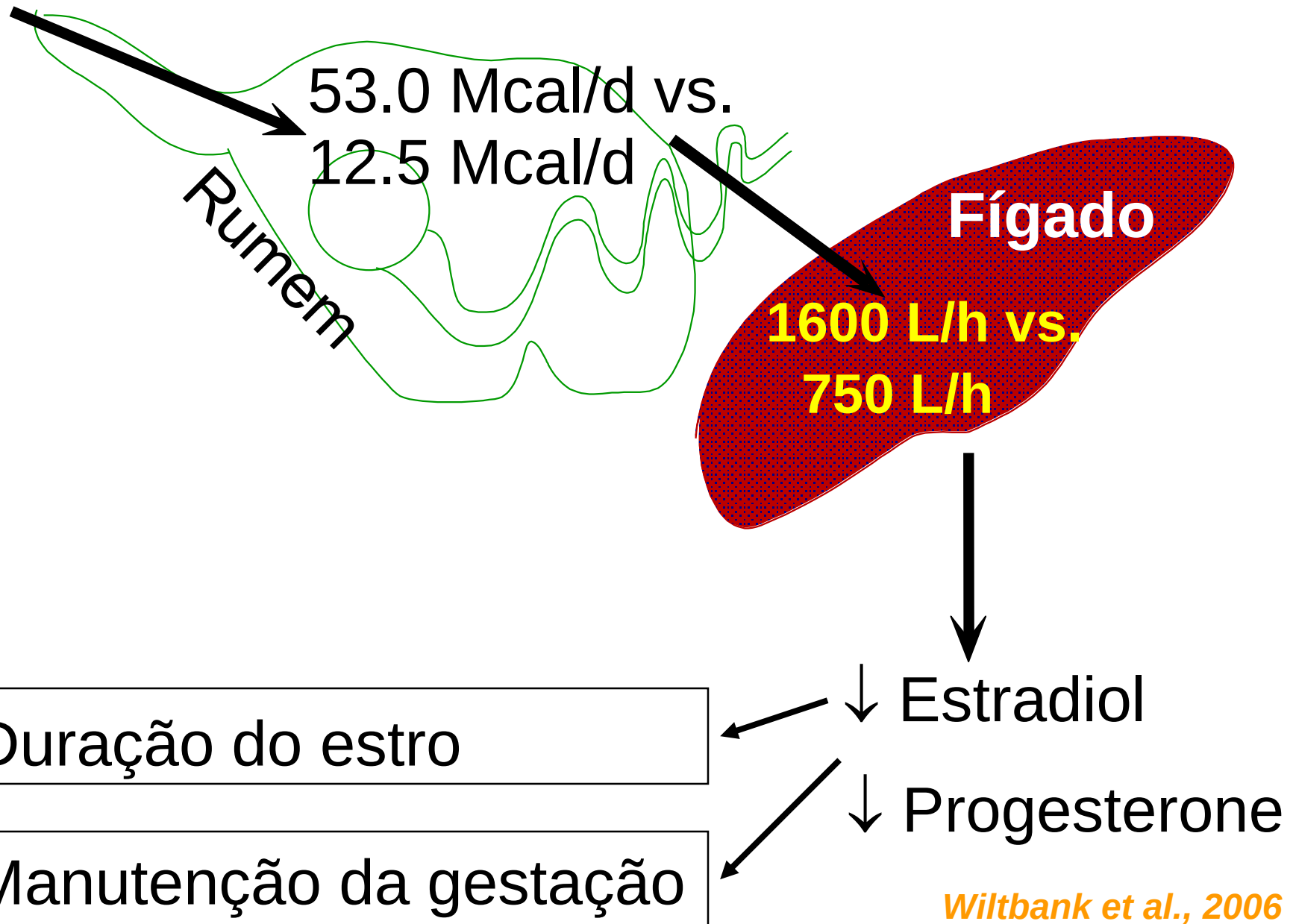
O que é balanço energético negativo?

A energia consumida é maior que a energia obtida na dieta



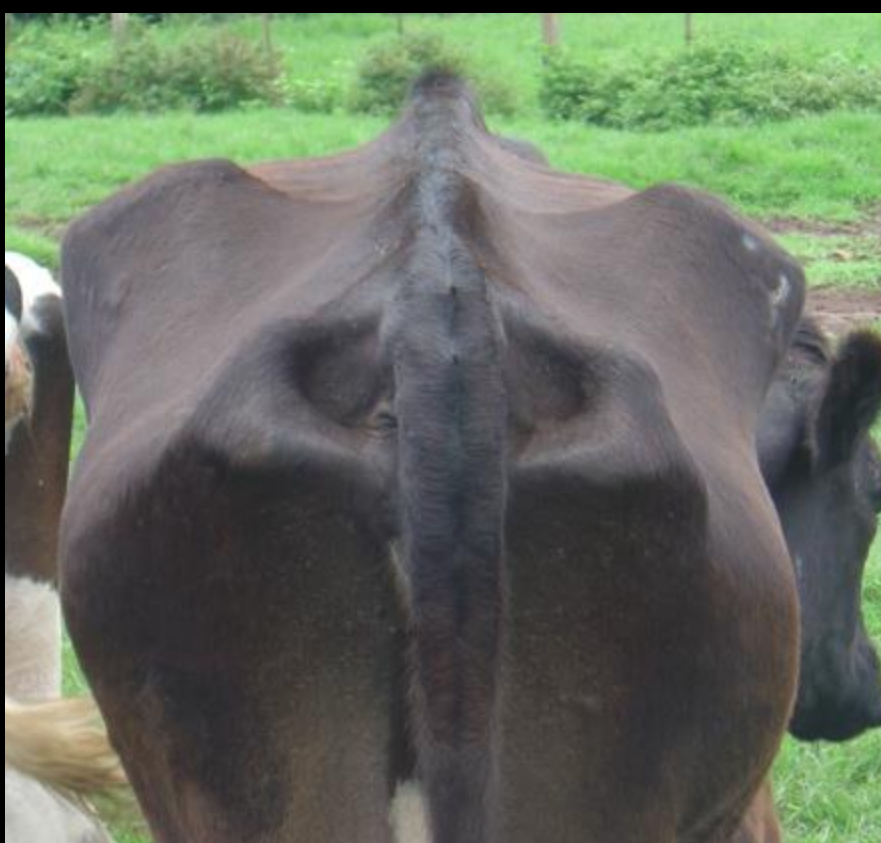
✓ **Bal. Energ. (Mcal) = $E_{\text{ingerida}} - (E_{\text{leite}} + E_{\text{manut.}})$**

Metabolismo dos esteróides



CONDIÇÃO CORPORAL x FERTILIDADE

BAIXA CONDIÇÃO
CORPORAL



ALTA CONDIÇÃO
CORPORAL



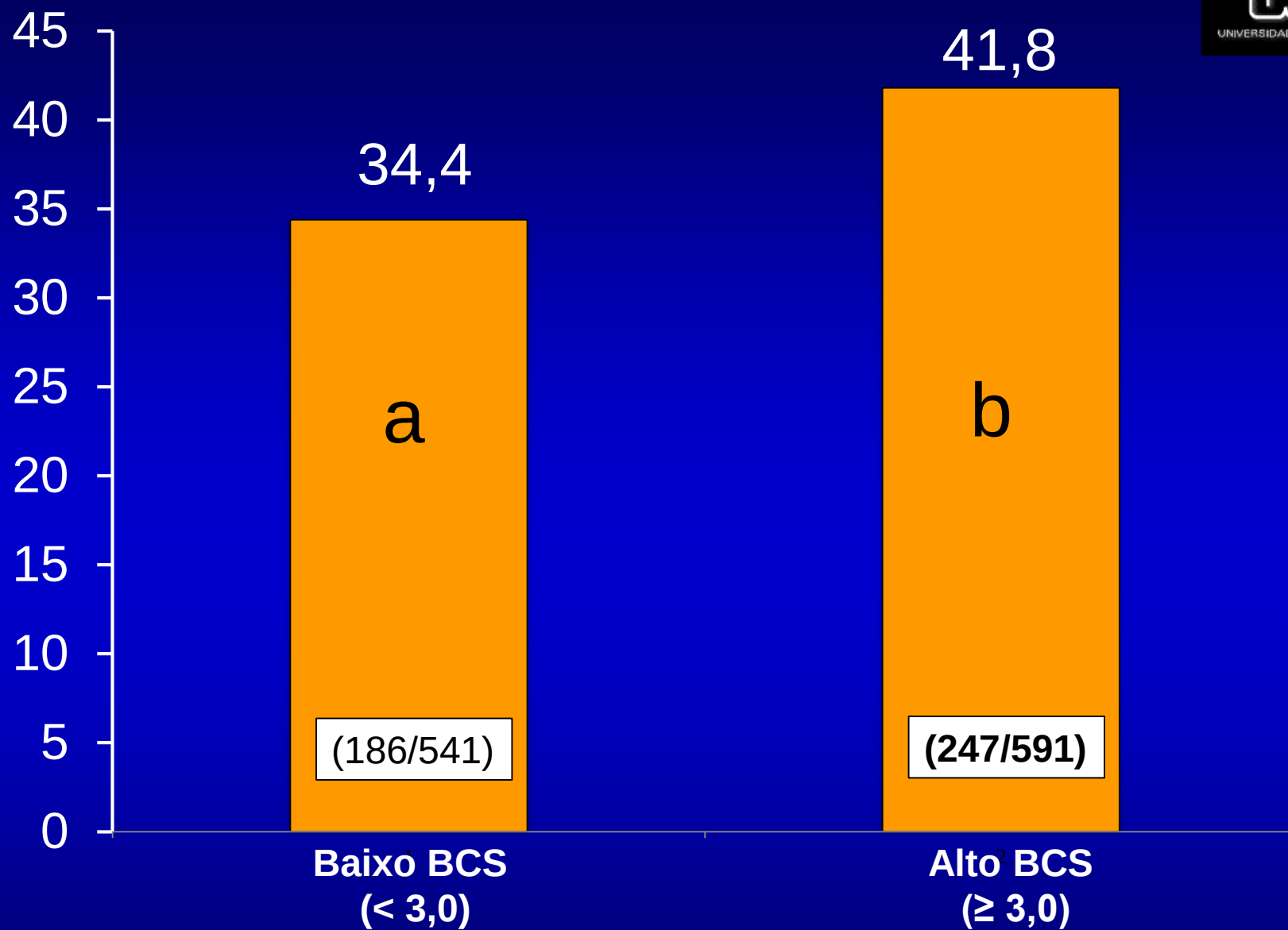
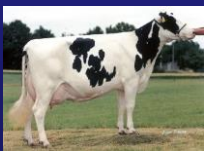
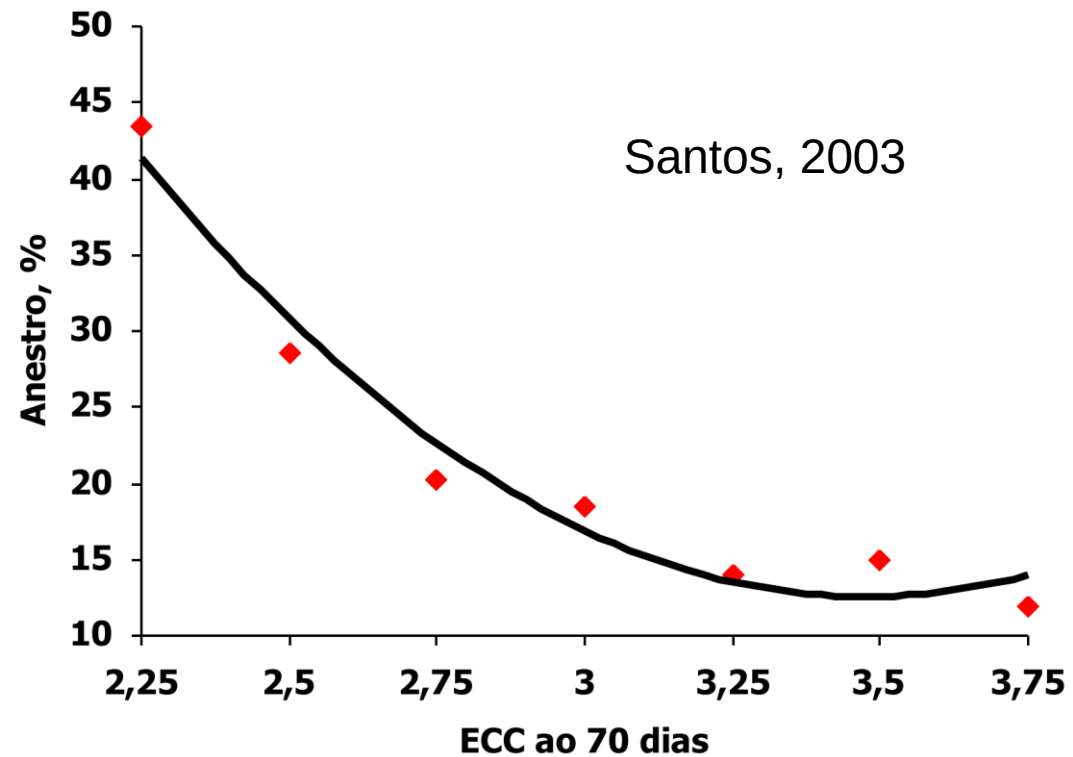
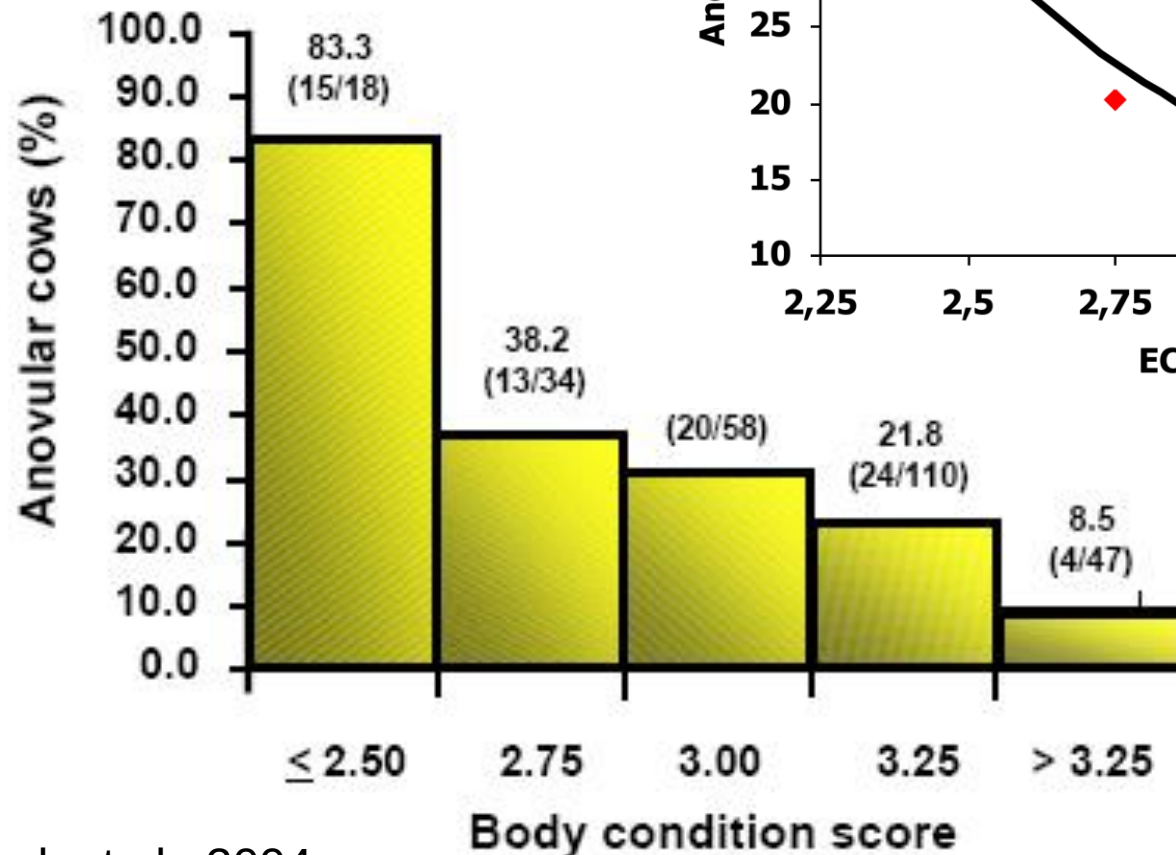


Gráfico. Efeito do escore de condição corporal (BCS) na taxa de concepção de vacas holandesas inseminadas em tempo fixo com o protocolo Ovsynch.

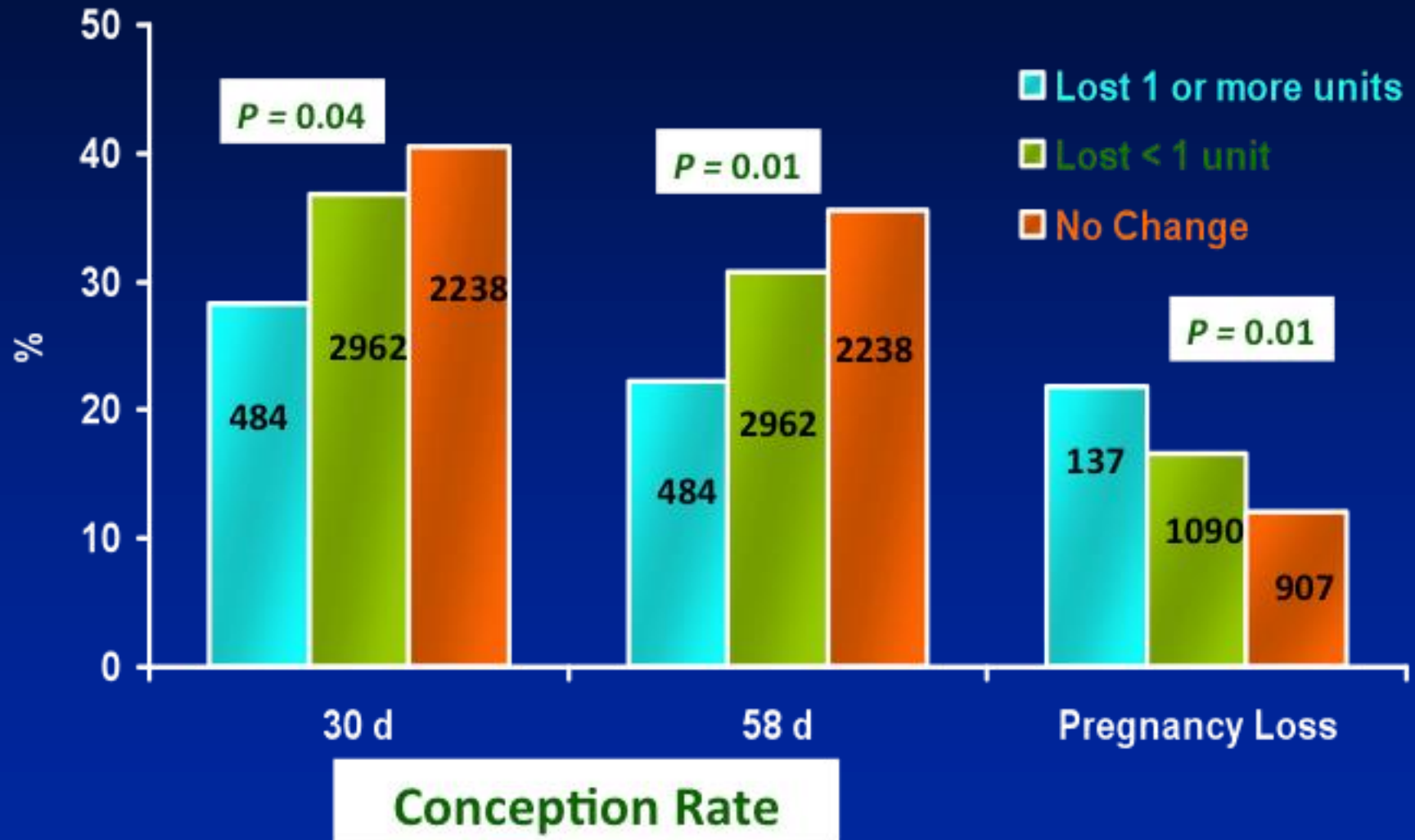
Ayres, 2011



Relação entre BCS e anestro em vacas de leite



Relação Entre a Perda de Condição Corporal, Concepção e Perda de Prenhez



n=5684

**Low BCS is associated
with low reproductive
efficiency ✓**



?

Overconditioned (fat) cows

EFFECT OF BODY CONDITION SCORE AT CALVING ON POSTPARTUM REPRODUCTIVE PERFORMANCE IN BUFFALO

P.S. BARUSELLI* , V.H. BARNABE, R.C. BARNABE, J.A. VISINTIN,
J.R. MOLERO-FILHO, R. PORTO

*Department of Animal Reproduction, Faculty of Veterinary Medicine,
University of São Paulo, 05508-000, São Paulo, Brazil*

Buffalo Journal 17 (1), 53-66, 2001

BCS

(1 to 5 scale)



Estrus detection + AI (4 service)



+



+

Natural service



Calving



D0

476 buffalos cows

D150

**Does the BCS at
calving influence the
interval between
calving to 1st
postpartum estrus in
buffalo cows?**

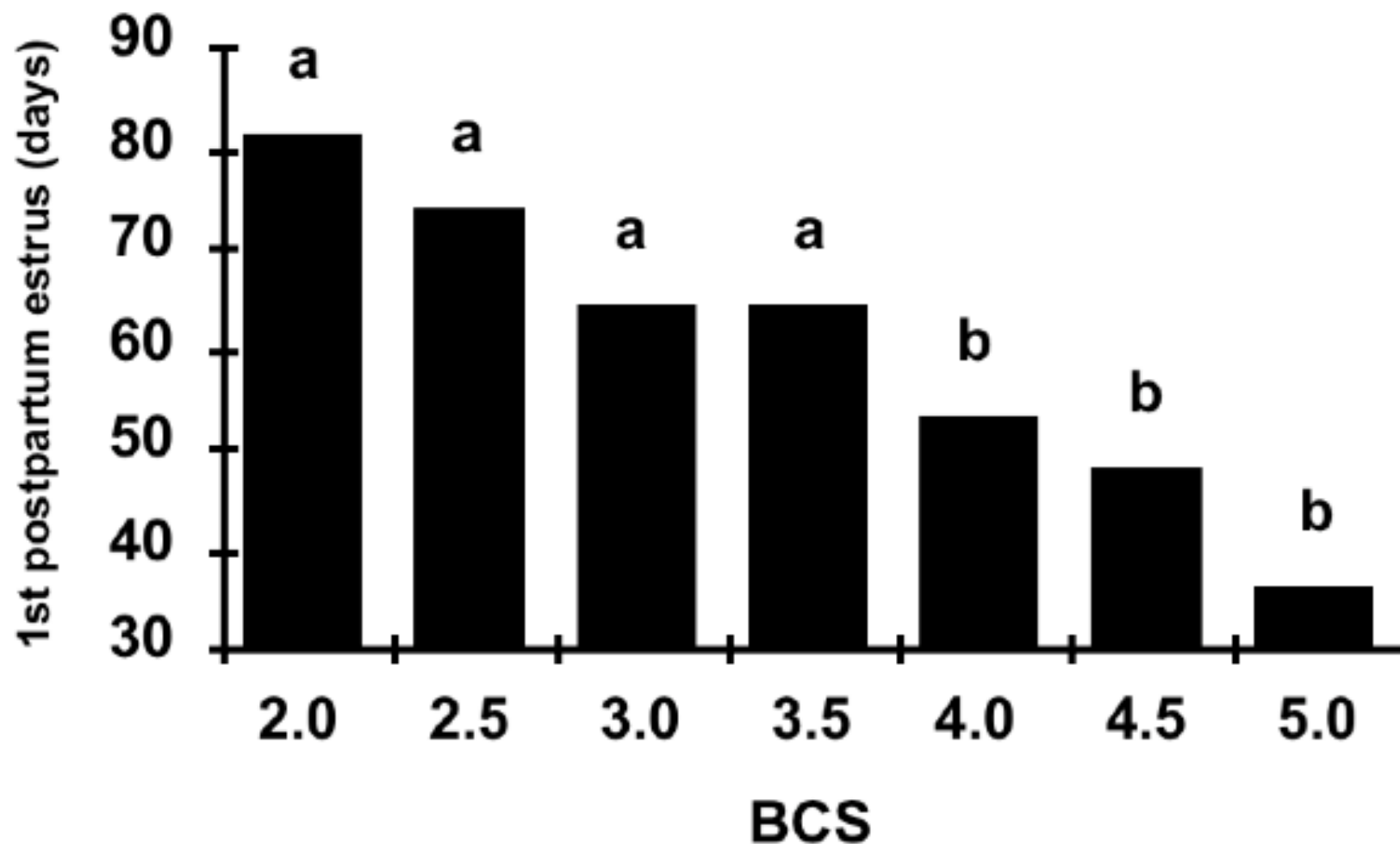


Figure: Influence of body condition score at calving on calving to first post partum estrus interval (n=412).

