

Grass Finishing: Nutrition and Palatability of Pasture Finished Meats



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GO
POWER
SHOPPING

UP THE HEALTH ANTE OF YOUR GROCERY
CART WITH OUR **GOOD/BETTER/BEST**
NUTRITIONAL GUIDE ■ BY SALLY KUZEMCHAK, RD

■ PHOTOGRAPHS BY LEVI BROWN



GRASS-FED BEEF

BEST



ORGANIC BEEF

BETTER



LEAN BEEF

GOOD

Fatty acids and Human Health

- **Good fats = Decrease LDL-cholesterol and increase HDL-cholesterol**
 - MUFA, monounsaturated fatty acids
 - Omega-3 PUFA, polyunsaturated fatty acids
 - Omega-6 PUFA*
- **Bad fats = Increase LDL-cholesterol**
 - SFA, certain saturated fatty acids, C14:0 + C16:0
 - Trans fatty acids*
- **Neutral = no change in LDL-cholesterol**
 - SFA, C18:0 (stearic acid)

Conjugated Linoleic Acid (CLA)

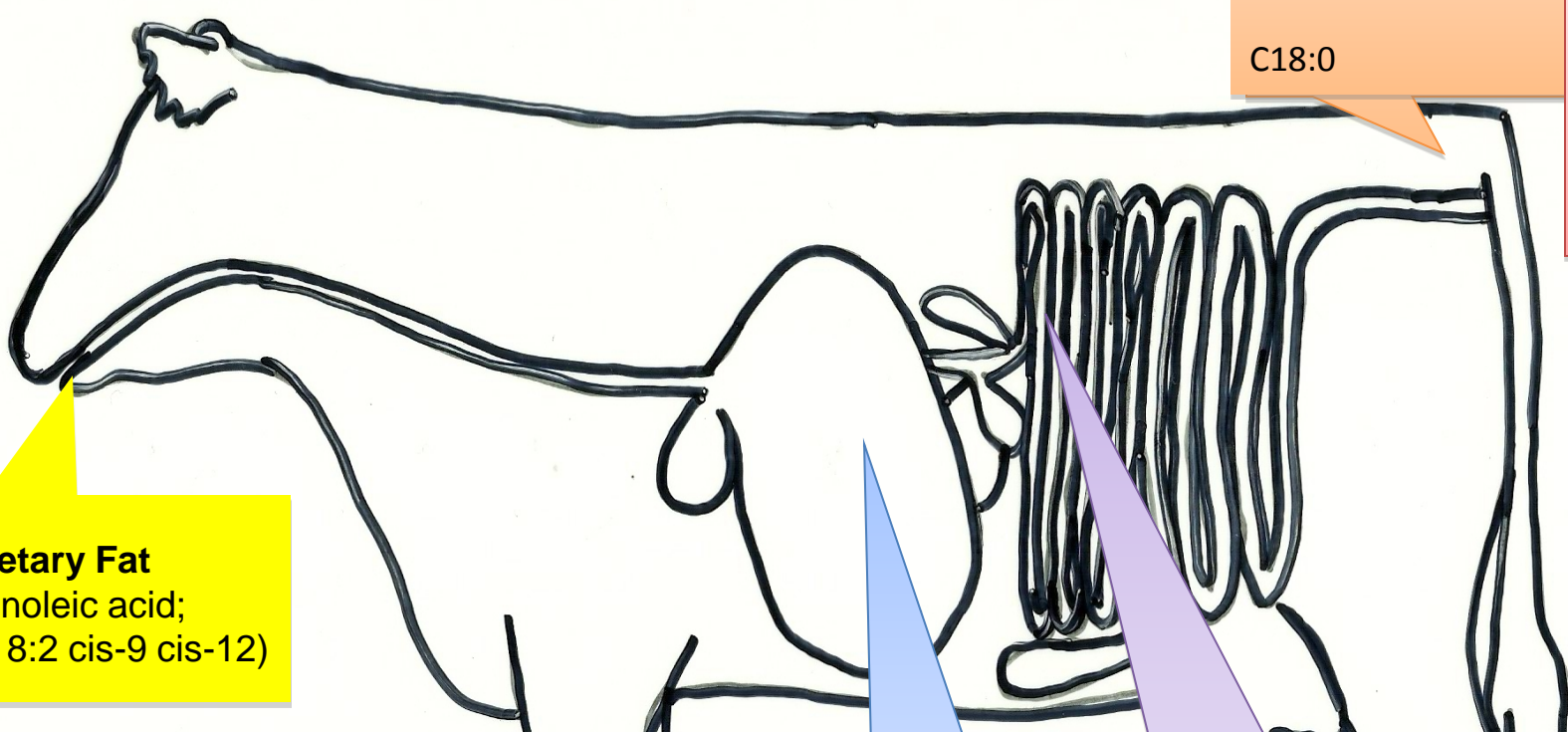
Adipose Tissue:
 C18:2 cis-9 cis-12
 C18:2 cis-9 trans-11 (CLA)
 C18:1 trans-11 (TVA)
 C18:0

> 80% of all CLA in meat and milk is from desaturation of TVA to CLA

Dietary Fat
 (Linoleic acid;
 C18:2 cis-9 cis-12)

Rumen:	SI (% of dietary C18:2):
C18:2 cis-9 cis-12	22% C18:2 cis-9 cis-12
C18:2 cis-9 trans-11	0.2% C18:2 cis-9 trans-11
C18:1 trans-11	3% C18:1 trans-11
C18:0	74.8% C18:0

Duckett et al., 2002. J. Anim. Sci. 80:3353



Grass-fed vs. Grain-fed

- 198 Angus steers, 3 yr study
- Finished (150-170 d) on corn-silage concentrate ration (CONC) or pasture (GRASS; bluegrass, orchardgrass, tall fescue, white clover)
- Harvested at a similar animal age endpoint, 18 mo of age
- Ribeye steaks sampled
- Neel et al. 2007, J. Anim. Sci. 85:2012-2018.
- Duckett et al., 2007. J. Anim. Sci. 85:2691-2698.
- Duckett et al., 2009. J. Anim. Sci. 87:2961-2970.

