

Effect of Ethanol Co-Products on Carcass and Beef Quality



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Fall 06

DDGS Research in Ruminants

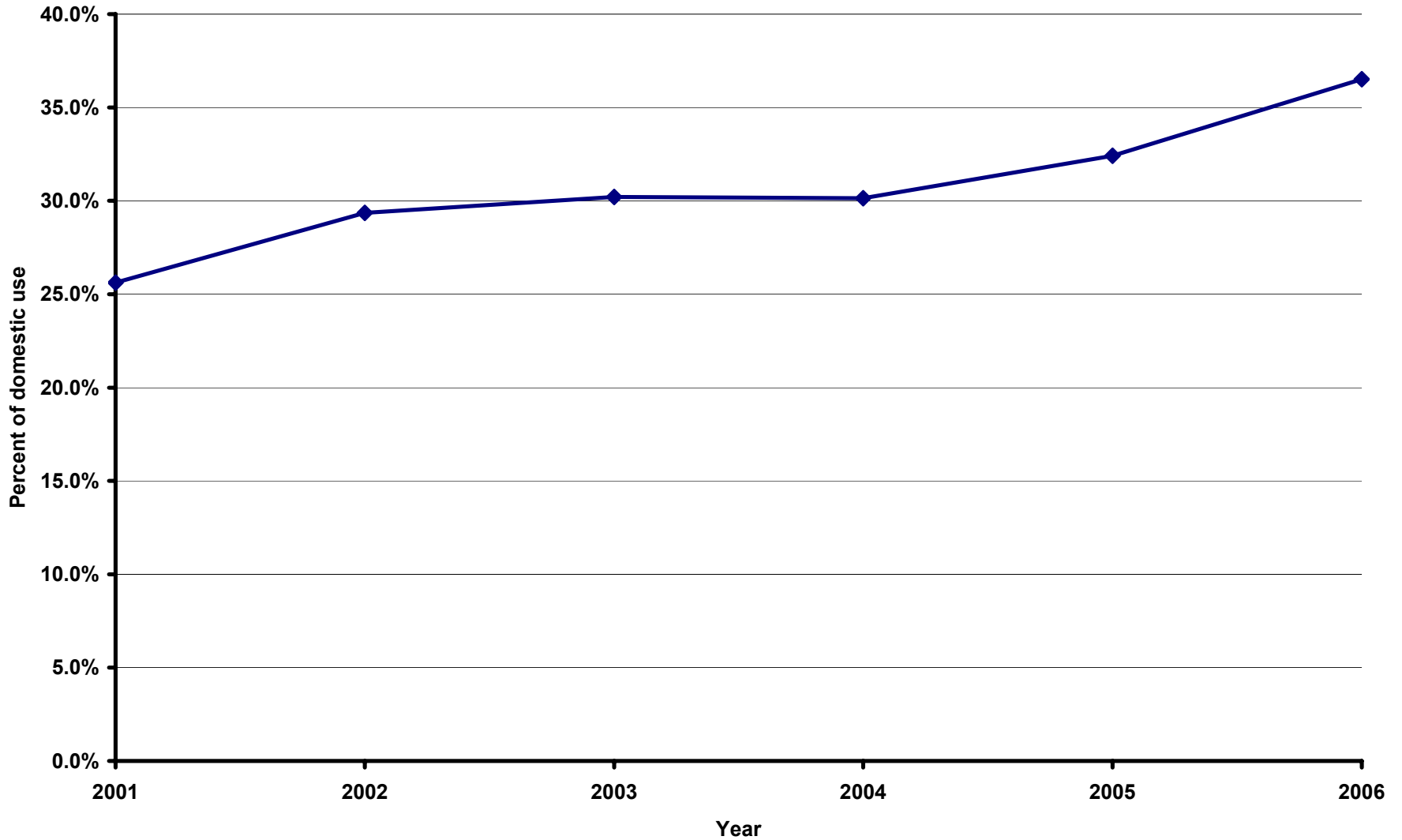
- **NCR-88 Beef Growing-Finishing Systems**
 - **Summarized studies in 1984 (NCR No. 297)**
 - **Characterization of fermentation by-products**
 - Higher protein concentration than corn
 - Similar or greater RUP
 - Similar energy concentration as corn
 - **DDGS as a protein source**
 - Replacement for other protein sources
 - » When combined with urea of equal value as SBM
 - As a bypass source
 - » Fortified with urea > urea alone
 - » More efficient protein source when combined with urea than SBM

A Prophetic Statement

- **DDGS as an energy source**
 - **“if abundant supplies of wet distillers’ grains should become available—as a result, for example, of increased production of fuel alcohol—this by-product could be used as an energy source in livestock feeds.”**

NCR No. 297

Industrial Use



What Will be The Impact on Beef Quality?

- **Ethanol Co-Products**

- high in NDF
- high in fat
- some high in moisture
- palatable
- inexpensive



Effects of Ethanol Co-Products

- Hot carcass weight
- Marbling
- Yield grade
- Quality grade
- Fat depth
- Ribeye area