**Does the BCS at
calving influence the
postpartum
anestrus in buffalo
cows?**

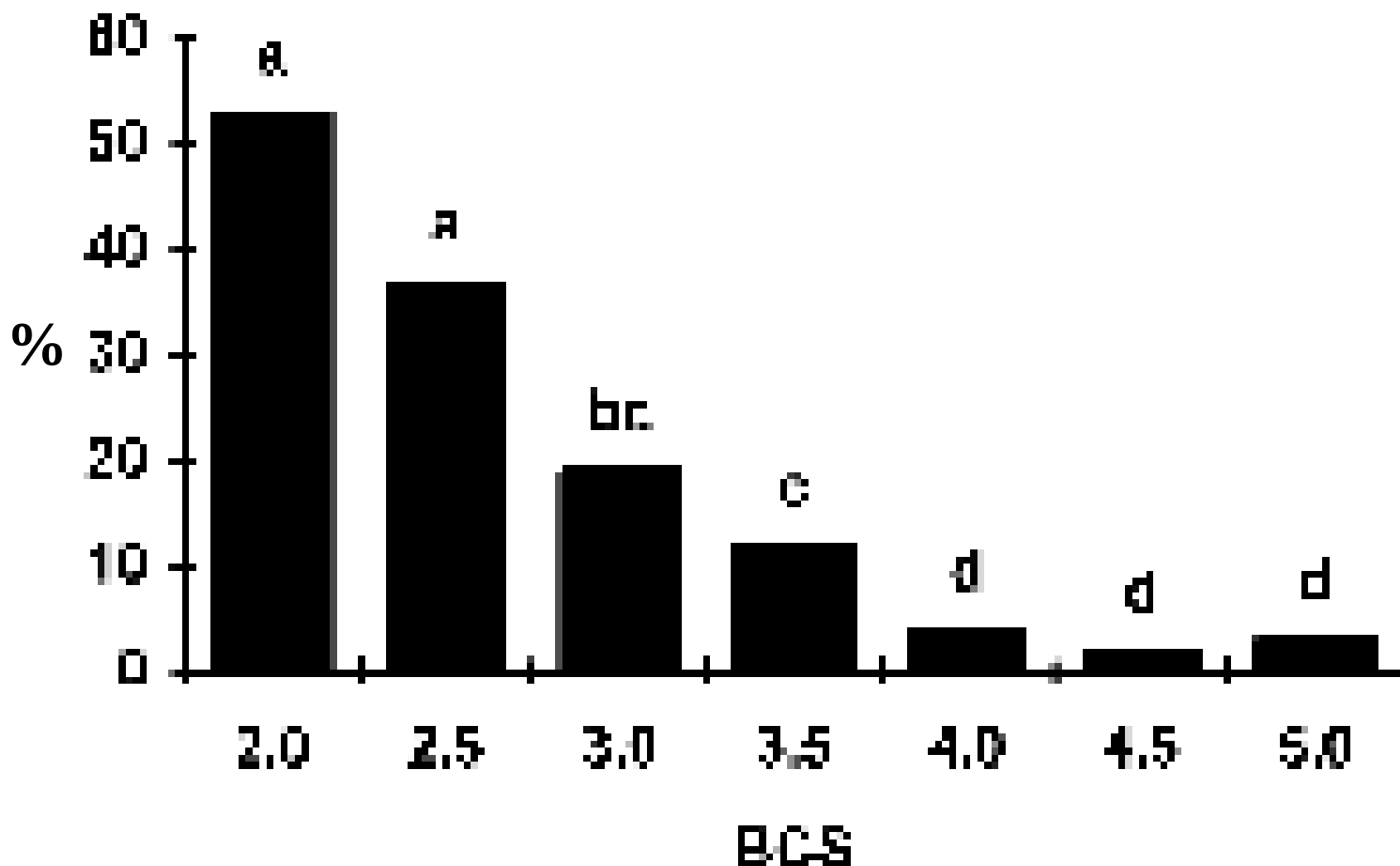


Figure: Effect of body condition score on post partum anestrus (n=412/476).

**Does the BCS at
calving influence the
the interval calving
to conception
(service period) in
buffalo cows?**

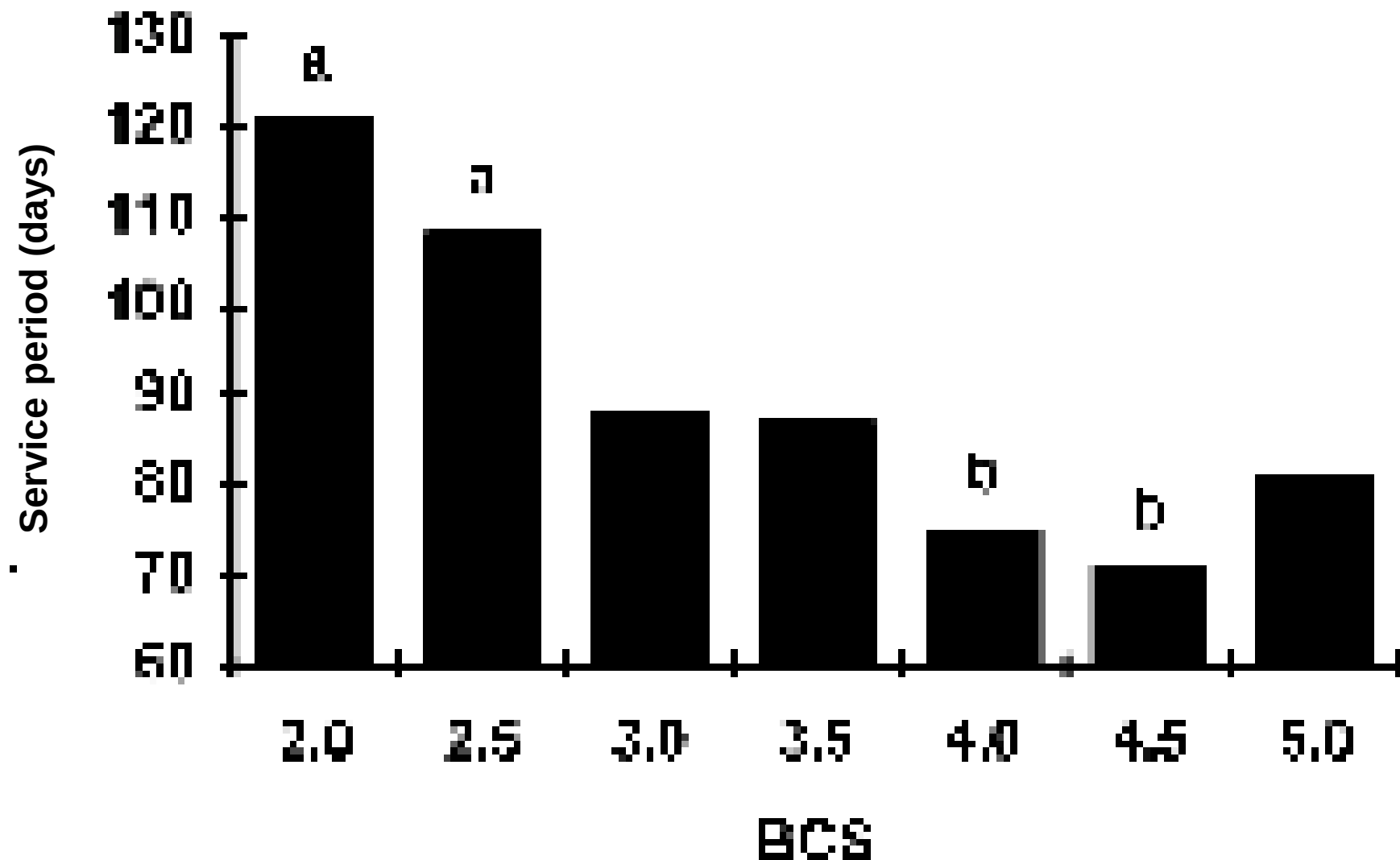


Figure: Interval from calving to pregnancy (service period) achieved by AI relation to body condition score (n=353).

**Does the BCS at
calving influence the
pregnancy per AI in
buffalo cows?**

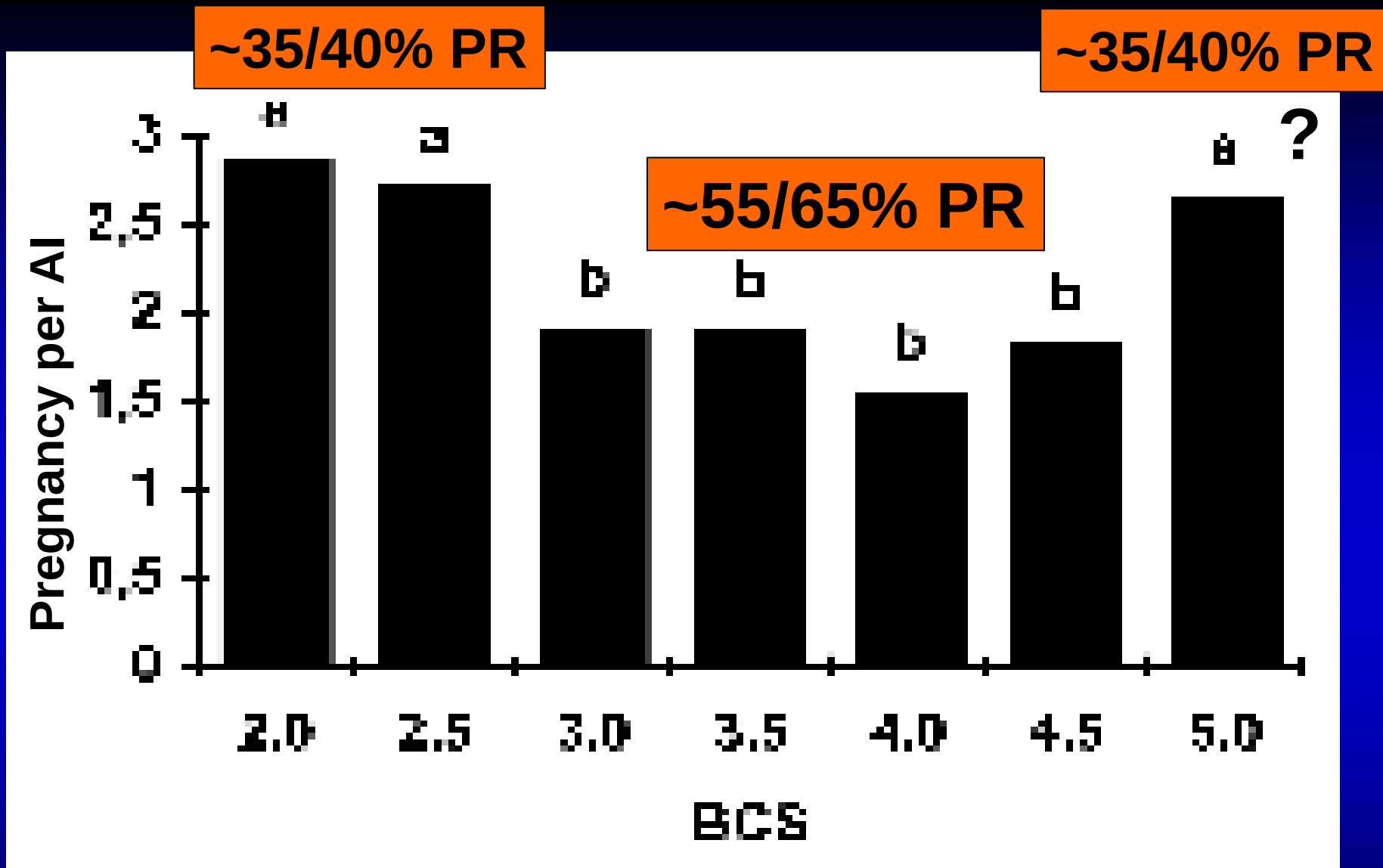


Figure: AI services per conception in relation to body condition score (n=405).

**Does the BCS at
calving influence the
pregnancy rate at AI
program in buffalo
cows?**

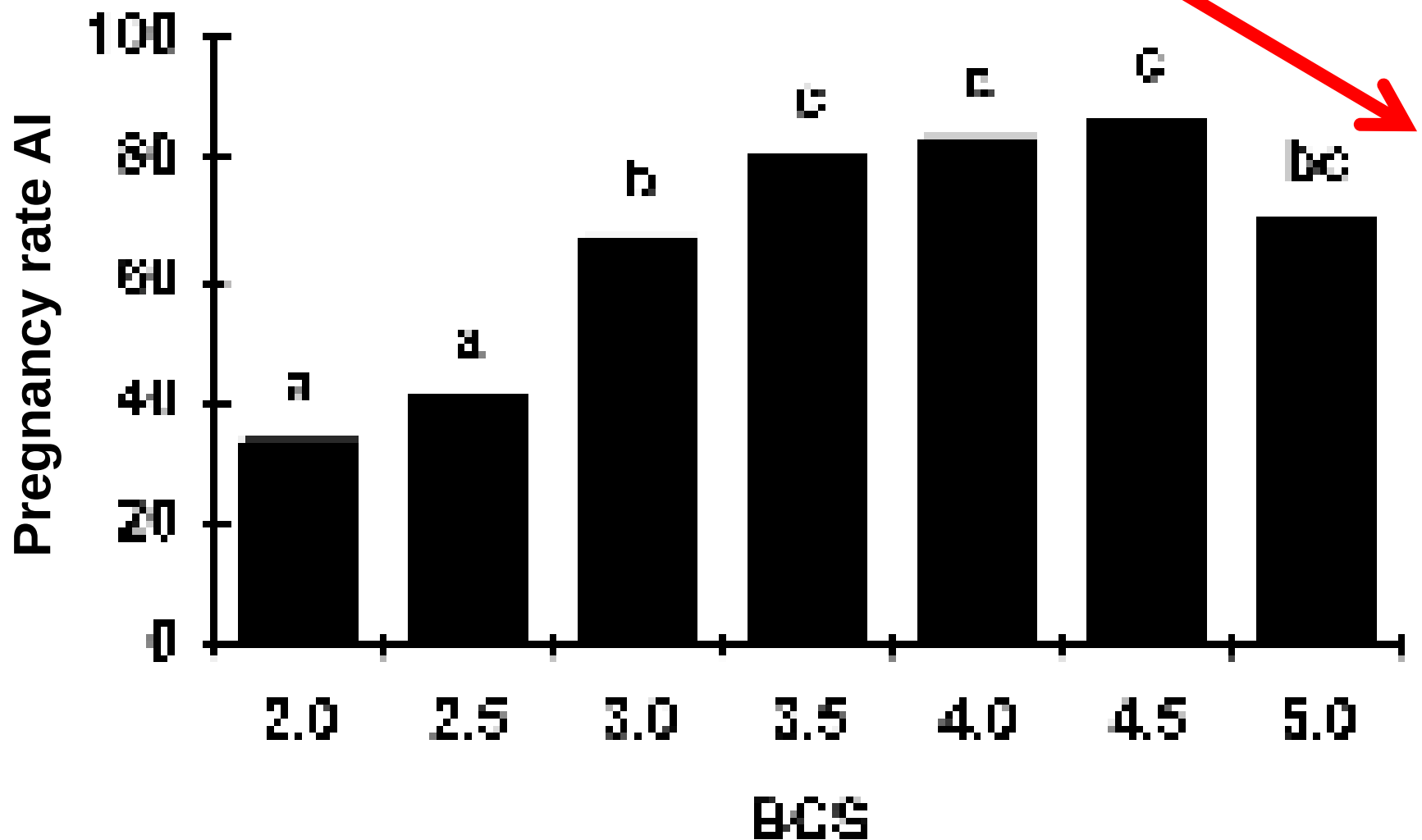


Figure: Pregnancy rate (%) following artificial insemination at the end of AI program in relation to body condition score (n=353/476).

**Does the BCS at
calving influence the
pregnancy rate
(AI + natural service)
in buffalo cows?**

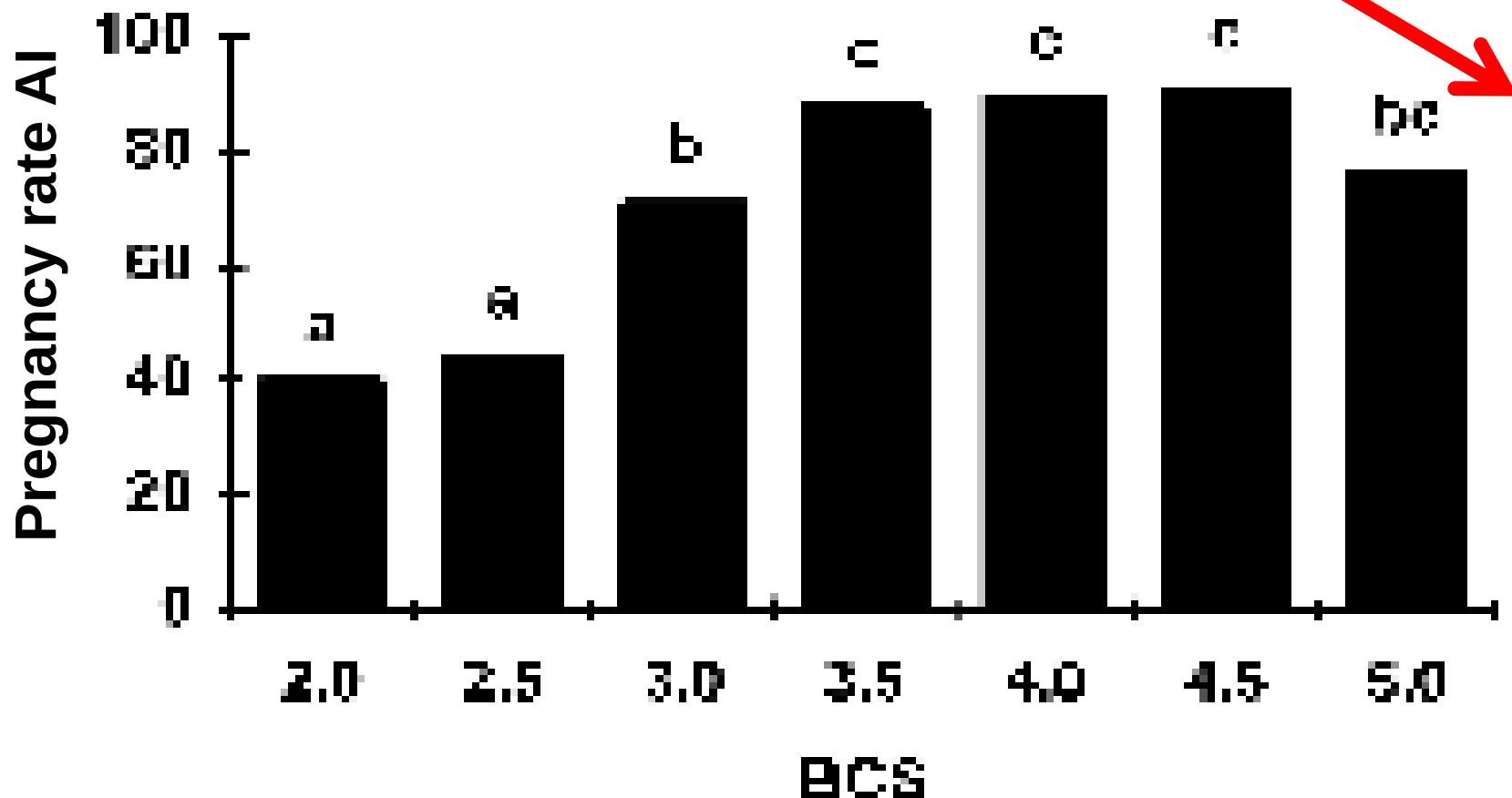
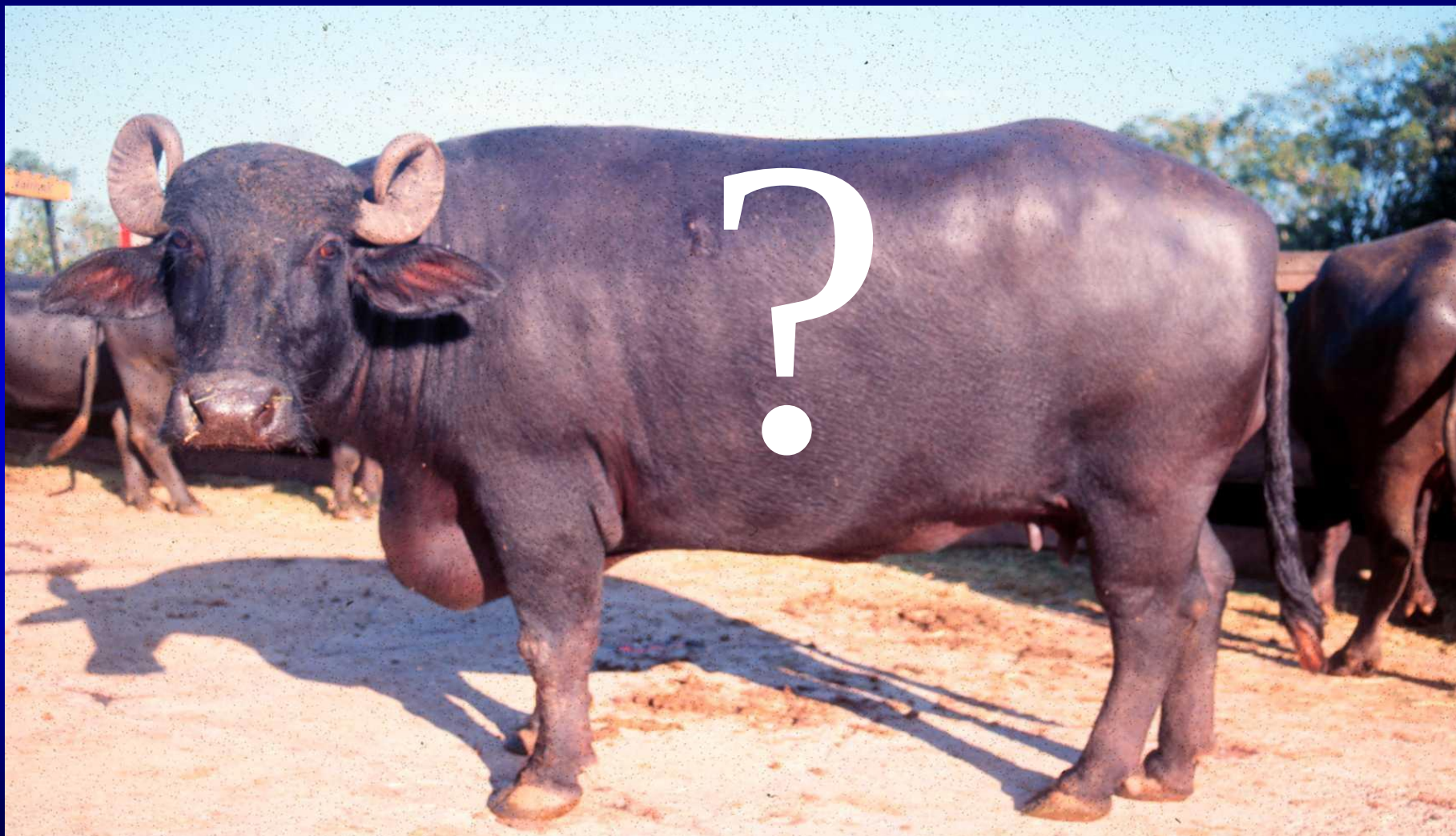