Total Lipid Content of Ribeye Steak

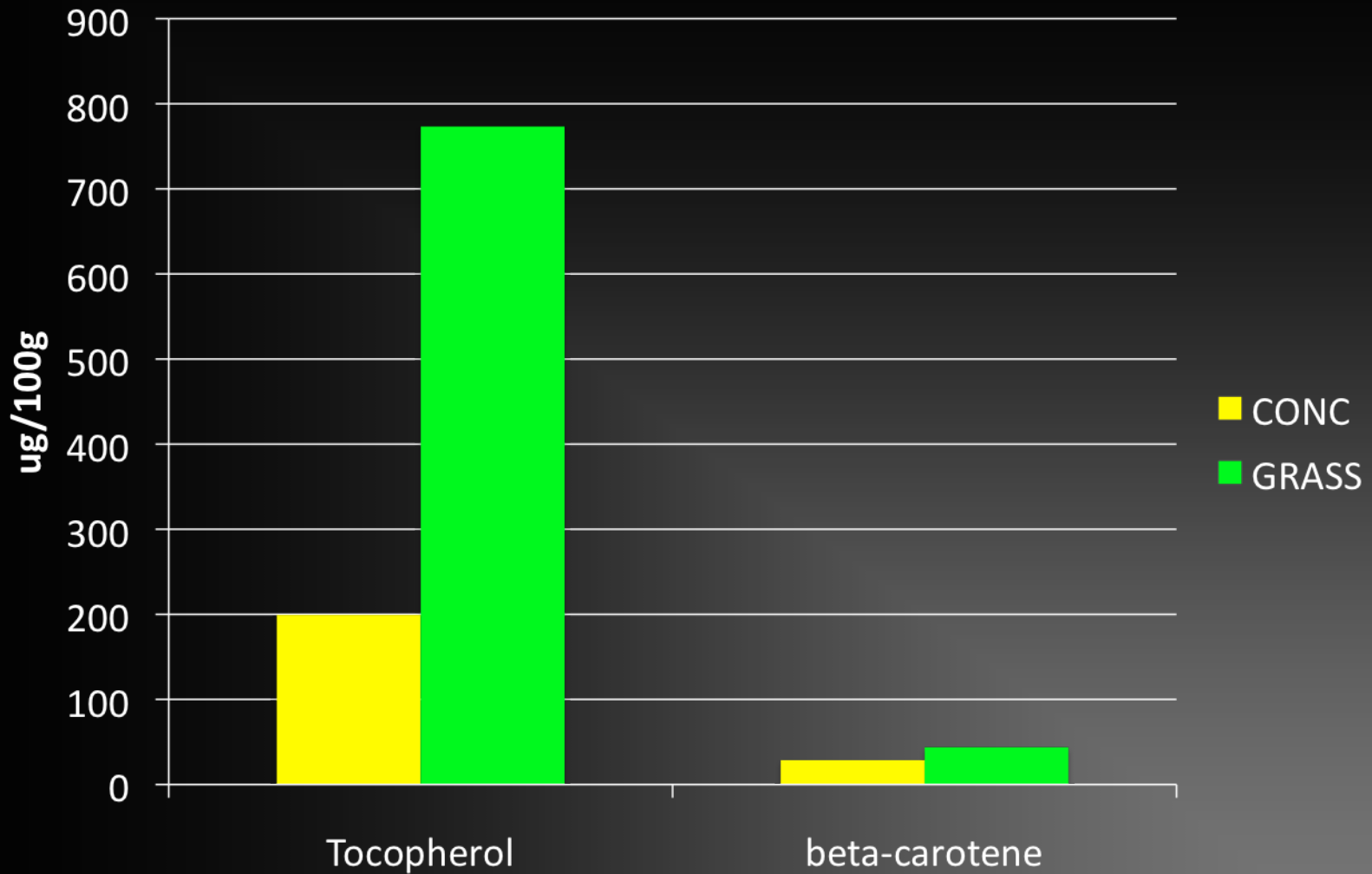


CONC = 83% Choice; PAST = 70% Select, 22% Standard, 6% Choice

Cholesterol Content of Ribeye Steak

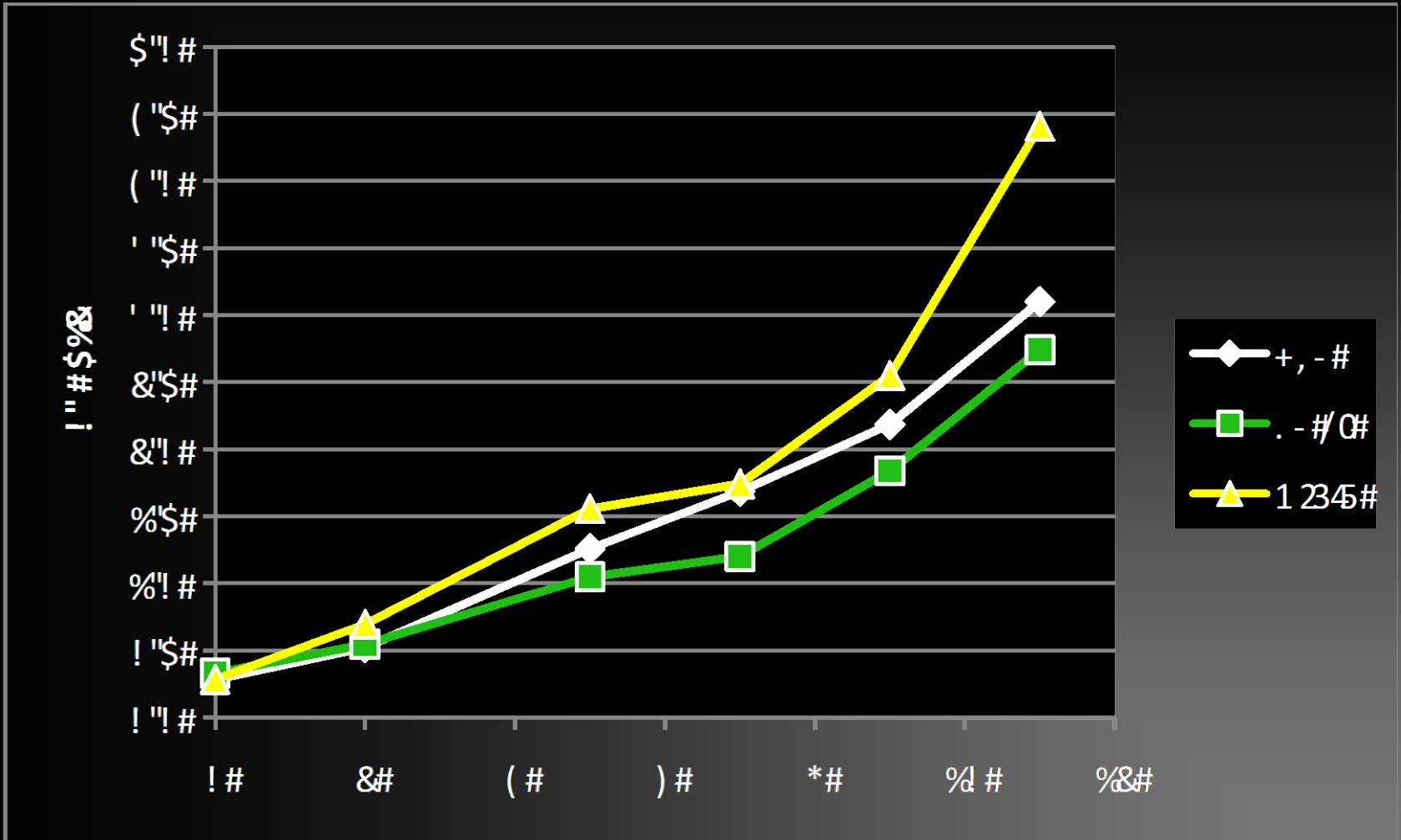


Fat Soluble Vitamins



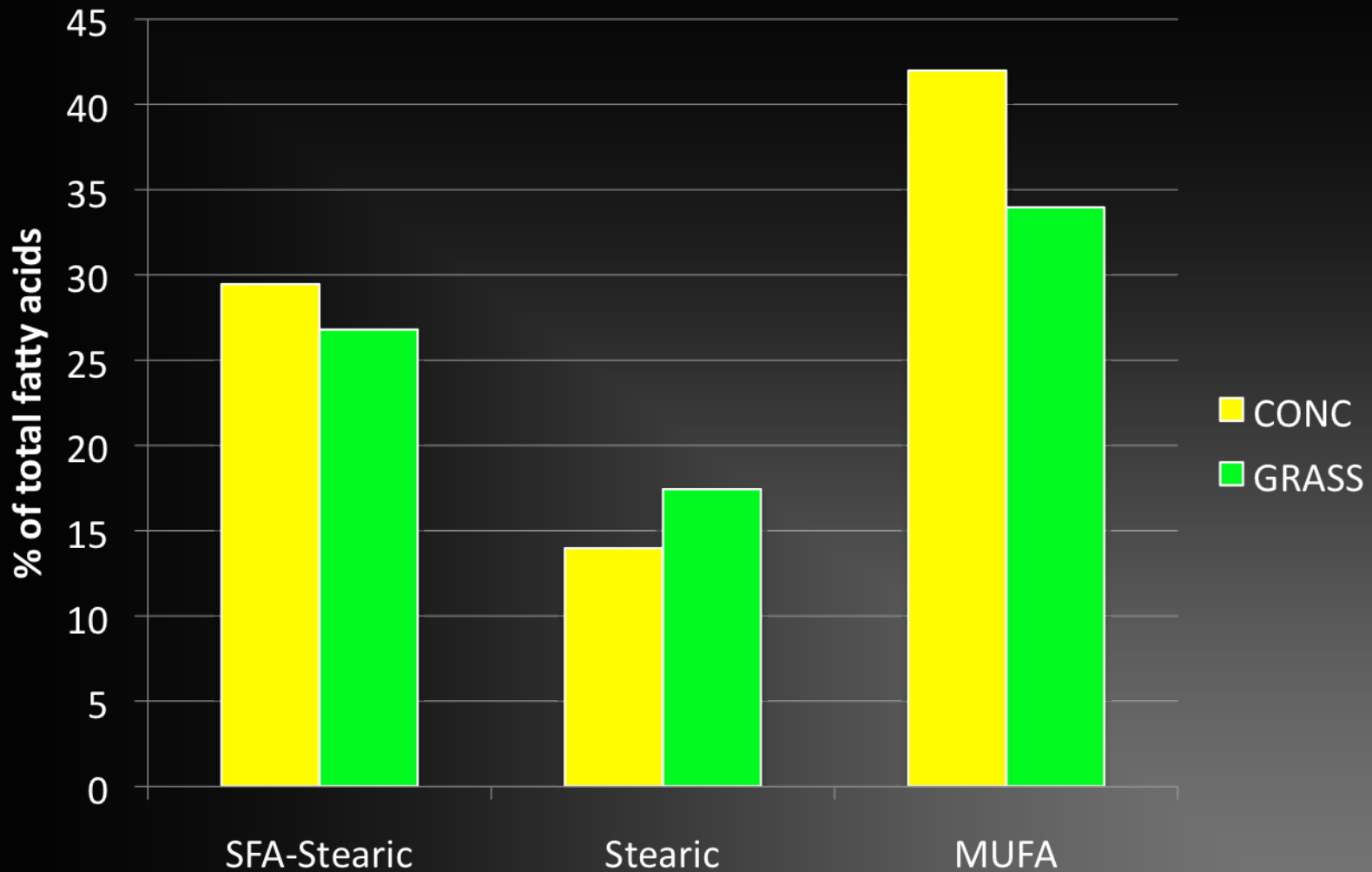
Tocopherol and beta-Carotene = Antioxidants

