Current State of Distillers Utlization

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The Golden Triangle

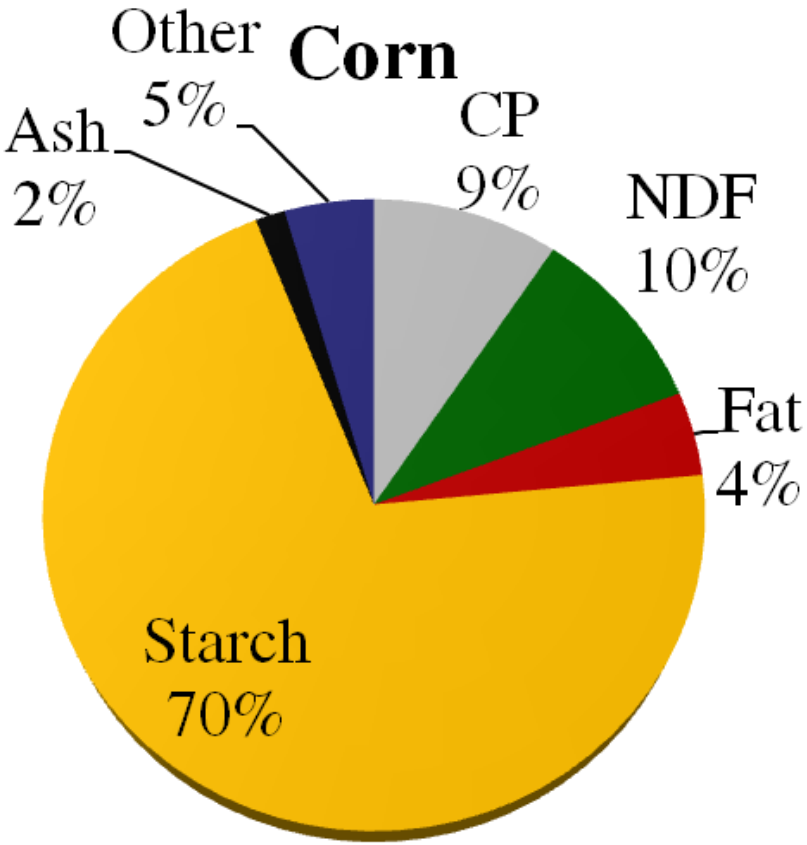
Corn

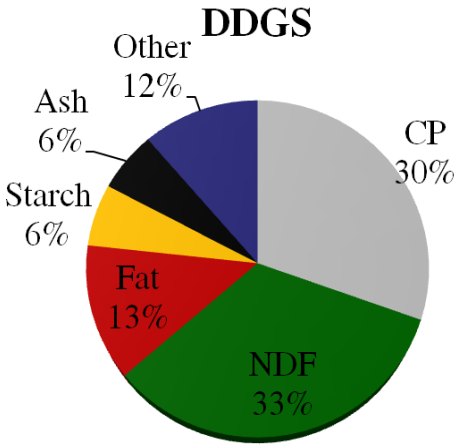
Nebraska

Ethanol

Cattle

Distillers issues

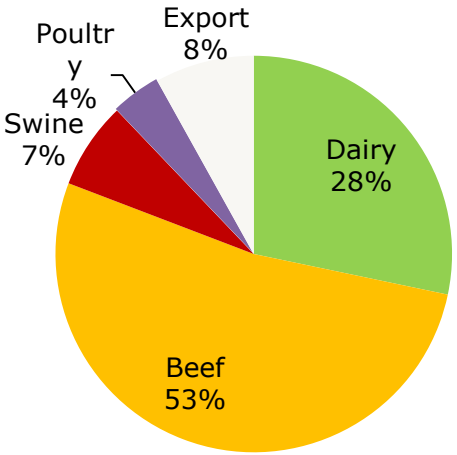




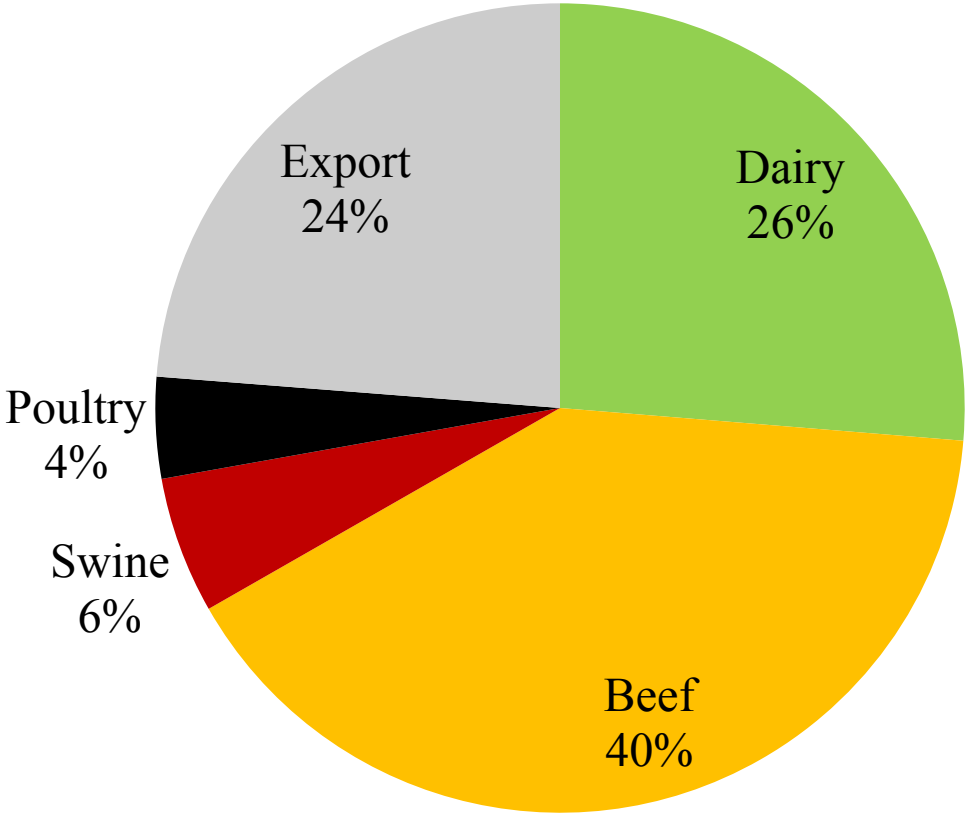
1/3 as much

Distillers issues

2005



2013

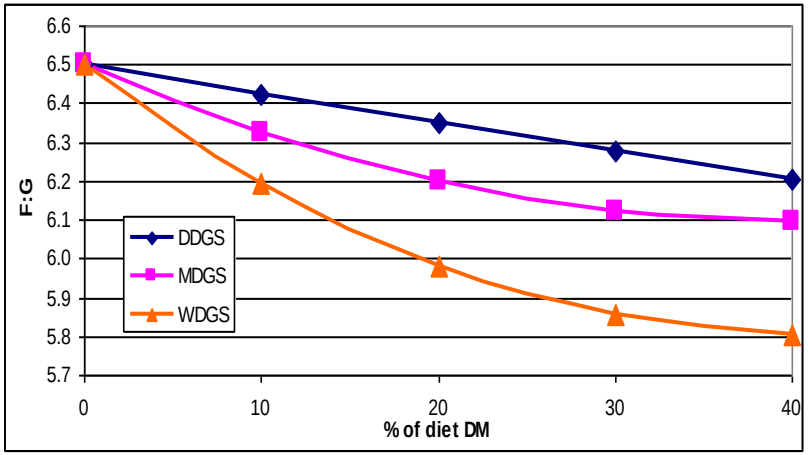


About 4X more produced total

Why fibrous byproducts?

- Fiber is our #1 need (energy)
  - Competitive advantage
  - Provides majority of energy (lifetime)
  - Short supply implications (drought)
  - Fibrous byproducts offer advantages
    - Price competitive to grain, usually
    - Add moisture to diets, usually
    - Limit ruminal acidosis (subacute & acute)
  - Cattle industry policy: take fiber, promote cellulosic, don't use grain! (Should we be OPPOSITE?)

Drying Impact - performance



Value of DGS, relative to corn

	10	20	30	40
WDGS	150	143	136	130
MDGS	128	124	120	117
DDGS	112	112	112	112

- WDGS
  (20 Exp, 3,365 steers, 350 pens)
- DDGS
  (4 Exp, 581 steers, 66 pens)
- MDGS
  (4 Exp, 680 steers, 85 pens)

Bremer et al., 2011 Prof. Anim. Scient.

Effect of drying

	WDGS	MDGS	DDGS	SEM	*P*-value
Performance[1]					
DMI, lb/d	24.8[a]	26.4[b]	27.1[b]	0.07	< 0.01
ADG, lb	4.11	4.17	4.05	0.3	0.30
F:G	6.06	6.33	6.67	0.002	<0.01
Carcass Characteristics[2]					