Figure: Pregnancy rate (%) at the end of the breeding season (AI plus natural mating) in relation to body condition score (n=380/476)

Não utilizar biotecnologias de reprodução em búfalos com baixa condição corporal



Não utilizar biotecnologias de reprodução em búfalos com baixa condição corporal





J. Dairy Sci. 98:3086–3099

<http://dx.doi.org/10.3168/jds.2014-8858>

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Effects of a high-energy diet on oocyte quality and in vitro embryo production in *Bos indicus* and *Bos taurus* cows

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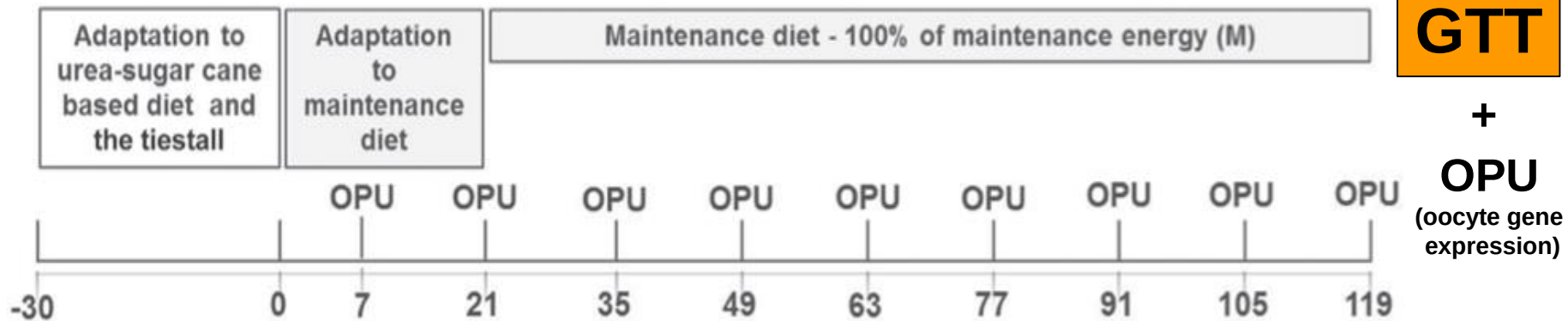
†Department of Veterinary Medicine, Departamento de Medicina Veterinária (DMV), Universidade Federal de Lavras, 37200-000, Lavras, MG, Brazil

‡EMBRAPA Gado de Leite, 36038-330 Juiz de Fora, MG, Brazil



Sales, 2010 (PhD Thesis, USP)

MAINTENANCE DIET



HIGH ENERGY DIET

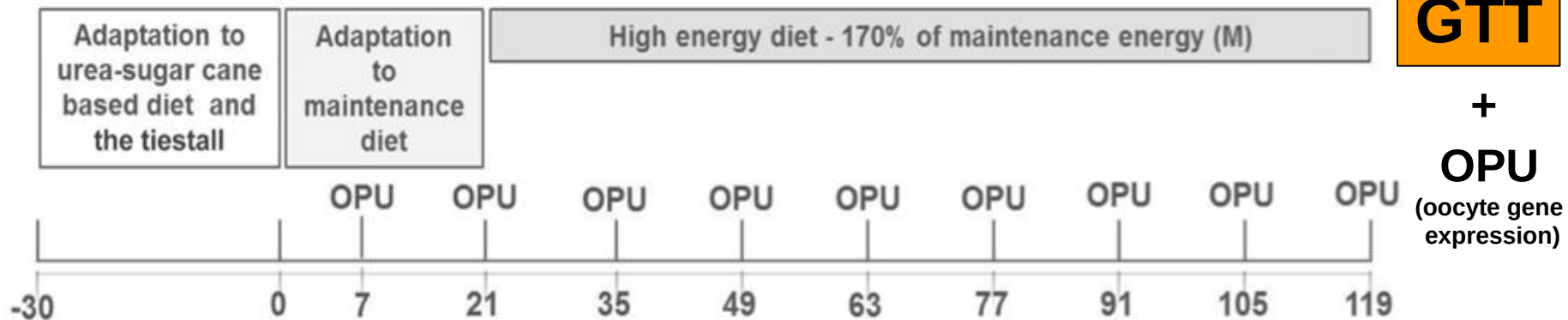
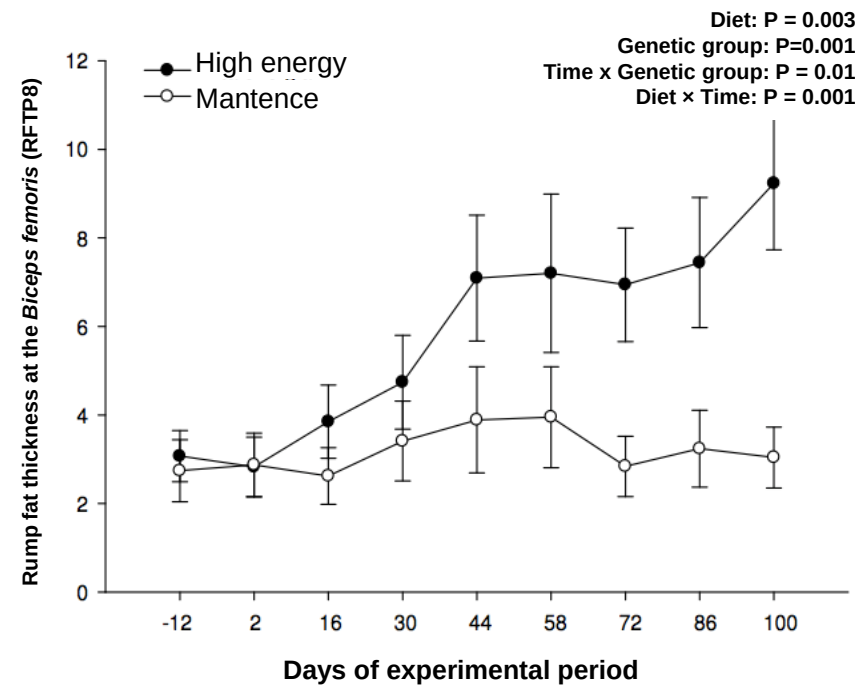
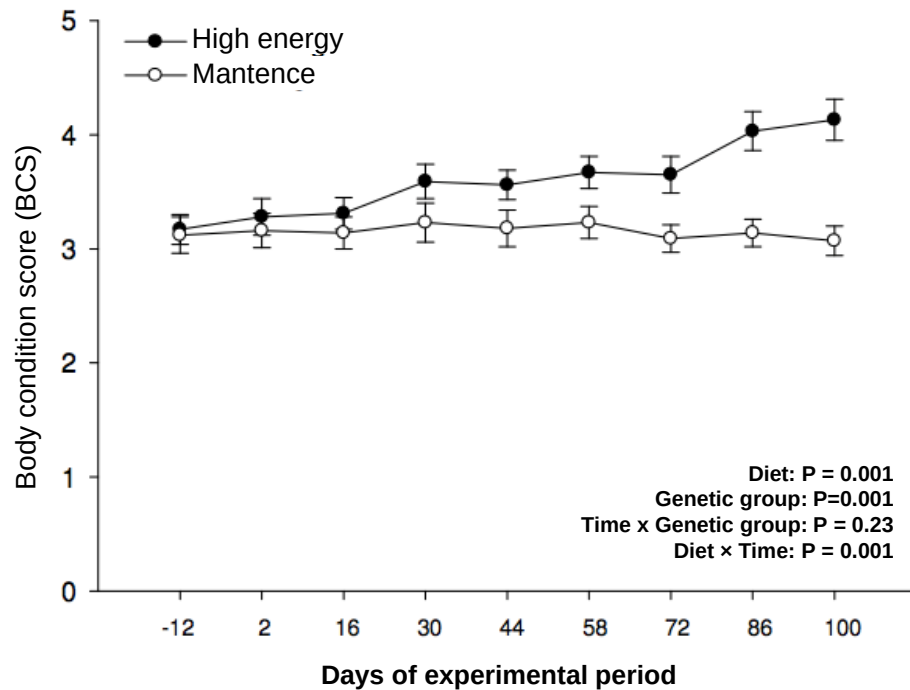


Figure 1. Experimental design of the different phases of the trial and ovum pick-up (OPU) for in vitro embryo production.



The BCS ($P = 0.001$) were greater in the 1.7M group compared with the M group. The RFAT was greater in animals that received the 1.7M diet ($P = 0.003$) and in *Bos indicus* cows ($P = 0.001$). Additionally, an interaction effect was noted between genetic groups and diet for RFAT ($P = 0.008$) such that the increase in RFAT was greater in *Bos indicus* than in *Bos taurus* cows on the 1.7M diet. A positive correlation between BCS and RFAT was observed ($r = 0.85$; $P = 0.0001$); however, no correlation between RFAT and BW was seen ($r = 0.02$; $P = 0.69$).

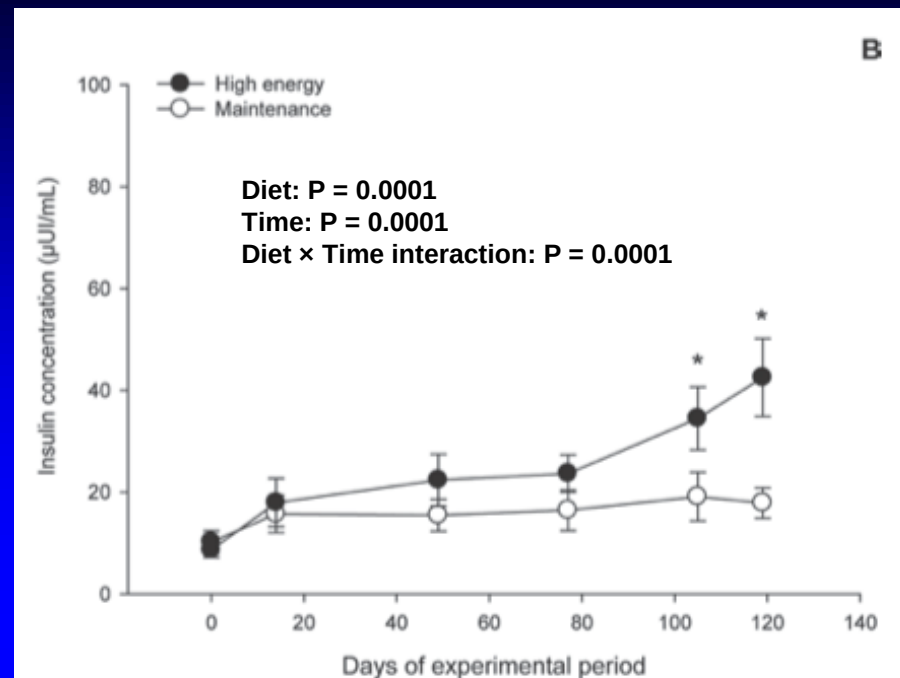
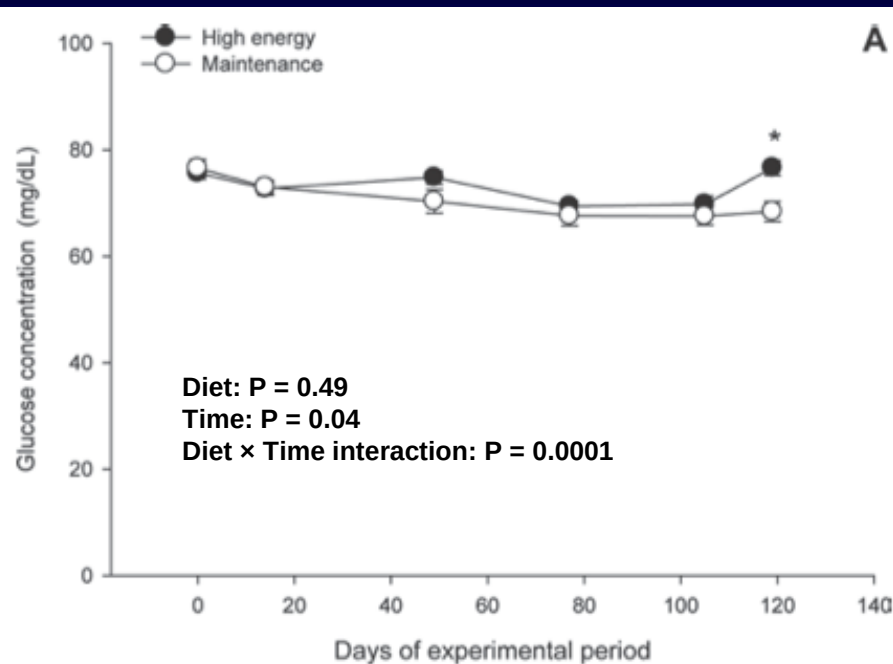
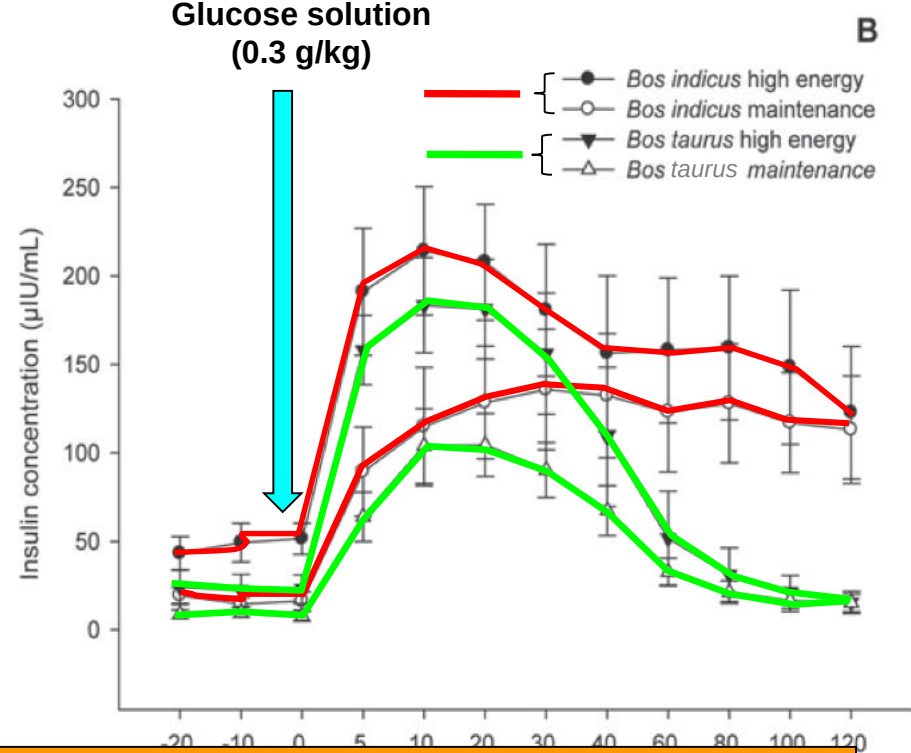
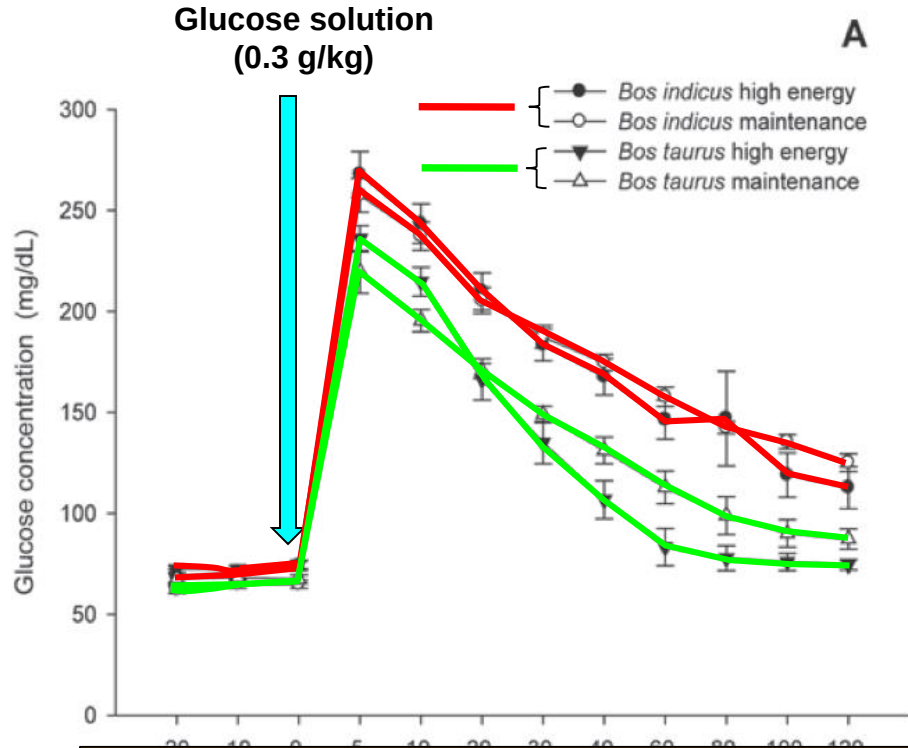


Figure. Serum concentrations of glucose (A) and insulin (B) in nonlactating cows fed diets to meet 100 (maintenance) or 170% (high energy) of the energy required for maintenance. An asterisk (*) means diet $\times$ time differ ($P < 0.0001$). Data are presented as means $\pm$ SEM.



Insulin resistance can be identified when greater insulin concentrations (peak, Dmax insulin, AUC) are necessary to reduce glucose concentrations to euglycemic levels during the GTT

Figure. Serum concentrations of glucose (A) and insulin (B) after i.v. infusion of sterile glucose solution at 0.3 g/kg of *Bos indicus* cows (Gir; n = 14) and *Bos taurus* cows (Holstein; n = 14) fed diets to meet 100 (maintenance) or 170% (high energy) of the energy required for maintenance. Data are presented as means $\pm$ SEM.

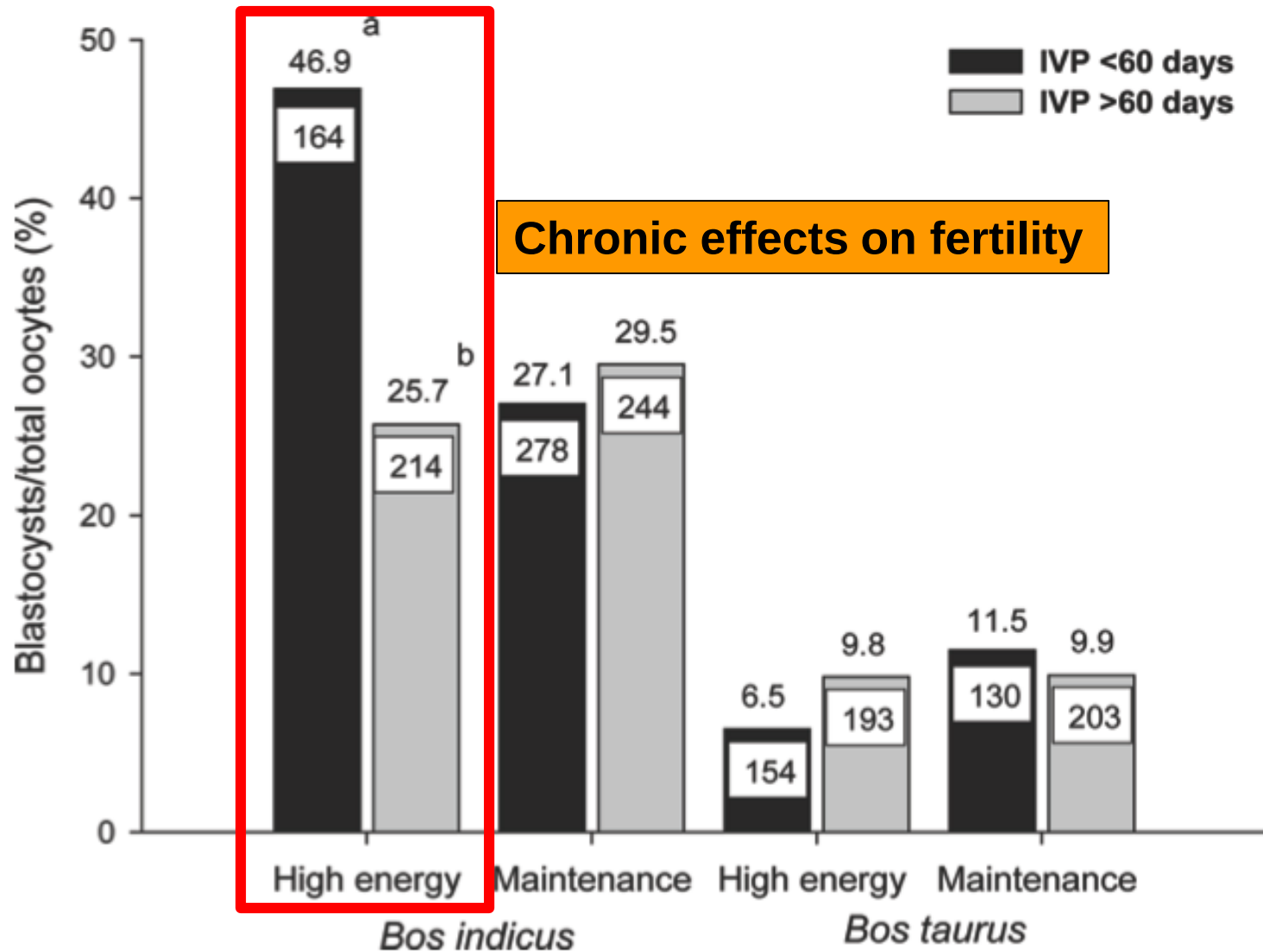


Figure. In vitro embryo production (IVP) of *Bos indicus* (Gir, n = 14) and *Bos taurus* (Holstein, n = 14) donors receiving high-energy diets (170% of maintenance) or maintenance (100% of maintenance) during the experimental period. Time 1 = IVP up to 60 d after the beginning of the experiment; time 2 = IVP 60 d after the beginning of the experiment. P-values were P = 0.21 for diet, P = 0.01 for genetic group, P = 0.24 for time, P = 0.01 for diet × genetic group interaction, and P = 0.01 diet × genetic group × time interaction. Different letters (a,b) represent significant differences (P = 0.01); numbers inside bars are viable oocytes.