Shelf-Life of Ground Beef



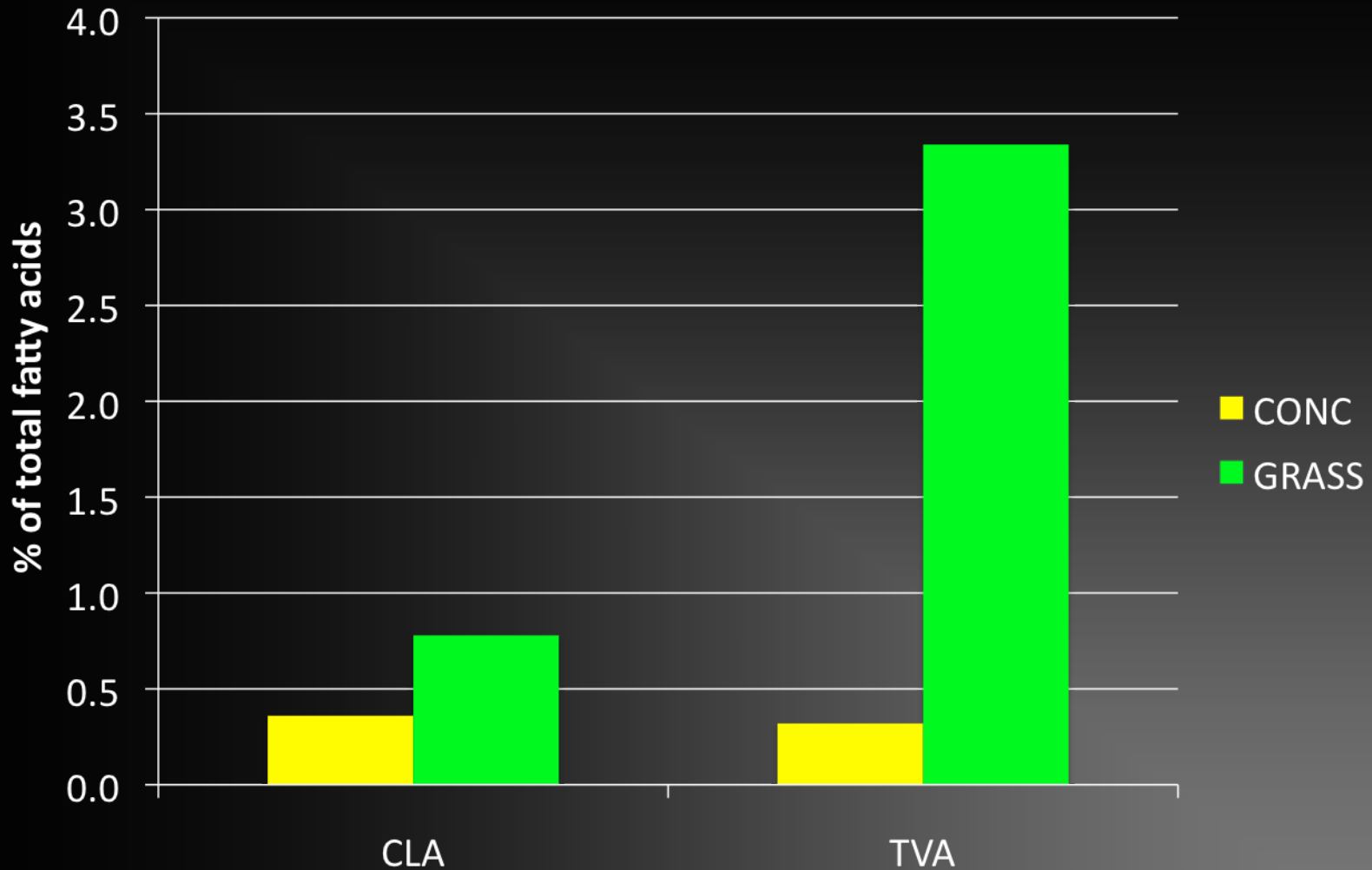
Higher TBARS = Greater Lipid Oxidation

SFA, Stearic acid, and MUFA



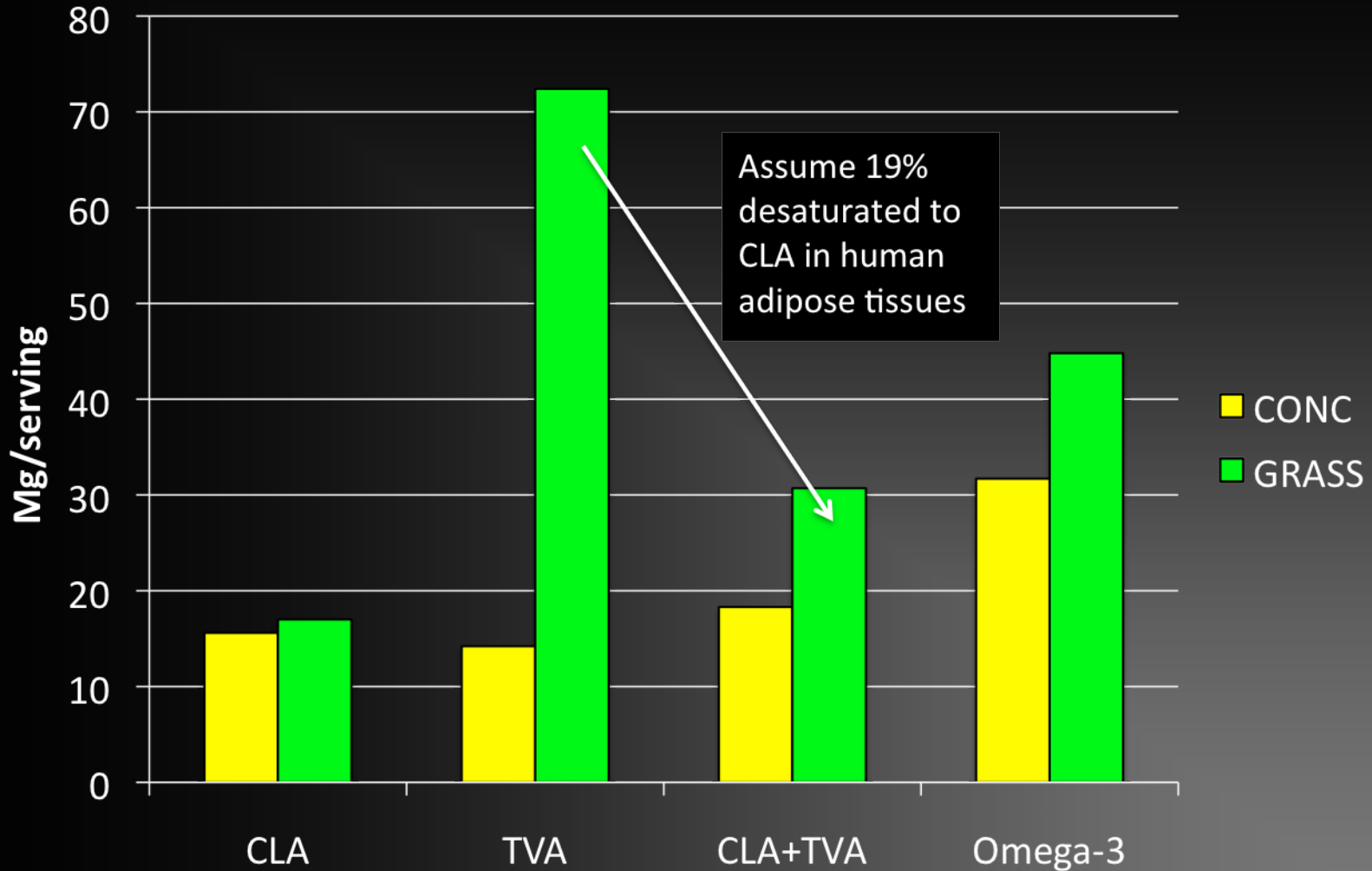
SFA = Saturated fatty acids
