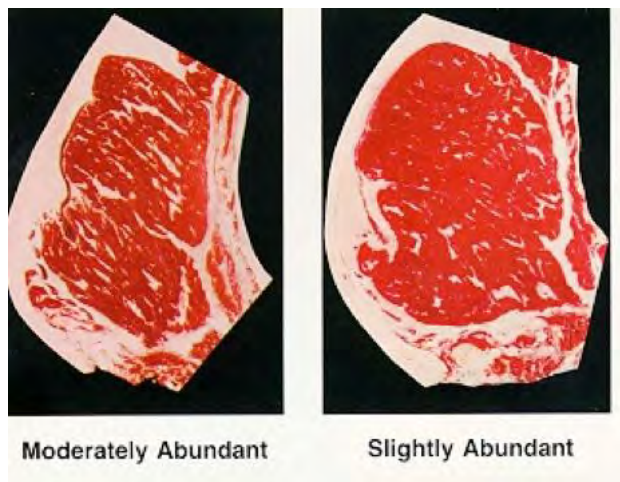




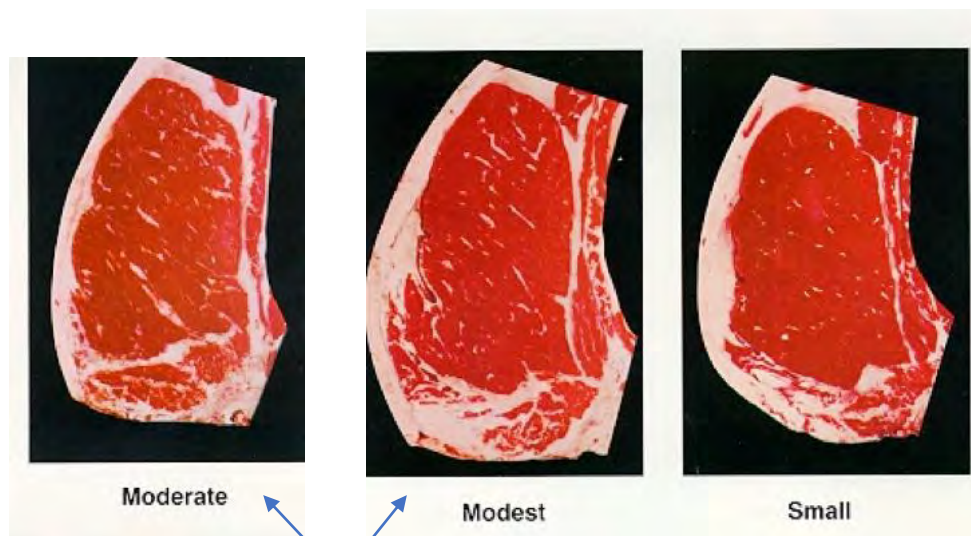
Physiology of Marbling

Susan K. Duckett
Clemson University

Marbling



Prime



**Upper
Choice,
CAB**

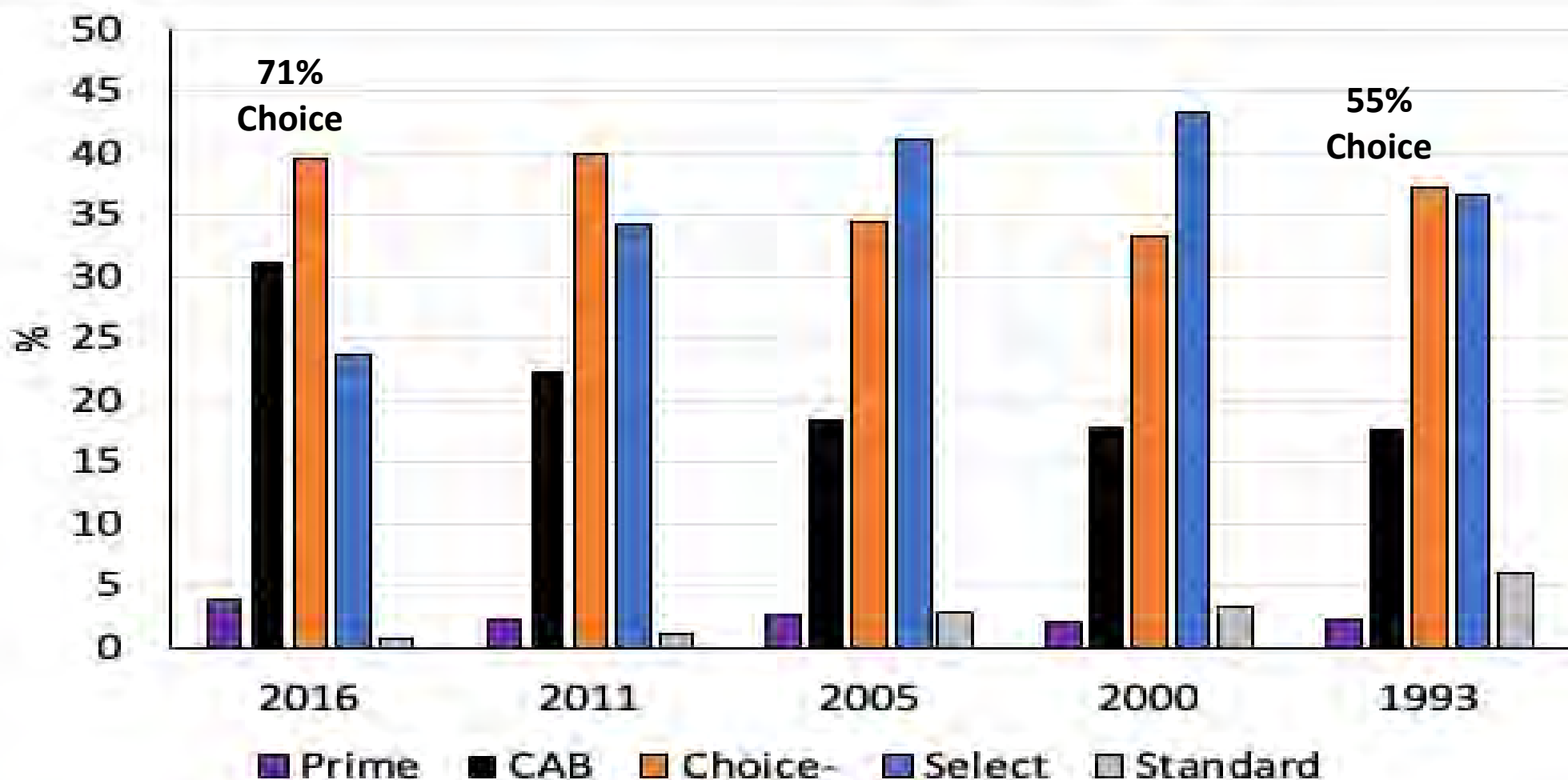
Choice-



Select



National Beef Quality Audits



2016 vs. 1993

+64% Prime

**+75% Upper
Choice (CAB)**

-35% Select

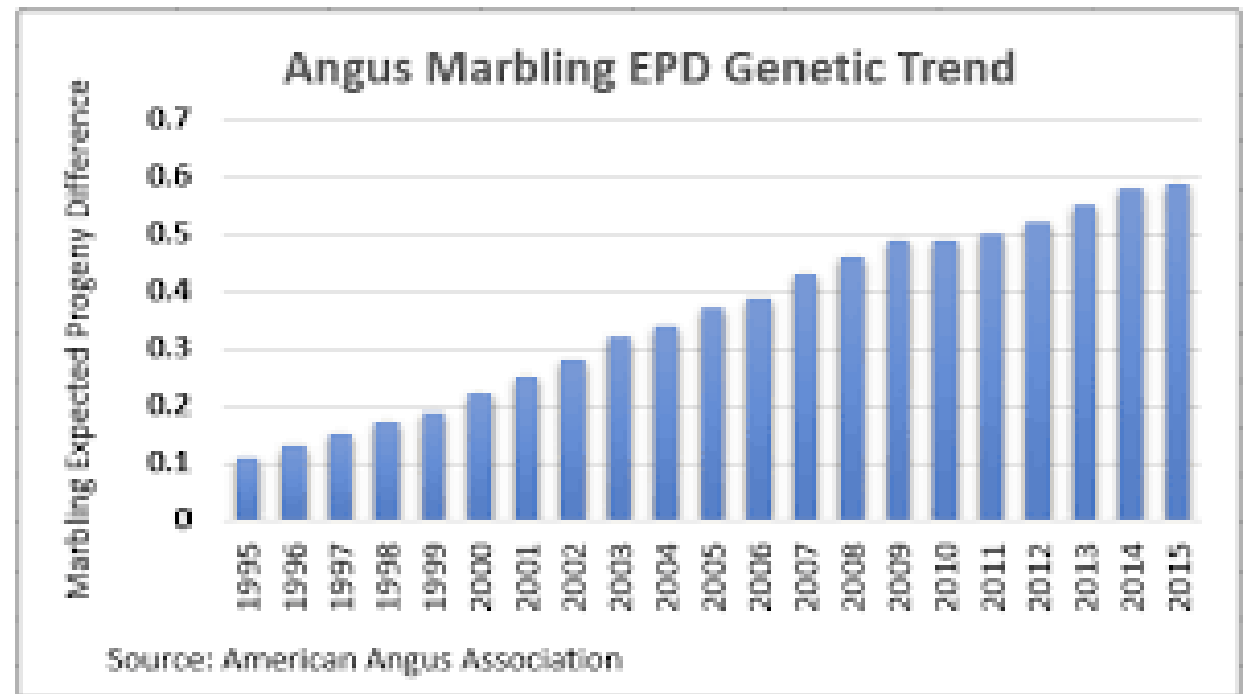
-86% Standard

Why?

