

Feeding Corn Processing Co-Products on Beef Product Quality

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Presentation

Review and analyze data from cattle feeding experiments conducted at Iowa State University

- Four experiments – DGS
- Two experiments – CGF
- One experiment – DGS fed to Holstein steers

Data analyzed

- Calculated data for each animal – analyzed pen means
 - a. Marbling scores
 - b. Percent USDA Choice
 - c. Sensory evaluation of strip loins from three experiments
 - d. Carcass value (\$) in a grid market

Discussion of results

Beef Cattle Fed Wet Distillers Grains

Experiments

- Four studies have been conducted (3 - steers, 1 - heifers)
- Fed 0, 16, 20 or 28, and 40% wet DGS (replaced corn and protein)
- Four to six replications (6 animals/pen)
- All yearling cattle (690 – 910 lbs) fed 112 to 186 days
- Implanted with Component E-S, TE-S/TE-H
- Diet: Dry whole or rolled corn, roughage source varied

Carcass

- Marbling and grades called after 24 or 48 hr chill by USDA graders
- Measurements by ISU personnel

Sensory Evaluation

- Conducted at ISU Meat Laboratory
- Strip loin steaks from each pen of one experiment were evaluated
1 = dislike extremely - - 9 = like extremely

Beef Steers Fed Wet Corn Gluten Feed

Experiments

- Two studies were included in the analysis
- Fed 0, 30 or 40, 50 or 65, and 90% wet CGF (replaced corn and roughage)
- Four to five replications (5 or 6 animals/pen)
- All steers (680 – 780 lbs) fed 108 to 215 days
- Implanted with Compudose
- Diet: Dry rolled corn, roughage source corn silage or ground cobs

Carcass

- Marbling and grades called after 24 or 48 hr chill by USDA graders
- Measurements by ISU personnel

Sensory Evaluation

- Conducted at ISU Meat Laboratory
- Strip loin steaks from each pen of one experiment were evaluated
1 = dislike extremely - - 9 = like extremely

Holstein Steers Fed Wet and Dry Distillers Grains

Experiment

- Fed 0, 10, 20 or 40% of diet DM as wet or dry DGS (replace corn and protein supplement)
- Four replications (6 steers/pen)
- Beginning weight 430 lbs, fed 299 days
- Implanted with Component ES on days 32, 119 and 224
- Diet: Dry rolled corn, 10% corn silage and 3% chopped grass hay

Carcass

- Marbling and grades called after 48 hr chill by plant personnel
- Measurements by ISU personnel

Sensory Evaluation

- Conducted at University of MN
- Four strip loin steaks from each pen were evaluated
1 = dislike extremely - - 9 = like extremely

Details of MN study:

http://www.iowacorn.org/forms/UMstudy_finalreport.pdf

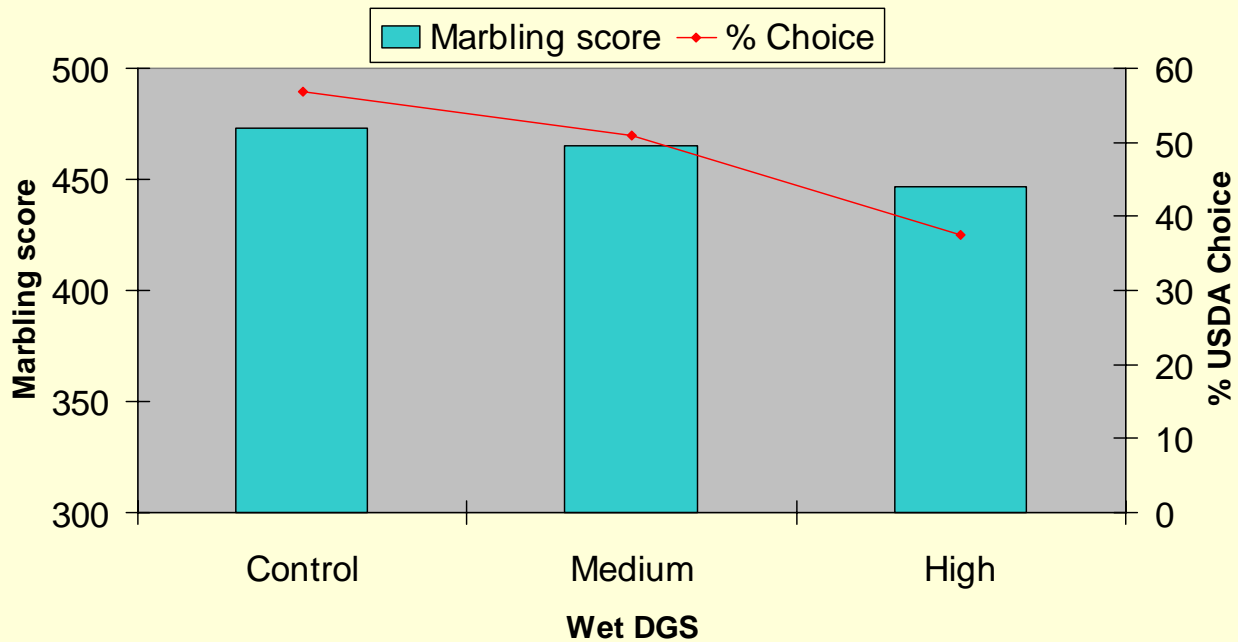
R. Gill, D.L. Roeber and A. DiCostanzo

Effects of Feeding Wet Distillers Grains on Carcass Measurements – Steers and Heifers

	Control	Medium	High
End live wt, lbs	1294	1306	1290
Daily gain, lbs	3.28	3.46	3.31
Carcass wt, lbs	792	806	788
Dressing %	61.1	61.9	61.4
REA, sq in	14.0	14.3	14.0
Backfat, in	0.42	0.44	0.40
KHP, %	2.21	2.34	2.20
Call YG	2.20	2.28	2.12
Calculated YG	2.52	2.58	2.45

AOV: ADG $P < 0.04$, Dress % $P < 0.05$
Bonferroni t-test: No significance

Effects of Feeding Wet Distillers Grains on Marbling Score and Percent Choice – Steers and Heifers