HCW, lb	882	887	877	6	0.52
Marbling Score	610	599	602	9	0.69
12th rib fat, in	0.63	0.64	0.60	0.1	0.15
LM area, in^2	13.3	13.2	13.4	0.15	0.50

[a,b,c] Means with different superscripts differ (*P* - value < 0.05).
[1] DMI - Dry matter intake; ADG - Average daily gain; G:F - gain per lb of feed.
[2] HCW - Hot carcass wt.; Marbling Score: 400 - slight, 500 - small, 600 - Modest, 700 - Moderate, 800 - Slightly Abundant.

Nuttelman et al., 2011 NE beef report

Effect of drying

	WDGS	MDGS	DDGS	CORN
Performance[1]				
DMI, lb/d	24.8[a]	26.4[b]	27.1[b]	24.6
ADG, lb	4.11	4.17	4.05	3.58
F:G	6.06	6.33	6.67	6.85
30% inclusion:	(138)	(125)	(109)	
Carcass Characteristics[2]				
HCW, lb	882	887	877	831

[a,b,c] Means with different superscripts differ (*P* - value < 0.05).
[1] DMI - Dry matter intake; ADG - Average daily gain; G:F - gain per lb of feed.
[2] HCW - Hot carcass wt.; Marbling Score: 400 - slight, 500 - small, 600 - Modest, 700 - Moderate, 800 - Slightly Abundant.

Nuttelman et al., 2011 NE beef report

Nebraska Lincoln

Advantages of Feeding Byproducts Wet

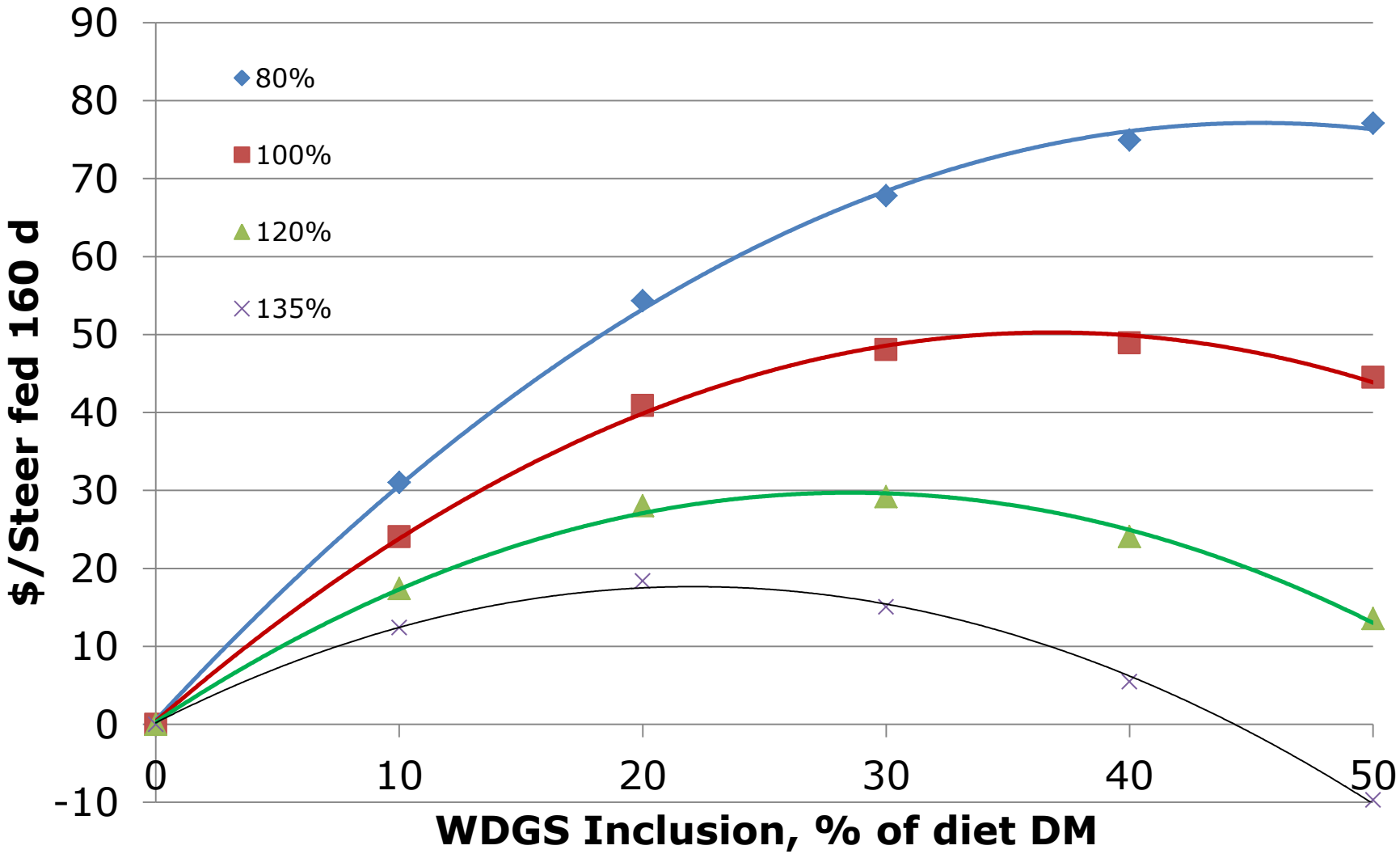
- Better performance
  - Same holds true for gluten feed
- Drying costs; wetter <u>should</u> be cheaper
- Price on DM (energy) basis, delivered
- GHG savings too (energy efficient)
- Feedlot cattle opportunity
  - Not true in growing calves
  - Not true in cows (pigs, etc)