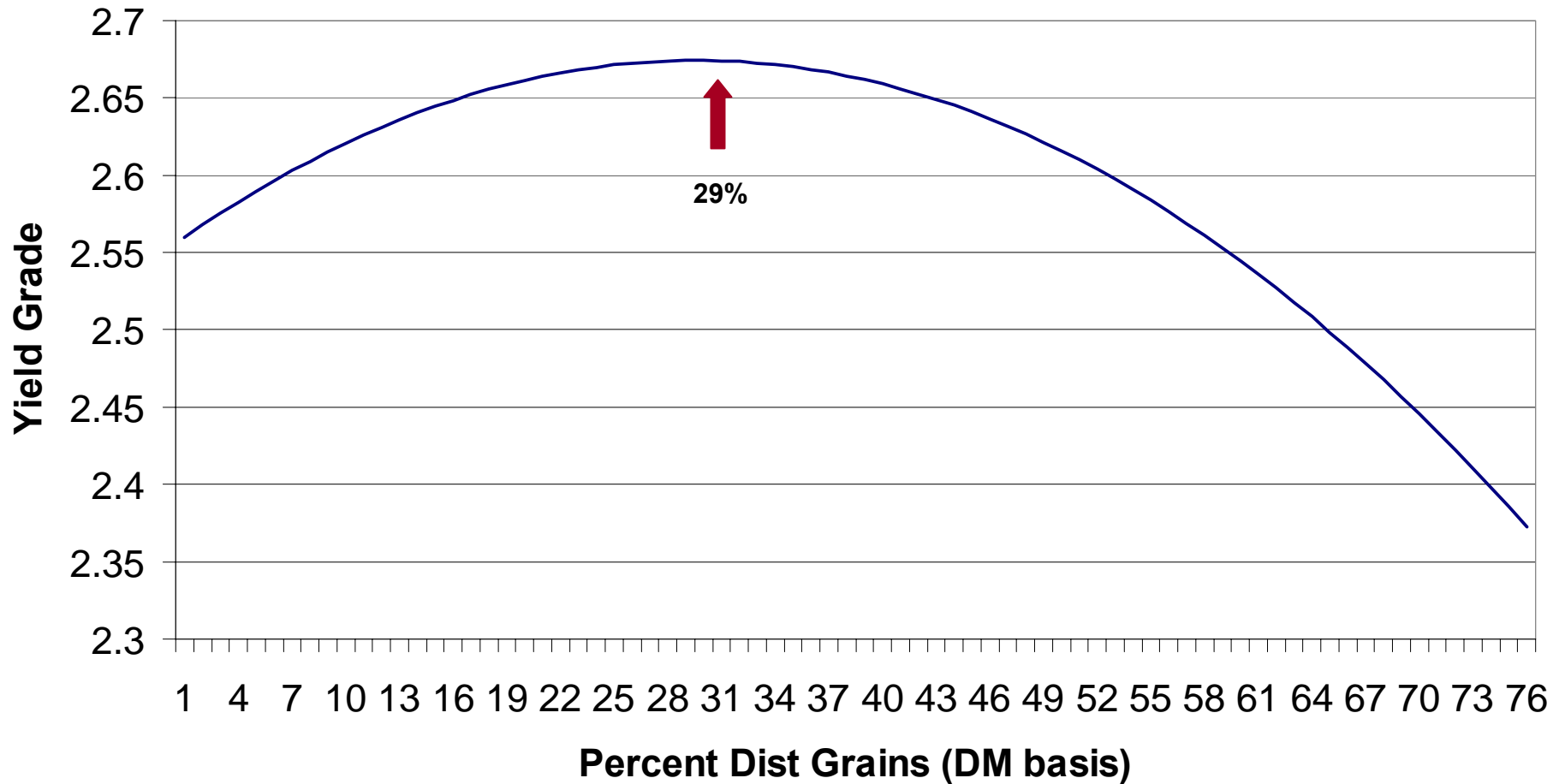


Data Set



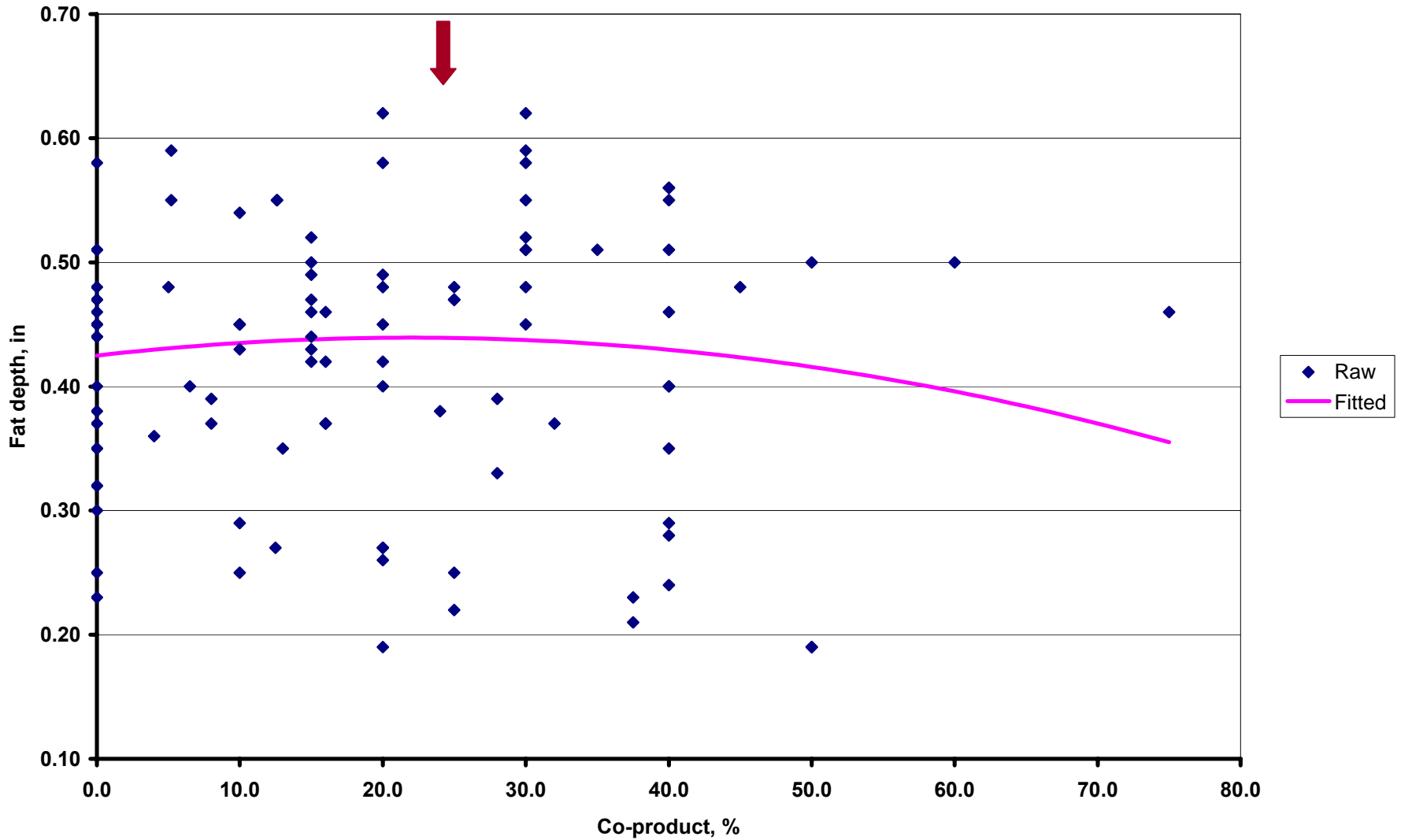
- 106 treatment means
- 21 studies
- 625 pens
- 4,752 cattle
- Co-prod = 0 to 75%
- DOF = 151, 58 to 299
- In BW, lb = 727, 421 to 948
- ADG, lb = 3.31, 1.81 to 4.55
- DMI, lb/d = 20.6, 15.4 to 26.0
- FTG = 6.3, 5.1 to 8.3
- End BW, lb = 1212, 997 to 1394
- HCW, lb = 754, 632 to 870
- Fat, in = 0.42, 0.19 to 0.62
- REA, in² = 12.8, 11.1 to 15.0
- Choice, % = 55.9, 16.7 to 95
- YG = 2.7, 1.8 to 3.6