Analysis of Variance

P < 0.05

Marbling

Control vs. Medium

Control vs. High *

Medium vs. High *

% Choice

Control vs. Medium

Control vs. High *

Medium vs. High *

Linear Regression

Marbling score P < 0.075

% Choice P < 0.01

62 pens of yearling cattle fed 112 to 186 days

Fed control (0), medium (20 or 28), and high (40%) wet DGS

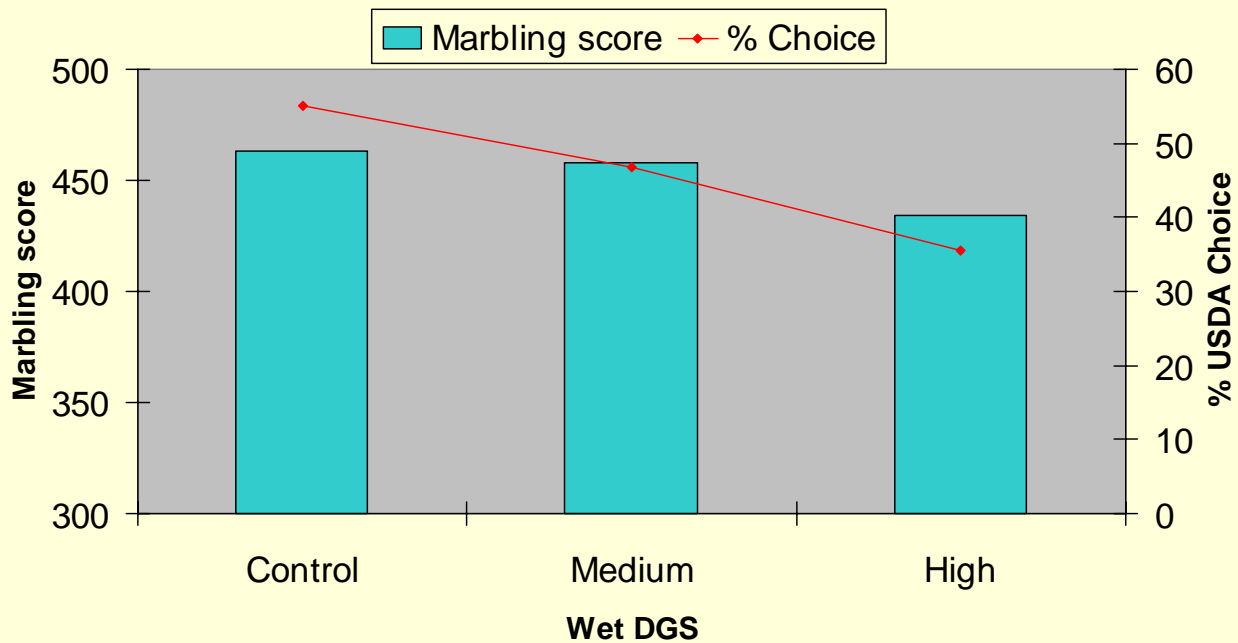
Effects of Feeding Wet Distillers Grains on Carcass Measurements – Steers

	Control	Medium	High
End live wt, lbs	1335	1354	1330
Daily gain, lbs	3.38	3.54	3.37
Carcass wt, lbs	818	837	818
Dressing %	61.1	61.8	61.4
REA, sq in	14.0	14.3	14.2
Backfat, in	.44	.46	0.40
KHP, %	2.1	2.3	2.2
Call YG	2.22	2.34	2.08
Calculated YG	2.65	2.70	2.52

AOV: ADG $P < 0.04$, Call YG $P < 0.04$

Bonferroni t-test: Call YG medium vs. high ($P < 0.05$)

Effects of Feeding Wet Distillers Grains on Marbling Score and Percent Choice – Steers