Distillers situation

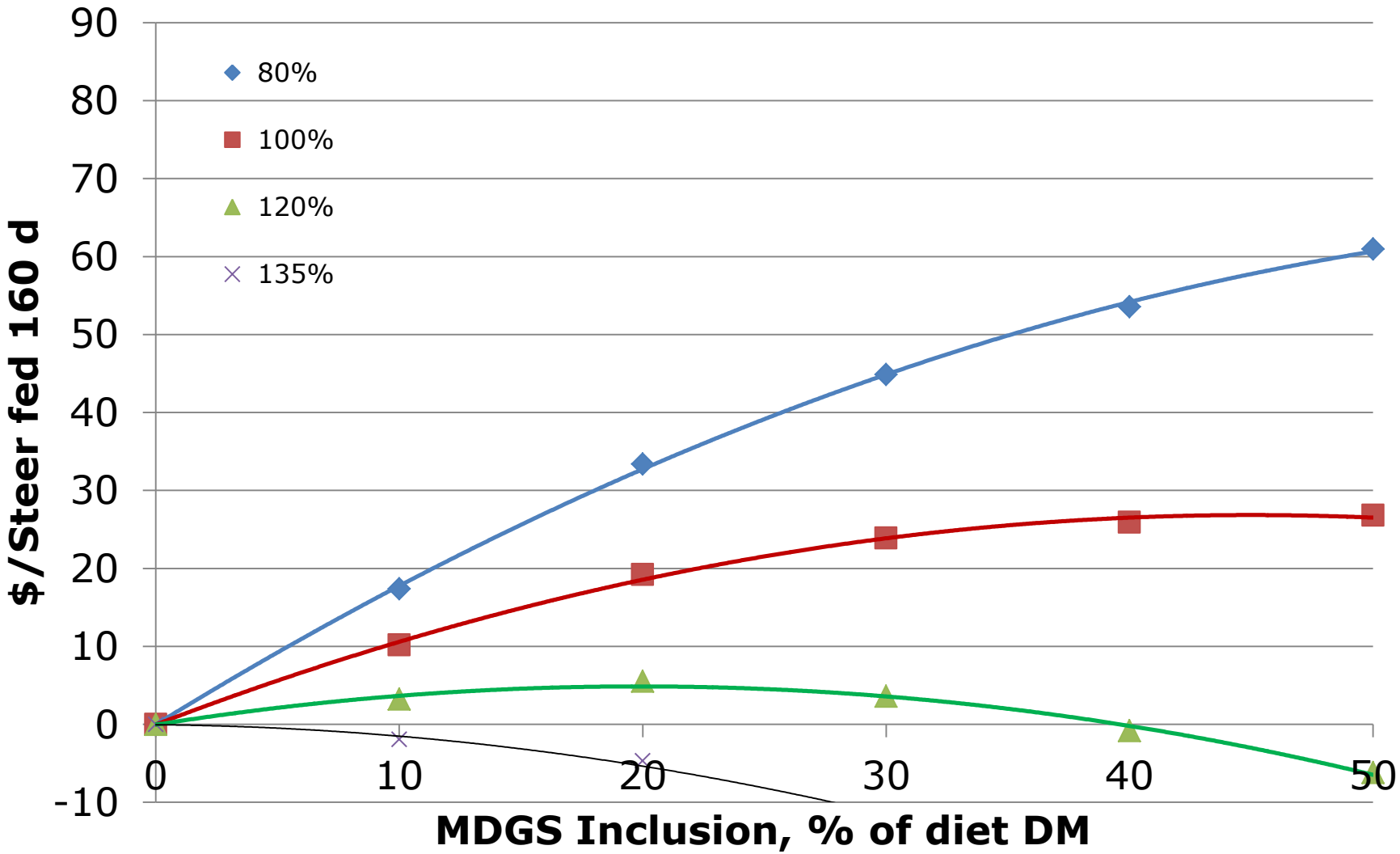
- UNL feedlot: feed 1-2000 tons/year
  - Pricing DGS on a dry-to-dry basis
  - Corn price/56/0.85*2000 = dry ton price
  - DGS price/DM decimal

	9/2012	7/2013	9/2013	1/2014	3/2014
Corn, $/bu	$7.47	$6.68	$5.20	$4.05	~4.25
DGS price, % of corn	90%	107%	135%	84%	~112%
DGS price, $/ton DM	282	300	295	136	~200