Stearic acid = C18:0, neutral fatty acid
MUFA = Monounsaturated fatty acids

CLA and TVA

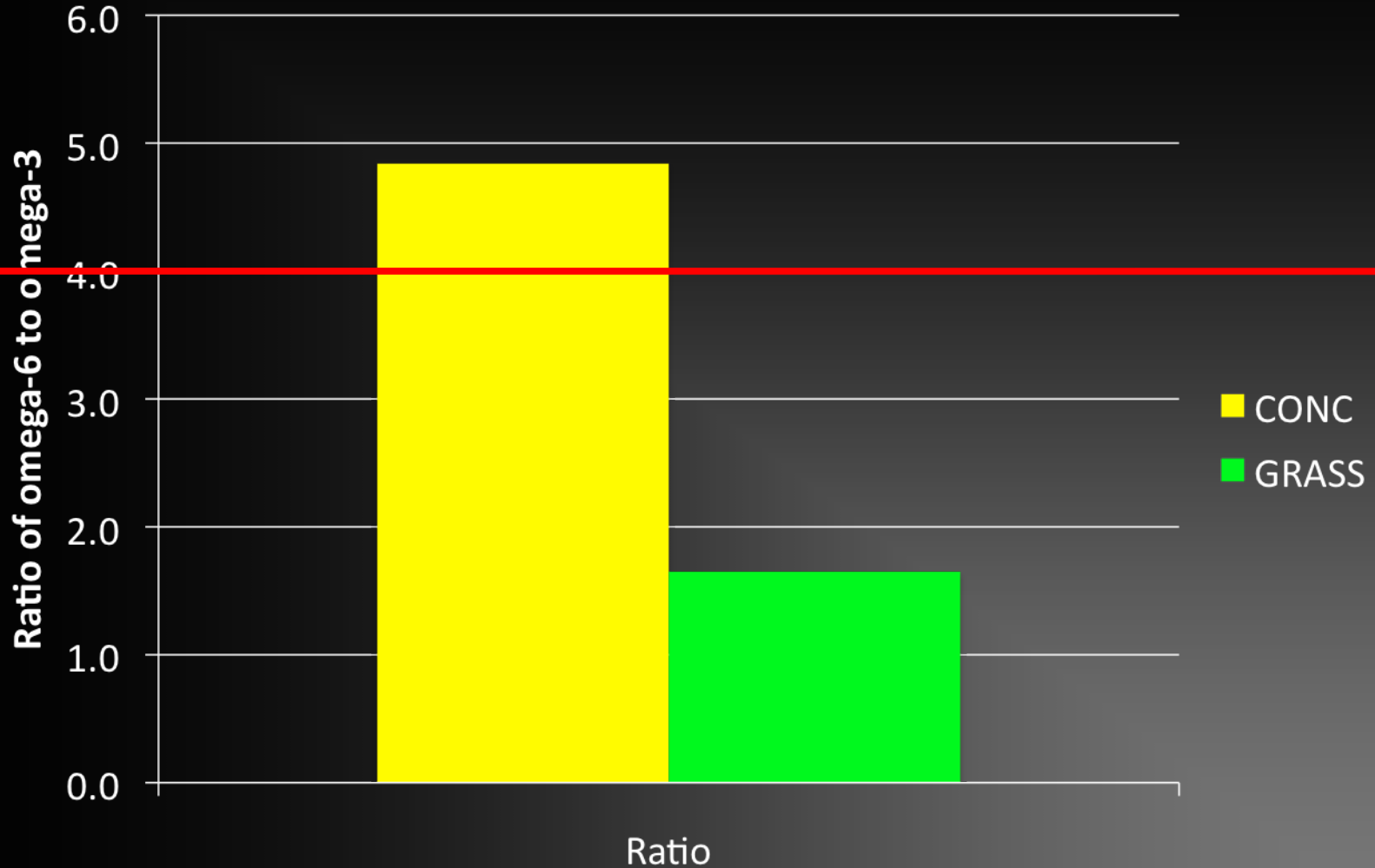


CLA = Conjugated linoleic acid, cis-9 trans-11 isomer
TVA = Trans-11 vaccenic acid