Analysis of Variance

P < 0.05

Marbling

Control vs. Medium

Control vs. High *

Medium vs. High *

% Choice

Control vs. Medium

Control vs. High *

Medium vs. High

Linear Regression

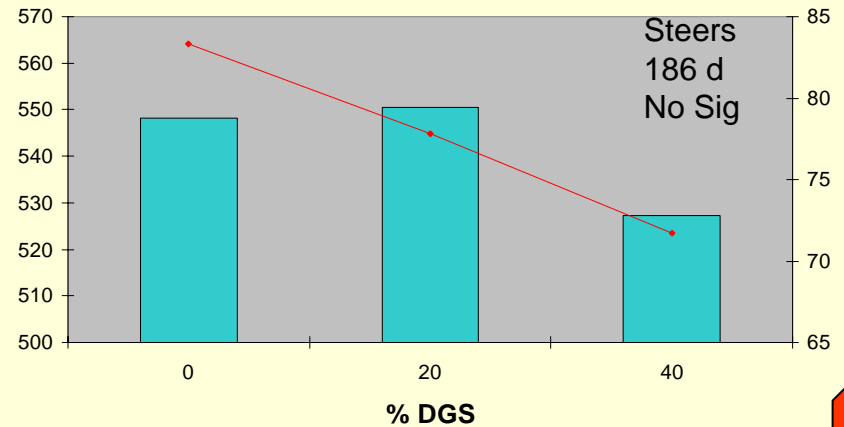
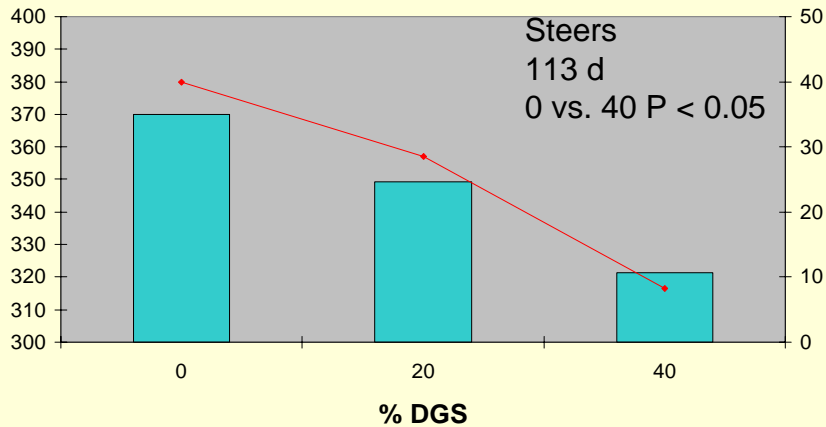
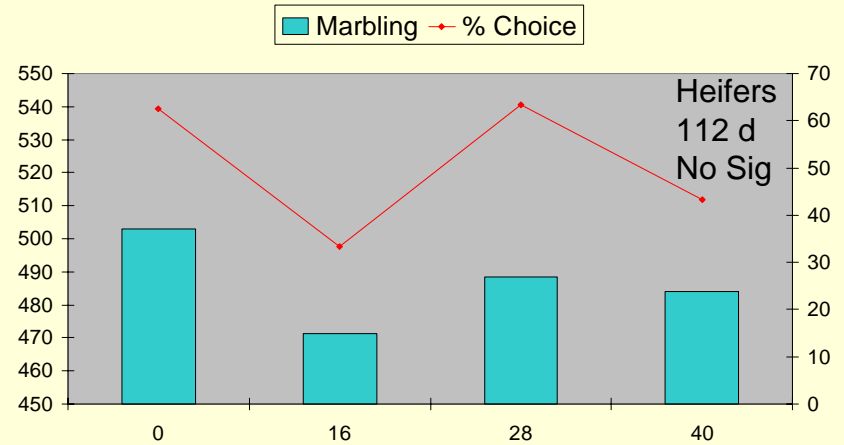
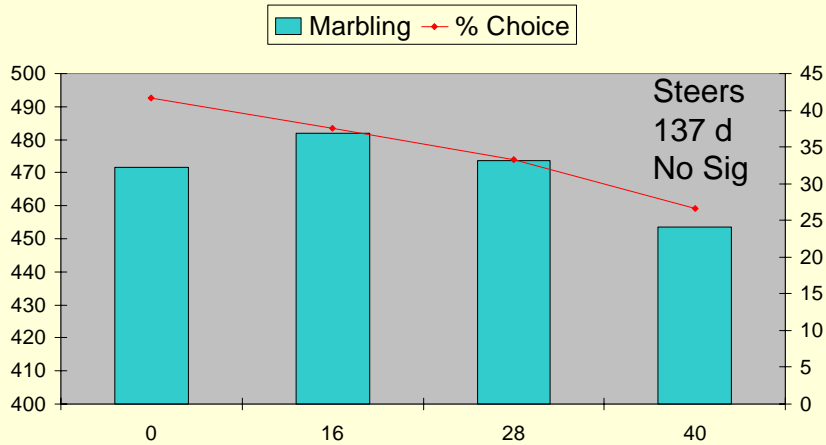
Marbling score P < 0.09

% Choice P < 0.01

48 pens of yearling cattle fed 112 to 186 days

Fed control (0), medium (20 or 28), and high (40%) wet DGS

Marbling Scores and Percent USDA Choice Individual Experiments



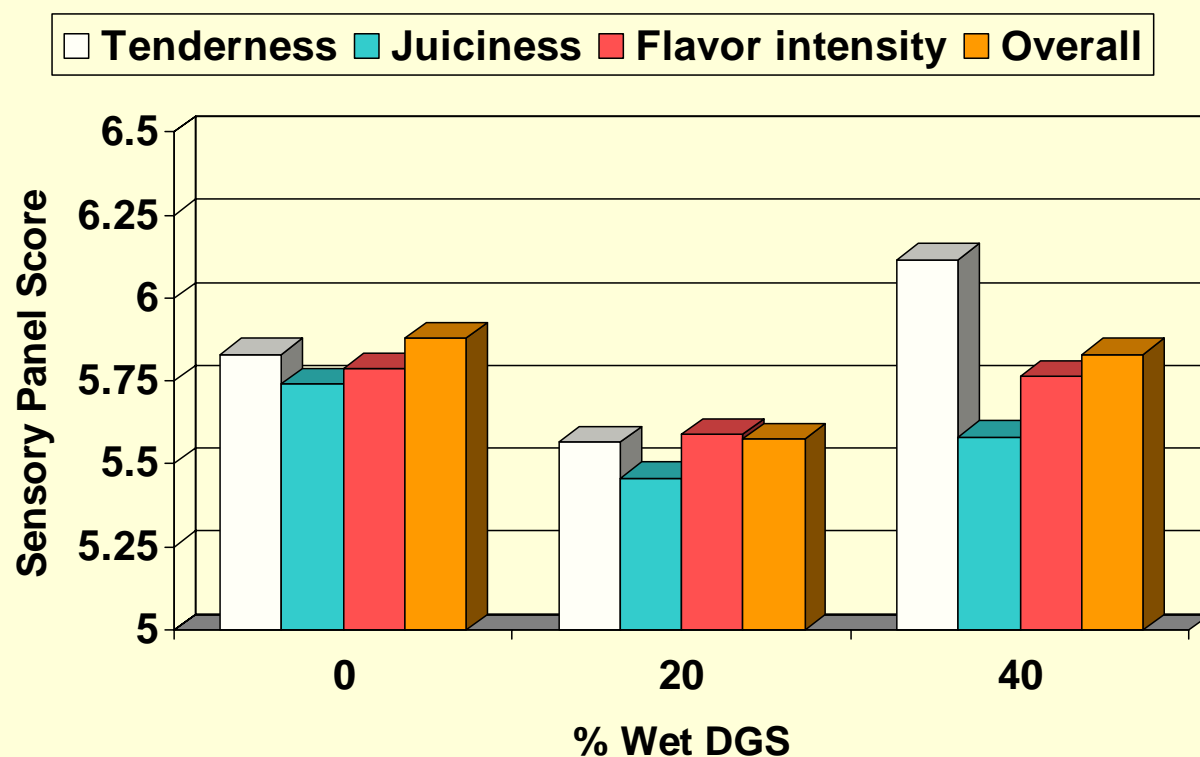
Effects of Feeding Wet Distillers Grains on Carcass Measurements – Beef Steers for Sensory Evaluation