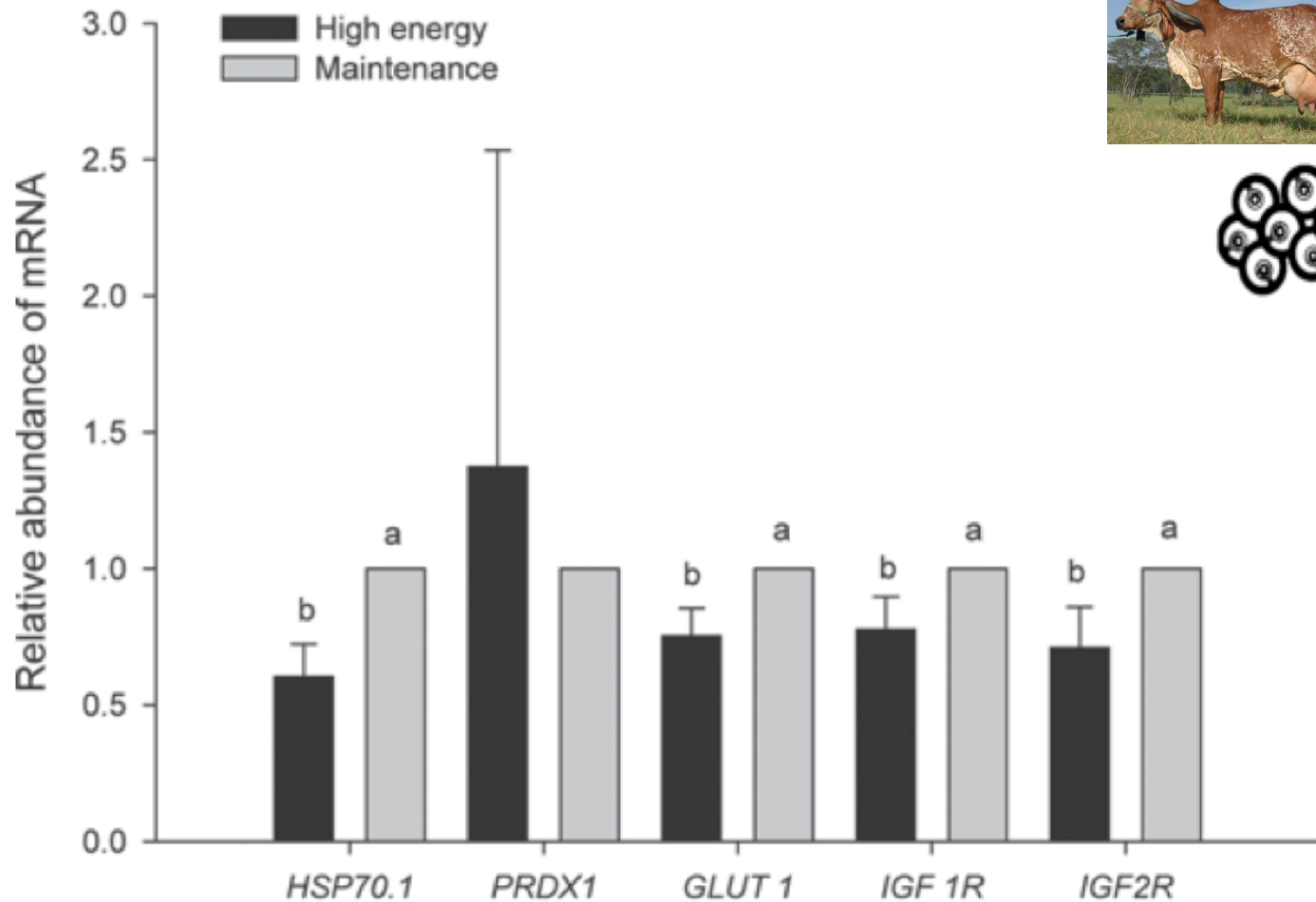


Figure. Relative abundance of transcripts (means $\pm$ SEM) associated with cellular stress (PRDX1 and HSP70.1) and metabolism (GLUT1, IGF1R, and IGF2R) were obtained by real-time PCR of oocytes of *Bos indicus* fed diets to meet 100% (maintenance, $n = 90$) or 170% (high energy, $n = 90$) of the energy required for maintenance. Different letters (a,b) represent significant differences ($P = 0.01$).

Overfeed cows

Vacas ↑ Ingestão
Energia

↑ Glicose

↑ Insulin

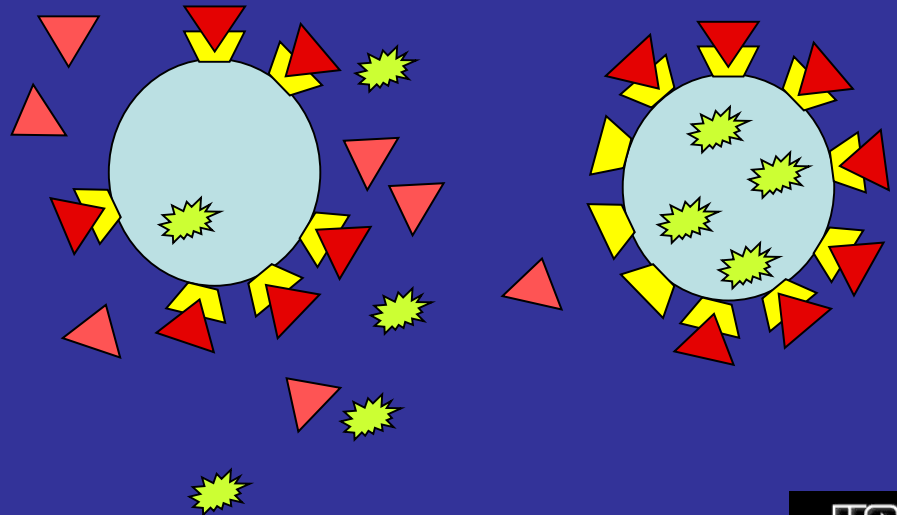
Hiperinsulinemia

Down regulation

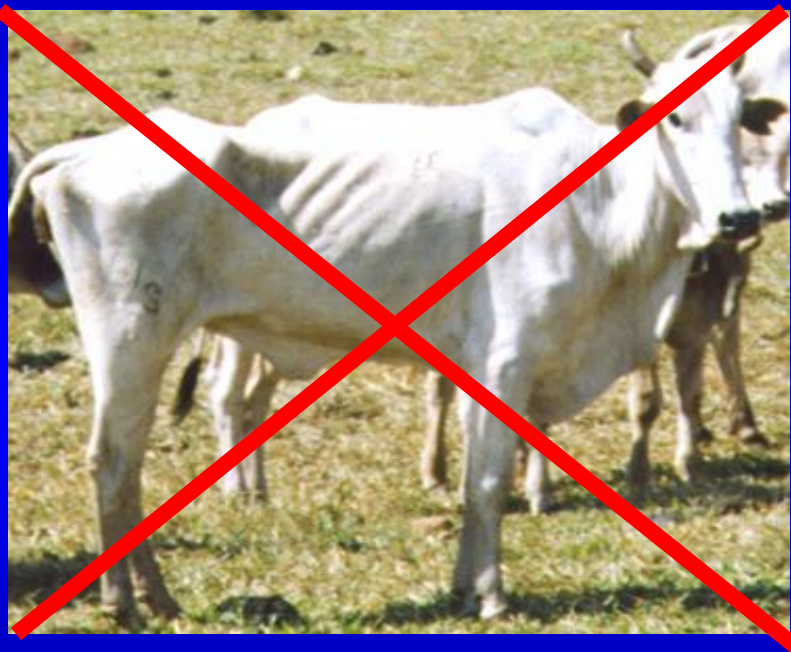
↑ IGF-1

↓ Glicose (célula)

↓ Qualidade oócito



Eficiência reprodutiva vs BCS



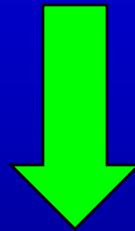
Baixo BCS



Elevado BCS

**Vacas em baixo BCS têm
redução nos padrões de
liberação de LH**

Alta incidência de anestro pós-parto



↓ Baixa taxa de prenhez

Ferramentas para melhorar a a taxa de prenhez à IATF em vacas com baixa condição corporal em anestro

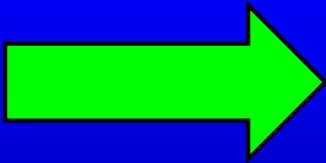
IATF  ↑ Eficiência reprodutiva

Tabela. Diâmetro do folículo dominante no momento da retirada do dispositivo de progesterona (Dia 8) na taxa de prenhez em vacas Nelore.

BCS category	LF on Day 8 ^b , mm mean±SEM	<i>P</i>	P/AI, % (n/n)	<i>P</i>
Low (2.0–2.5)	10.3 ± 0.3	0.002	42.9 (63/147)	0.04
Moderate to high (>2.5)	11.4 ± 0.2		53.4 (158/296)	

Vacas com baixo BCS possuem menor diâmetro do folículo dominante na sincronização para IATF

BCS vs occurrence of estrus

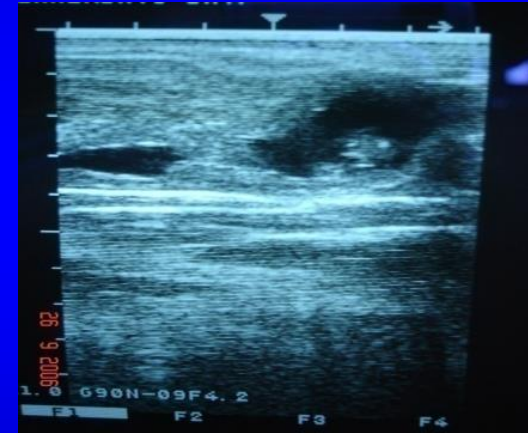
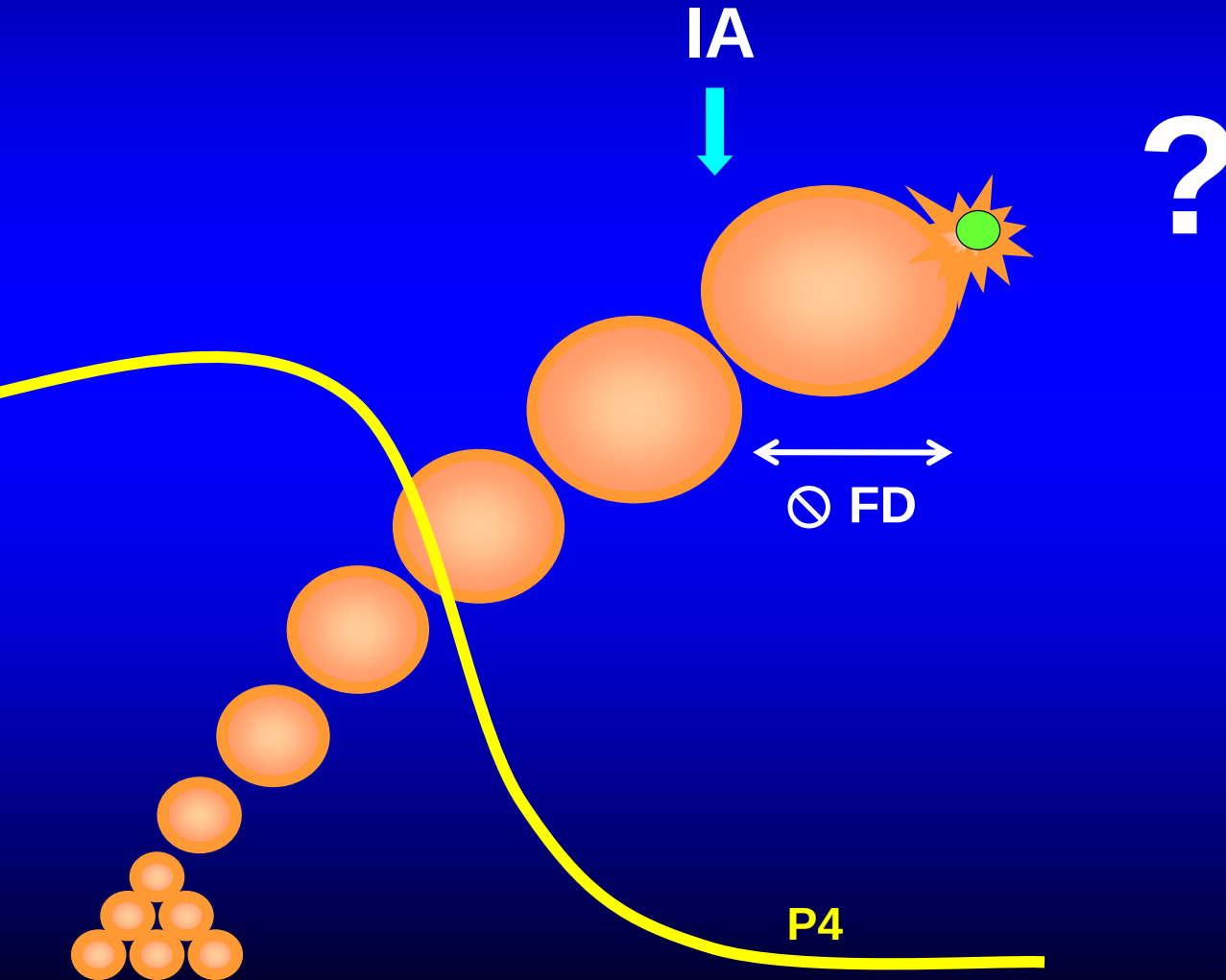
Table 2

Risk factors for occurrence of estrus following an estradiol/progesterone-based synchronization protocol in suckled *Bos indicus* cows (data from Experiments 2 and 3).

Variable	Estrus, % (N/N)	Adjusted OR (95% CI)	P
Farm			
A	46.3 (126/272)*	Referent	
B	54.0 (87/161) [†]	1.82 (1.16–2.86)	
C	67.9 (36/53) [†]	2.95 (1.54–5.65)	
D	68.9 (73/106) [†]	2.88 (1.72–4.82)	<0.0001
E	70.1 (131/187) [†]	3.10 (2.01–4.77)	
Breed			
Nelore (<i>Bos indicus</i>)	56.6 (310/548)	Referent	
Crossbred (<i>Bos indicus</i> × <i>taurus</i>)	61.9 (143/231)	1.61 (1.12–2.31)	0.01
Parity			
Primiparous	37.1 (45/124)	Referent	
Multiparous	62.1 (407/655)	2.39 (1.49–3.83)	0.0003
BCS category			
Low to moderate (2.0 to 3.0)	54.9 (257/468)	Referent	
High (>3.25)	63.0 (196/311)	1.41 (1.00–2.00)	0.05

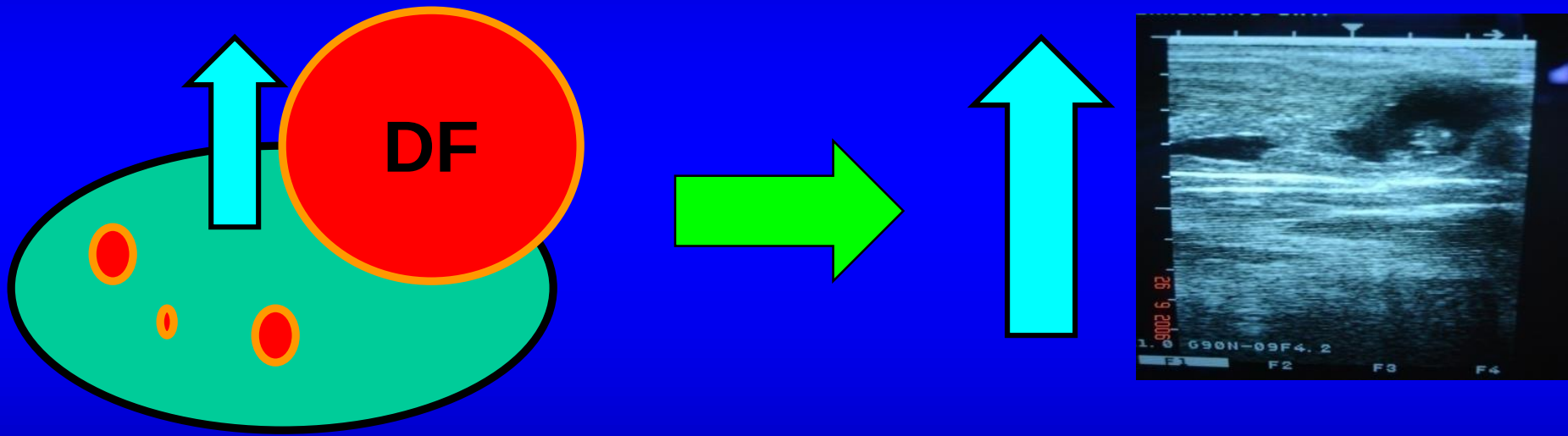
Vacas com baixo BCS possuem menor manifestação de estro ao final da sincronização para IATF

O diâmetro do folículo dominante na IA está associado à qualidade do ovócito e à taxa de concepção?