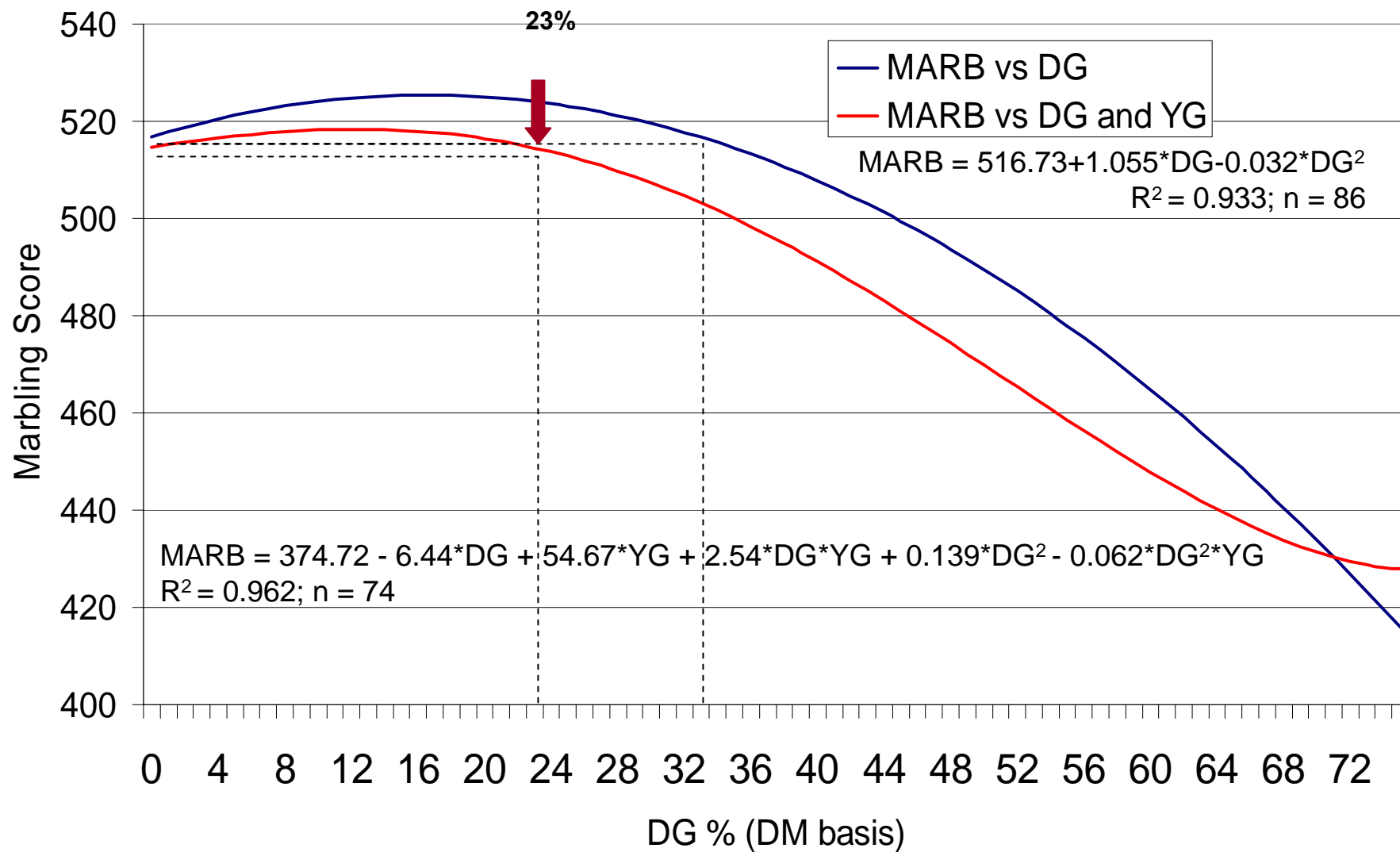
YG vs Level of Distillers Grains

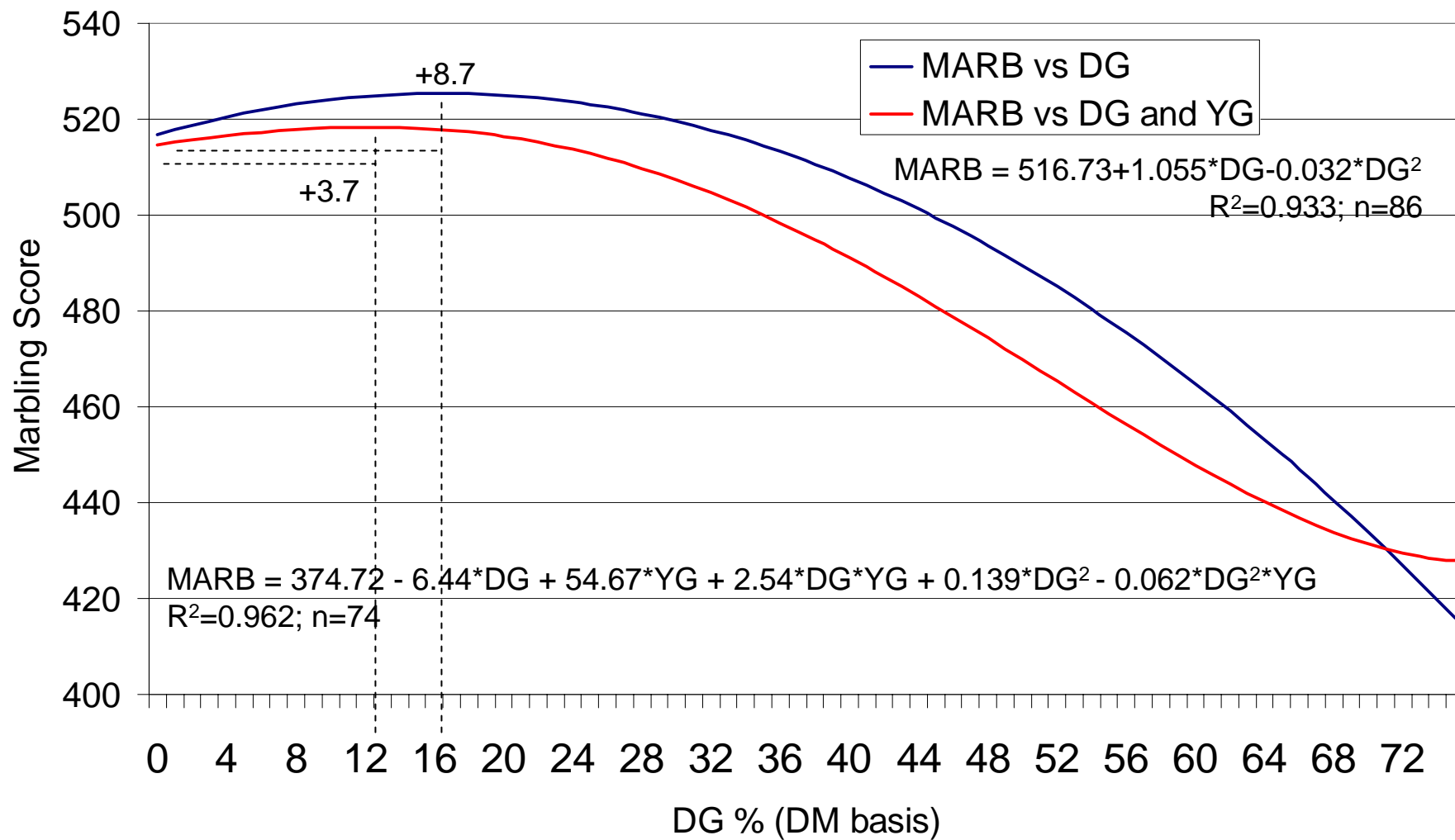


Fat Depth and Co-product

22%



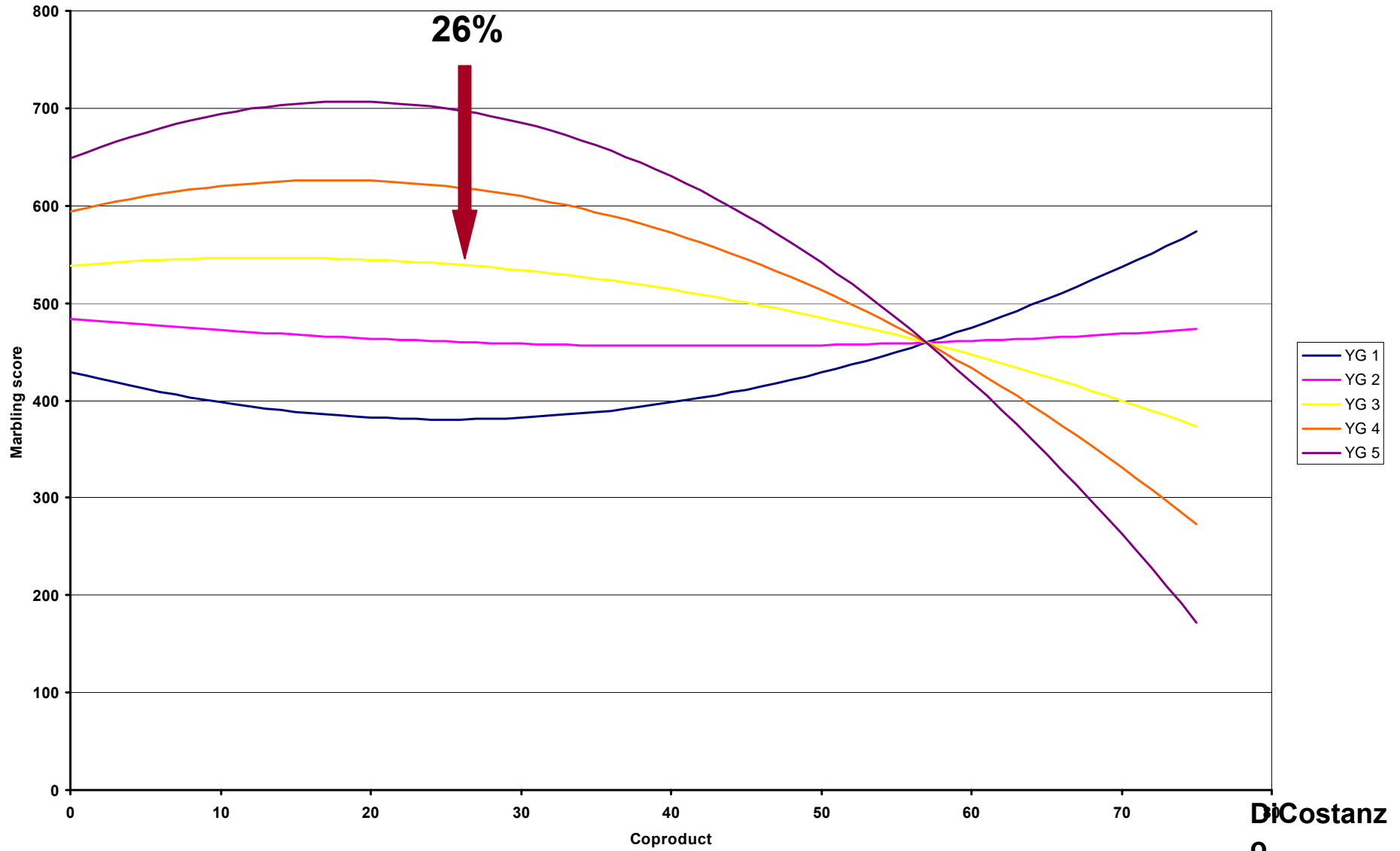




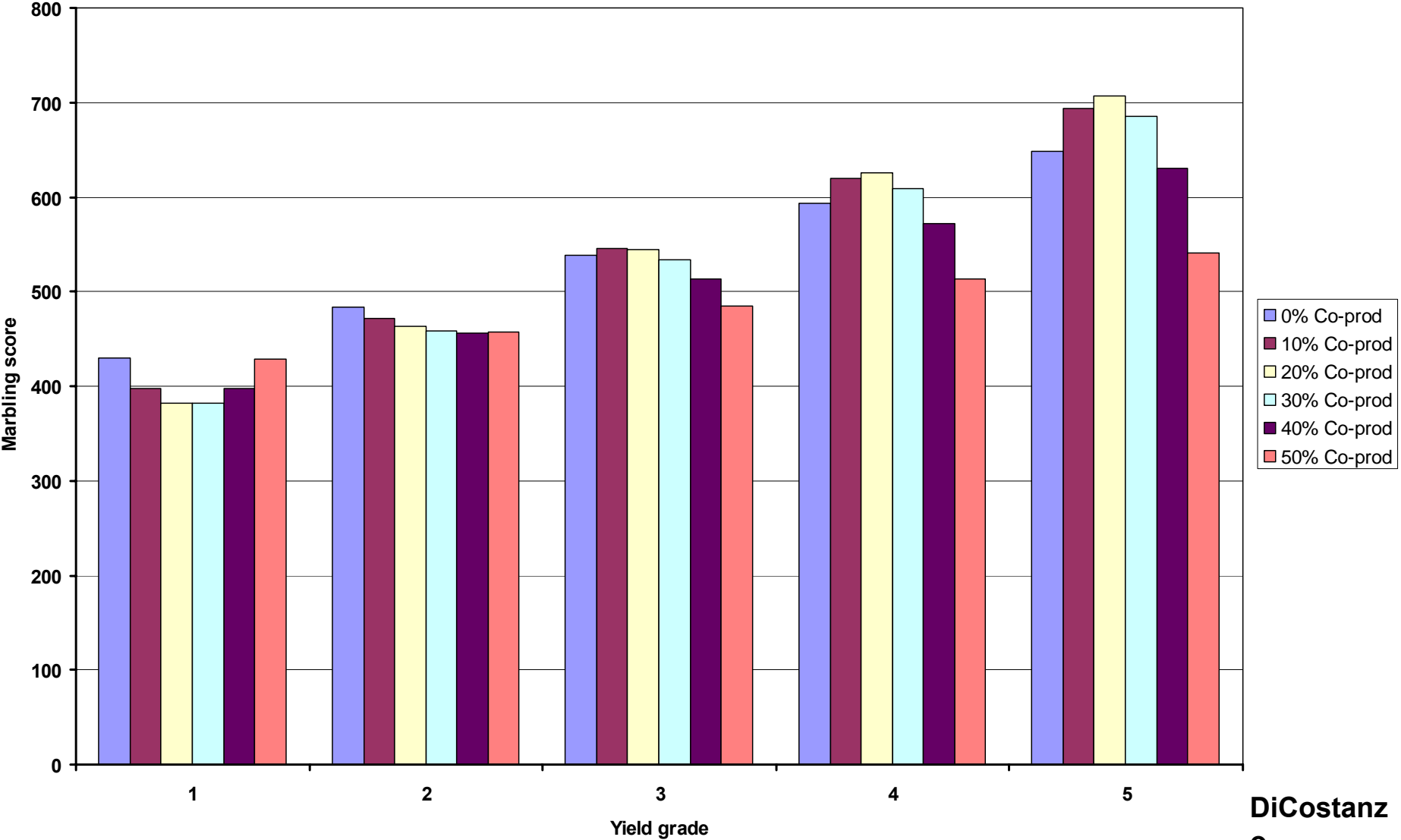
Effects on Marbling and YG

- **At intermediate concentrations, co-products increase YG**