	Control	20	40
End live wt, lbs	1278	1320	1280
Daily gain, lbs	3.03	3.36	3.00
Carcass wt, lbs	786	813	791
Dressing %	61.0	61.6	61.5
REA, sq in	14.5	15.0	14.4
Backfat, in	0.37	0.42	0.34
KHP, %	2.56	2.62	2.42
Call YG	1.83	2.12	1.74
Calculated YG	2.28	2.36	2.20
Marbling score	370	349	321*
% USDA Choice	40.0	29.2	8.3*

AOV: Marbling $P < 0.009$, % Choice $P < 0.03$

*Bonferroni t-test: 40% DGS different from control

Sensory Evaluation of Steaks from the Strip Loins of Steers Fed Wet Distillers Grains – Beef Steers



Analysis of Variance

P < 0.05

Tenderness

0 vs. 20

0 vs. 40

20 vs. 40 *

Juiciness

0 vs. 20

0 vs. 40

20 vs. 40

Flavor

0 vs. 20

0 vs. 40

20 vs. 40

Overall

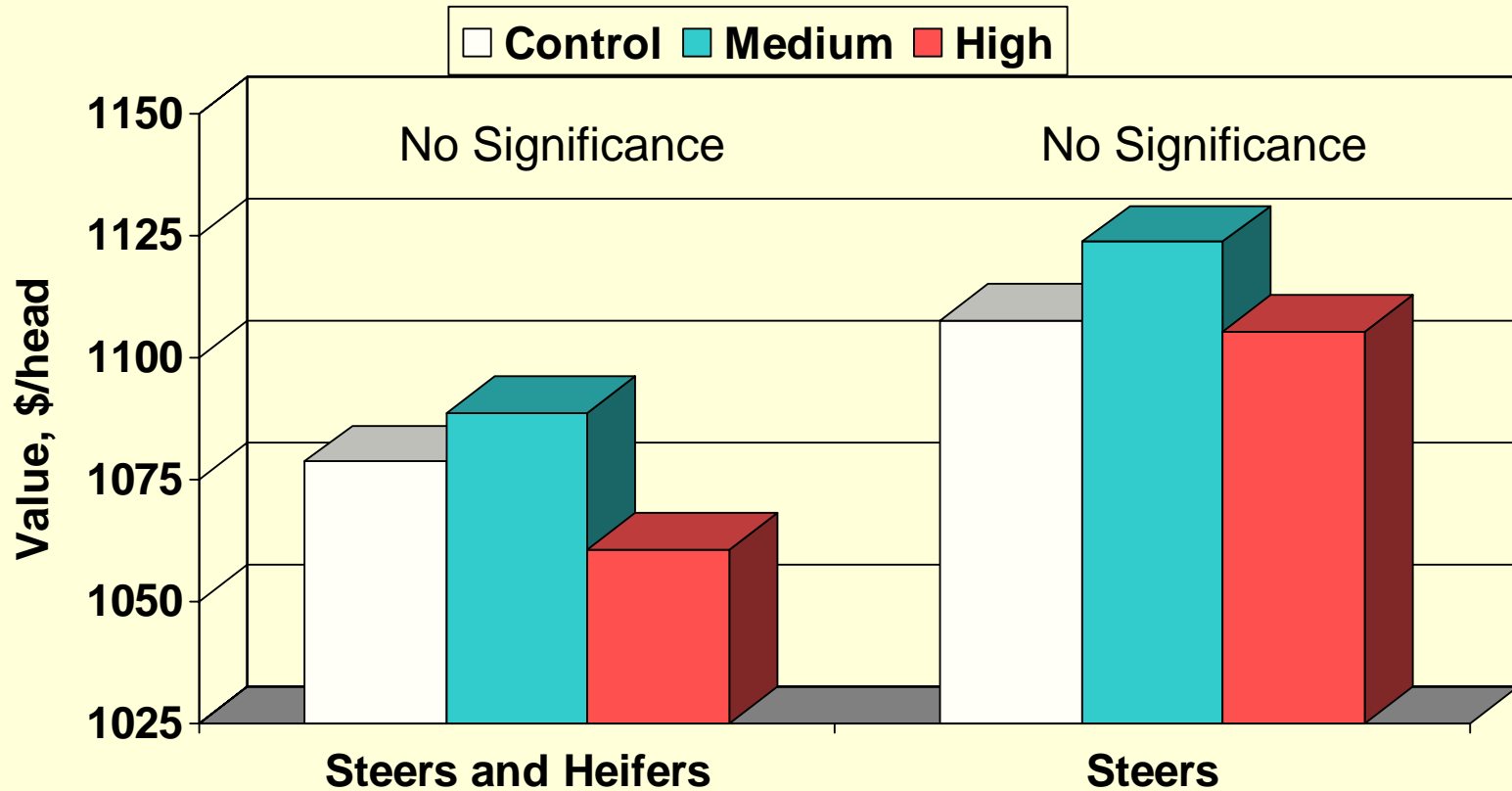