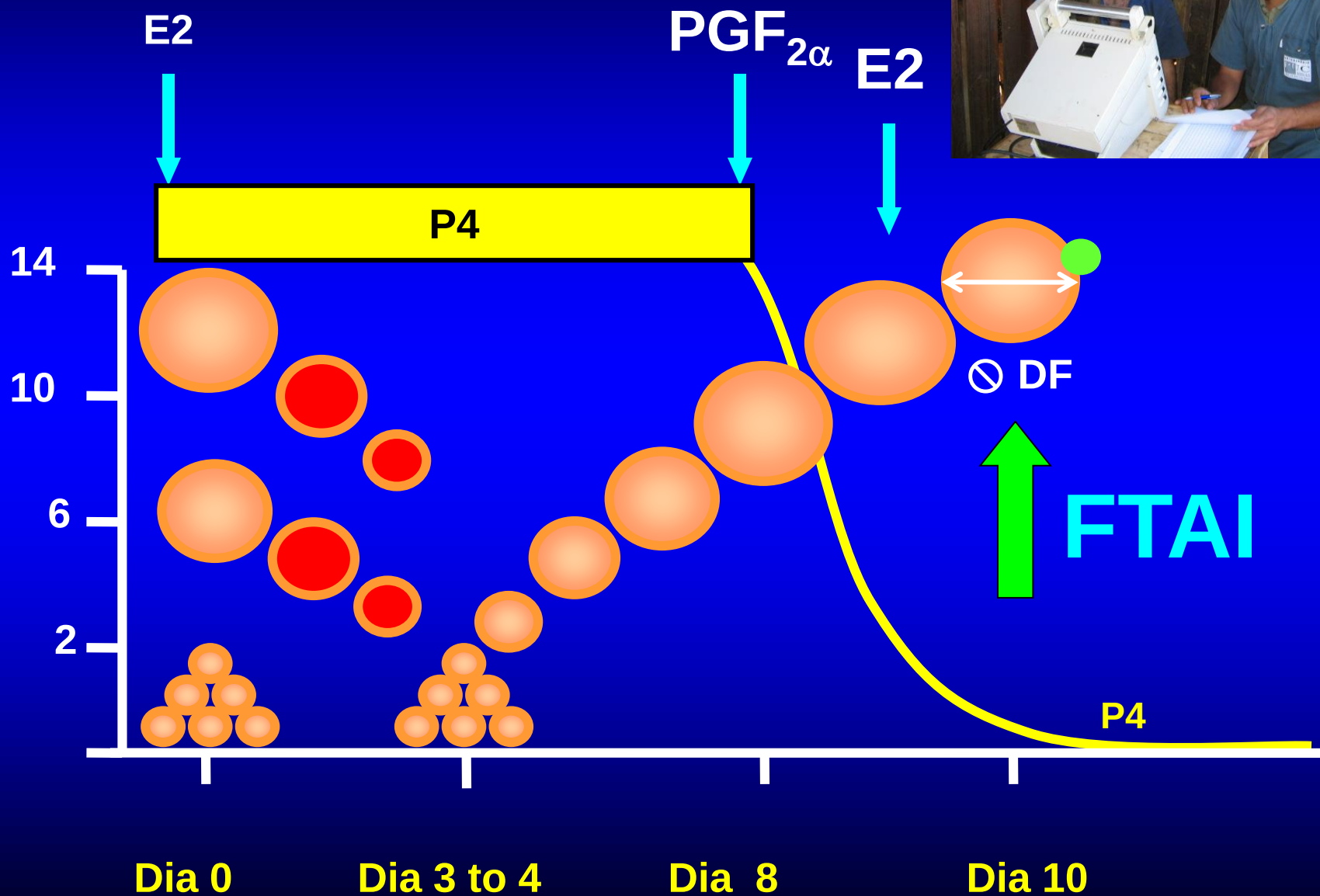
TP

Experimental hypothesis





n = 2,388 Nelore cows



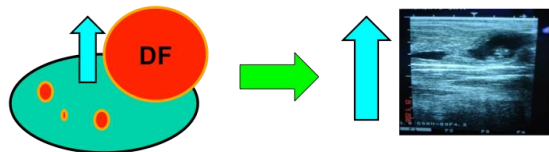
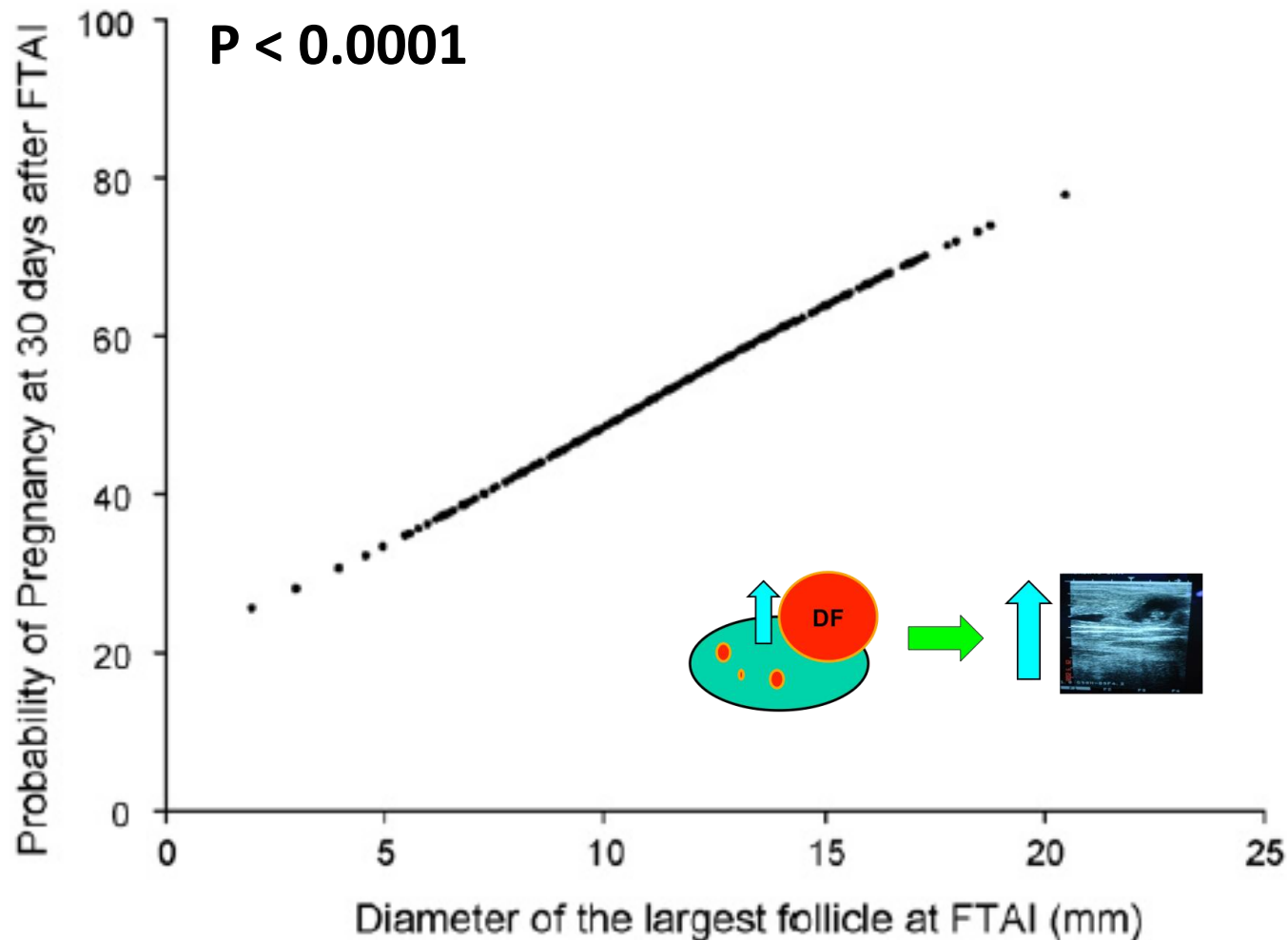
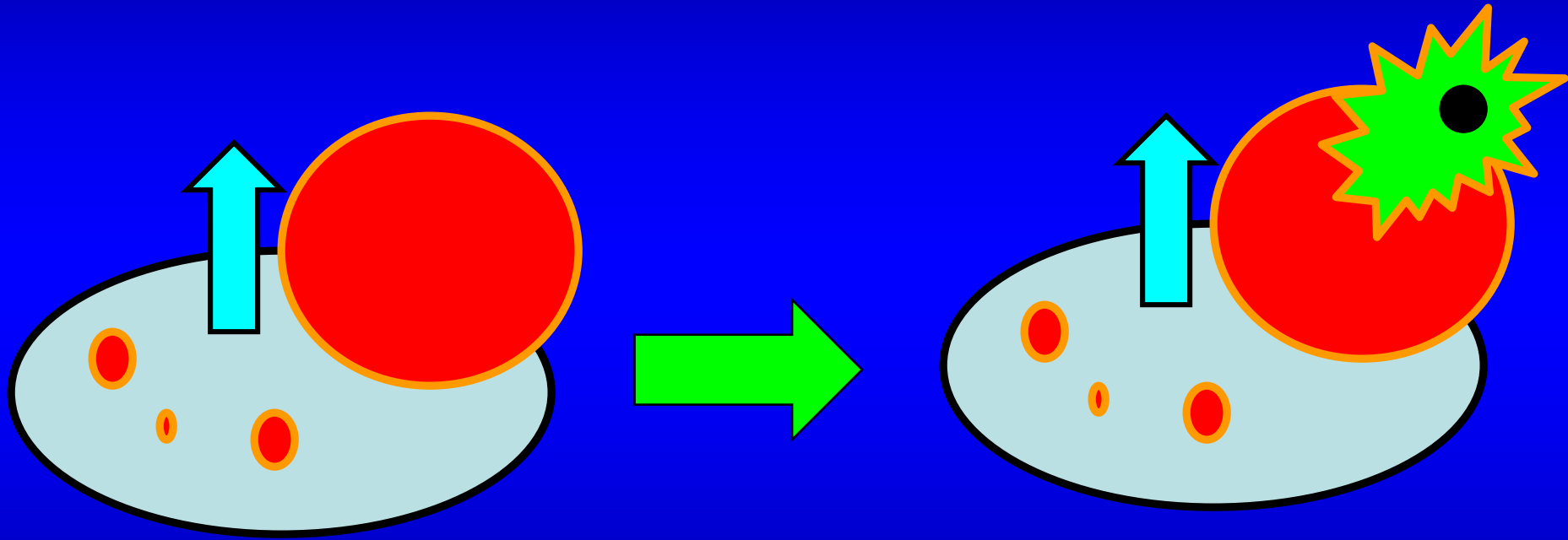


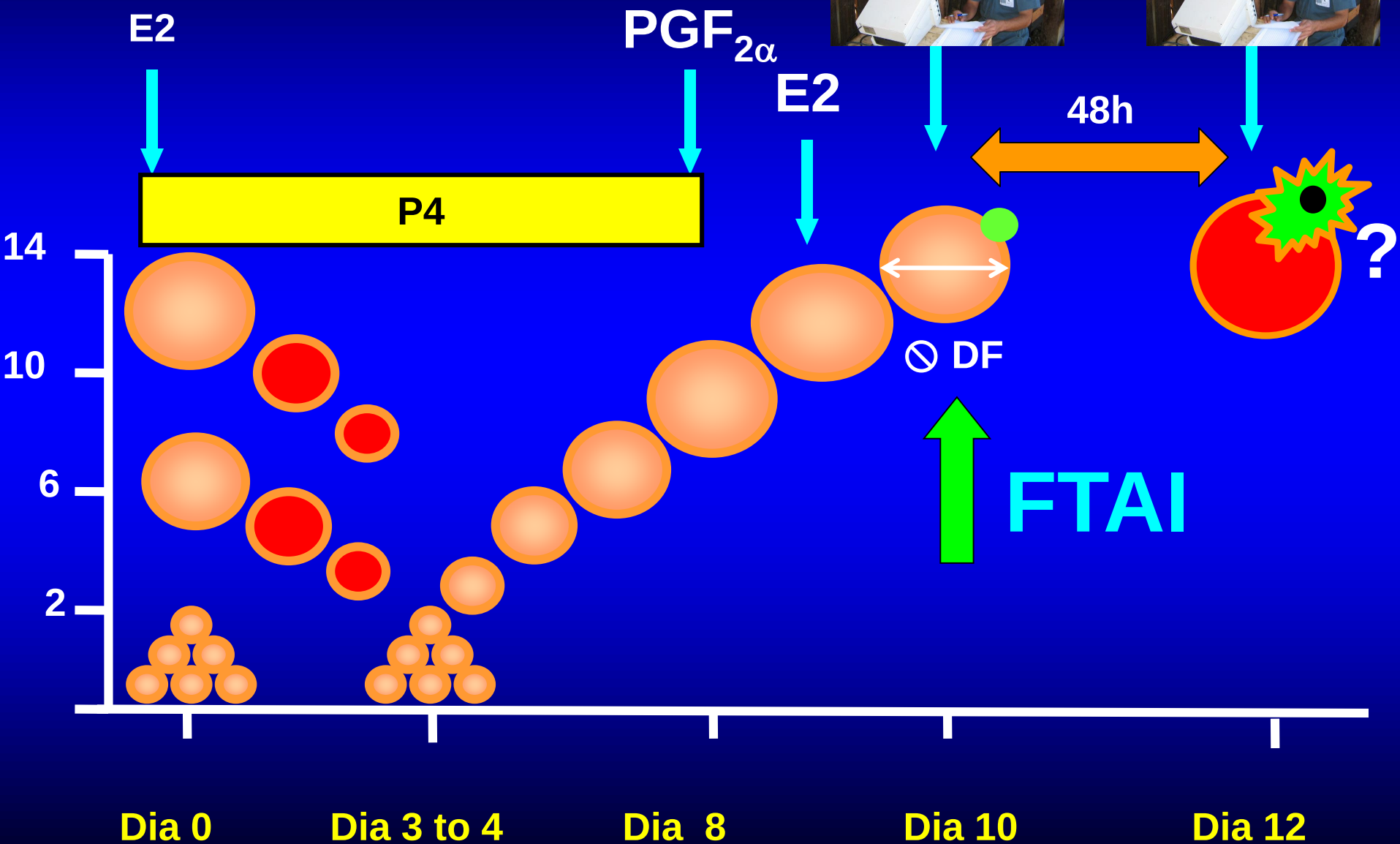
Fig. **Probability of pregnancy** on day 30 after fixed-time artificial insemination (FTAI) in suckled *Bos indicus* cows (**n = 2388**) according to the diameter of the largest follicle (LF) at FTAI [probability of pregnancy at 30 days = $\exp(-1.3282 + 0.1256 \times \text{diameter of the LF at FTAI}) / 1 + \exp(-1.3282 + 0.1256 \times \text{diameter of the LF at FTAI})$].

Experimental hypothesis





n = 813 Nelore cows



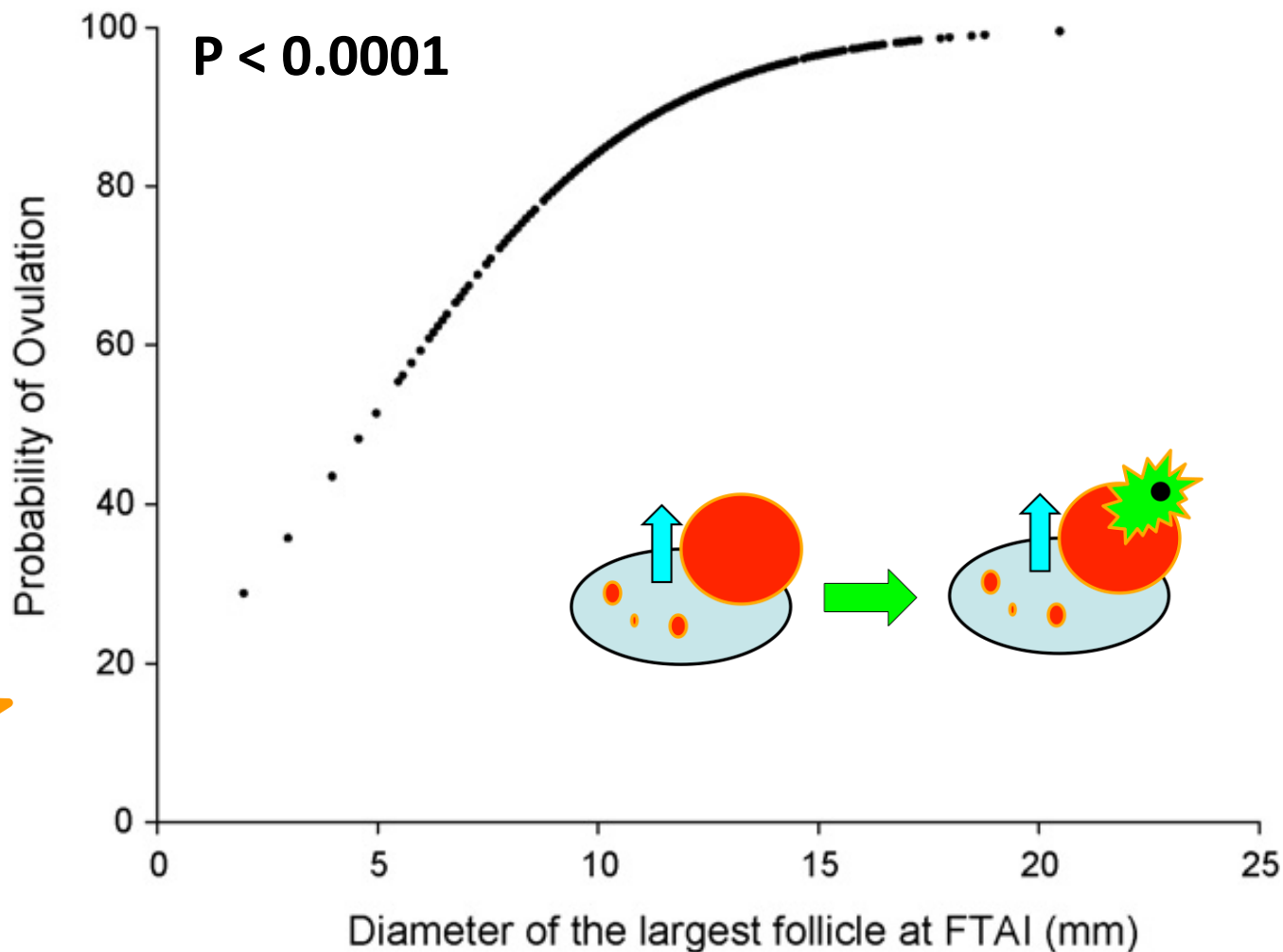
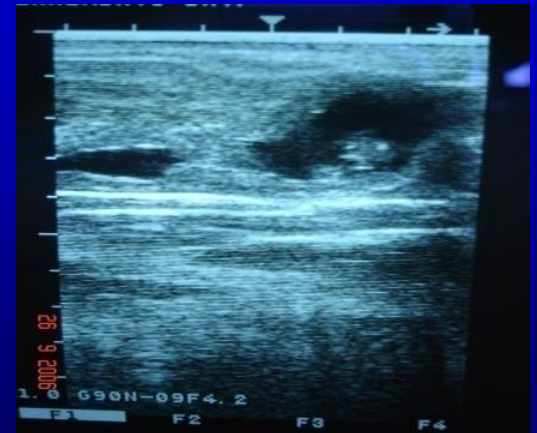
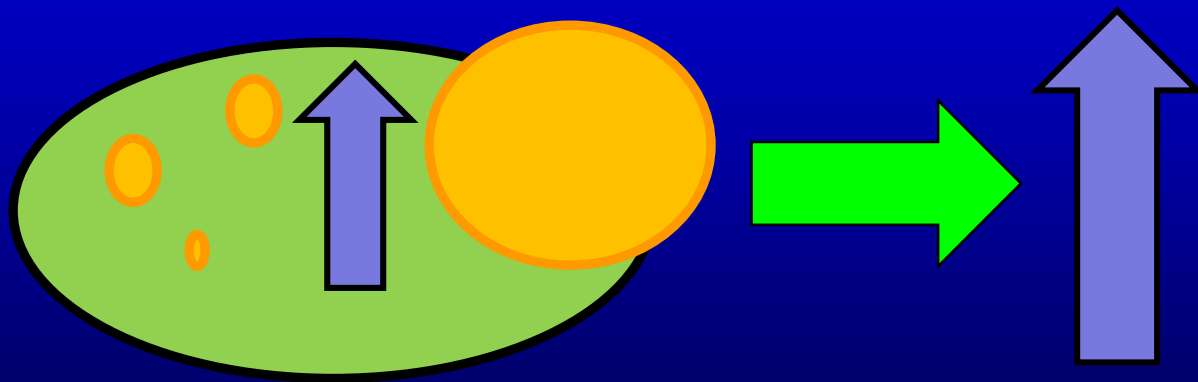


Fig. Probability of ovulation after estrous synchronization protocol for fixed-time artificial insemination (FTAI) in suckled *Bos indicus* cows (**n = 813**) according to the diameter of the largest follicle (LF) at FTAI [probability of ovulation = $\exp(-1.5536 + 0.3201 \times \text{diameter of the LF at FTAI}) / 1 + \exp(-1.5536 + 0.3201 \times \text{diameter of the LF at FTAI})$].

COMO AUMENTAR O DIÂMETRO FOLICULAR NA IATF?



THE USE OF FSH AND eCG IN FIXED TIME ARTIFICIAL INSEMINATION IN ANESTROUS LACTATING BEEF COWS

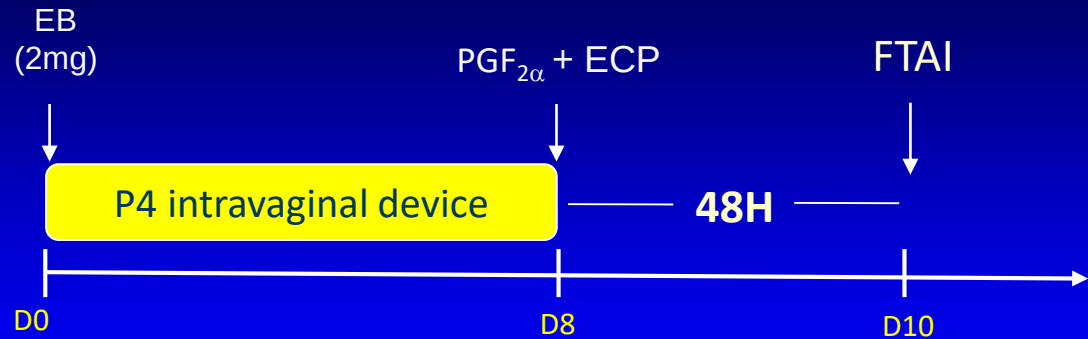


Sales et al., (2011) Animal Reproduction Science, 124, p. 12–18

Cows with no CL after 2 US

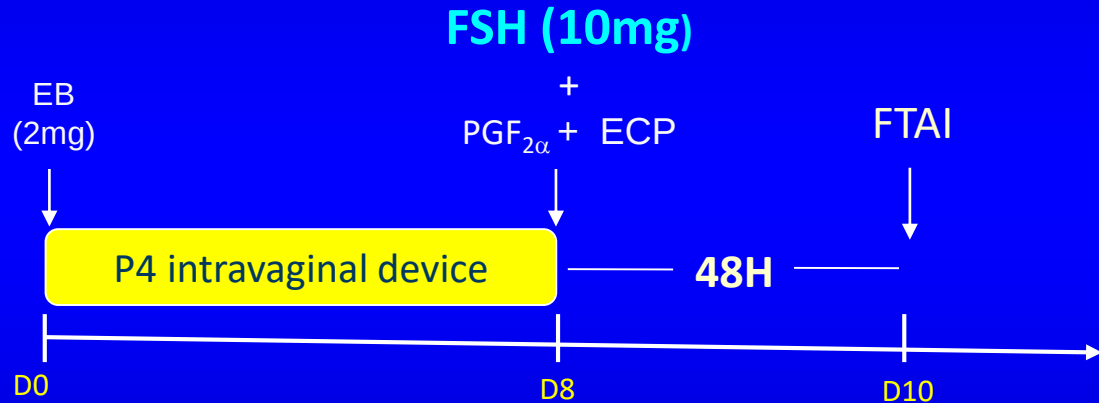
1) Group Control

n=148



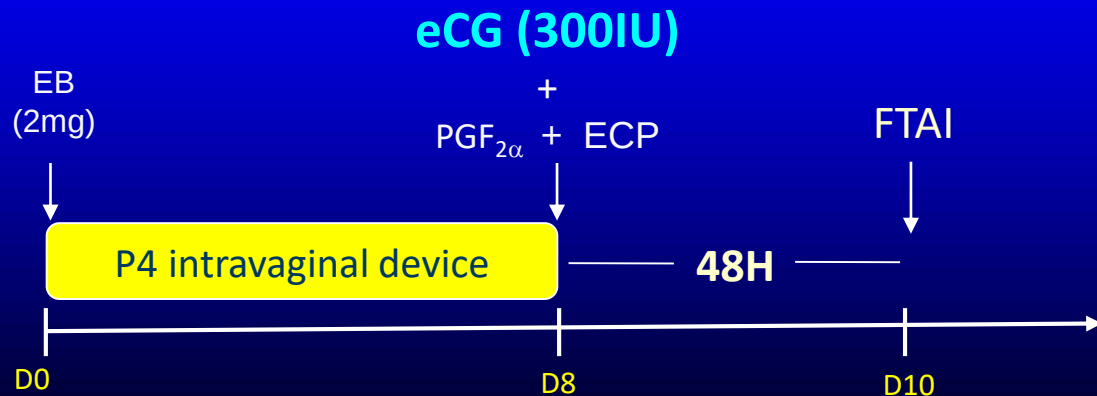
2) Group FSH

n=150



3) Group eCG

n=146



Groups:

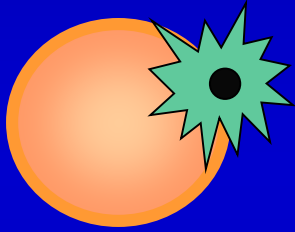
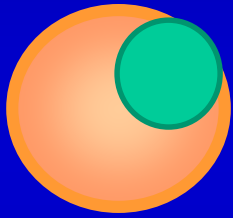
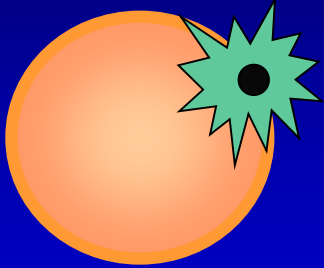
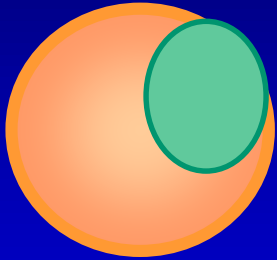
- Control n=134
- FSH n=132
- eCG n=123

Diameter F. Ovulatory

Ovulation rate

eCG - 13.9 mm^a

eCG - 88.6%^a
(109/123)



Control - 12.9 mm^b

FSH - 12.8 mm^b

Control - 71.9%^b
(96/134)

FSH - 71.6%^b
(95/132)