**DISCOUNTS and
premiums**

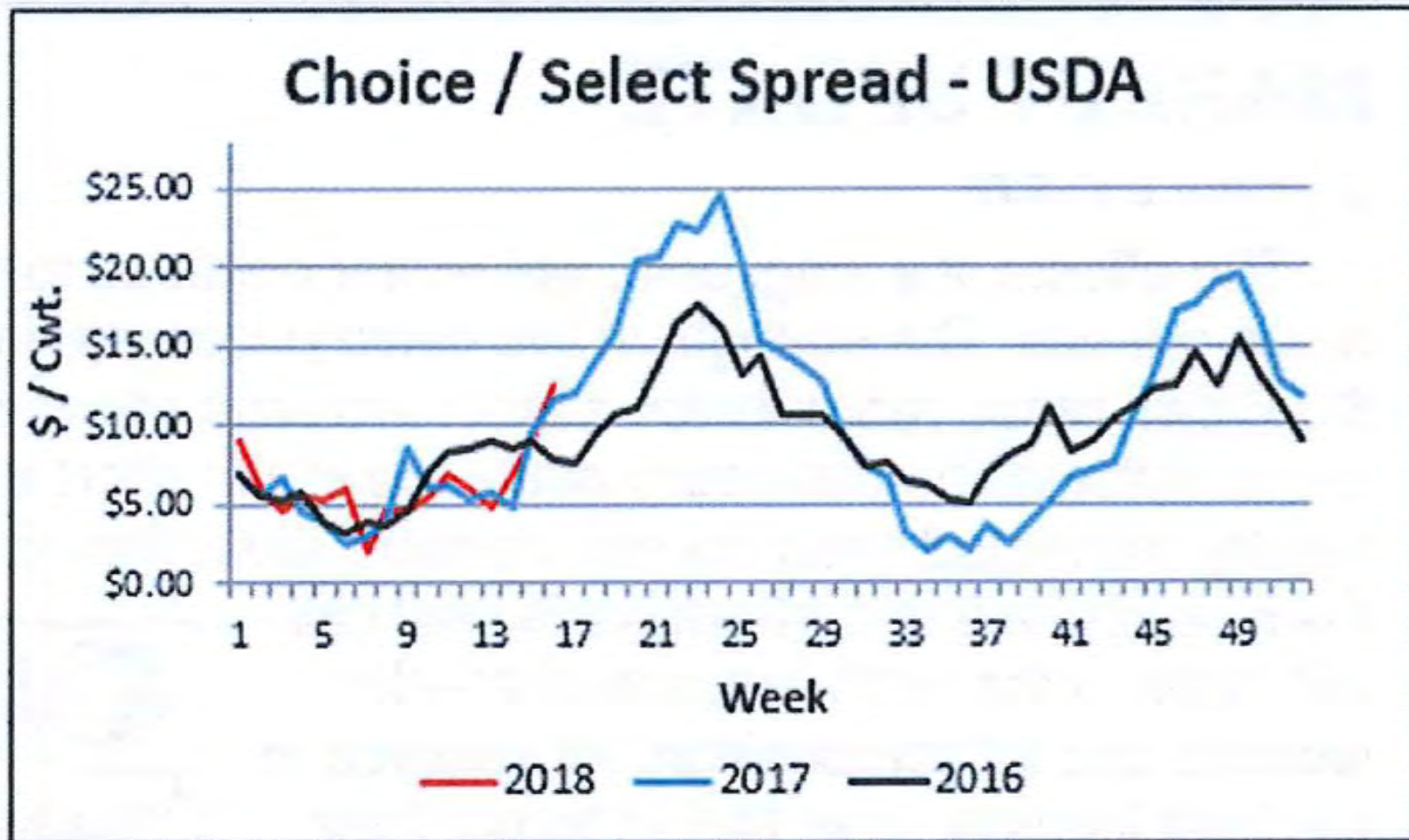


**Marbling $h^2 = 0.48$
Carcass EPDs**





Choice – Select Spread



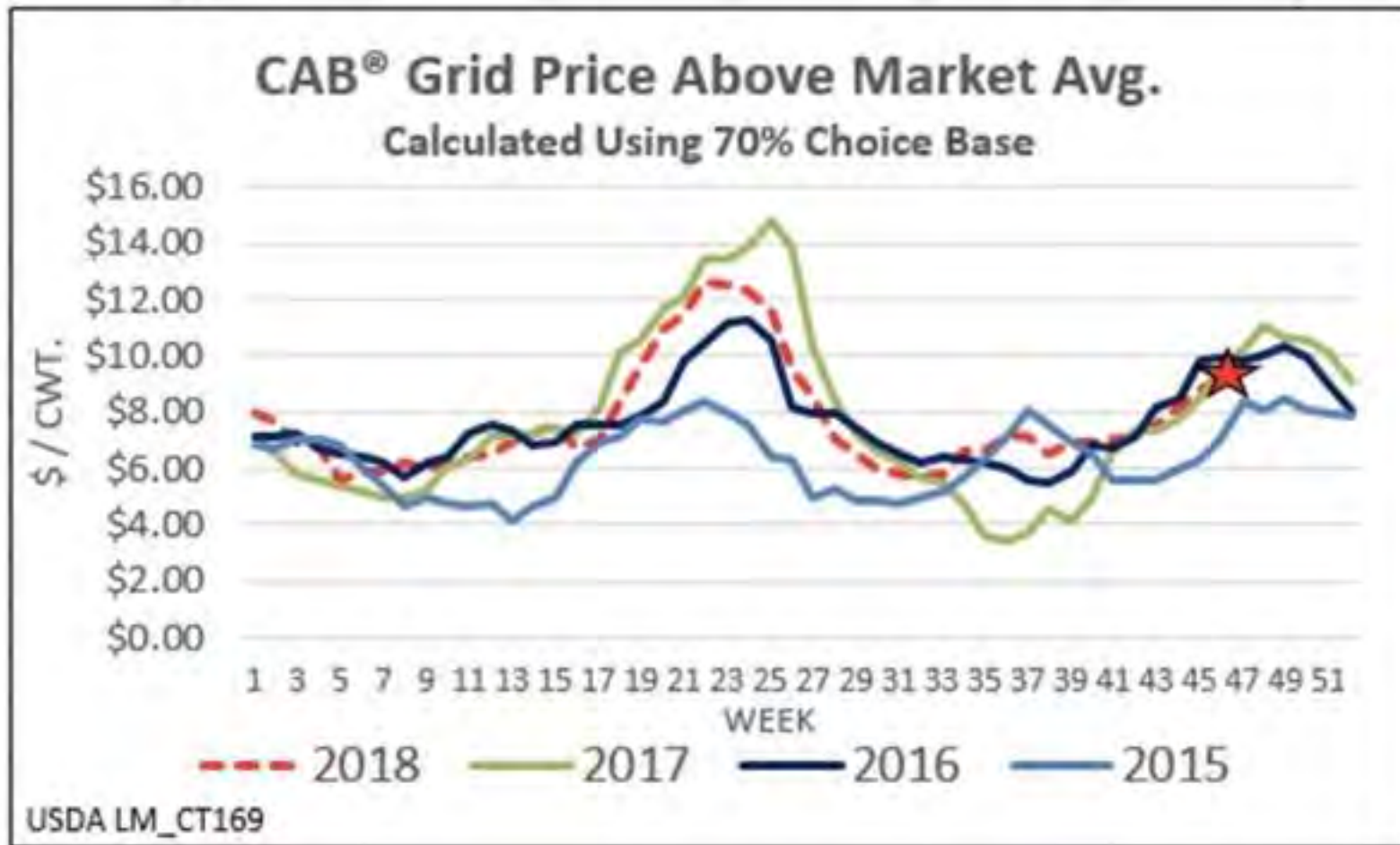
Choice – Select Spread
\$2 - \$25/cwt differential

Avg. HCW = 879 lb
\$18 - \$220/carcass loss

Graph taken from CAB Insider, May 2 2018



Premiums and Incentives



CAB (Upper Choice):
\$4-14/cwt premium

PRIME:
\$9-26/cwt premium



Current Market



USDA BEEF CARCASS PRICE EQUIVALENT INDEX VALUE

Index	CHOICE 600-900#	SELECT 600-900#
Values =>	\$202.60	\$188.95
Change =>	-0.11	-0.09

Current Index Reflects the Equivalent of 169,847 head of cattle.

SUPPLY (Live) 121,394 Hd

Equivalent: \$190.20 \$175.92

DEMAND (Box) 48,453 Hd*

Equivalent: \$215.00 \$201.98

Live-Box Spread: (\$24.80) (\$26.06)

Input Breakdown				Boxed Beef Cutouts	
National Daily Direct Cattle (5 day accumulated wgthd avg)				Ch 600-900#	\$227.00
Weight	Price	Head		Se 600-900#	\$213.98
Live Steer:	1388	\$123.72	46,524	Current Lds:	98.7
Live Heifer:	1247	\$123.41	19,849	Previous Lds:	107.4
Drsd Steer:	879	\$198.93	45,104		
Drsd Heifer:	798	\$198.47	9,917		

Grading % Breakdown			Drop Credit	
Ch 600-900# :	83.08%		Steer Dressing % :	63.49%
Ch 600-750# :	34.14%		Heifer Dressing % :	63.41%
Ch 750-900# :	48.94%		Processing Cost :	12.00
Se 600-900# :	16.92%		Slaughter Cost :	50.50
Se 600-750# :	5.69%			
Se 750-900# :	11.23%			

Equivalent Values for Outlying Beef Carcass Types

Basis Value = 202.60

		Carcass Weights				
		400-500#	500-600#	600-900#	900-1000#	1000#/up
Qlty/Yield	(1)	-30.71	-17.64		-4.50	-18.00
Prime 1-3	13.80	\$185.69	\$198.76	\$216.40	\$211.90	\$198.40
Certified 1-3	5.28	\$177.17	\$190.24	\$207.88	\$203.38	\$189.88
Choice 1	3.86	\$175.75	\$188.82	\$206.46	\$201.96	\$188.46
Select 1	-9.83	\$162.06	\$175.13	\$192.77	\$188.27	\$174.77
Stdndr 1-3	-29.77	\$142.12	\$155.19	\$172.83	\$168.33	\$154.83
Prime 4	1.09	\$172.98	\$186.05	\$203.69	\$199.19	\$185.69
Choice 4	-11.21	\$160.68	\$173.75	\$191.39	\$186.89	\$173.39

Base Price: Ch YG 3

\$202.60/cwt

Premiums:

Prime 1-3 \$13.80/cwt

CAB 1-3 \$5.28/cwt

YG 1 \$3.86/cwt

Discounts:

Select \$-13.65/cwt

Standard \$-29.77/cwt

YG 4 \$-11.21/cwt



Historical Model of Marbling Deposition



- Marbling:
 - Last to be deposited and First to be mobilized





IMF



Backfat,
subcutaneous

Marbling,
intramuscular

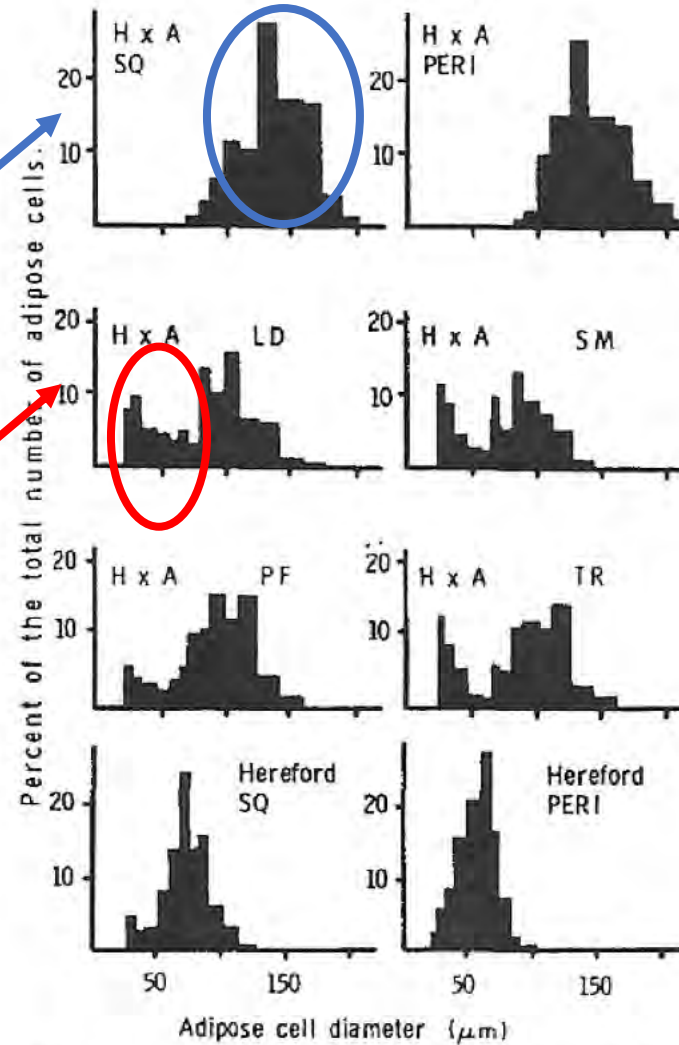
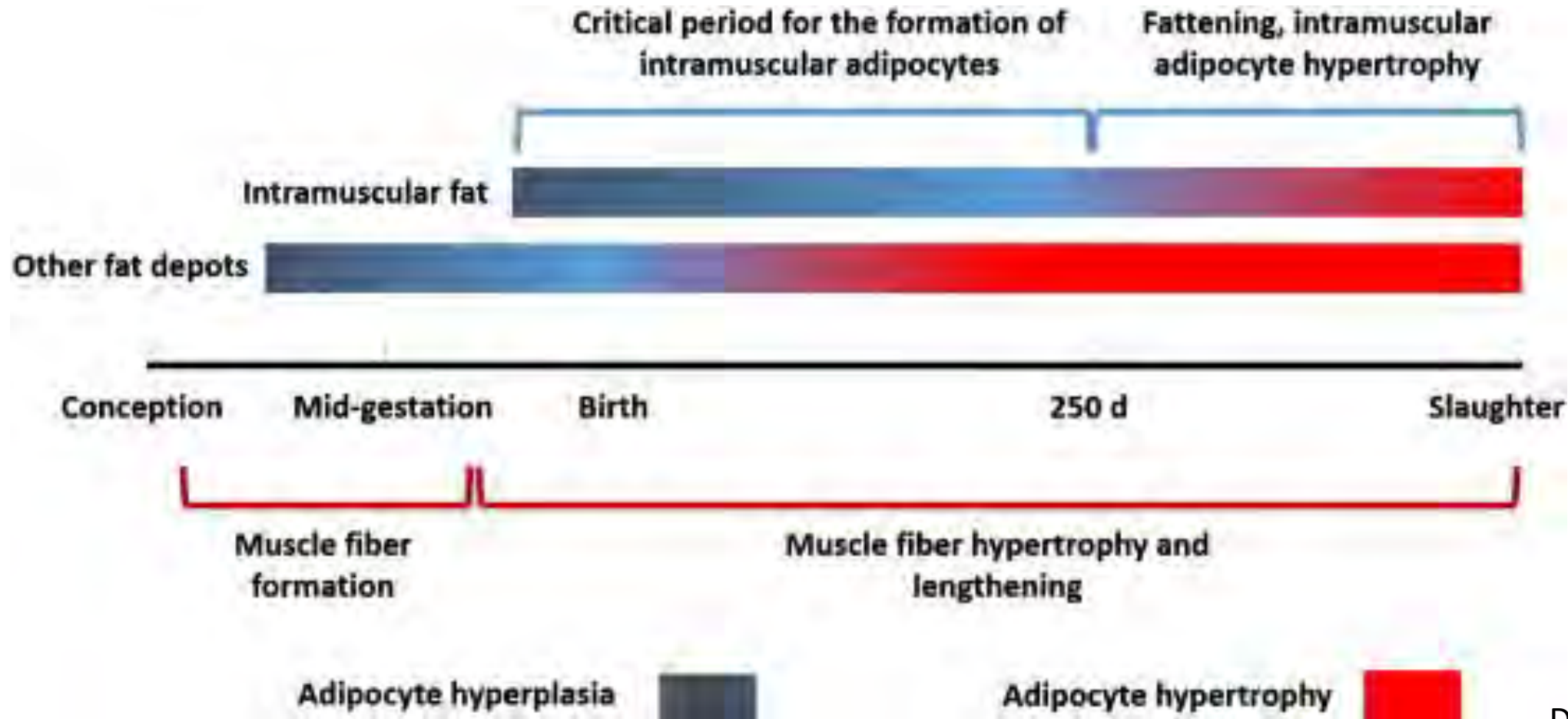


Fig. 3. Number frequency distribution of adipose cells from bovine adipose tissue. H×A, Hereford × Angus animals, 14 months old and 470 kg live weight; Hereford animals, 8 months old and 215 kg live weight; LD, SM, PF, and TR refer to adipose cells from longissimus dorsi, semimembranosus, pectoralis profundus, and trapezius muscles, respectively. SQ and PERI refer to subcutaneous and perirenal adipose tissue, respectively.

Recent Models of Marbling Deposition



Du et al. 2015.
Meat Sci. 40-47



IMF Fractional Growth Rate



Fractional growth ^b	Hot carcass weight, lb			
	450-550	550-650	650-748 ^{a,b}	748-849
	204 to 250 kg	250 to 295 kg	295 to 340 kg	340 to 386 kg
Protein	0.34	0.26	0.20	0.15
Fat	0.85	0.72	0.62	0.54
IMF ^c	1.04	0.71	0.54	0.44

^aBased on compositions predicted by regression equation predicting change in mass relative to hot carcass weight in Table 5.

^bPercent per day.

^cIntramuscular fat content of the 12th-rib face.

Can we Accelerate Marbling Deposition?