0 vs. 20

0 vs. 40

20 vs. 40

Carcass Value in a Grid Market

Effects of Feeding Wet DGS



Grid: \$140/Cwt Choice YG 3

Quality: Prime +\$29, CAB +\$7, Select -\$9, NR -\$12

Yield grade: YG 1 +\$6.5, YG 2 +\$2.5, YG 4 -\$15

Weight: 951-1050 lbs -\$18, >1050 -\$35, 526-550 -\$18, <525 -\$30

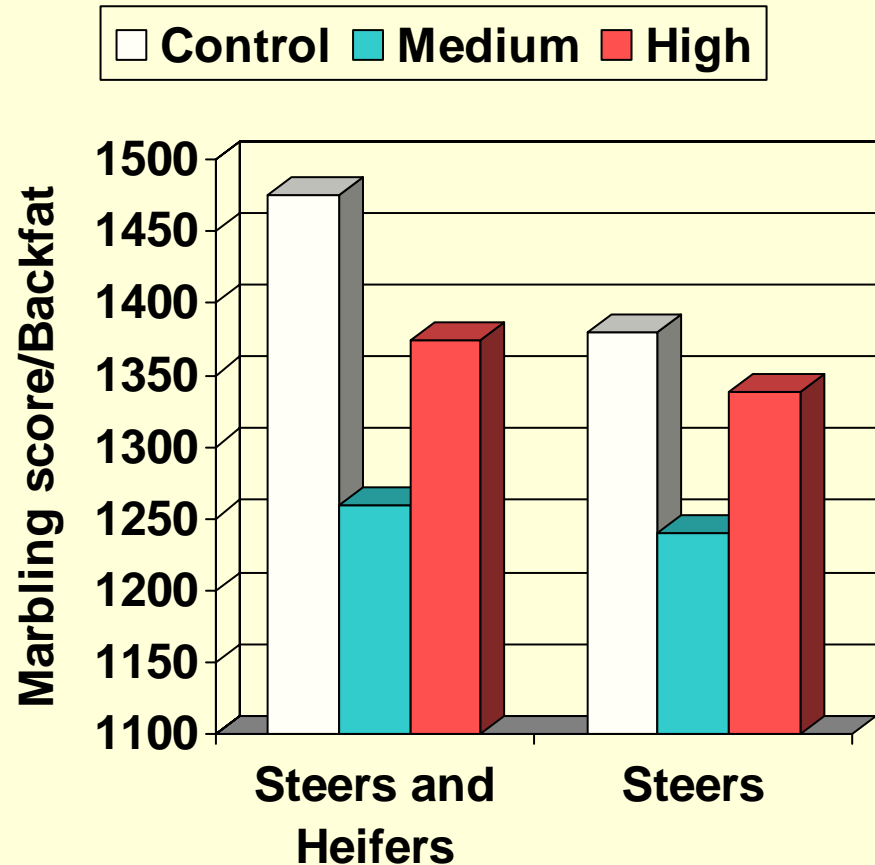
Effect of Feeding Wet DGS on Distribution of Body Fat

Marbling score/Backfat

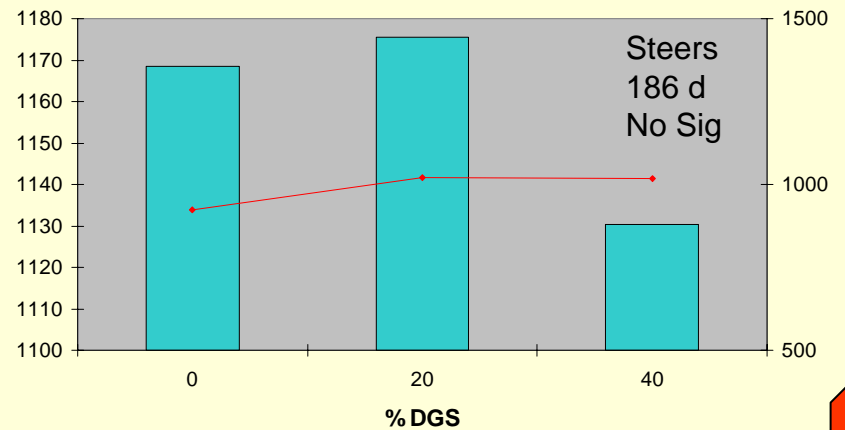
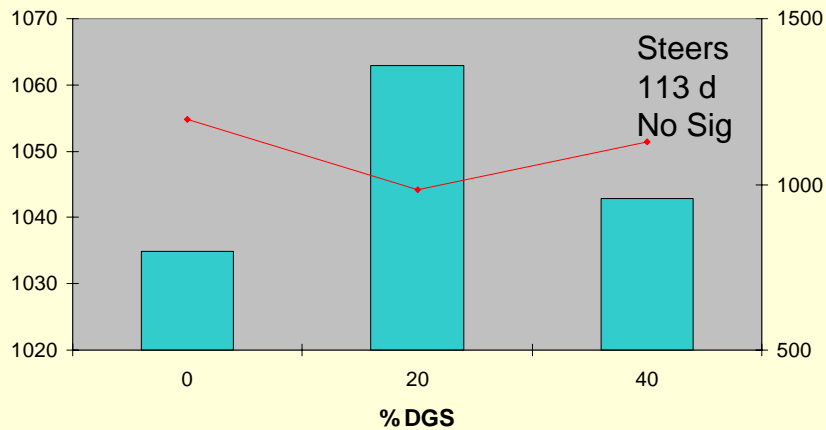
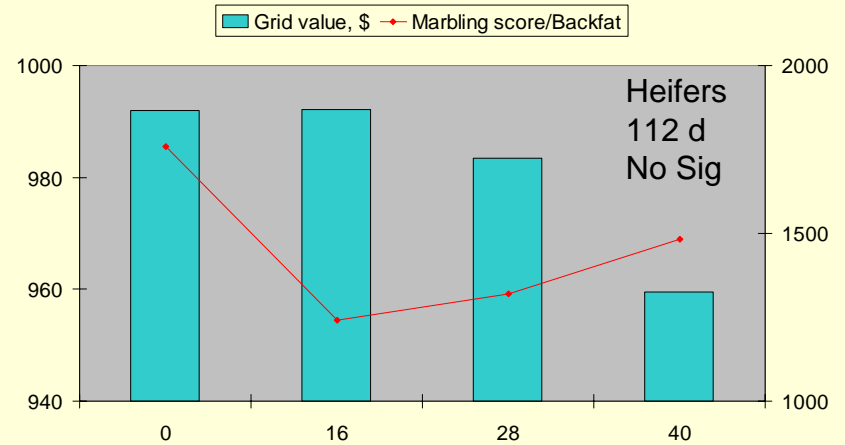
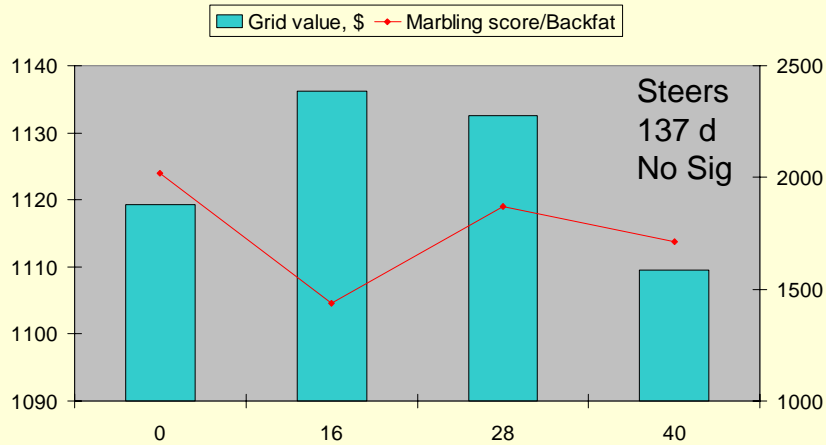
- Ratio will decrease
 - Decrease in marbling score
 - Increase in Backfat
 - Less increase in marbling than backfat