FTAI

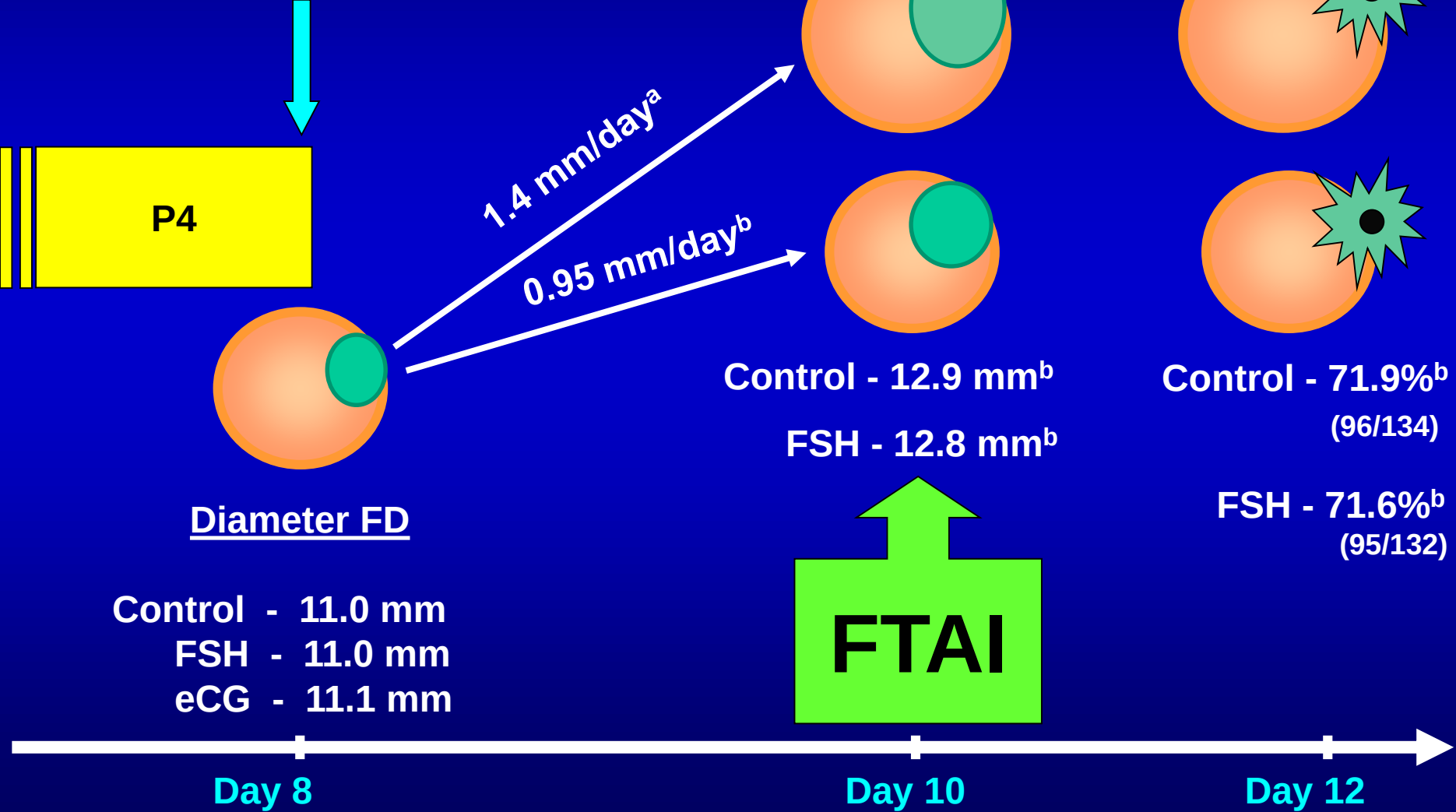
Diameter FD

Control - 11.0 mm
FSH - 11.0 mm
eCG - 11.1 mm

Day 8

Day 10

Day 12



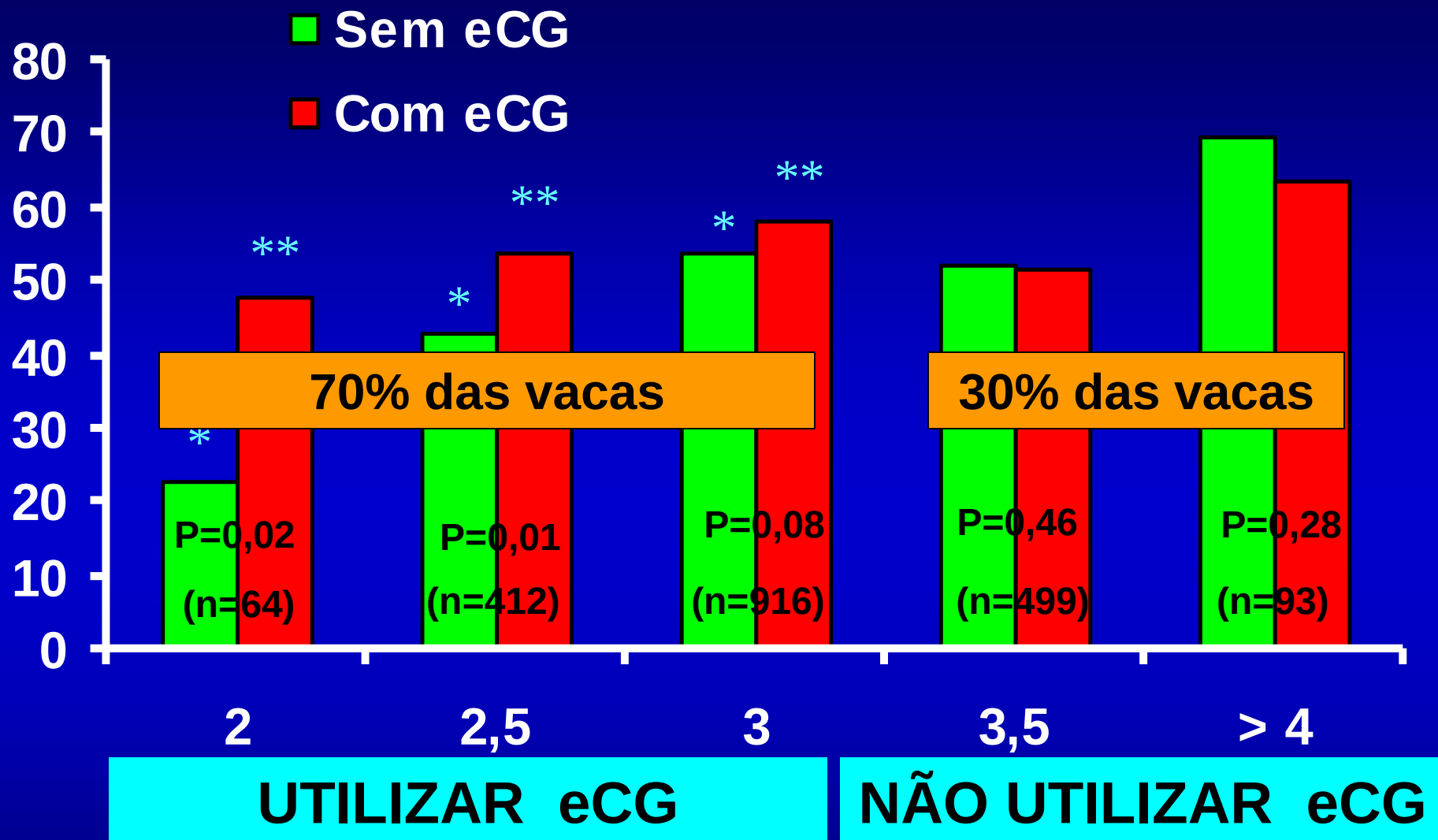
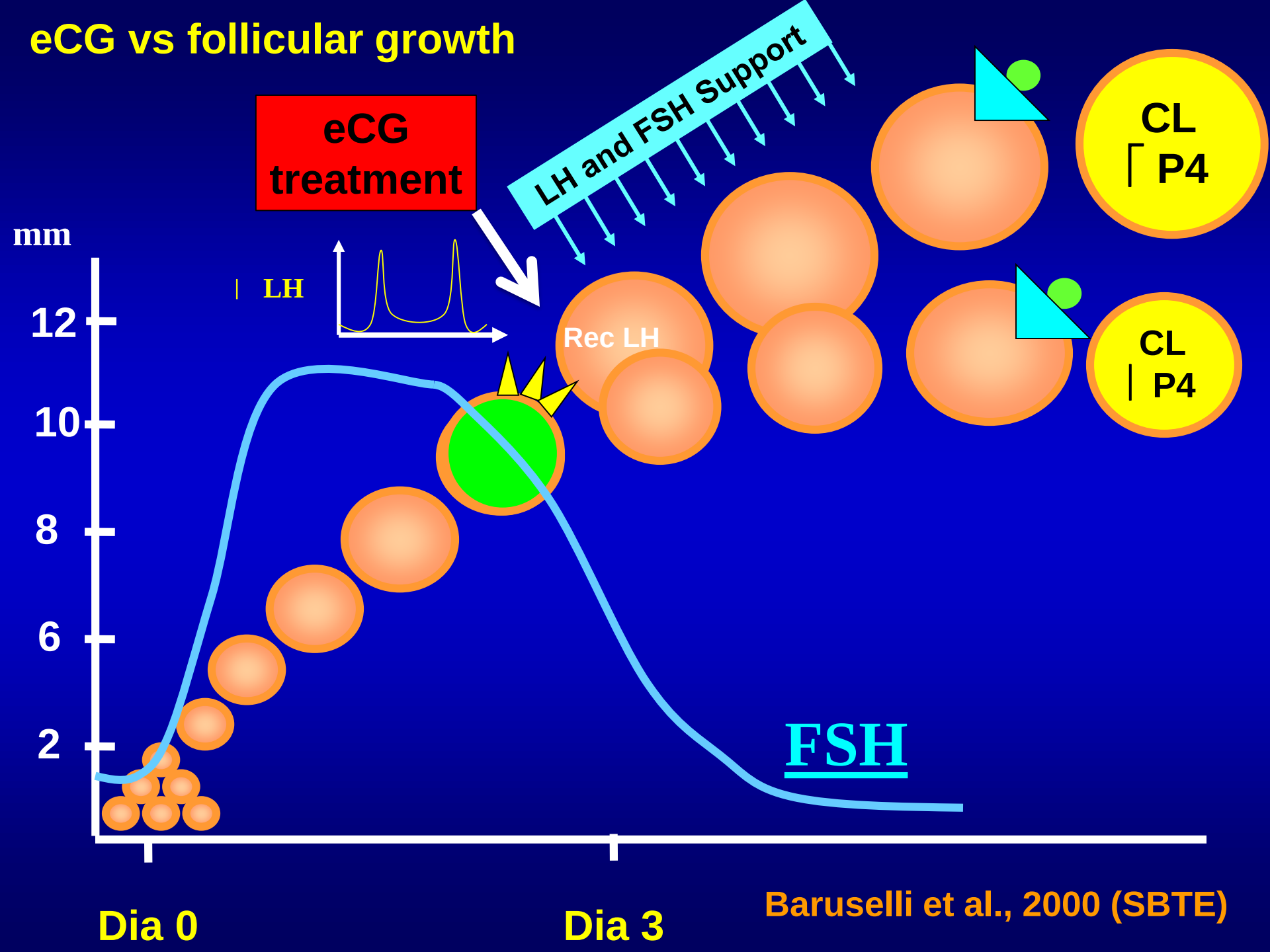


Gráfico. Taxa de concepção de vacas *Bos indicus* (Nelore) lactantes (> 60 dias pós-parto) tratadas com e sem eCG no momento da retirada do dispositivo intravaginal de progesterona (n= 1.984).

Baruselli et al., 2005

eCG vs follicular growth



**Manejo nutricional
para reduzir a idade à
primeira concepção**

Propriedade de cria (2.150 ha)



Propriedade de cria (2.140 ha)

350 novilhas
(12/24 meses; 0,7 UA/ha)
TOTAL = 245 ha

350 novilhas
(36/48 meses; 0,9 UA/ha)
TOTAL = 315 ha

350 novilhas
(24/36 meses; 0,8 UA/ha)
TOTAL = 280 ha

1000 vacas
+ 700 bezerros (70%)
(vacas, 1 UA/ha e bezerros, 0,3 UA/ha)
TOTAL = 1300 ha

315 ha para recria
(15% da área de cria)

525 ha = 433 vacas + 303 bezerros = 43% + bezerros/área
(1 UA/ha) (70% desm; 0,3 UA/ha)

Propriedade de cria (2.140 ha)

Valor de mercado:

Bezerro macho= R\$ 1.100,00

Vaca descarte= R\$ 1.600,00

Novilha descarte= R\$ 1.060,00

Idade a primeira cobertura

14 meses

36 meses

Número de vacas

1.433

1.000

Venda de animais

Bezerros machos até 12 meses

501 (R\$ 551.100,00)

350 (R\$ 385.000,00)

Vacas vazias (30%)

430 (R\$ 688.000,00)

300 (R\$ 480.000,00)

Novilhas descarte

72 (R\$ 76.320,00)

50 (R\$ 53.000,00)

Faturamento (total)

R\$ 1.315.420,00

R\$ 918.000,00

Faturamento (ha)

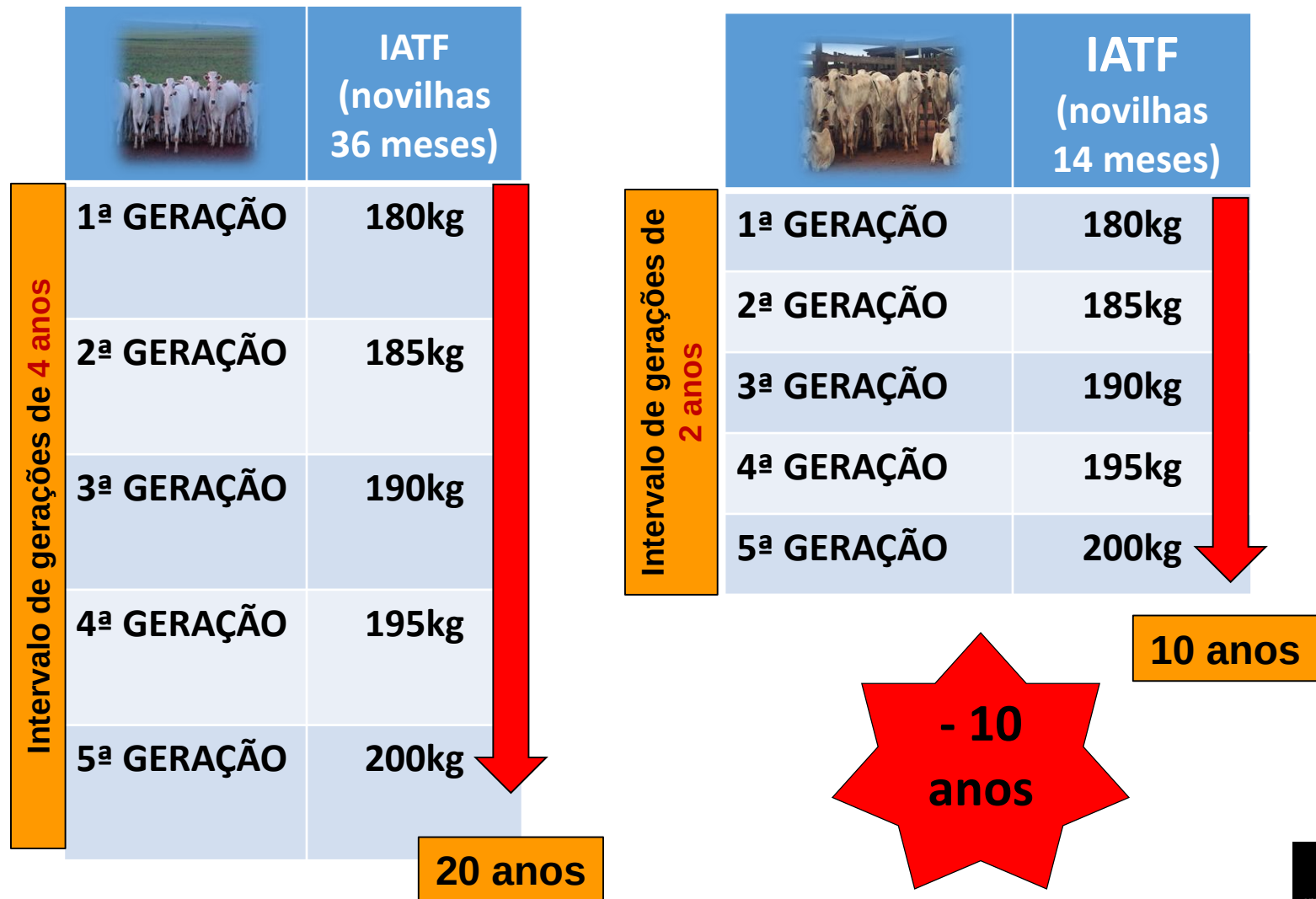
R\$ 614,68

R\$ 428,97

SIMULAÇÃO DO GANHO GENÉTICO

Simulação:

- Rebanho com peso médio à desmama de 180kg
- Sêmen de touros com DEP +5kg à desmama



Fatores que influenciam a taxa de prenhez de novilhas Nelore precoces?

Número de folículos antrais?

AMH?

Escore de condição corporal (1 a 5)?

Idade?

Peso?

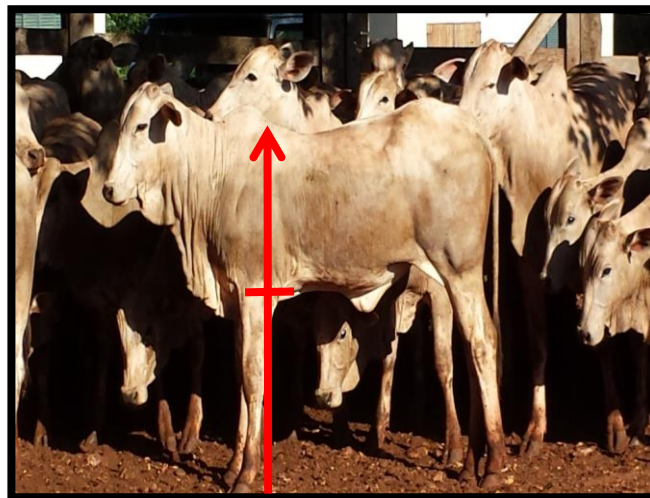
Profundidade de costela?

Altura de cernelha?

Espessura de gordura
gordura subcutânea?

Genética?

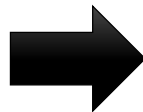
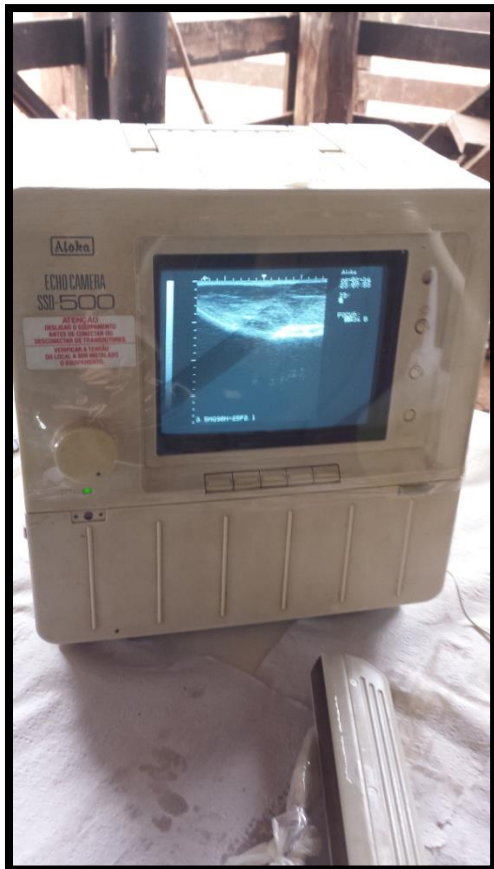
MATERIAL E MÉTODOS



**Altura de cernelha e profundidade
de costela**

Freitas et al., 2015

MATERIAL E MÉTODOS



Dra. Marina Bonin

Ultrassonografia de carcaça – EGPU* (P8)

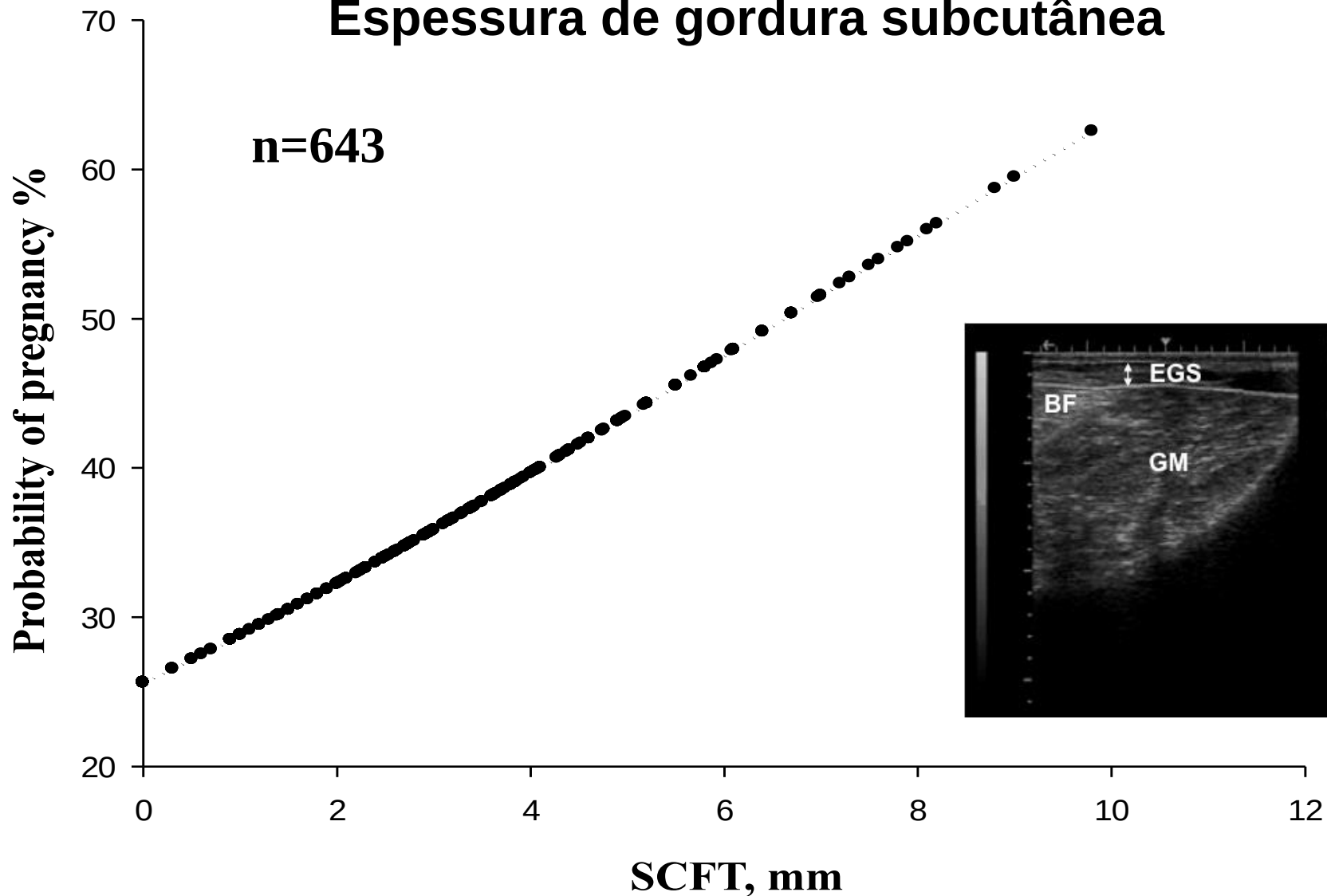
*espessura de gordura subcutânea na garupa

NOVILHAS PRECOCES

Tabela 1. Taxa de concepção de novilhas da raça Nelore com média de 13,8 meses de idade, de acordo com as variáveis estudadas.