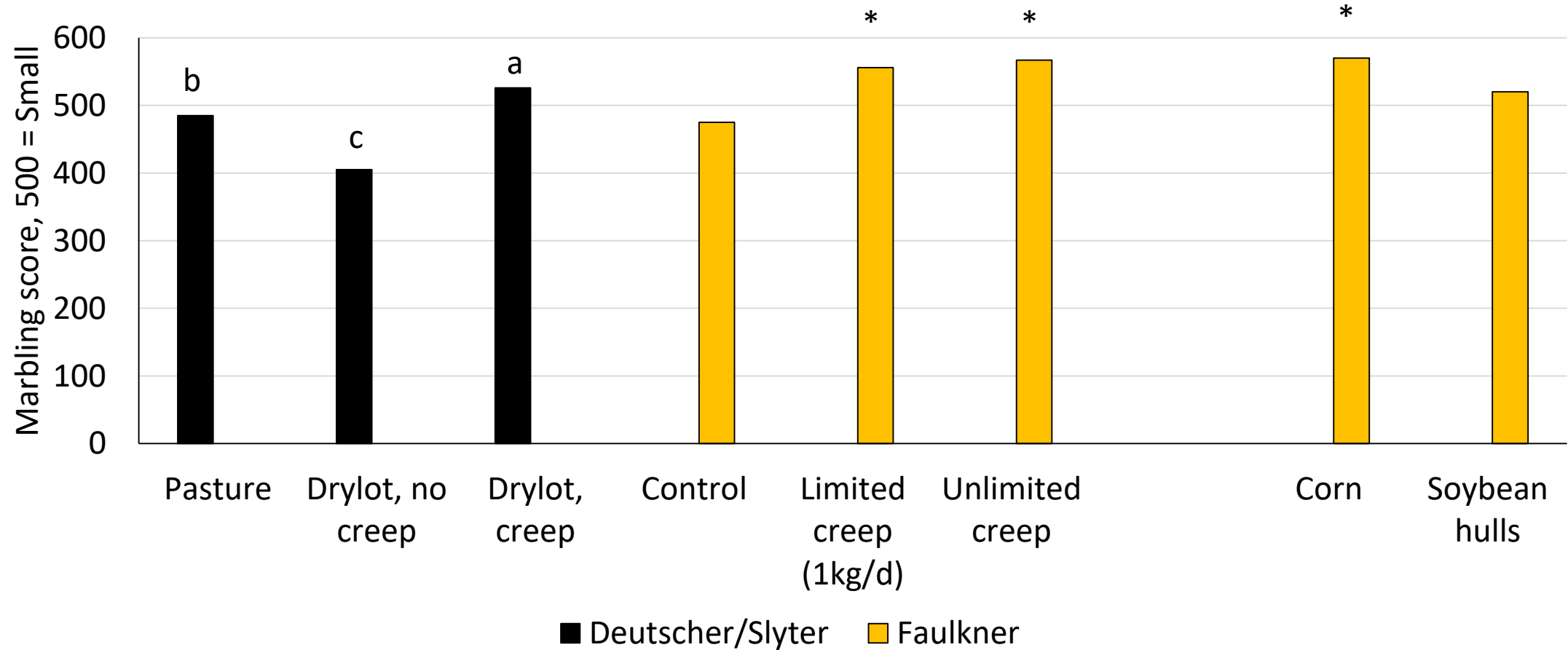


Creep Feeding





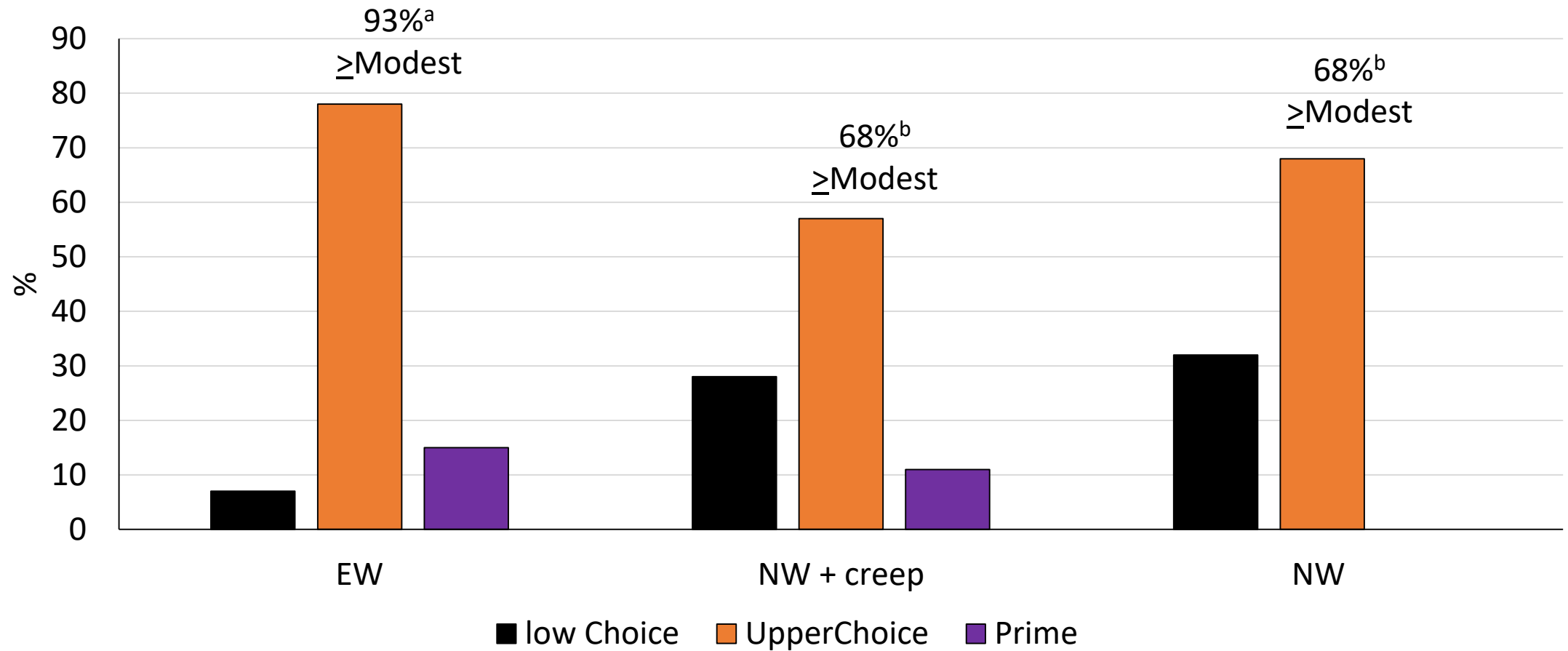
Creep Feeding -



Deutscher and Slyter, 1978, JAS 47:19-28. SD, 6 yr
Faulkner et al. 1994. JAS 72:470-477. Illinois