 - **effect on increasing fat depth**
- **At intermediate concentrations, co-products increase YG, but maintain marbling**

Marbling and Coproduct Given YG



Marbling and Co-product Given YG



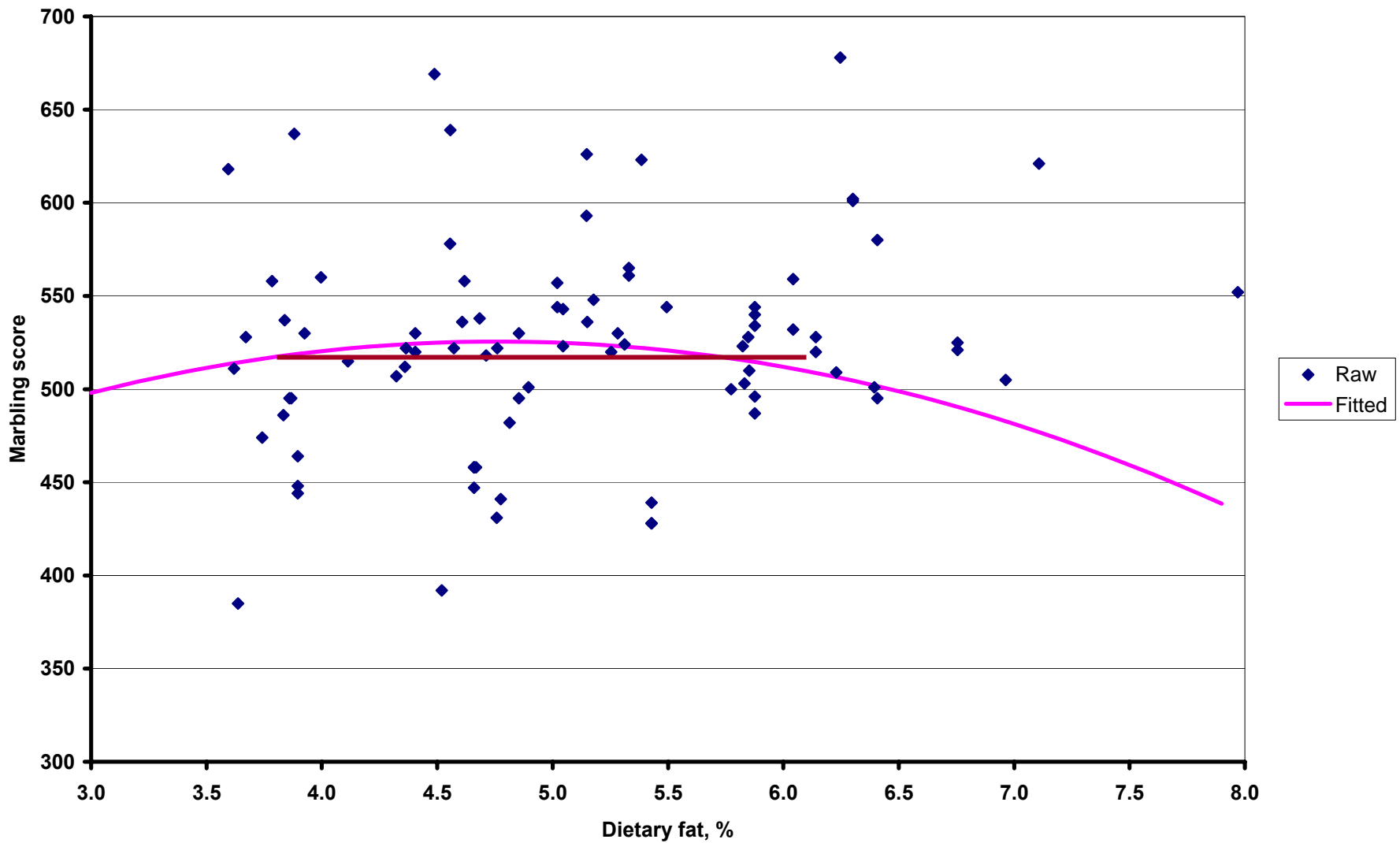
Effects on Marbling and YG

- **At a given YG end point, effects of co-products are variable**
- **At low YG (lower energy diets or lean cattle)**
 - **co-products reduce marbling at any inclusion**
- **At YG 3**
 - **co-products have no effect on marbling up to 20% inclusion**
- **At high YG (extended DOF, early-maturing cattle or heifers)**
 - **co-products increase marbling at low to intermediate inclusion**