Steers and heifers: No significant differences

Steers: No significant differences



Grid Value (\$/carcass) and Marbling Score/BF Individual Experiments

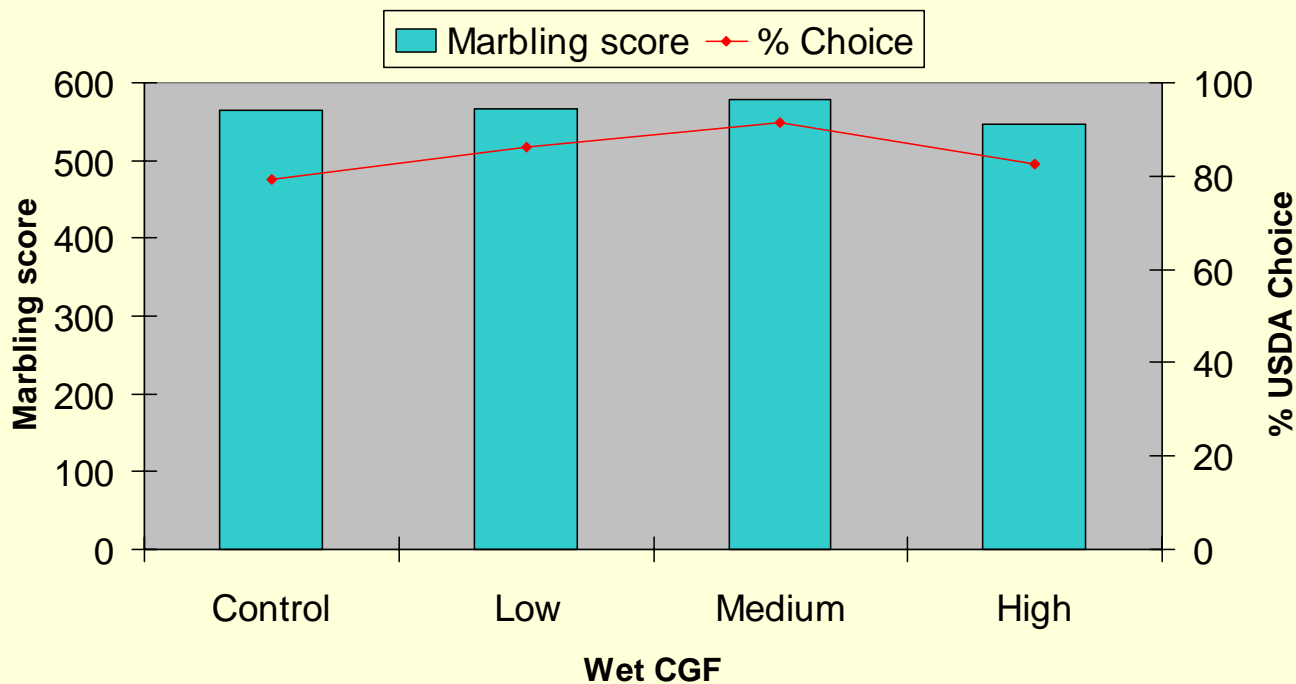


Effects of Feeding Wet Corn Gluten Feed on Carcass Measurements – Beef Steers

	Control	Low	Medium	High
End live wt, lbs	1254	1271	1268	1249
Daily gain, lbs	3.18	3.25	3.24	3.12
Carcass wt, lbs	755	785	775	756
Dressing %	60.1	61.6*	61.0	60.4
REA, sq in	12.8	12.8	12.8	12.7
Backfat, in	0.44	0.50	0.48	0.46
KHP, %	2.06	2.16	2.05	1.94
Call YG	2.58	2.78	2.64	2.55
Calculated YG	2.78	3.08	2.95	2.85

*Dressing %: Low vs. Control $P < 0.05$

Effects of Feeding Wet Corn Gluten Feed on Marbling Score and Percent Choice – Beef Steers



Analysis of Variance

No significance

Regression analysis

Linear - Quadratic

No significance

36 pens of yearling cattle fed 108 to 215 days

Fed control (0), low 30 or 40), medium (50 or 65), and high (90%) wet CGF

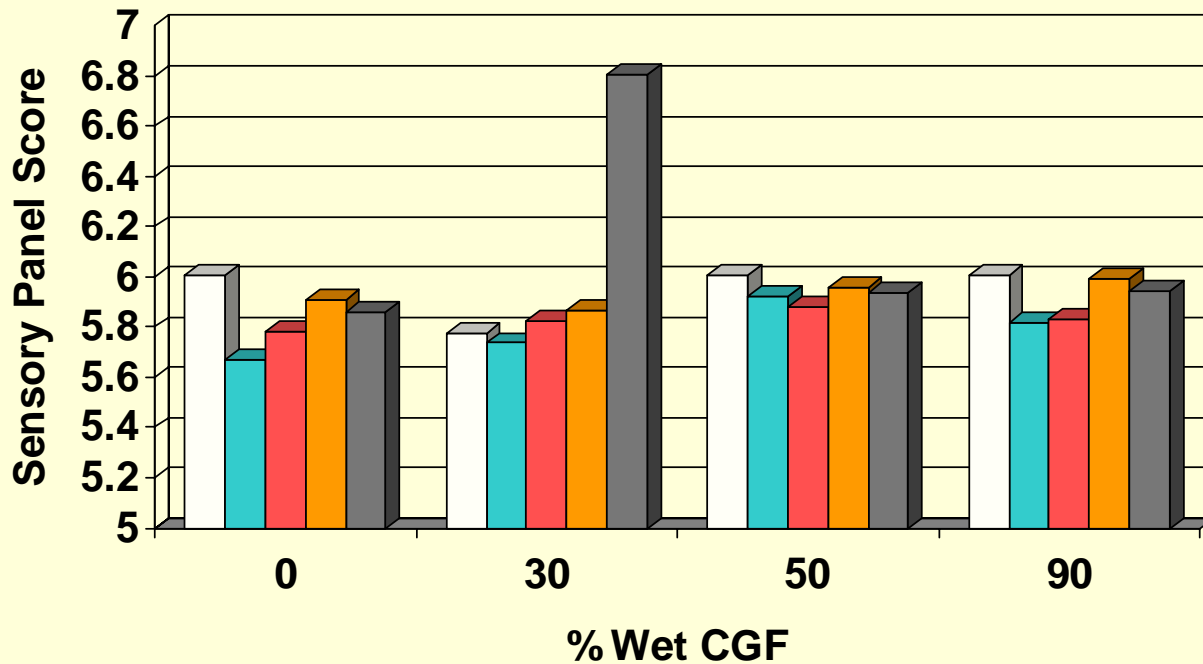
Effects of Feeding Wet Corn Gluten Feed on Carcass Measurements – Beef Steers for Sensory Evaluation