CLA, TVA and Omega-3



Ratio of Omega-6 to Omega-3

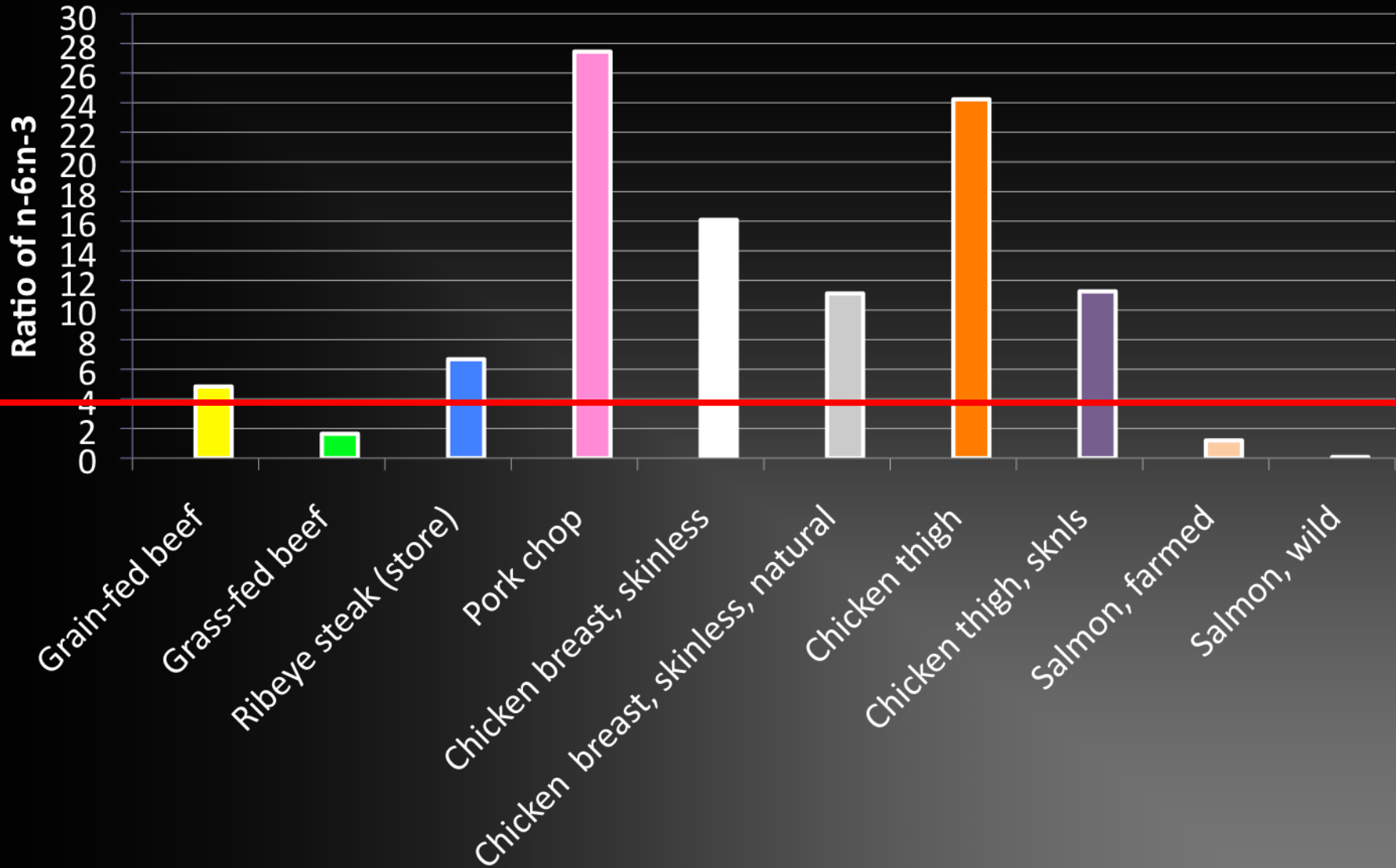


Health professionals recommend ratio of 4:1 or less

Omega-3 Levels

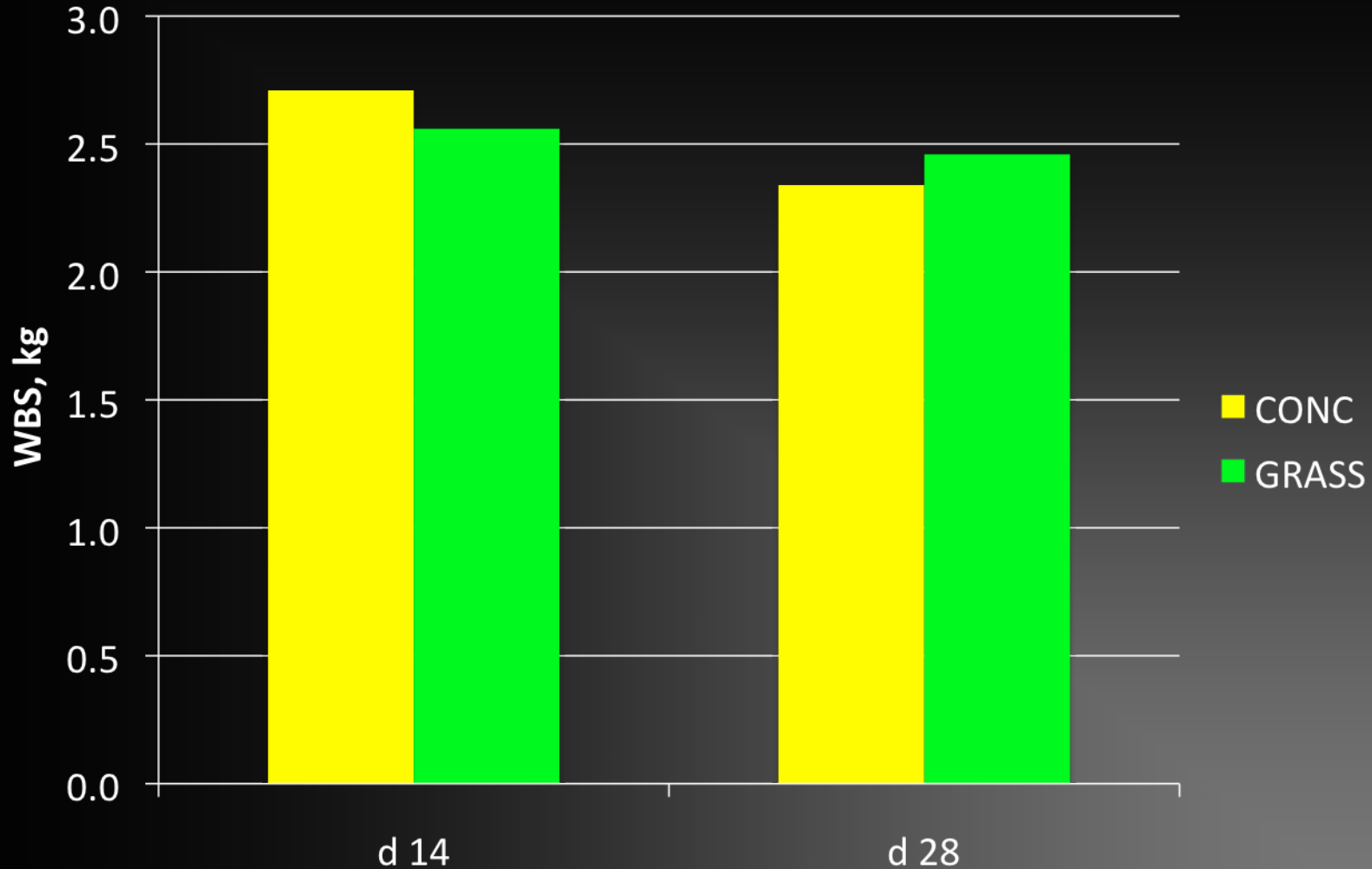
- Health professionals recommend diets with ratio of less than 4:1
- Lyon Heart Study
 - Dietary intervention study in patients after 1st myocardial infarction; reduced linoleic to linolenic ratio to 4:1
 - 76% decrease in mortality after 2 yrs on intervention diet
- Source of omega-3, Australian diet
 - Red meat supplied over 70% of total dietary DPA