Current economics - WDGS



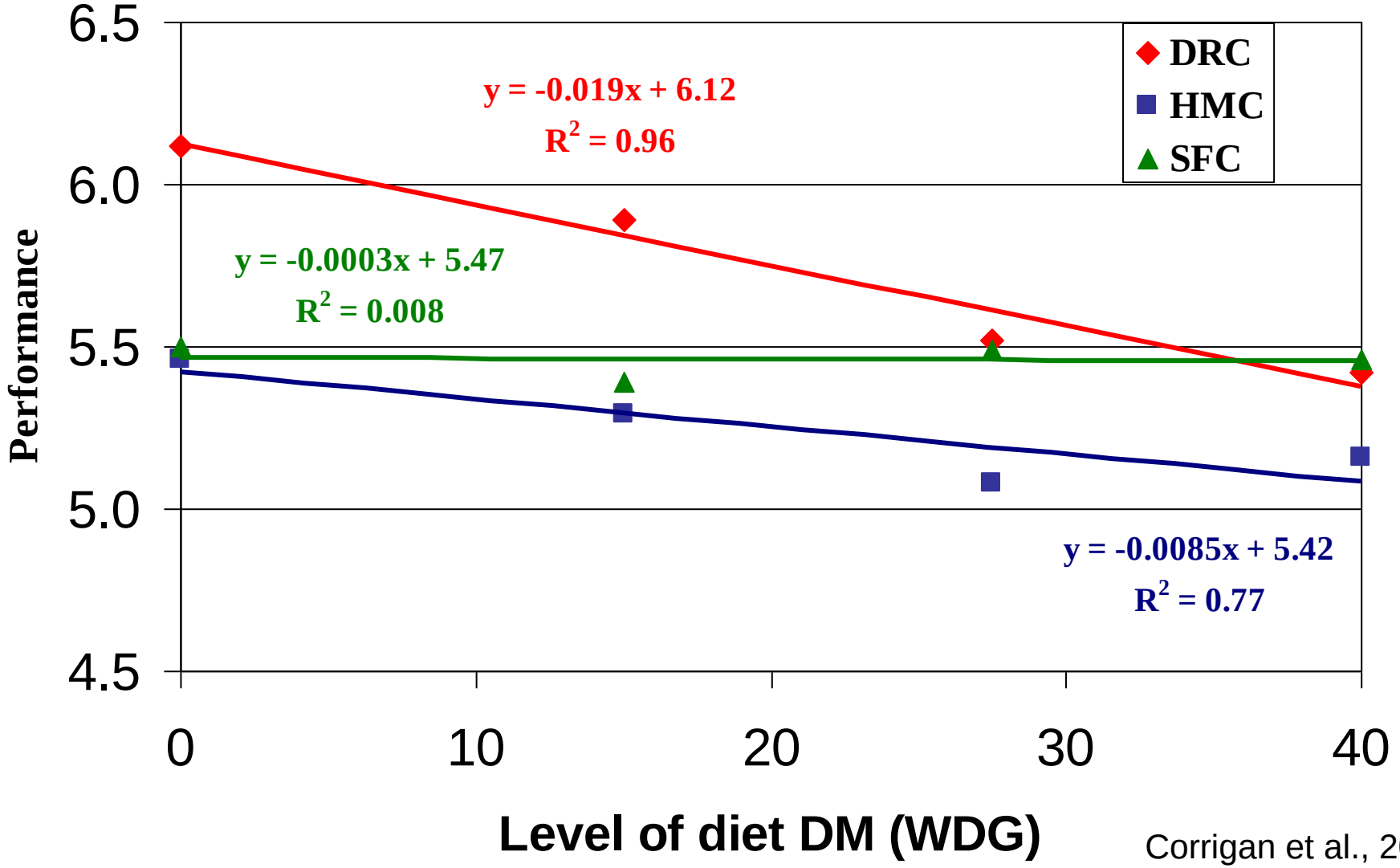
Current economics - MDGS



Fiber Conclusions

- Monitor price relationships of byproducts with corn
  - Have been economical (prior to 2013)
- Optimum inclusion is 20-40% (DM)
- **Will change more in future**
- Working on future alternatives
- Fiber is important to beef industry

Distillers and Corn Processing



Corrigan et al., 2009.

Does Grain Type Influence WDGS?

100% Corn

100% Sorghum

MacDonald, 2011 DGTC

Sorghum distillers

Item	Control	Distillers Grains Corn	Distillers Grains Sorghum
Ingredients			
Dry-rolled corn	84	54	54
Corn WDGS	--	30	--
Sorghum WDGS	--	---	30
Chemical composition			
CP	13.0	16.1	17.2
Ether Extract	5.8	8.2	7.9

Al-Suwaiegh et al., 2002

Sorghum distillers

Item	Diet			P-value	
	Control	CDG	SDG	CON vs. DGS	DGS Type
Performance					
Final BW, lb	1256	1293	1317	0.03	0.37
DMI, lb/d	23.6	22.9	24.5	0.71	0.02
ADG, lb	3.63	3.96	4.12	<0.01	0.19
F:G	6.41	5.78	5.95	<0.01	0.25
Feeding Value	**--**	**136%**	**125%**		
Corn vs Sorghum DGS		**110%**			

Al-Suwaiegh et al., 2002

Sorghum distillers

Item	Treatment			
	Corn	Sorghum	Blend	Corn(LF)
Final BW, lb	1353	1345	1341	1346
DMI, lb/d	21.9 [ab]	22.0 [b]	22.1 [b]	21.6 [a]
ADG, lb	3.51	3.46	3.45	3.46
F:G	6.27 [x]	6.38 [y]	6.42 [y]	6.27 [x]