Variável	n	Taxa de concepção	Valor de P
Idade			
> 13 meses	391	40,9%	0,01
≤ 13 meses	259	27,8%	
Peso (Dia -10)			
> 248 kg	394	39,8%	0,001
≤ 248 kg	255	29,4%	
ECC (Dia -10)			
> 3,00	249	45,4%	< 0,001
≤ 3,00	400	29,7%	
EGPU (Dia -10)			
> 2,47 mm	378	44,4%	< 0,001
≤ 2,47 mm	265	23,4%	
Prof. de costela (Dia -10)			
> 44,0%	358	41,9%	< 0,001
≤ 44,0%	285	27,0%	

Espessura de gordura subcutânea



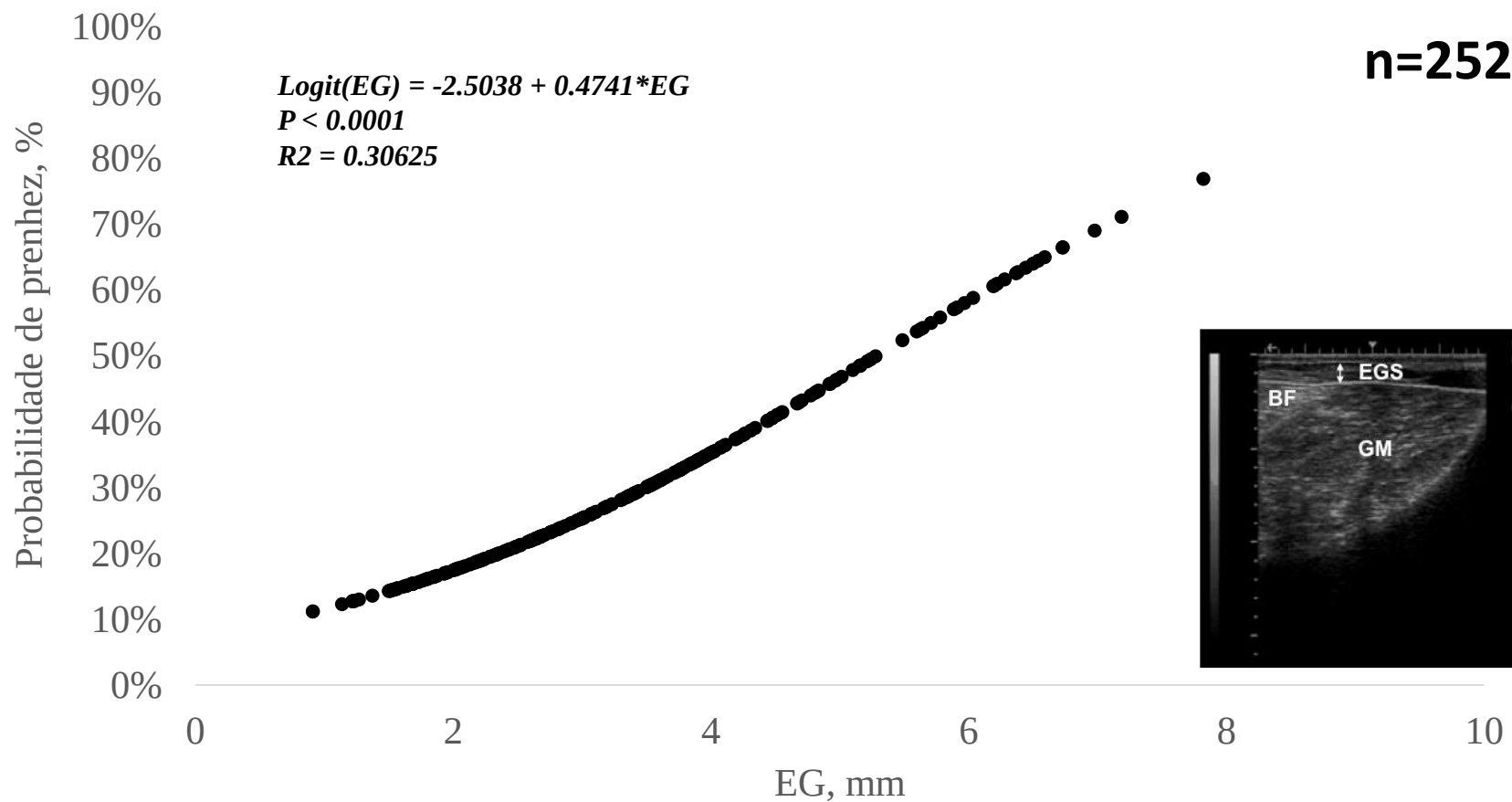
Probability of pregnancy to TAI as a function of the subcutaneous fat thickness (SCFT) of Nelore heifers with a mean of 13.9 months of age [Logit (SCFT)= $1.0662 + 0.1612 \cdot \text{SCFT}$; $P=0.0003$].

Adapted from Freitas, 2015



Novilhas Nelore (14 meses)

Probabilidade de prenhez à IATF (%)
(Efeito da EG; mm)

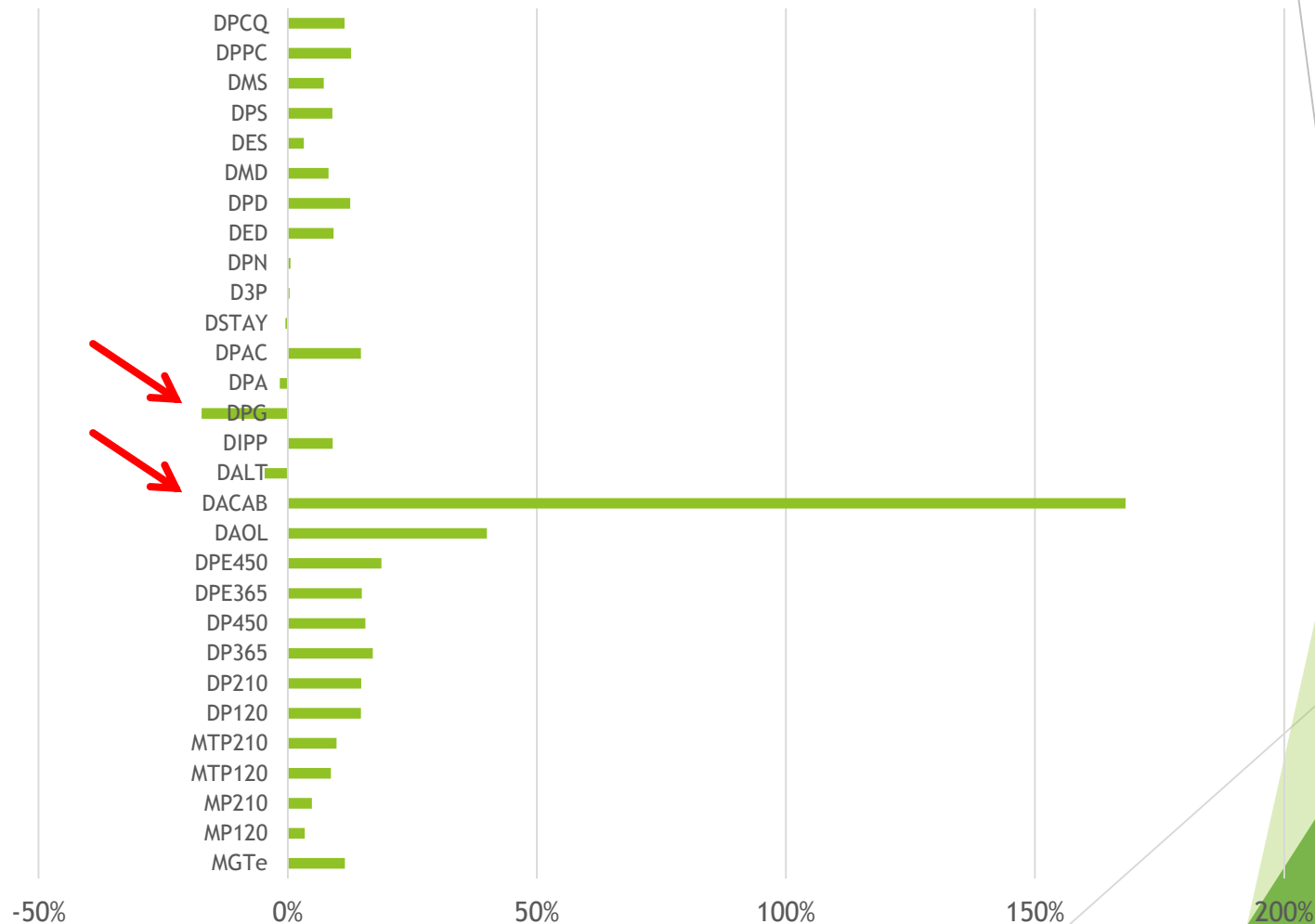


Diferença % Entre Prenhas e Vazias

(safra 2014; 700 novilhas)



Diferença Dep's P+ vs VZ



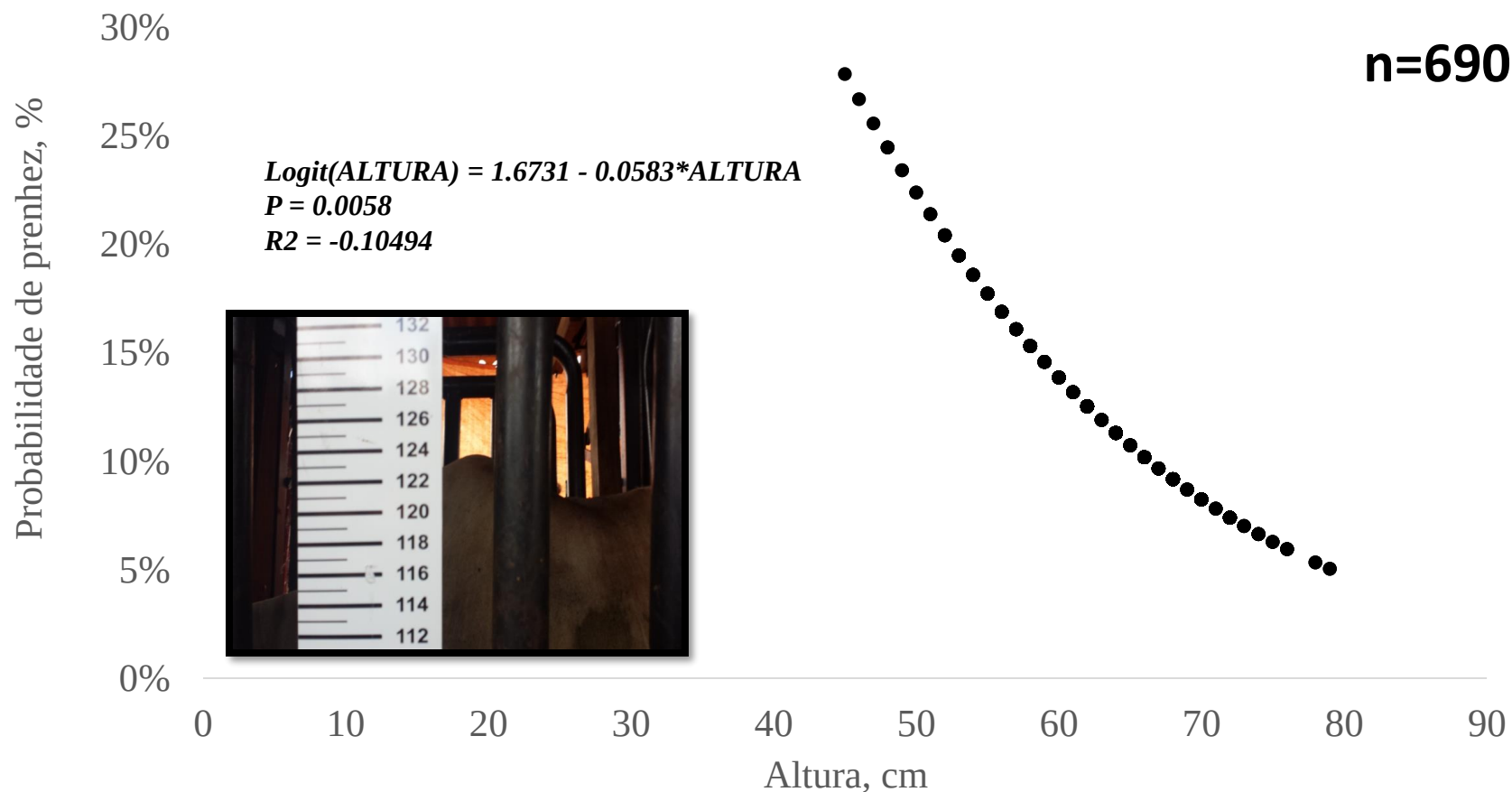
RICARDO VIACAVAL

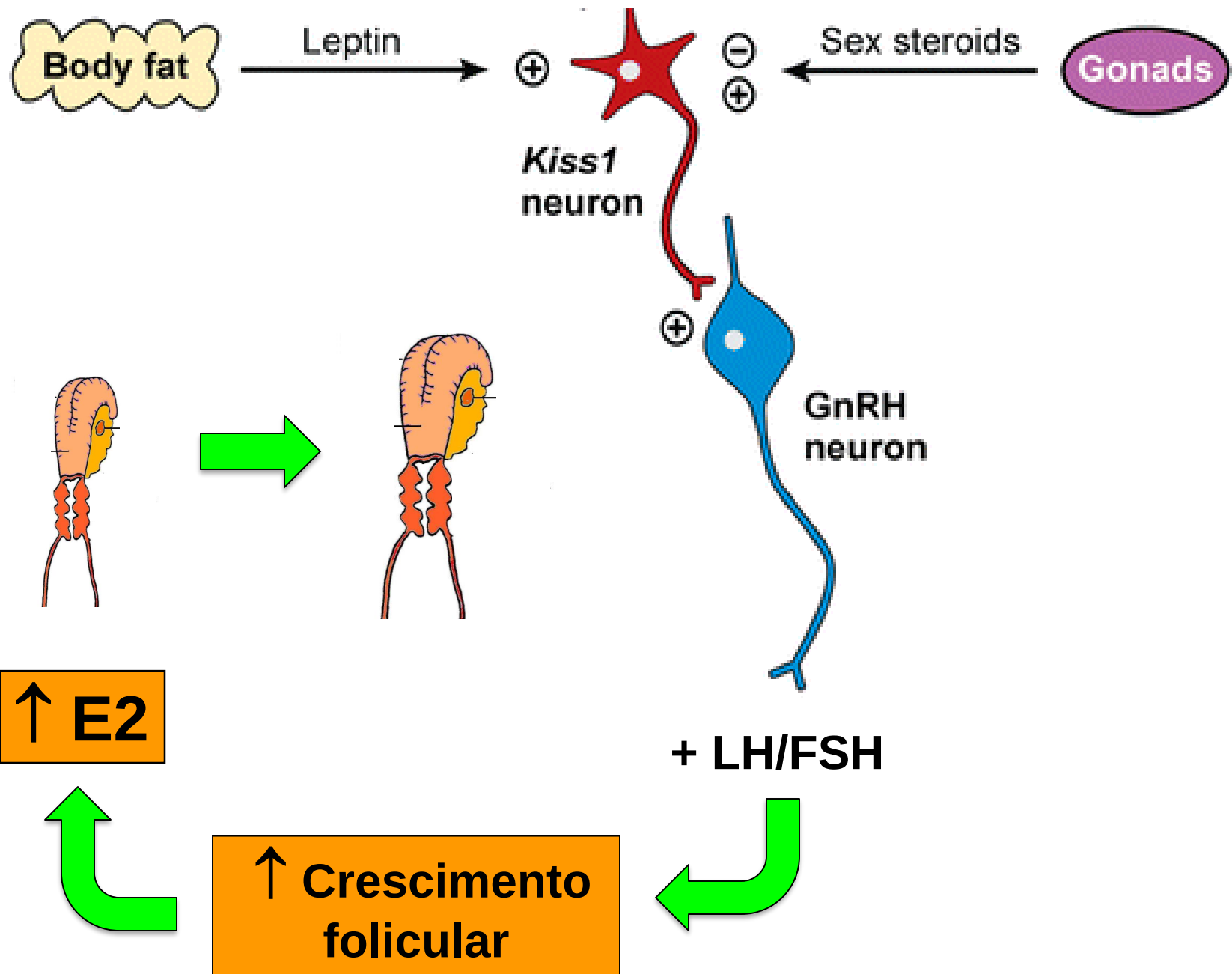




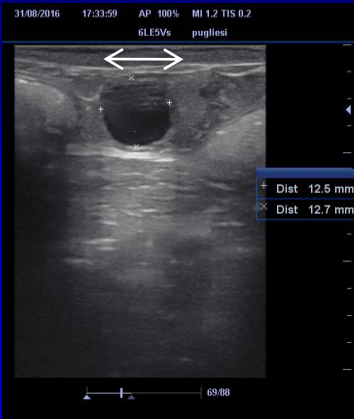
Novilhas Nelore (14 meses)

Probabilidade de prenhez à IATF (%)
(Efeito da altura; cm)

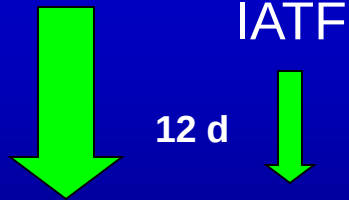




Ø do FD dominante no início EM



Avaliação do
diâmetro folicular
por ultrassonografia



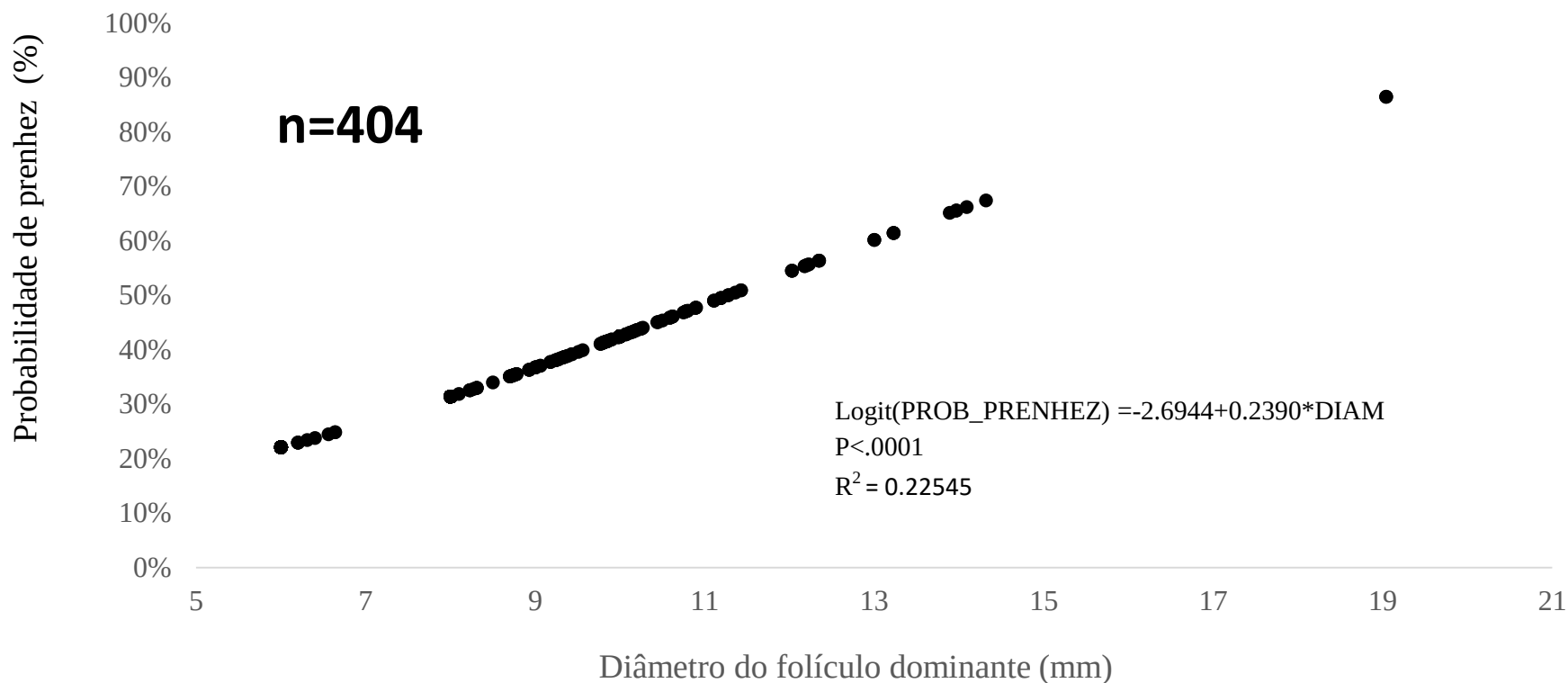
n=404

Estação de Monta



IATF Novilhas Nelore (14 meses)

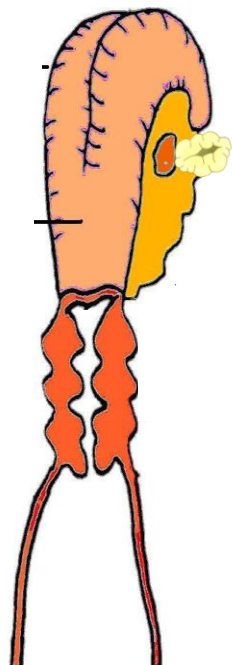
Diâmetro do maior folículo (FD) no início EM



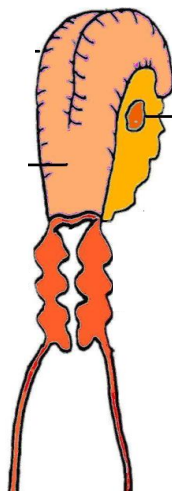
Martins et al., 2017 (SBTE)



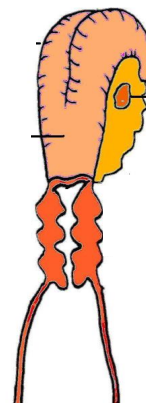
Avaliação do escore do útero em novilhas Nelore



A
(com CL)