Ratio of Omega-6 to Omega-3



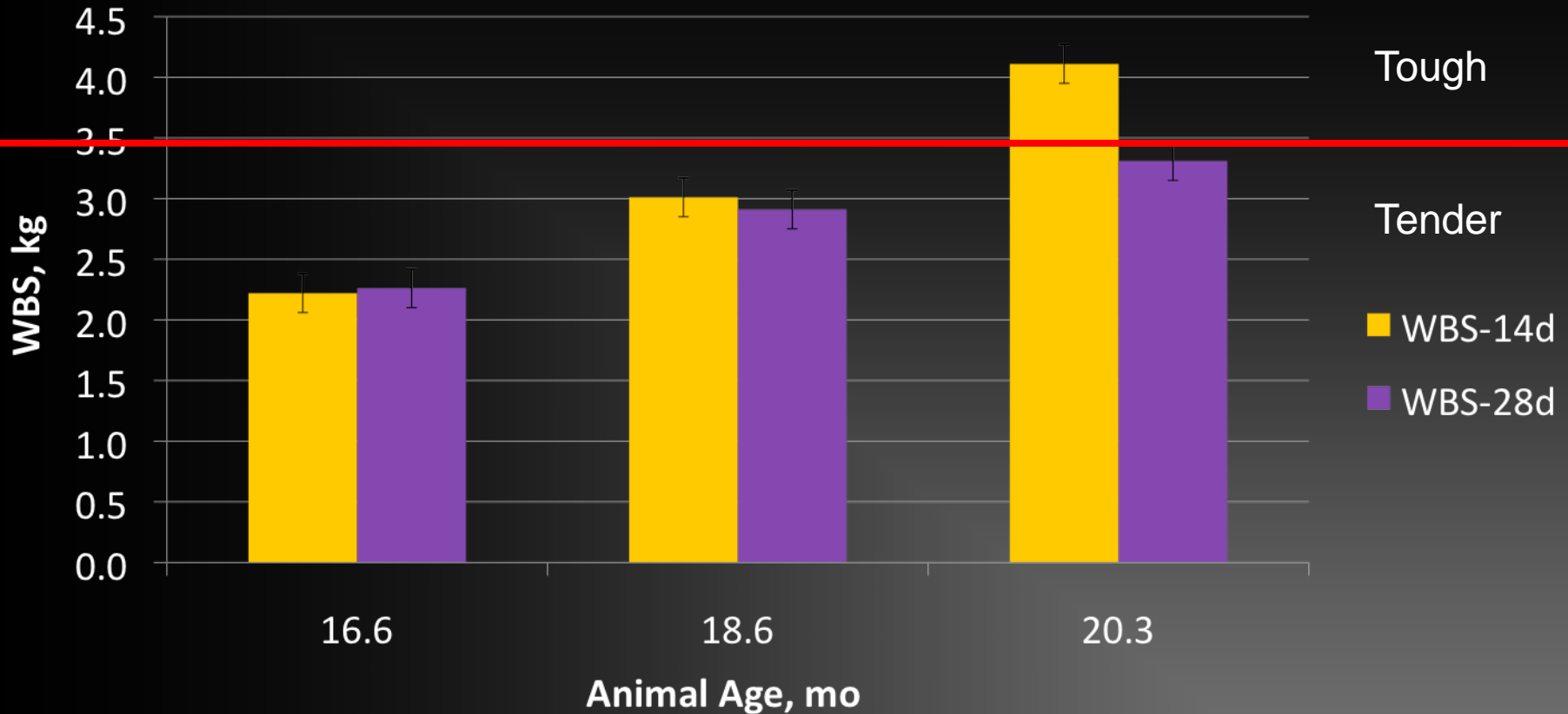
Health professionals recommend ratio of 4:1 or less

Warner-Bratzler Shear Force



CONC = 83% Choice; GRASS = 70% Select, 22% Standard, 6% Choice

Animal Age at Slaughter



- Animal age decreases tenderness; therefore we need high quality forage systems to finish at 18 mo of age for greatest tenderness.
- If comparisons are made and animal age is not constant, there will be differences in tenderness between grass-fed and grain-fed systems.

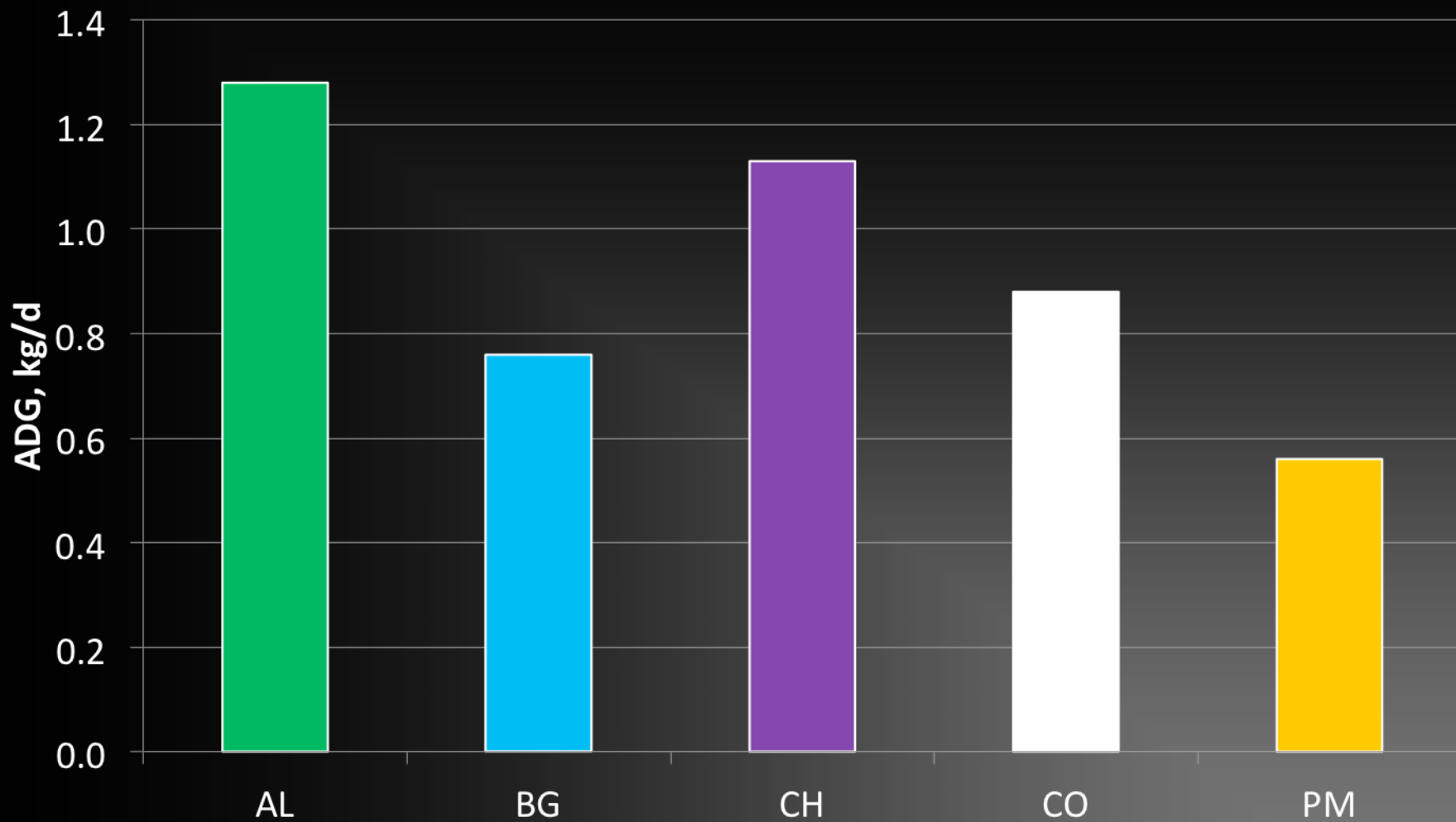
Forage Species

Forages for Summer Finishing in SC

- Alfalfa (AL)
- Bermudagrass (BG)
- Chicory (CH)
- Cowpea (CO)
- Pearl Millet (PM)