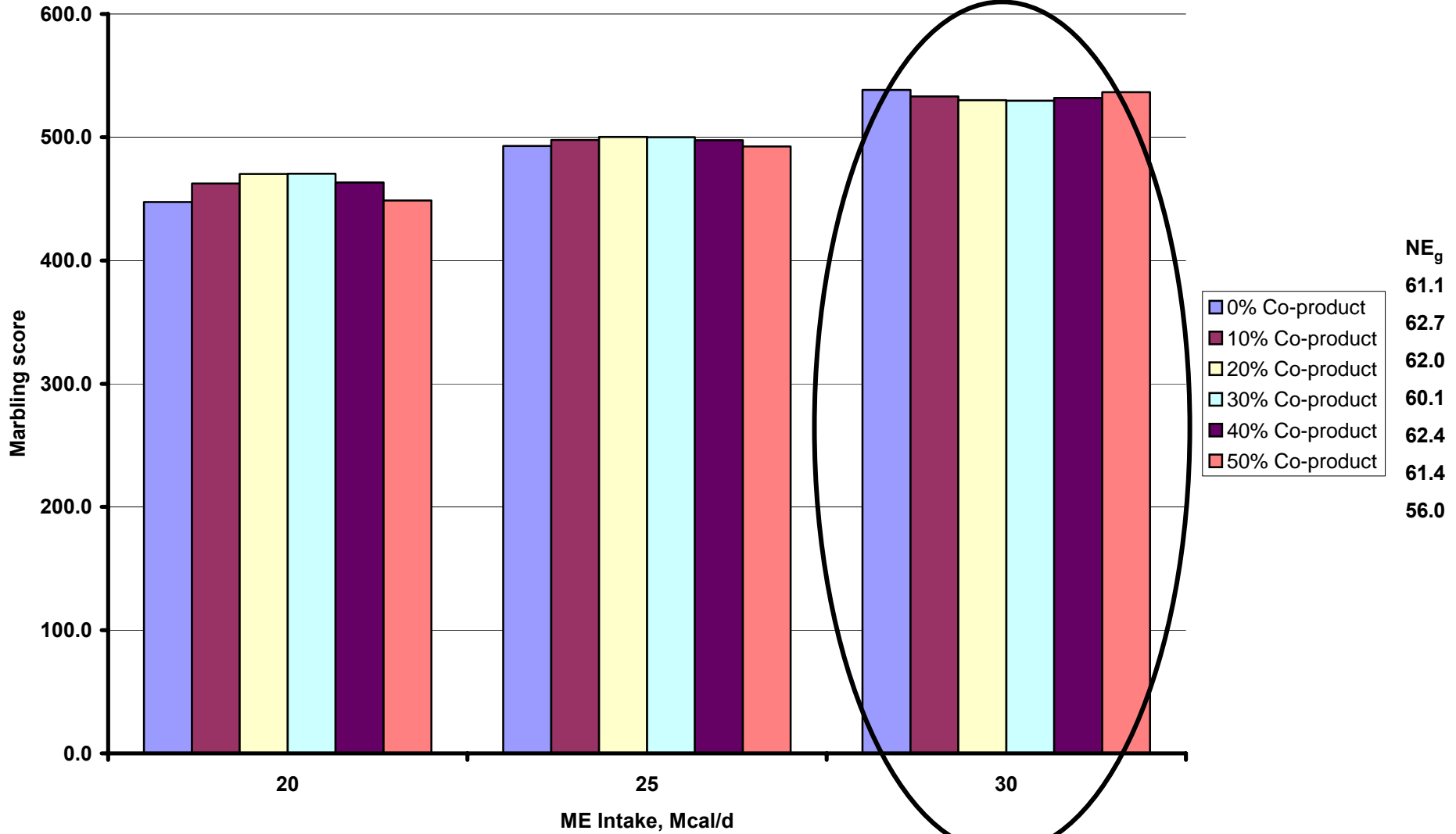
Are They Really Effects of Co-Products?

- **Difficult to separate from this dataset**
- **During, experimental feeding of ethanol co-products, energy, protein and ether extract of diet are permitted to fluctuate**
- **Therefore, is marbling affected because of co-products or something that co-products affect?**
 - **ether extract intake**
 - **starch intake**
 - **energy intake**