108%

Commercial trial, 6 reps, 172 DOF

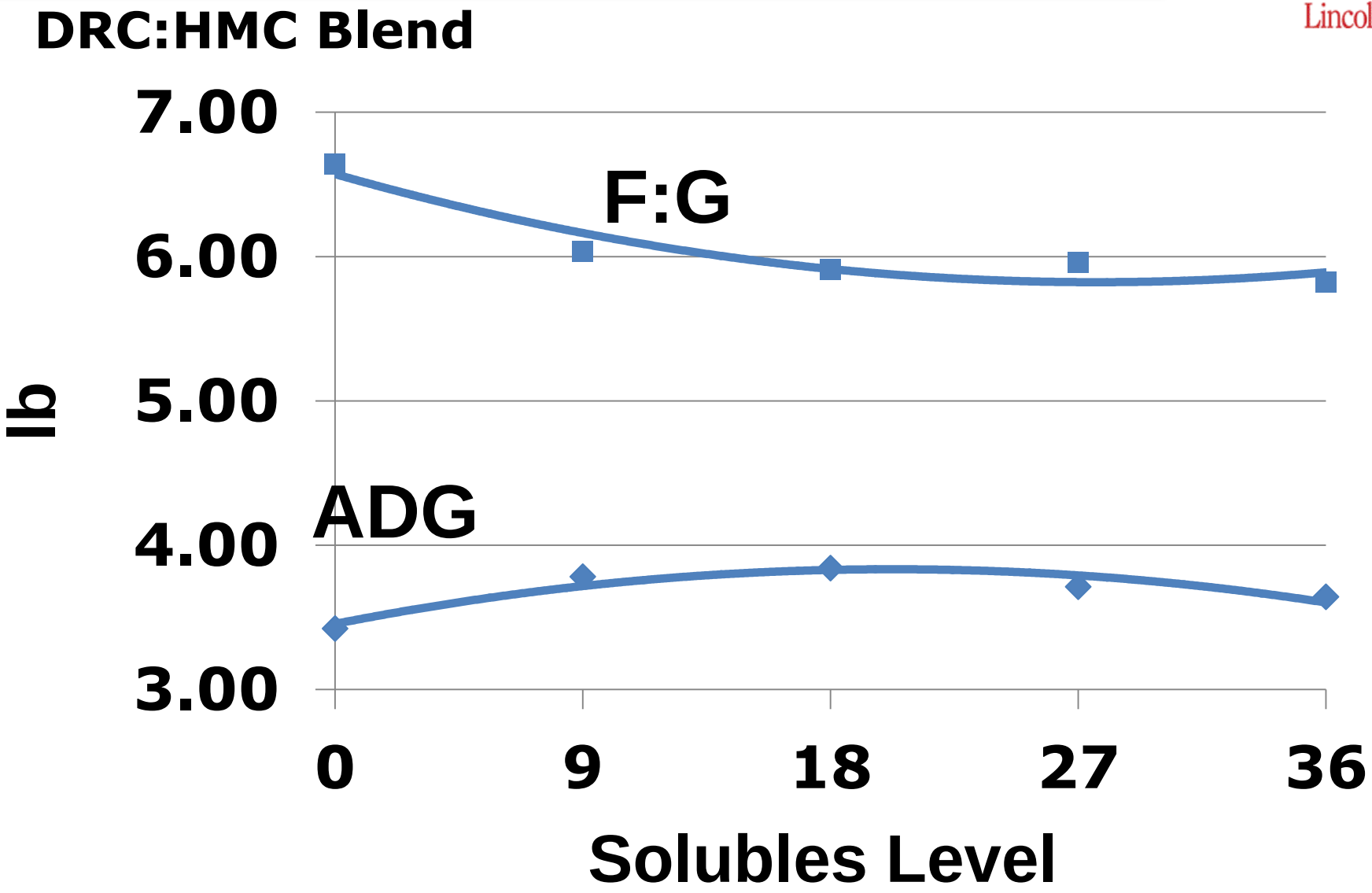
Diets contained 61.6% SFC and 22% DGS
WDGS from either corn, sorghum, blend of sorghum & corn,
or corn WDG without solubles

Milton, USCP

Changing Distillers

- One way to predict impact of process changes: evaluate components
- Distillers solubles
- Distillers grains relative to solubles
- Value of the oil (or fat)
- Value of the protein (RUP) for energy
- Value of the fiber

Feeding Solubles (syrup)



Pesta et al., 2012 NE beef report

Components evaluation

		40% inclusion of byproduct			
Item	**Corn**	**WCGF**	**COMP**	**COMP -fat**	**COMP -CP**
DMI	21.6	20.8	19.5	20.2	20.9
ADG	3.09	2.89	2.98	2.92	3.03
F:G	7.09^{bc}	7.29^{c}	6.79^{b}	6.89^{bc}	6.72^{b}

Lodge et al., 1996 Nebraska Beef Report

Materials and Methods

- Exp. 1
  - 27% CDS or 40% MDGS (+/- oil; same plant)
  - 6% vs 21% CDS; 9.2% vs 11.8% MDGS
- Exp. 2
  - 35, 50, 65% WDGS (+/- oil; same plant)
  - 7.9% vs 12.4% WDGS
- Exp. 3
  - 0, 15, 30, 45, 60% de-oiled
  - 15 and 30% with oil (same plant)
  - 7.2% vs 12.0% MDGS
- Exp. 4
  - 0, 17.5, 35% de-oiled in DRC and SFC
  - 35% also fed (different plant) with more oil
  - 7.5% vs 9.1% WDGS
- Two growing studies

Performance

	De-Oiled CDS	Normal CDS	CDS
Final BW, lb	1293[b,c]	1277[a,b]	0.43
DMI, lb/d	19.4[b]	19.4[b]	0.97
ADG, lb	3.53[b,c]	3.43[a,b]	0.36
F:G	5.49[b]	5.66[b]	0.29

[a,b,c] Within a row, means without a common superscript differ ($P < 0.05$)

Jolly et al., 2013 NE beef report

Performance

	De-Oiled CDS	Normal CDS	De-Oiled MDGS	Normal MDGS	CDS	MDGS
Final BW, lb	1293[b,c]	1277[a,b]	1308[b,c]	1318[c]	0.43	0.61
DMI, lb/d	19.4[b]	19.4[b]	20.5[a]	20.8[a]	0.97	0.58
ADG, lb	3.53[b,c]	3.43[a,b]	3.61[b,c]	3.67[c]	0.36	0.60
F:G	5.49[b]	5.66[b]	5.69[b]	5.67[b]	0.29	0.80

[a,b,c] Within a row, means without a common superscript differ ($P < 0.05$)