Creep Feeding -

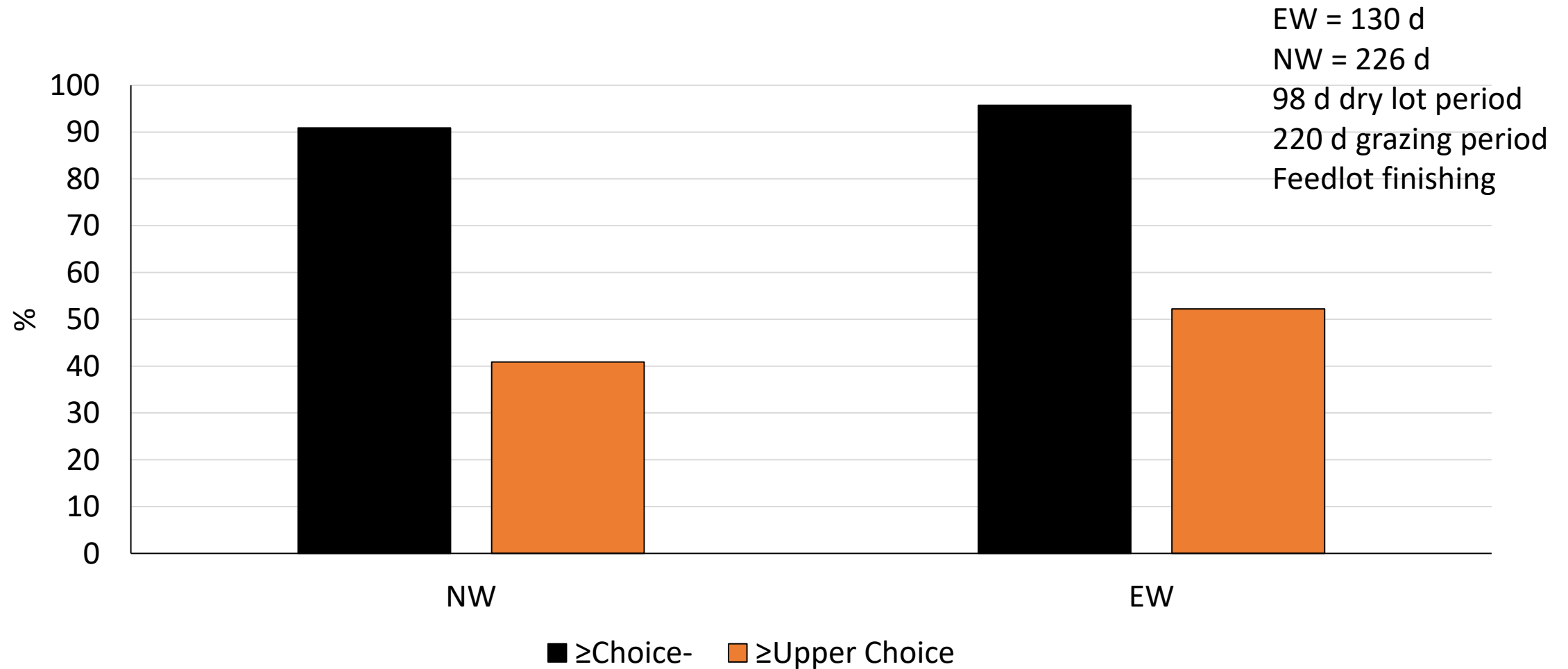


Time of Weaning



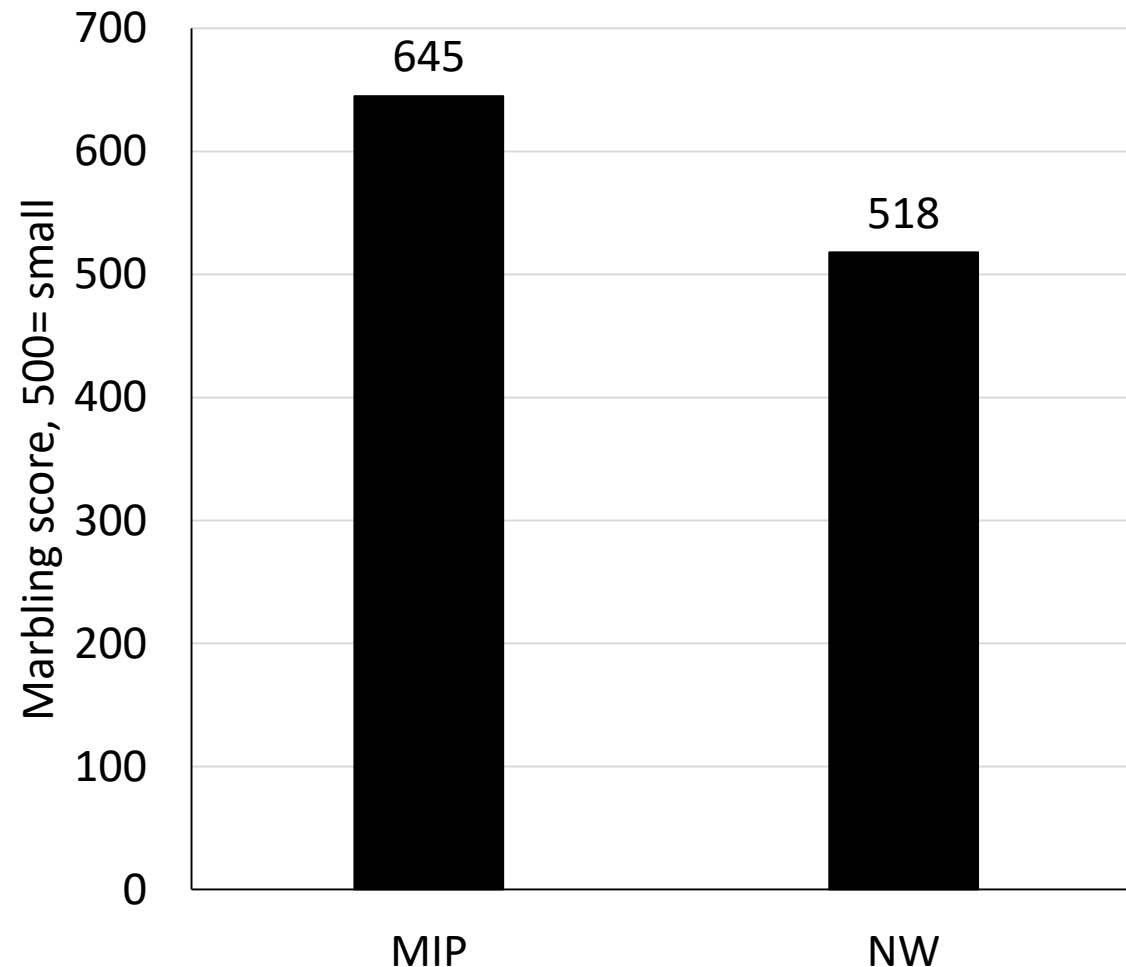


Early vs. Normal Weaning





Metabolic Imprinting – Early Weaned Steers



Early weaned @ 105 d of age (**MIP**)
Normal weaned @ 253 d of age (**NW**)