B
($> 1,5 \text{ cm } \varnothing$)
Sem CL

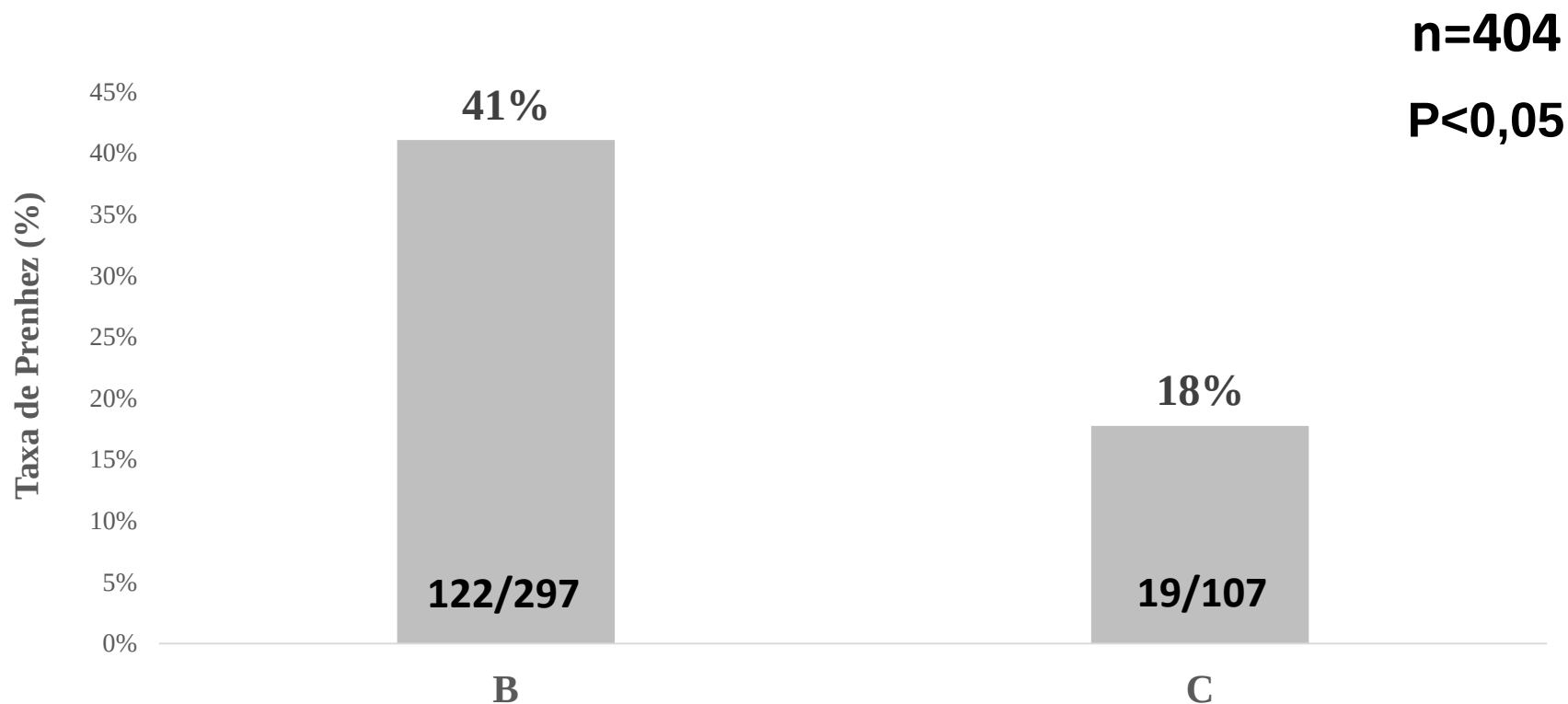


C
($> 1,5 \text{ cm } \varnothing$)
Sem CL



IATF Novilhas Nelore (14 meses)

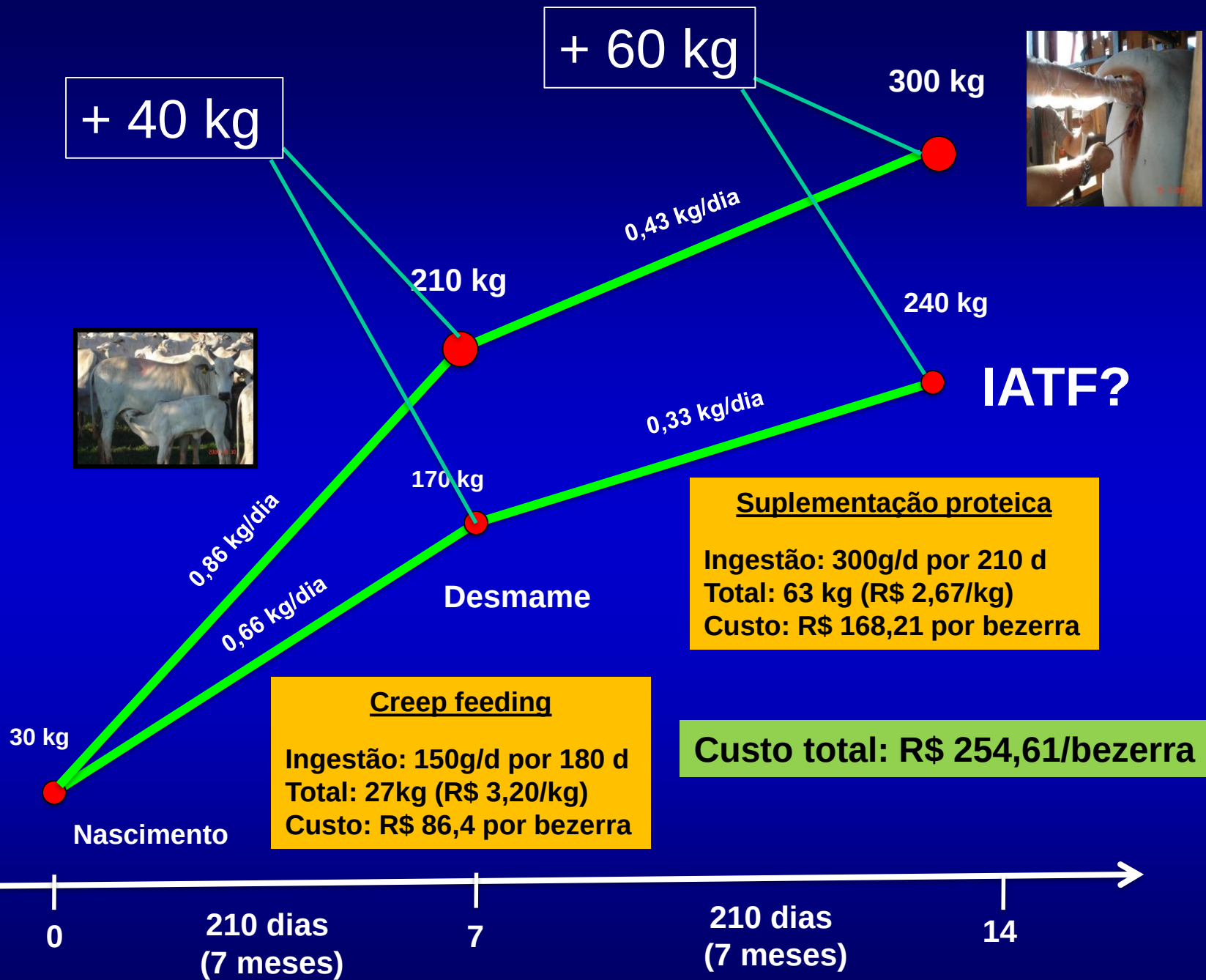
Escore de útero no início EM



Martins et al., 2017 (SBTE)



Peso (Kg)



1 IATF + Touro

(novilhas precoces ½ angus)

n=1232

IATF

+

Monta
Natural

(1/25)

22 a 25m
(primíparas)

Pasto (n=446)

X

Confinadas (n=786)

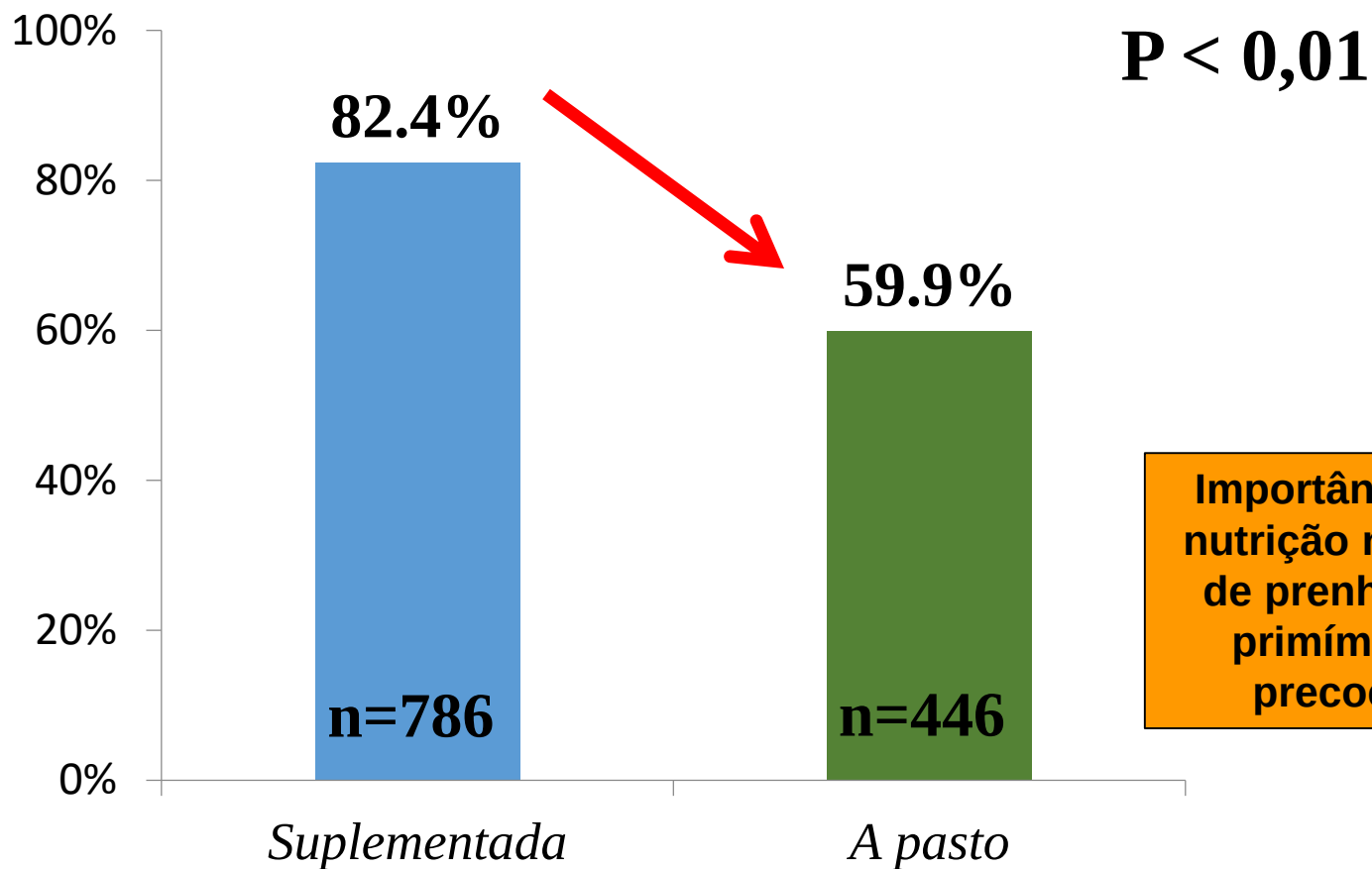
0 dias

90 dias

90 dias



Taxa de prenhez ao final da EM (IATF + Touro) de primíparas cruzadas (2 anos; ½ Angus-Nelore) suplementadas no pós-parto



EQUINOS



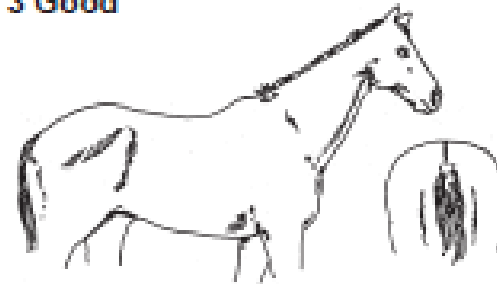
BAIXA CONDIÇÃO CORPORAL

0 Very poor



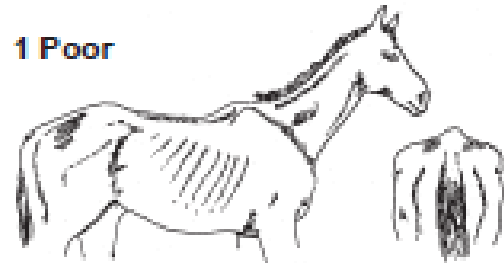
Very sunken rump, deep cavity under tail, skin tight over bones, very prominent backbone & pelvis, marked ewe back.

3 Good



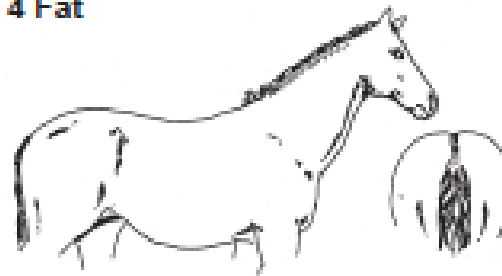
Rounded rump, ribs just covered but easily felt and no crest, firm neck.

1 Poor



Sunken rump, deep cavity under tail, ribs easily visible, prominent backbone & croup, ewe neck - narrow & slack.

4 Fat



Rump well rounded, gutter along back, ribs and pelvis hard to feel and slight crest.

2 Moderate



Flat rump either side of backbone, ribs just visible, narrow but firm neck & backbone well covered.

5 Very fat



Very bulging rump, deep gutter along back, ribs buried, marked crest fold and lumps of fat.

ATRASO RETORNO CICLICIDADE

CONDIÇÃO CORPORAL

Vet Res Commun (2010) 34 (Suppl 1):S41–S45
DOI 10.1007/s11259-010-9407-0

EXTENDED ABSTRACT

Relationship between body fat and body condition score and their effects on estrous cycles of the Standardbred maiden mare

I. Vecchi • A. Sabbioni • E. Bigliardi • G. Morini •
L. Ferrari • F. Di Ciommo • P. Superchi • E. Parmigiani



Table 2 Effects of the mare's body condition on ovulation onset

Subcutaneous fat thickness class	Subcutaneous fat thickness (mm)	BCS	Ovulation onset (days)
1	6.25a	1.81a	97c
2	9.00b	2.14b	96c
3	14.40c	2.70c	69b
4	18.80d	3.30d	29a
5	23.00e	3.75e	44ab

a,b,c,d,e different for $P < 0.05$

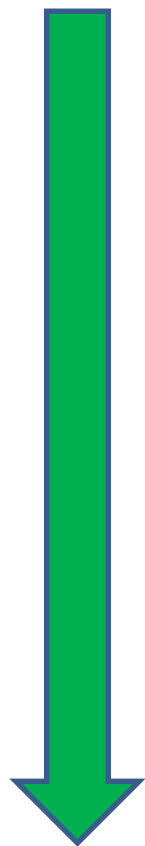
CONDIÇÃO CORPORAL

ECC ao parto ou
início estação

No.

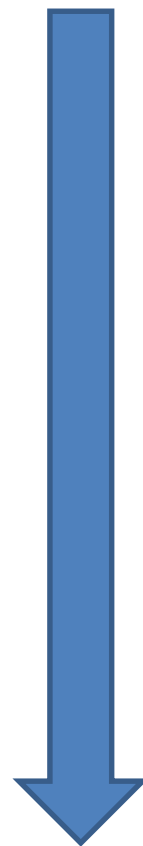
Taxa
Prenhez

N ciclo para
prenhez

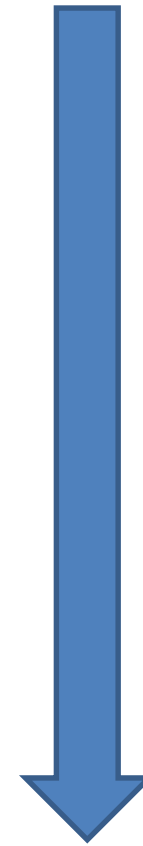


3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8

16
36
39
67
175
167
222
103
63
26
13



56
55
79
74
89
96
92
97
94
100
100



3.66
3.4
2.77
2.58
1.52
1.38
1.48
1.24
1.43
1.61
1.38

SUÍÑOS



UNIDADES FUNCIONAIS NA GRANJA

UNIDADE DE MATERNIDADE



MATRIZ

LEITÕES

UNIDADE GESTAÇÃO



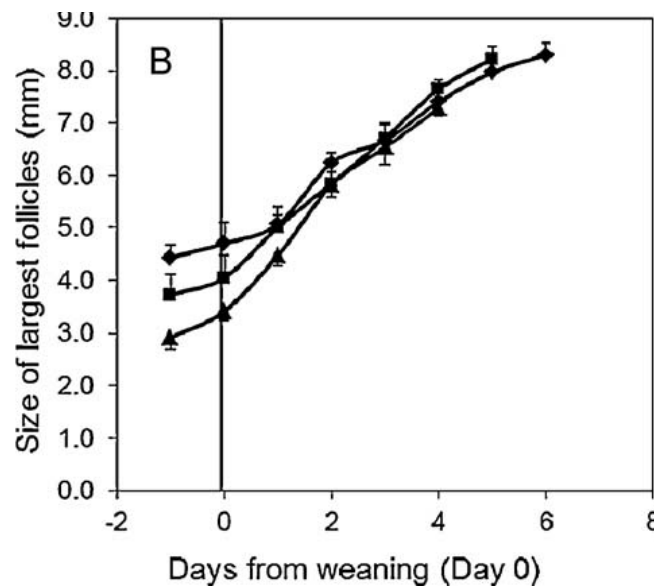
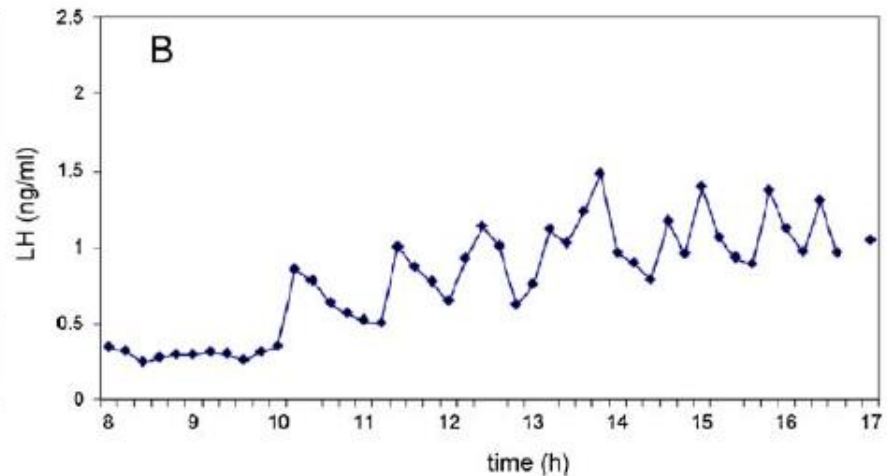
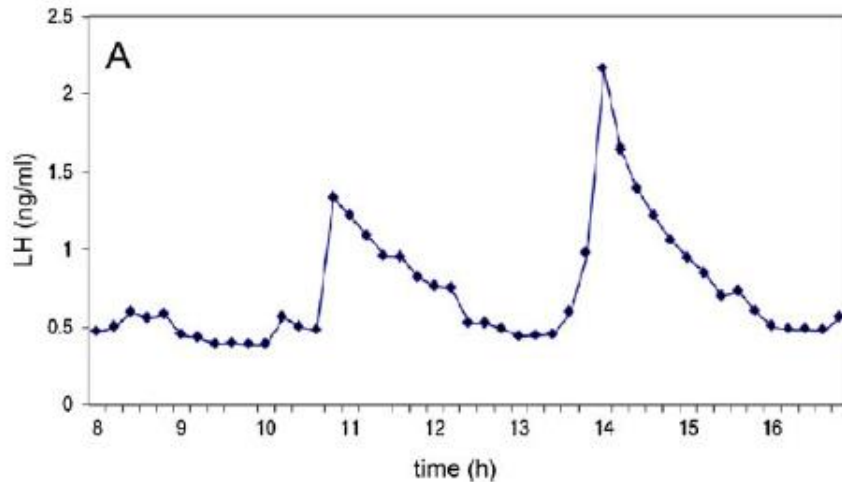
Intervalo Desmame-Estro (IDE)
3 a 5 dias (max. 7 dias)

UNIDADE CRECHE

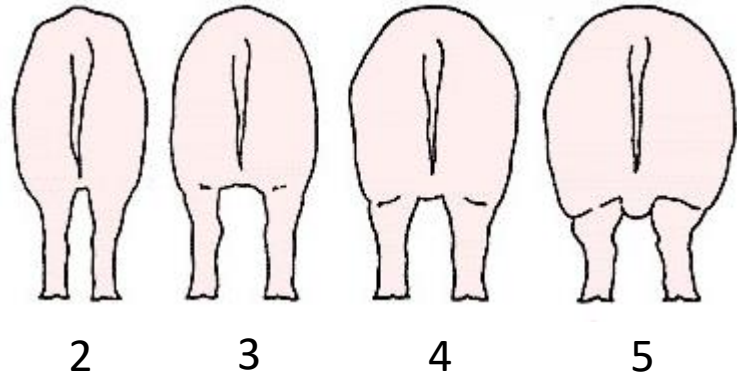
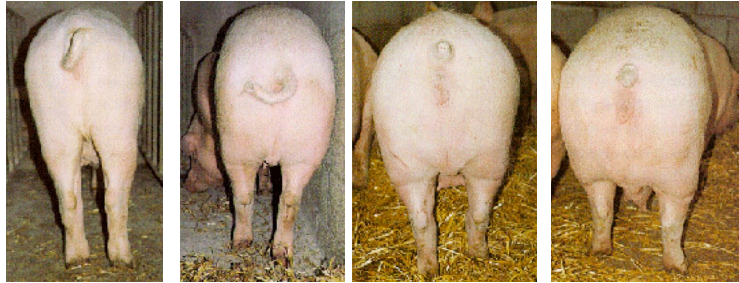


Creche (63 a 70 dias de idade)

PULSATILIDADE DE LH E DESENVOLVIMENTO FOLICULAR PÓS DESMAME



BAIXA NUTRIÇÃO DURANTE LACTAÇÃO



Recomendado entre 2,5 a 3,5

Ao parto: 3-3.5, 80% ECC 3

Lactação e desmame: 2.5-3.5

Perda condição corporal durante lactação



Redução e atraso no estro pós desmame (**primíparas)



Menor eficiência reprodutiva

**Influence of nutrition, body condition, and metabolic status on reproduction in
female beef cattle: A review**

M.J. D'Occhio ¹, P.S. Baruselli ², G. Campanile ³

¹ School of Life and Environmental Sciences, Faculty of Science, The University of
Sydney, Camden, New South Wales, Australia

² Department of Animal Reproduction, Faculty of Veterinary Medicine and Zootecnia,
University of Sao Paulo, Sao Paulo, Brazil

³ Department of Veterinary Medicine and Animal Production, University of Naples
Federico II, Naples, Italy

Conclusão

- A correta nutrição é imprescindível para elevada eficiência reprodutiva
- O BCS representa a reserva energética das fêmeas
- Baixo ou muito elevado BCS são relacionados à redução da eficiência reprodutiva
- A sincronização com eCG pode colaborar no aumento da taxa de prenhez em fêmeas em anestro com baixo BCS