Marbling and Dietary Fat

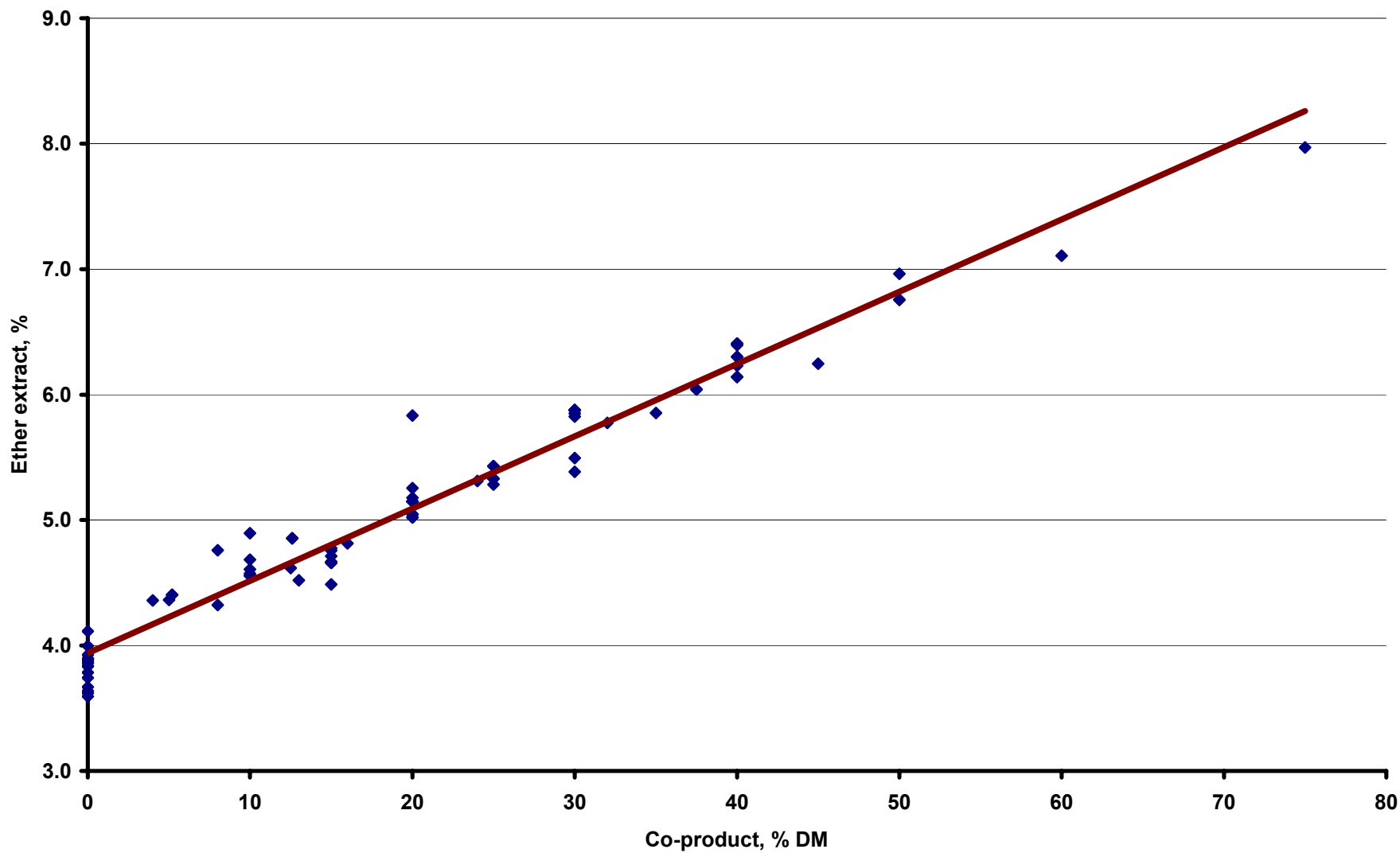


Marbling and ME Intake



NE_g
61.1
62.7
62.0
60.1
62.4
61.4
56.0

Ether Extract and Co-Product

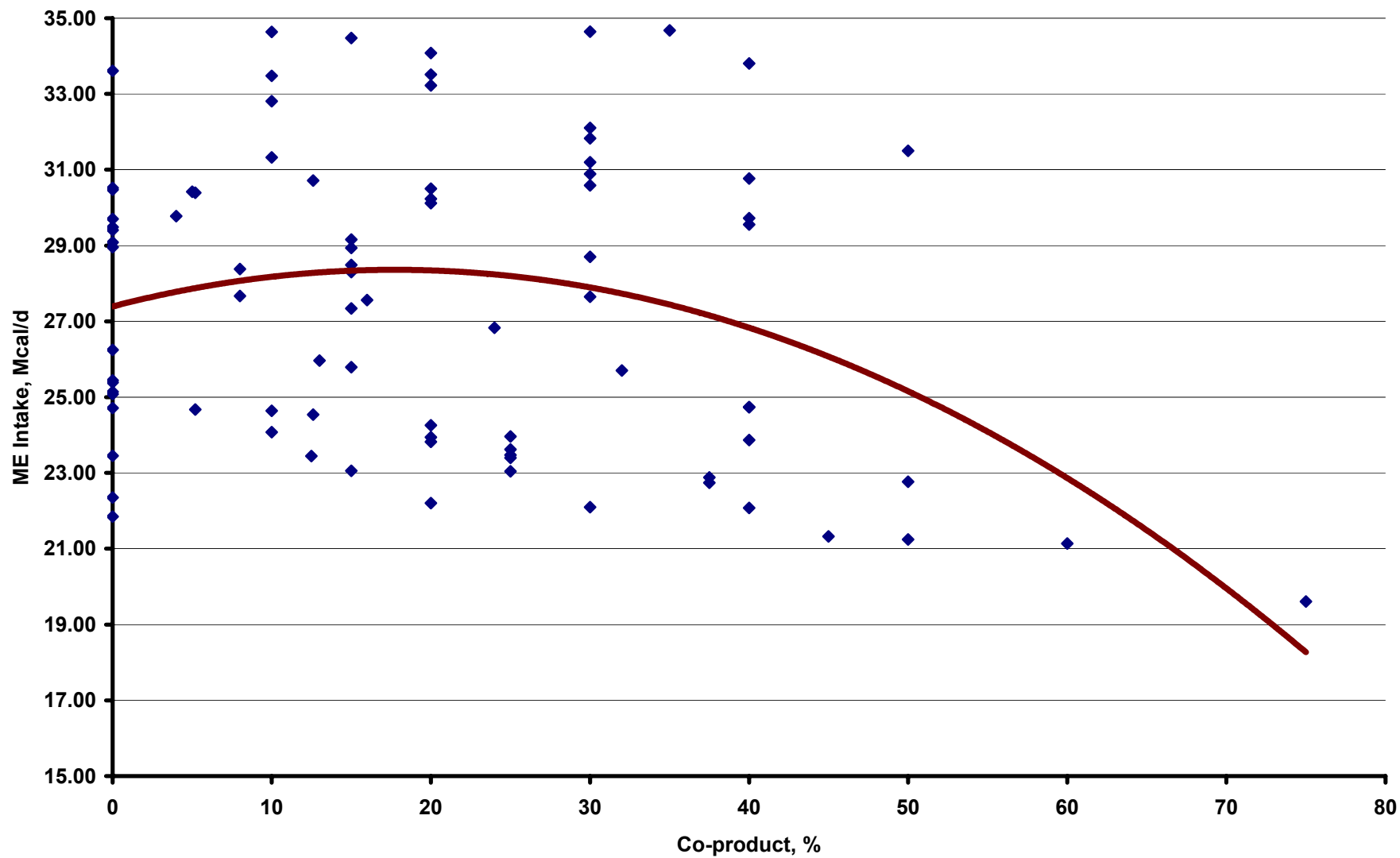


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ME Intake and Co-Product Content



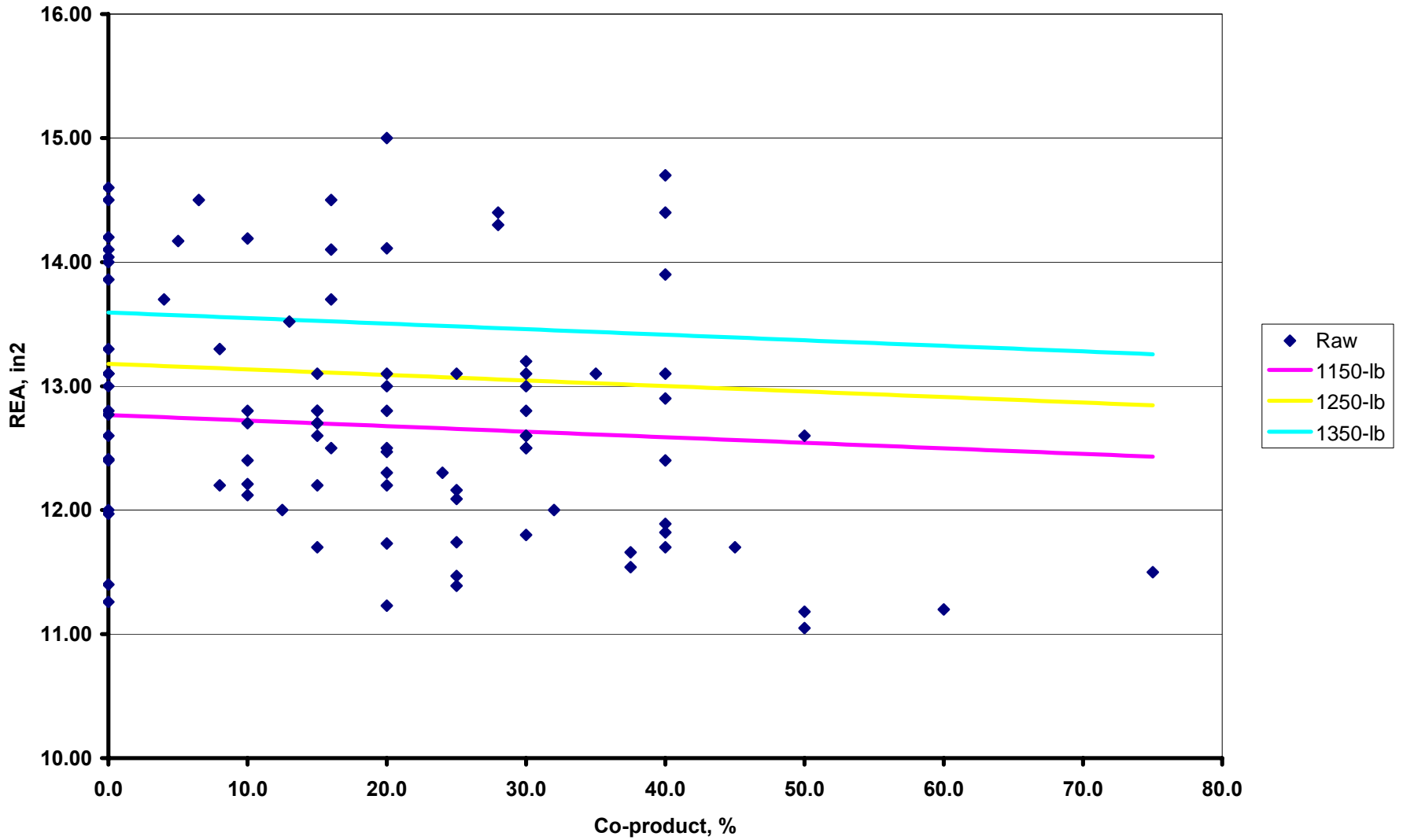
Co-product Effects

- **Effect of ether extract on marbling score is clear**
 - **virtually no change in marbling between 3.7% and 5.7% ether extract**
- **Effect of co-product on marbling score is dependent on ME intake**
 - **At ME intakes up to 30 Mcal/d, co-product inclusion at up to 50% is not detrimental to marbling**
 - **At lower ME intakes, co-product inclusion is actually positive on marbling**