Average Daily Gains



HCW, kg
DP

323
60.9

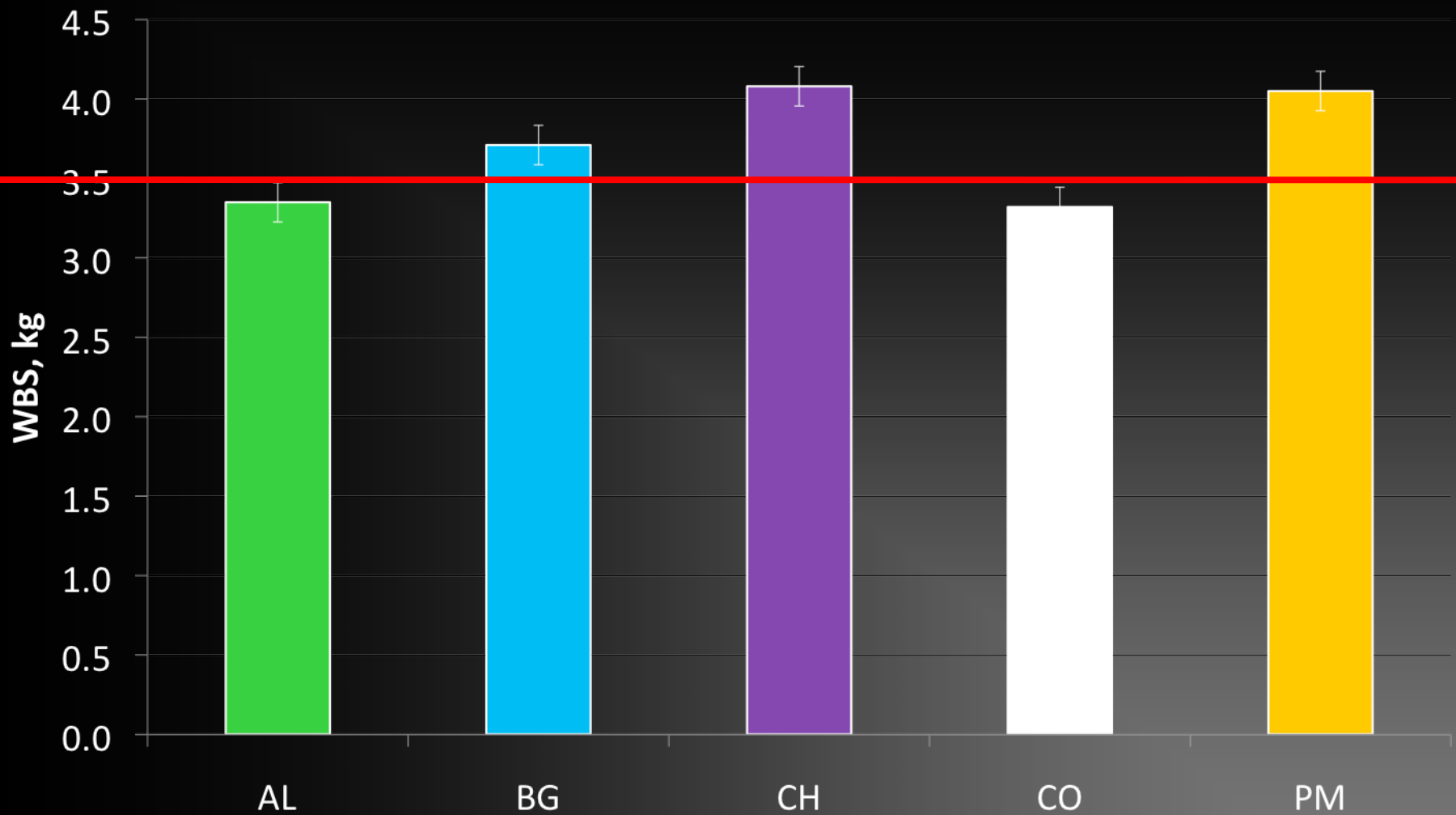
327
57.6

307
60.4

342
62.3

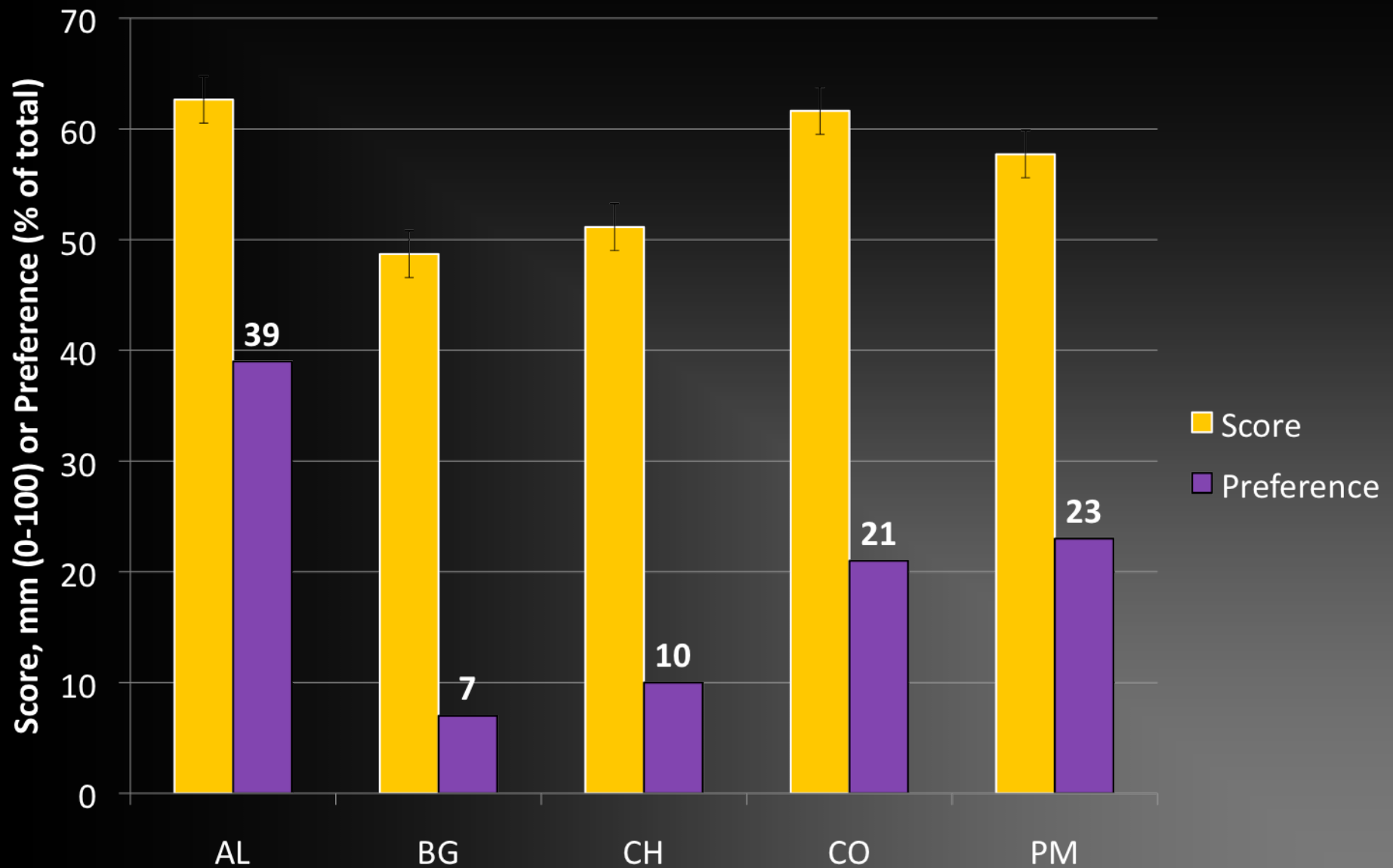
302
58.9

Warner-Bratzler Shear Force, d 14



Legumes: Lower shear force values and greater tenderness.