	Control	30	50	90
End live wt, lbs	1201	1196	1202	1178
Daily gain, lbs	3.48	3.45	3.50	3.31
Carcass wt, lbs	688	701	705	686
Dressing %	57.3	58.6	58.6	58.2
REA, sq in	12.0	12.0	11.9	11.8
Backfat, in	0.31	0.34	0.41	0.40
KHP, %	1.41	1.50	1.46	1.20
Call YG	2.17	2.26	2.41	2.39
Calculated YG	2.33	2.47	2.70	2.57
Marbling score	535	526	567	518
% USDA Choice	64.2	74.2	78.3	69.2

No significant differences

Sensory Evaluation of Steaks from the Strip Loins of Steers Fed Wet Corn Gluten Feed – Beef Steers

□ Tenderness ■ Juiciness ■ Flavor ■ Overall ■ WB shear



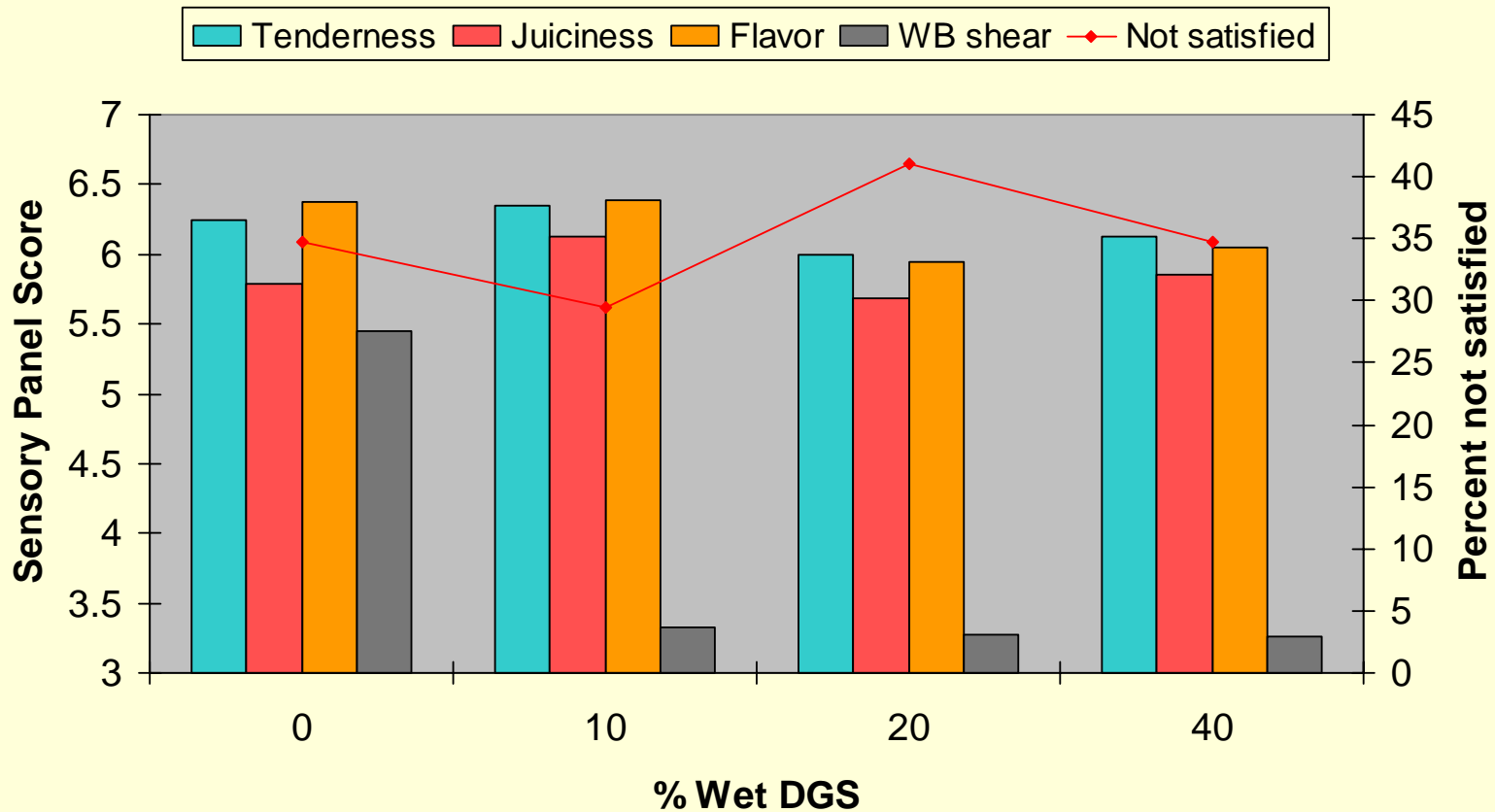
Analysis of variance
No significance

Effects of Feeding Wet Distillers Grains on Carcass Measurements of Long-Fed Holstein Steers