MIP fed CONC d 105 to 253
NW and MIP were grouped and grazed for 156 d
NW and MIP were fed corn-silage based feedlot diet to 0.4 – 0.5 in of backfat

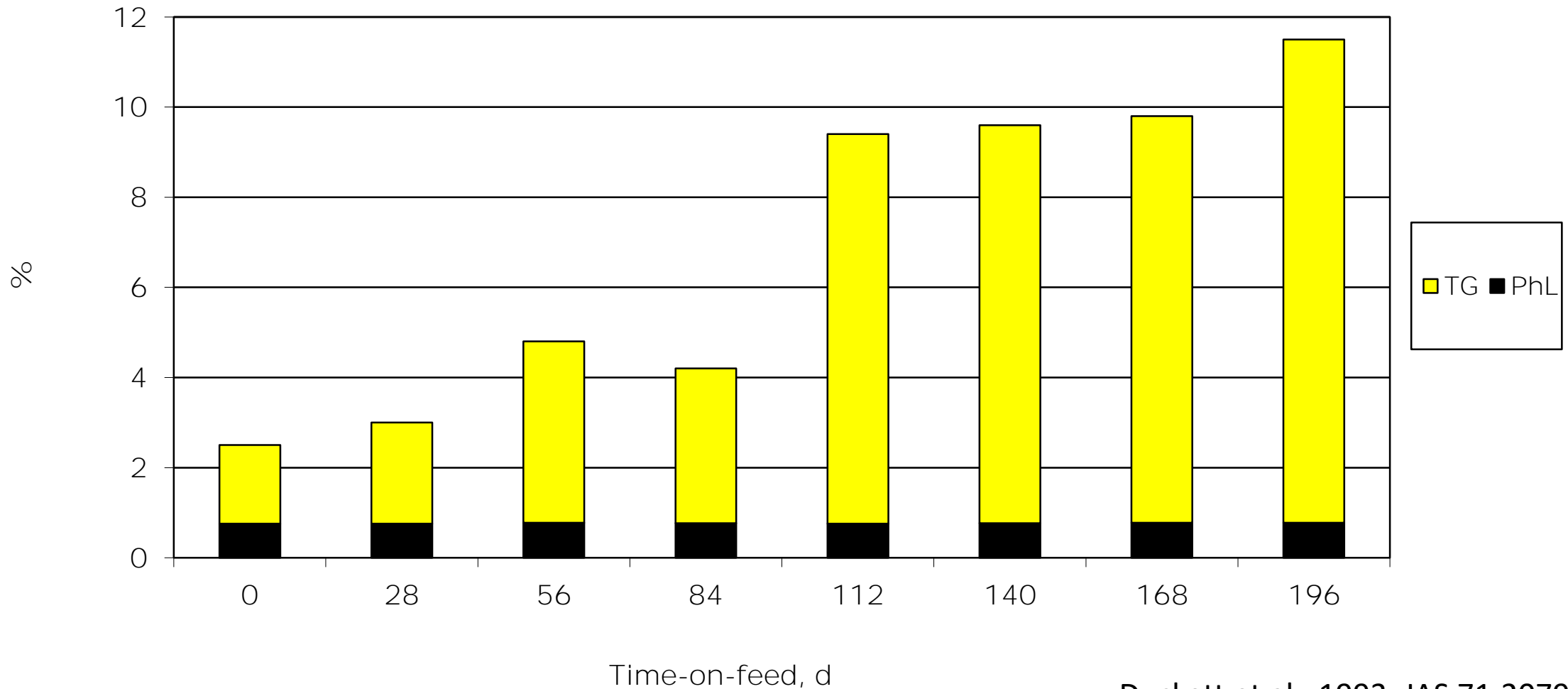
Diet or Animal Age?

- Is it exposure to high concentrate diets OR early weaning?