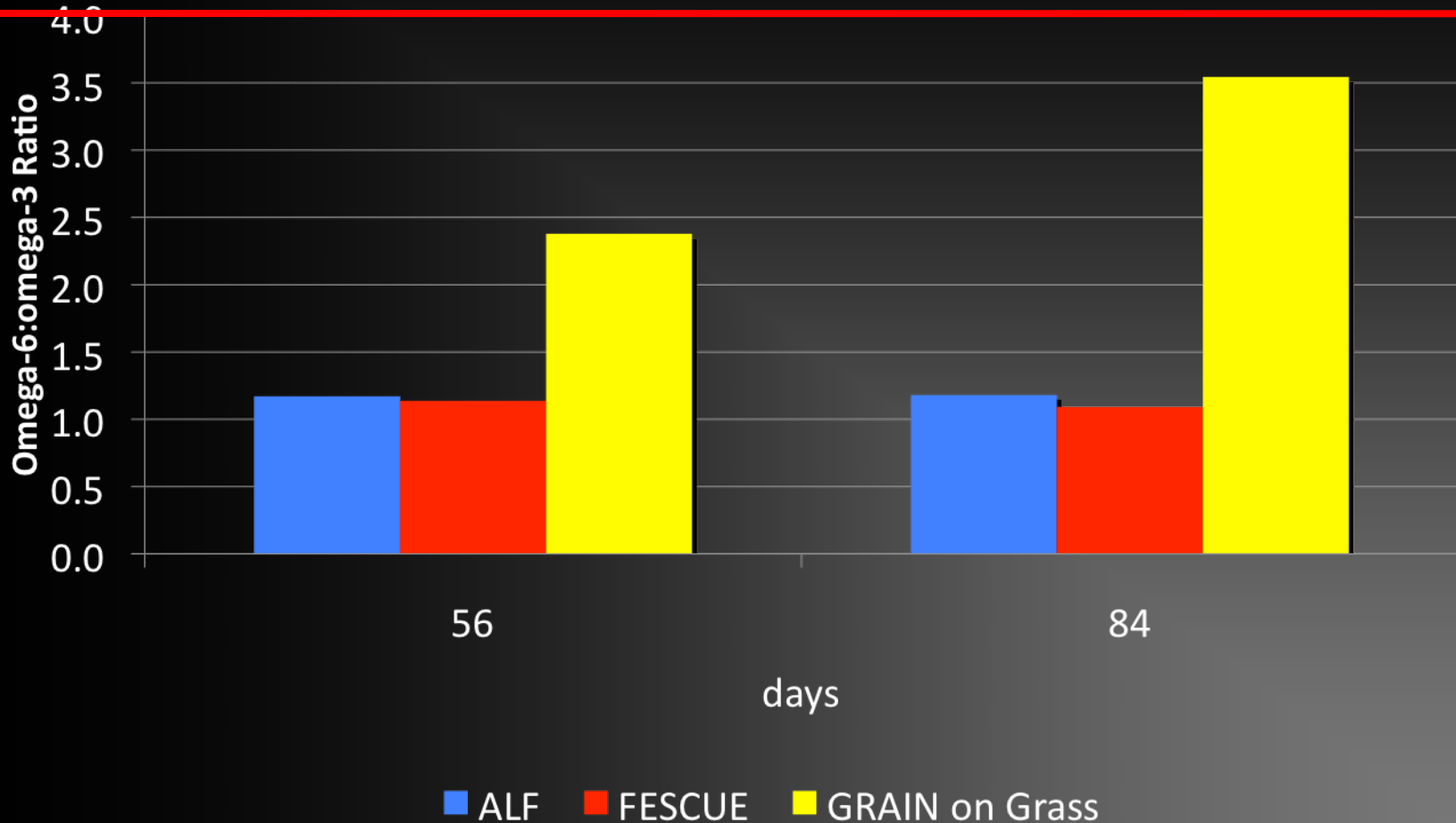
Consumer Panel



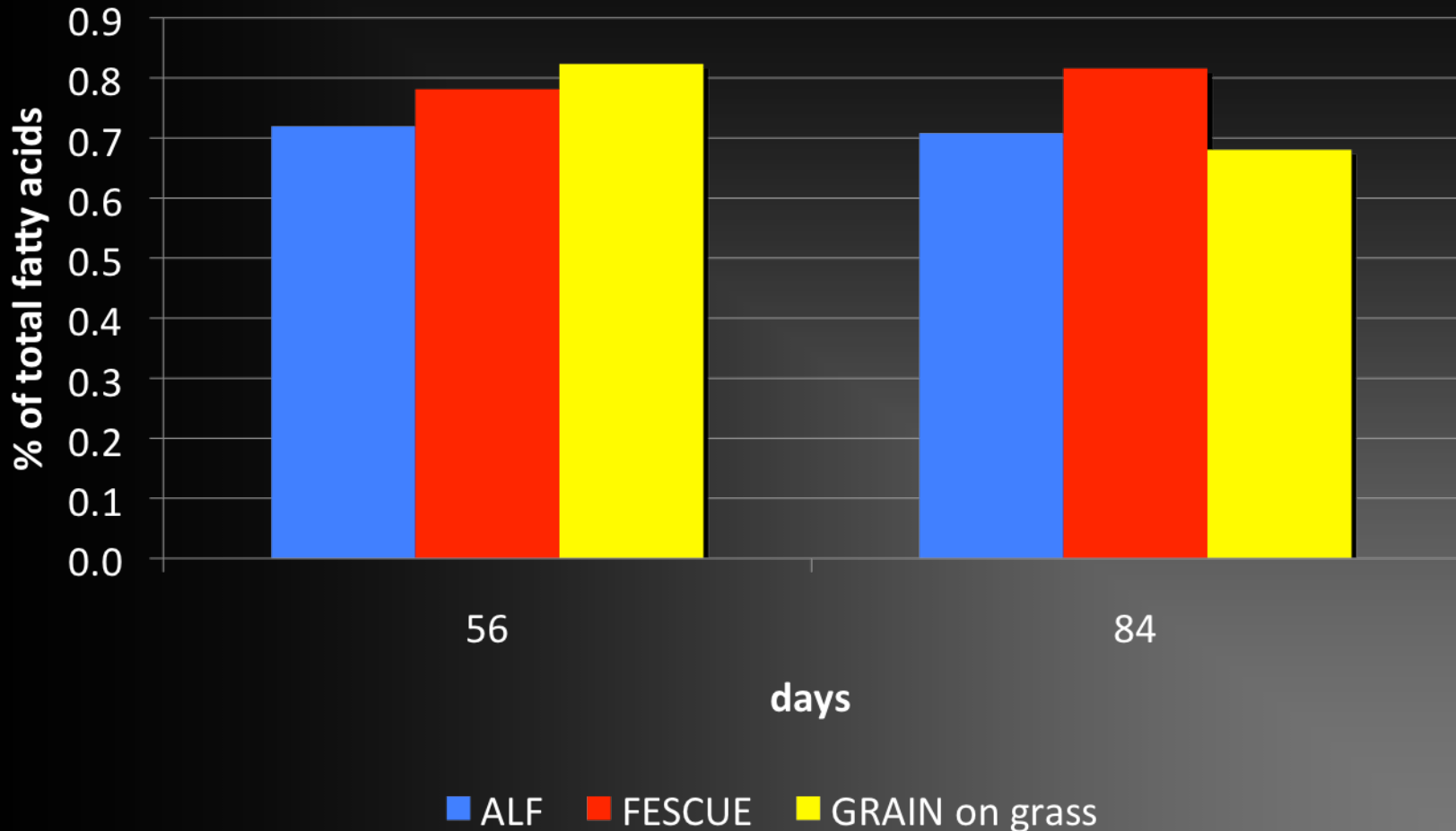
**Which one was supplemented
with grain?**



Corn Grain Supplementation on Grass: Omega-6 to Omega-3 ratio



Corn Grain Supplementation on Grass: CLA



Summary

- Grass-fed Beef vs. Grain-fed Beef
 - Leaner
 - Increased omega-3 and CLA concentrations
 - Increased antioxidant content
 - No difference in palatability
- Animal Age
 - Most important factor influencing tenderness
 - ≤ 18.6 mo of age for greatest tenderness

Summary

- Legumes
 - Improve animal performance, carcass quality, dressing percent, and tenderness
- Supplementation
 - Strategic supplementation strategies
 - Increase stocking density, extend forage resources in drought, balance nutrients
 - Alters omega-6 to omega-3 ratio