Jolly et al., 2013 NE beef report

Performance

	Control	De-Oiled CDS	Normal CDS	De-Oiled MDGS	Normal MDGS	F-Test	CDS	MDGS
Final BW, lb	1248[a]	1293[b,c]	1277[a,b]	1308[b,c]	1318[c]	0.01	0.43	0.61
DMI, lb/d	20.8[a]	19.4[b]	19.4[b]	20.5[a]	20.8[a]	0.01	0.97	0.58
ADG, lb	3.28[a]	3.53[b,c]	3.43[a,b]	3.61[b,c]	3.67[c]	0.02	0.36	0.60
F:G	6.36[a]	5.49[b]	5.66[b]	5.69[b]	5.67[b]	<0.01	0.29	0.80

[a,b,c] Within a row, means without a common superscript differ ($P < 0.05$)

Jolly et al., 2013 NE beef report

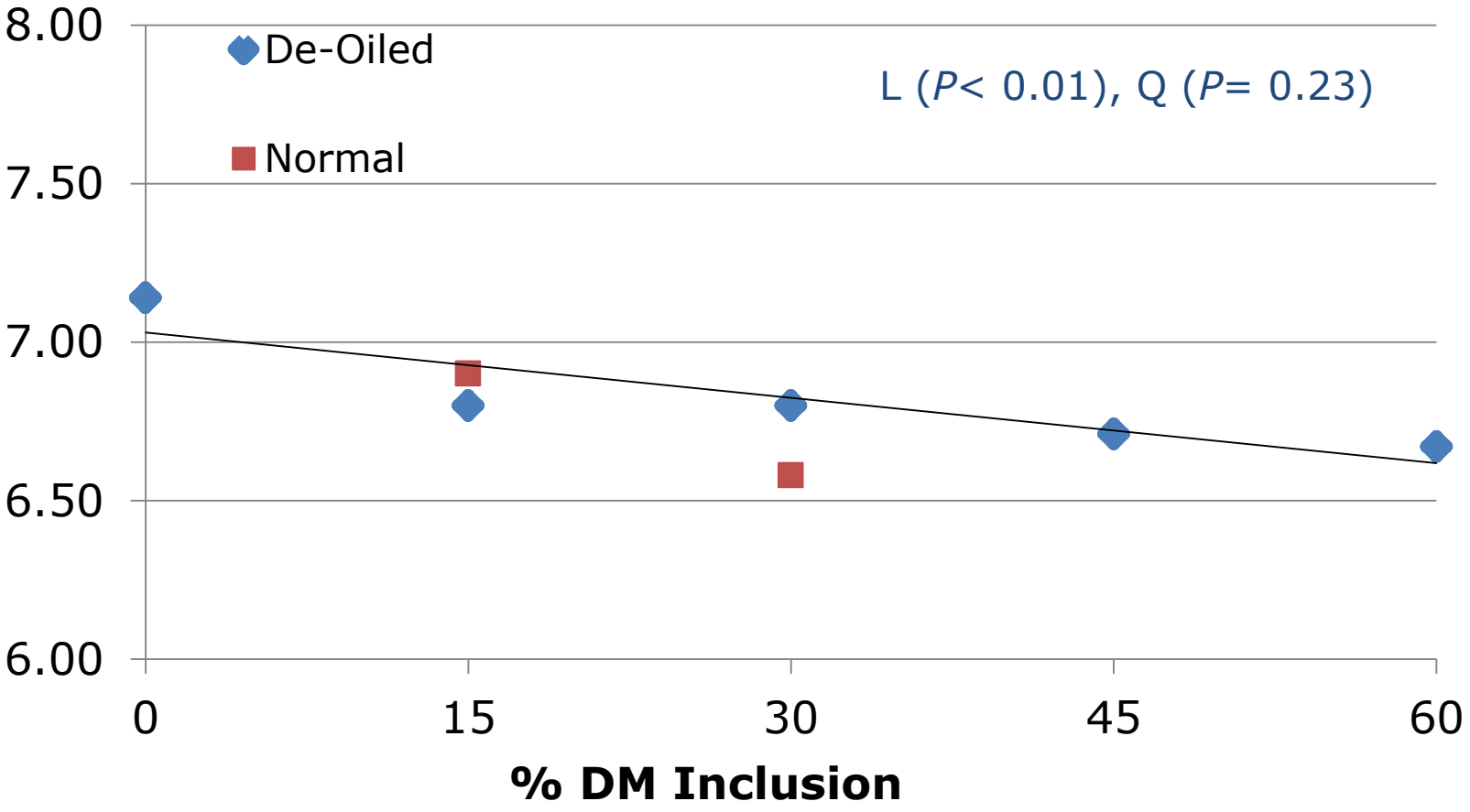
Main effect of fat removal

	De-oiled	Normal	P-value	CORN
Performance				
DMI, lb/d	25.1	24.1	<0.01	25.1
ADG, lb	4.09	4.04	0.58	3.88
F:G	6.12	5.96	0.19	6.44
% different:	2.6%			
Carcass Characteristics				
HCW, lb	870	867	0.68	851
Fat depth	0.56	0.56	0.93	0.52
Marbling	565	576	0.34	547