Changes in IMF across Time-on-Feed (TOF)



Duckett et al., 1993, JAS 71:2079



Timing of Exposure to Concentrates (CONC)



Phase 1: 0-111d

Phase 2: 97 d

Phase 3: to 1250 lb

NW and 30d
background

NW and 30d background	Phase 1: 0-111d	Phase 2: 97 d	Phase 3: to 1250 lb		
			CONC	FOR	CONC-CONC
			FOR	CONC	CONC-FOR
			FOR	FOR	FOR-CONC
	CONC (n = 20)	FOR	CONC	FOR	FOR-FOR
	FOR (n = 20)	FOR	FOR		

CONC:

25% corn silage

75% corn/sbm

FOR:

Novel fescue

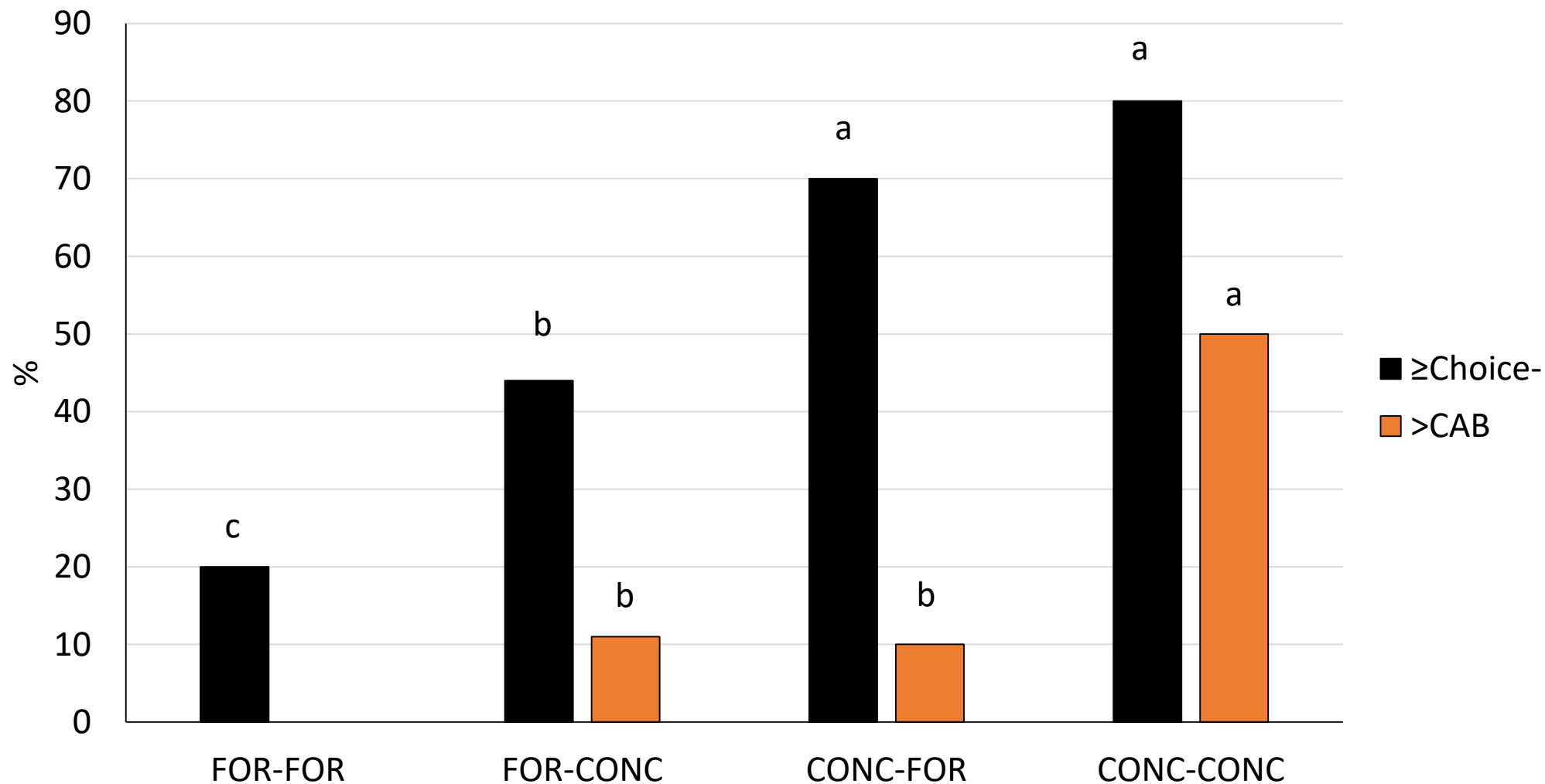
Annual ryegrass

Alfalfa

Cowpea



Study 1: Percent Choice or CAB

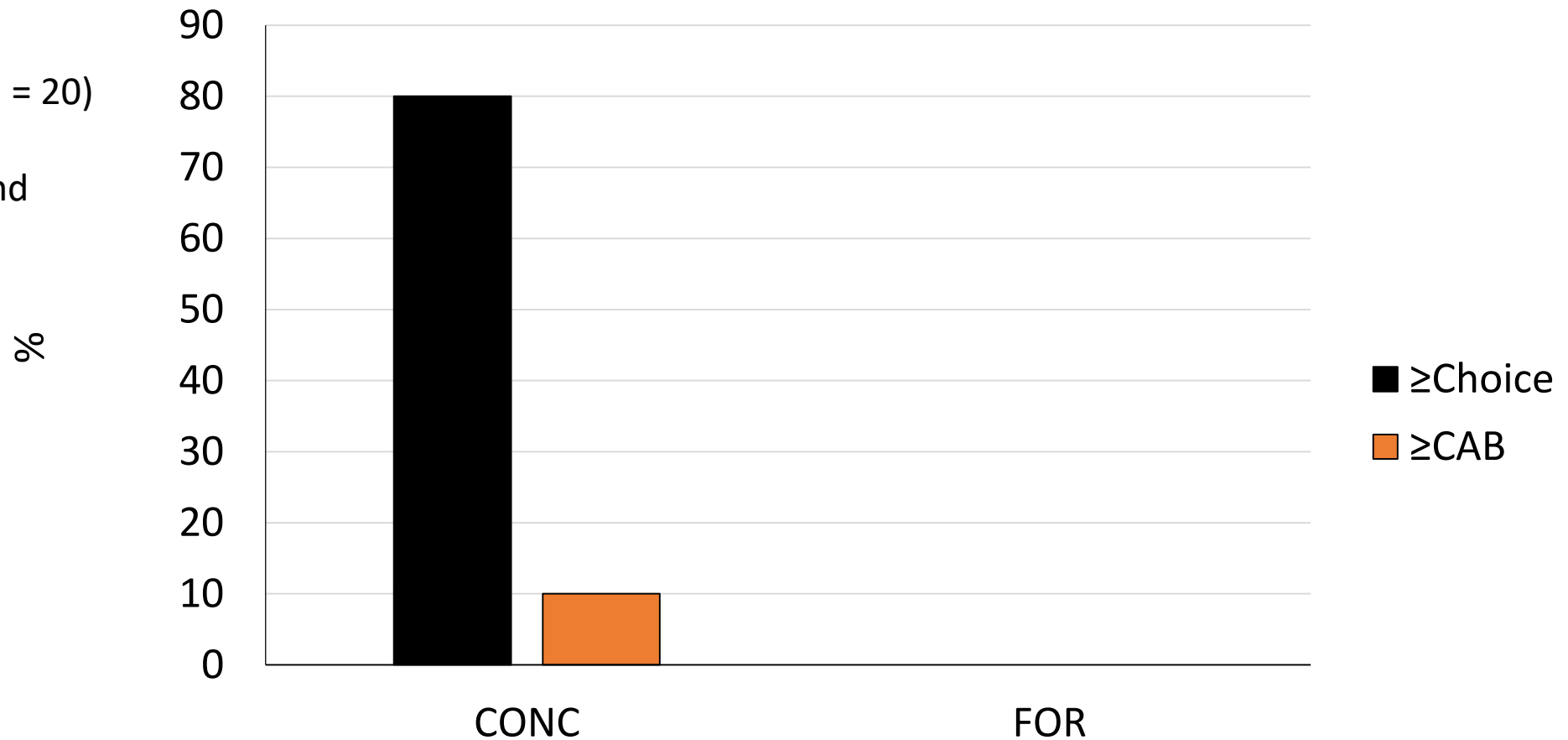




Study 2: Early Exposure

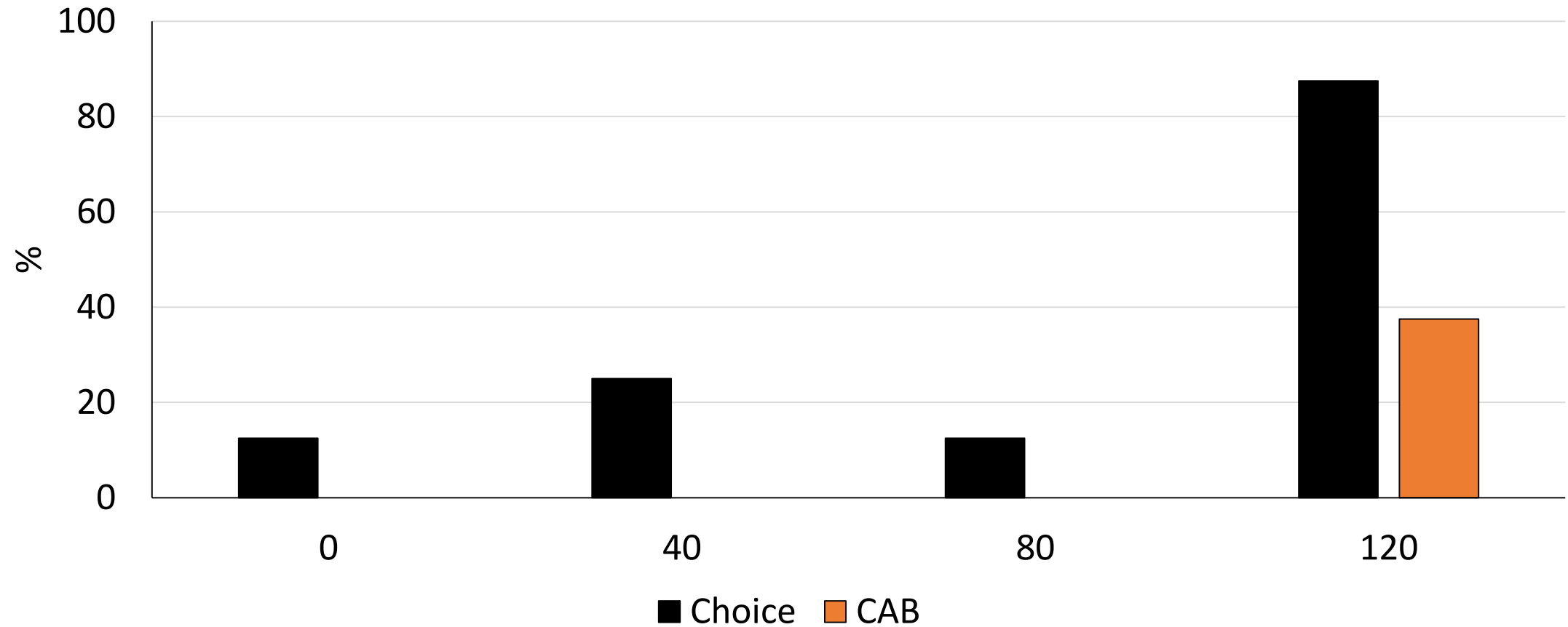


Angus steers (n = 20)
NW
30-d background
Fed for 111 d





Study 3: Time on CONC

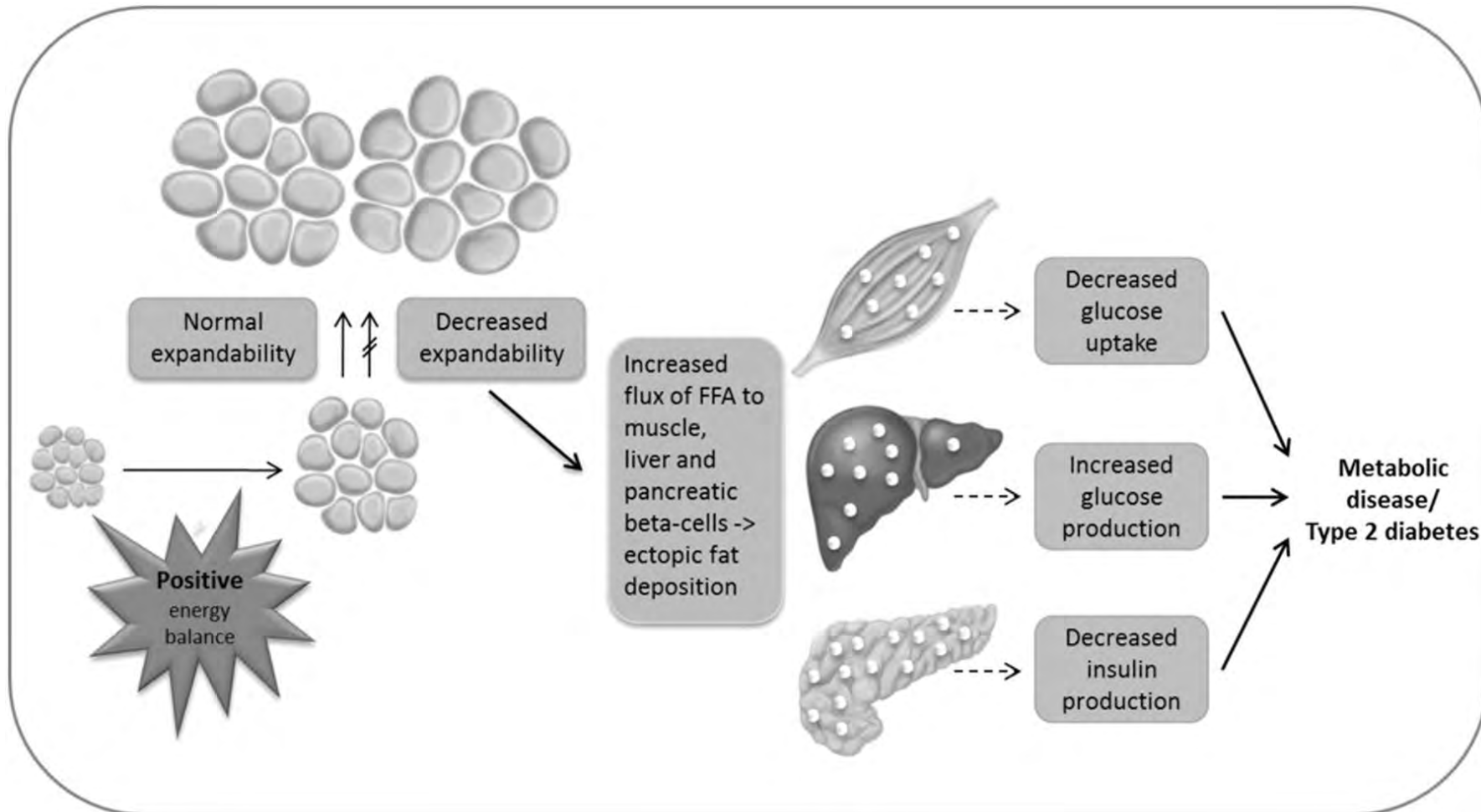




Insulin Resistance



Type II Diabetes



The proposed hypothesis for limited adipose tissue expandability. When the body is in a positive energy balance, the adipose tissue will expand to handle the excess energy. If the adipose tissue is not capable of expanding sufficiently, there will be a spillover of FFA to non-adipose tissue leading to harmful effects in liver, muscle and pancreas.

European Journal of
Endocrinology 176, 2;
[10.1530/EJE-16-0488](https://doi.org/10.1530/EJE-16-0488)

Conclusions



- Rethink our approach for calves with high marbling potential
- Marbling does not have to be a 'LATE' developing depot
- Feeding high concentrates early is important
 - Creep feeding may help
 - EW vs NW
 - exposure to concentrates early
 - Early deposition will persist during forage finishing
- More research needs to be done.....

NCAA football · Today

Final



44 - 16



2 Clemson
(15 - 0)

1 Alabama
(14 - 1)

Final

Team	1	2	3	4	T
CLEM	14	17	13	0	44
ALA	13	3	0	0	16