**When feeding ethanol co-products,
the effect of the inherent increase in dietary ether extract
may be of greater influence on marbling
than that of increased ME intake**

REA and Co-product



Effects on REA

- If one ignores final BW, REA is decreased by co-product inclusion at a rate of 0.004 in^2 for each percentage increase in co-product inclusion
- When including final BW, the effect of feeding co-products is almost canceled out
 - 1 lb increase in final BW = 0.004 in^2 increase in REA

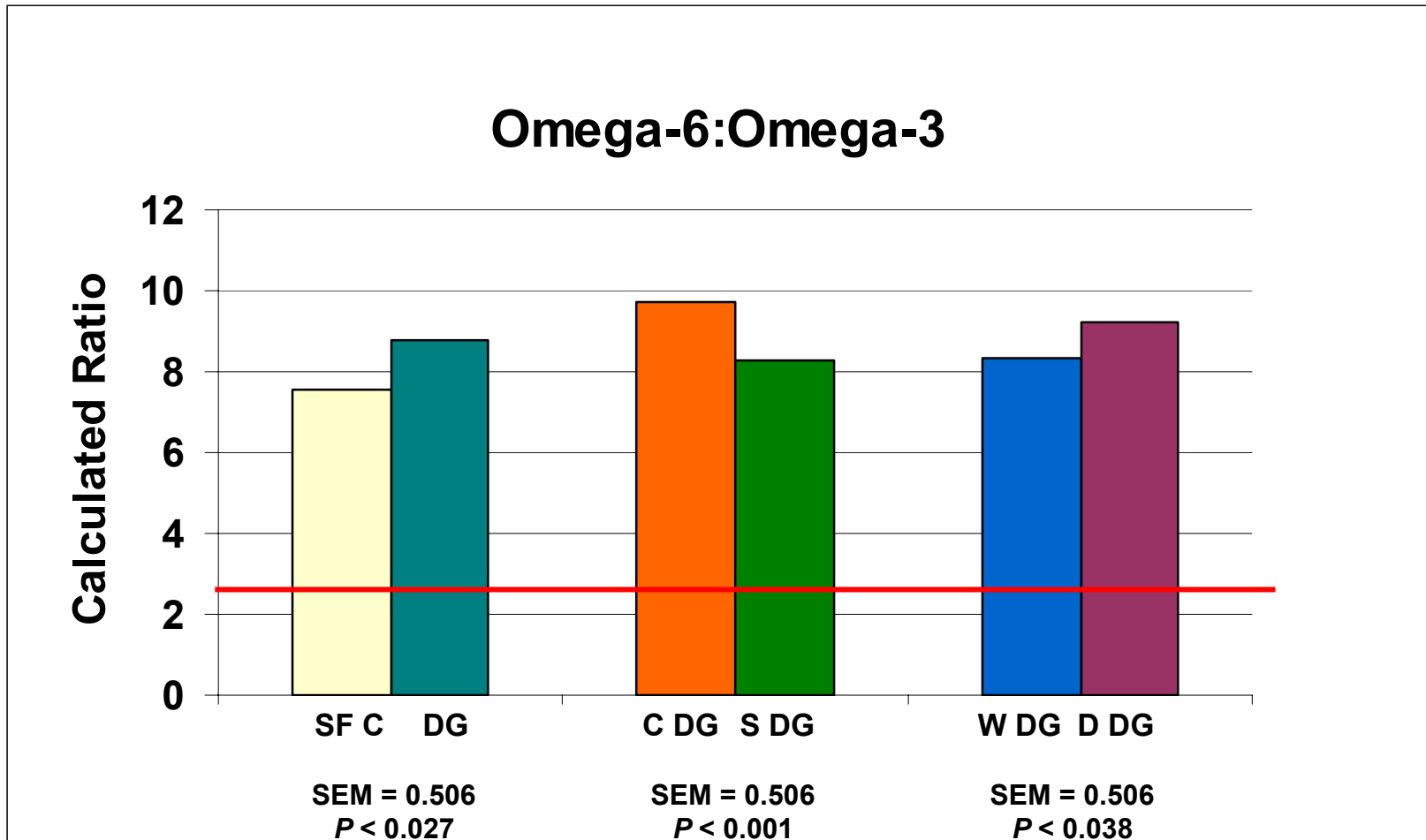
Summary

- **Feeding ethanol co-products:**
 - increased YG 0.17 units up to 30% inclusion
 - had no effect on marbling at up to 30% inclusion when end point YG = 3
 - reduced marbling 25 and 50 points at 40% and 50% inclusion, respectively
 - reduced marbling at up to 40% inclusion when end point YG ≤ 2
 - slightly increased marbling at up to 30% inclusion when end point YG = 4
 - reduced marbling 20 and 80 points at 40% and 50% inclusion, respectively
- **Marbling depression may be due to excessive dietary fat or reduced dietary starch**

Summary

- **The effects of ethanol co-products are on REA are dependent on end weight**
 - **When considering both co-product inclusion and end-weight, the effects of co-products on REA are minimal**

Fatty Acid Composition



FA Profile Summary

- **Ethanol co-products increased the omega-6:omega-3 ratio**
- **Sorghum co-products yielded better omega-6:omega-3 ratios**
- **Wet co-products yielded better omega-6:omega-3 ratios**
- **Omega-6:omega-3 ratios were at least three times greater than recommended (2.3:1)**

Research Needs

- **Additional data points to strengthen analyses**
 - **carcass trait data missing**
 - summarize existing pen data for a more robust analysis?
 - analyze response on quality grade using appropriate statistics (categorical data)
 - incorporate data from Texas research
 - conduct multiple component analyses to prevent collinearity between independent variables
 - yield grade and co-product content
 - ether extract and energy intake

Research Needs

- **Conduct research to test two hypotheses:**
 - **Ether extract of diet, and not an intrinsic component of ethanol co-products, affects marbling deposition**
 - **Overall energy intake, and not an intrinsic component of ethanol co-products, affects marbling deposition**