	Control	10	20	40
End live wt, lbs	1375	1367	1342	1258*
Daily gain, lbs	3.16	3.15	3.06	2.78*
Carcass wt, lbs	798	813	799	751*
Dressing %	58.1	59.4	59.5	59.8*
REA, sq in	12.2	12.1	12.2	11.8
Backfat, in	0.25	0.29	0.27	0.24
Call YG	2.00	2.45	2.21	1.96
Calculated YG	2.87	3.04	2.89	2.78
Marbling score	565	638	626	602
% USDA Choice	83.3	90.8	83.3	83.3

*P < 0.05 Different from Control

Sensory Evaluation of Steaks from the Strip Loins of Holstein Steers Fed Wet Distillers Grains



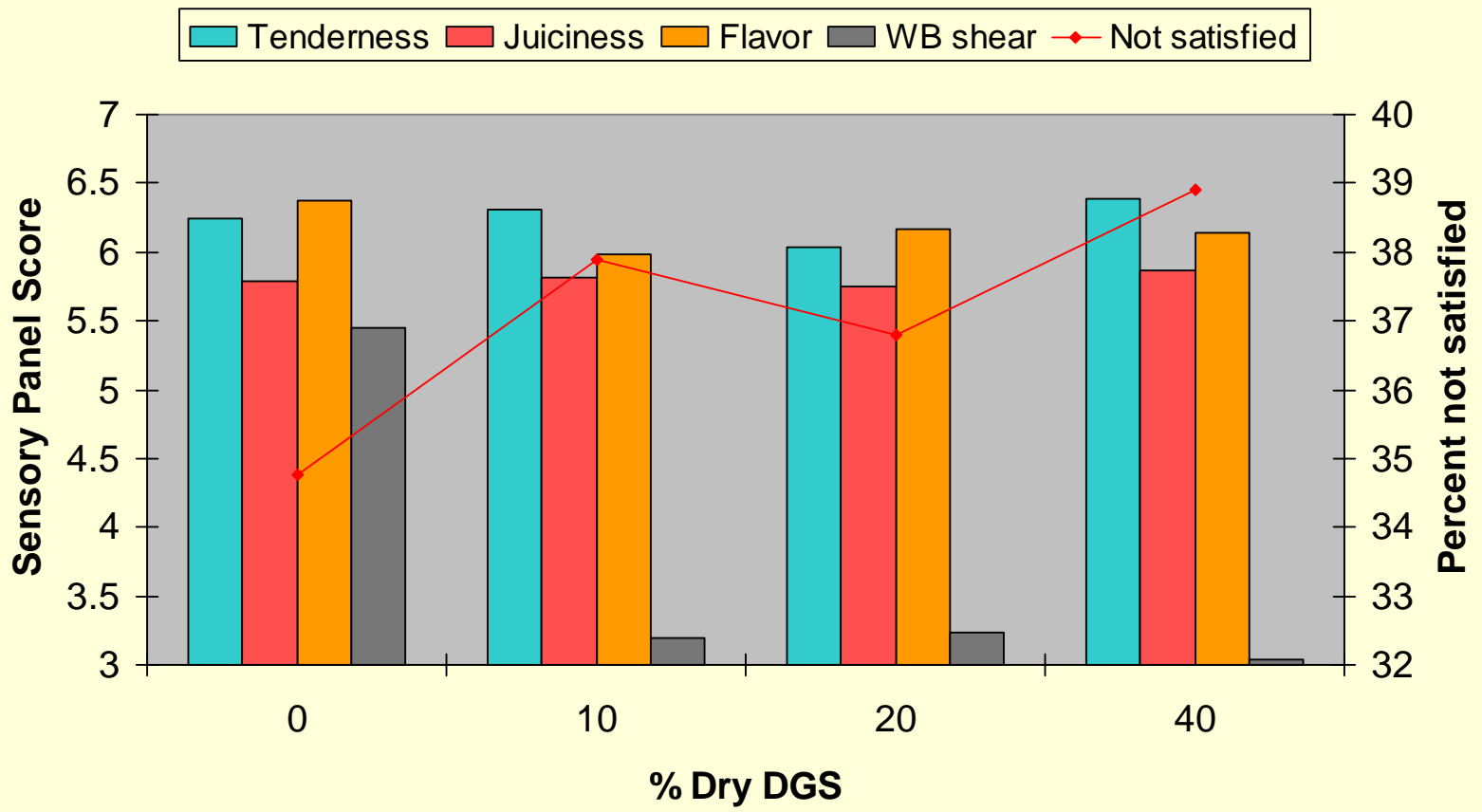
Analysis of variance: No significant differences

Effects of Feeding Dry Distillers Grains on Carcass Measurements of Long-Fed Holstein Steers

	Control	10	20	40
End live wt, lbs	1375	1330	1317	1321
Daily gain, lbs	3.16	3.02	2.97	2.97
Carcass wt, lbs	798	790	786	792
Dressing %	58.1	59.3	59.6	60.0*
REA, sq in	12.2	12.2	12.5	11.9
Backfat, in	0.25	0.25	0.27	0.28
Call YG	2.00	1.79	2.17	2.12
Calculated YG	2.87	2.83	2.76	3.01
Marbling score	565	578	593	601
% USDA Choice	83.3	75.0	87.5	77.5

*P < 0.05 Different from Control

Sensory Evaluation of Steaks from the Strip Loins of Holstein Steers Fed Dry Distillers Grains



Analysis of variance: No significant differences



Conclusions

Feeding Wet DGS to Cattle

1. Feeding high concentrations of wet DGS seems to decrease marbling
 - Starch intake not likely a factor (CGF experiments)
 - Distribution of fat deposition not likely involved (Marbling/BF ratio)
 - Cattle fed DGS consume more dietary oil (unsaturated fatty acids)
 - Data bases analyzed
 - i. DGS – aggressive implant program
 - ii. CGF – moderate implant program
 - iii. Holsteins fed DGS – moderate implant program
 2. Net value of the carcasses not significantly decreased
 - Depending on price relationships – net income likely increased
 3. Consumer acceptance of the beef not altered
- 