Jolly et al., 2014 NE beef report

De-oiled distillers

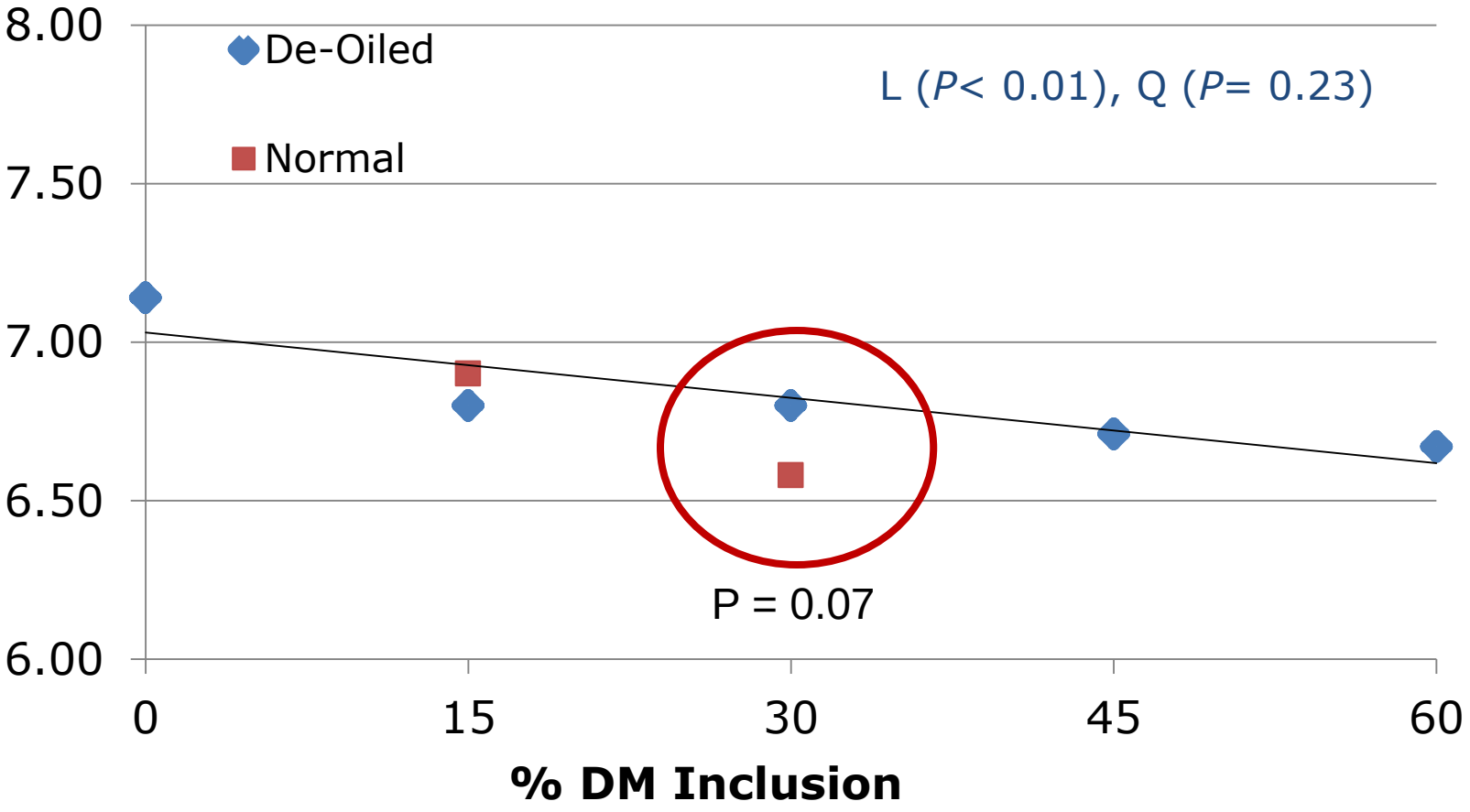
F:G



Bremer et al., 2014 Midwest ASAS

De-oiled distillers

F:G



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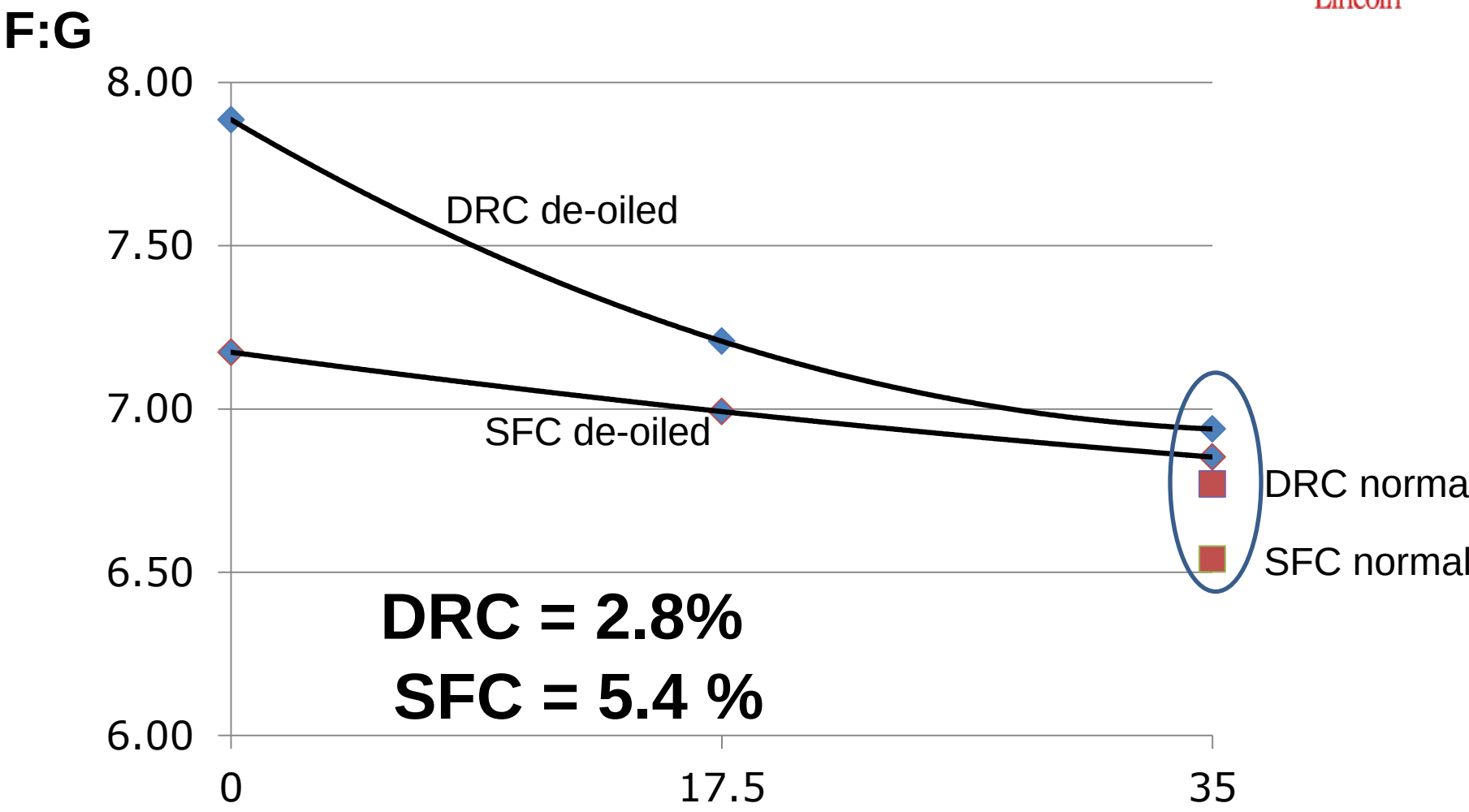
De-oiled distillers



Bremer et al., 2014 Midwest ASAS

De-oiled distillers

- Growing Studies
  - Two experiments (one with solubles, one with MDGS)
  - At 20% inclusion, solubles with fat better
  - At 40% inclusion, no difference (fat a hindrance on fiber digestion?)
  - For MDGS, no impact at either 20 or 40% inclusion

- Feedlot Studies
  - Four experiments (40%; 35, 50, 65%; 15, 30, 45, 60%; 35%)
    - No difference in first (at 40% MDGS or 27% solubles)
    - About 2.7% worse in second (35-65%)
    - About 1.4% better (15%) to 3.4% worse (30%) in third one
    - About 2.8% worse (DRC) to 5.4% worse (SFC) in fourth

  - These data only apply for centrifuging the solubles or syrup stream; other data on more intensive fat removal suggests poorer performance
  - FUTURE!

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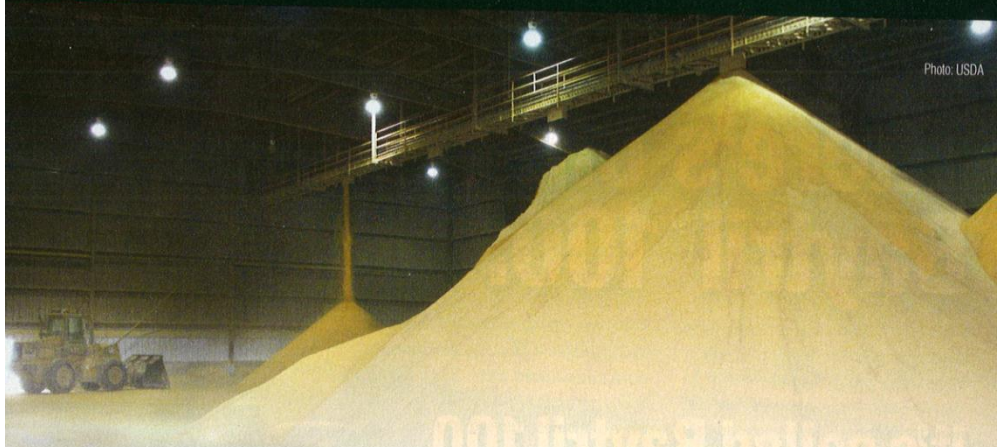
Feed values for 280 byproduct feeds PAGE 16

BEEF®

March 2014

Nutrition



Not What They Used To Be

As ethanol plants look for ways to extract more value from distillers grains, the nutritional value of the byproduct is changing.

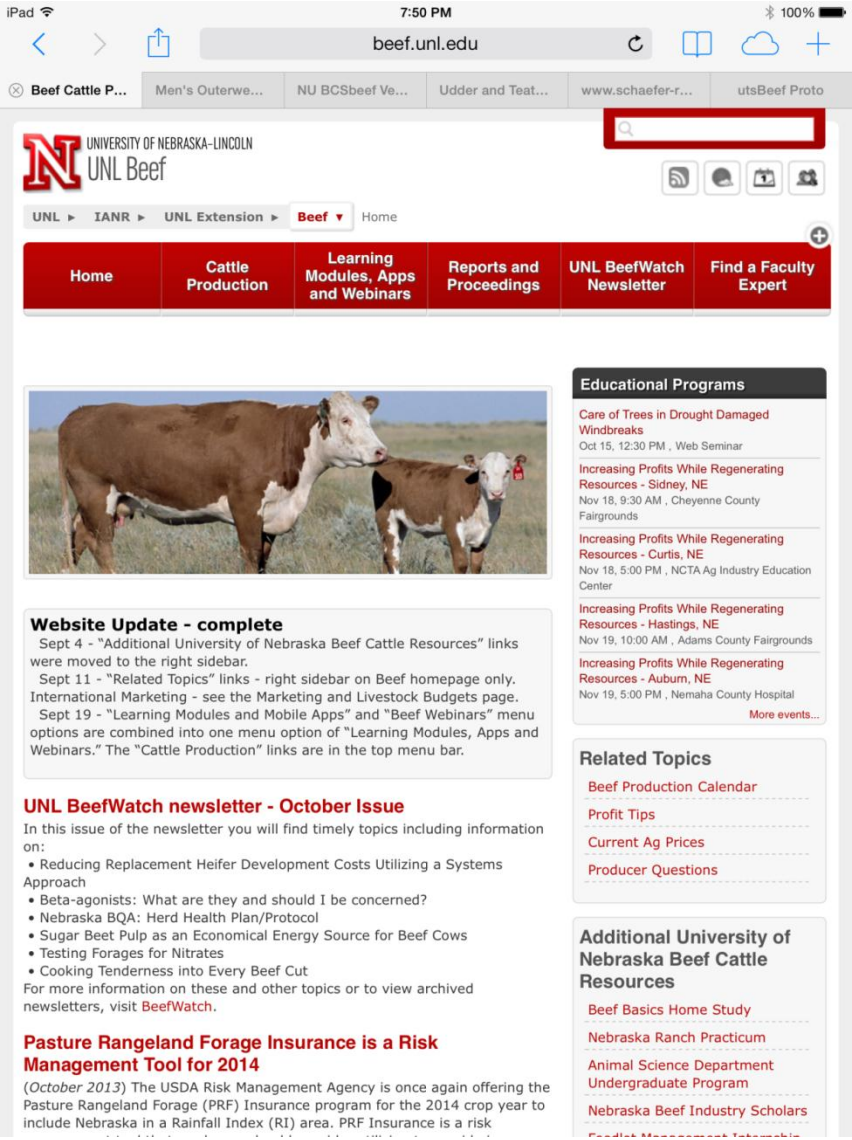
BY BURT RUTHERFORD

Overall Conclusions

- Wetter is better
- Distillers have been economical
  - Even with tighter supply & costly grain
  - Replacing protein at a minimum
- Trying to figure out ways to optimize
- Oil removal has little impact?
  - Decreases feeding value 4-10%
- Fiber Removal?

Overall Conclusions

- Manage diets with DGS like grain diets
  - Feed additives have same value
  - Roughage kept “normal”
  - Watch Sulfur in DGS, know source, check your water
  - If less than 40% of DM, not an issue with clean water (<200 ppm sulfate)

http://beef.unl.edu

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