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## High Oleic Soybean (HOSB) - Plenish

**Past and current research**

**Artwork of Roasting**

**Value**

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# Past

## Chemical, In Vitro, and In Vivo Evaluation of Soybeans Heat-Treated by Various Processing Methods<sup>1</sup>

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### ABSTRACT

In trial 1, eight Holstein heifers weighing 410 kg were used in an 8 × 8 Latin square and fed TMR containing 79.3% alfalfa silage and 20% soybeans. The first four treatments were raw soybeans, soybeans roasted and held for 3 h at the roasting temperature, extruded soybeans, and soybeans roasted in a California Pellet Mill Jet-Spinder®. The remaining four treatments were obtained by altering the residence time of soybeans in the Jet-Spinder®. The tempera-

tures of 141 or 146°C and held for .5 h. Estimated post-ruminal available lysine was higher for soybeans roasted and held versus roasted or raw soybeans. However, BW gain for heifers was similar across diets, averaging 90 kg/d for 12 wk. Concentrations of AA in plasma were not affected by diet. Overall, results support the recommendation of holding soybeans for at least .5 h following roasting.  
 (Key words: ruminant, protein, soybean, lysine)

## Chemical, In Vitro, and In Situ Evaluation of Heat-Treated Soybean Proteins<sup>1</sup>

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### ABSTRACT

The effect on protein degradability of roasting soybeans and soybean meal and holding them at elevated temperatures for 0, .5, 1, 1.5, 2, 2.5, and 3 h was assessed using in vitro, in situ, and chemical techniques. Ruminant in vitro degradation rates decreased with initial roasting for both soybeans and soybean meal from .165 to .065 h<sup>-1</sup> and .155 to .092 h<sup>-1</sup>, respectively. Roasting and holding for 2 h resulted in the lowest

sive heat treatment than typically is obtained in commercial processing.  
 (Key words: rumen degradation, roasted soybeans, available lysine)

Abbreviation key: FDNB = fluorodinitrobenzene, PRNAL = post-ruminal nutritionally available lysine, RSB = roasted soybeans, RSBM = roasted soybean meal, SB = soybeans, SBM = soybean meal, TLM = total lysine minus inaccessible lysine, UIP = undegradable intake protein.

## Feeding Heat-Treated Full Fat Soybeans to Cows in Early Lactation<sup>1</sup>

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### ABSTRACT

Forty-six multiparous Holstein cows were fed one of three total mixed diets from 15 to 119 d postpartum with alfalfa silage as the only forage. Each diet contained 50% forage and 50% concentrate on a DM basis. Diets were formulated to be isonitrogenous by replacing corn and solvent soybean meal with raw soybeans

related primarily to improved supply of undegraded intake protein.  
 (Key words: alfalfa, silage, protein, roasting)

Abbreviation key: HSB = heat-treated soybeans, PRAL = post-ruminal available lysine, SB = raw soybeans, SBM = soybean meal, UIP = undegraded intake protein.



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# Past

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TABLE 3. Effect of supplemental protein on feed intake, BW change, and milk yield and composition.

Item	Soybean meal	Raw soybeans	Heated soybeans
No. of cows	16	15	15
Intake			
DM, <sup>1</sup> kg/d	23.4	22.3	23.6
DM, % of BW	4.06	3.76	3.84
CP, <sup>1</sup> kg/d	4.11	3.91	4.11
BW, kg			
Beginning	574	613	595
Ending	600	615	626
Change	26 <sup>a</sup>	2 <sup>b</sup>	31 <sup>a</sup>
Yield, kg/d			
Milk <sup>1</sup>	34.5 <sup>b</sup>	34.2 <sup>b</sup>	38.9 <sup>a</sup>
FCM, 3.5%	33.4 <sup>b</sup>	34.7 <sup>b</sup>	38.0 <sup>a</sup>
Fat	1.16 <sup>b</sup>	1.22 <sup>ab</sup>	1.31 <sup>a</sup>
Protein	1.01 <sup>b</sup>	1.01 <sup>b</sup>	1.10 <sup>a</sup>
Milk composition, %			
Fat	3.41	3.50	3.41
Protein	2.99 <sup>a</sup>	2.89 <sup>ab</sup>	2.85 <sup>b</sup>

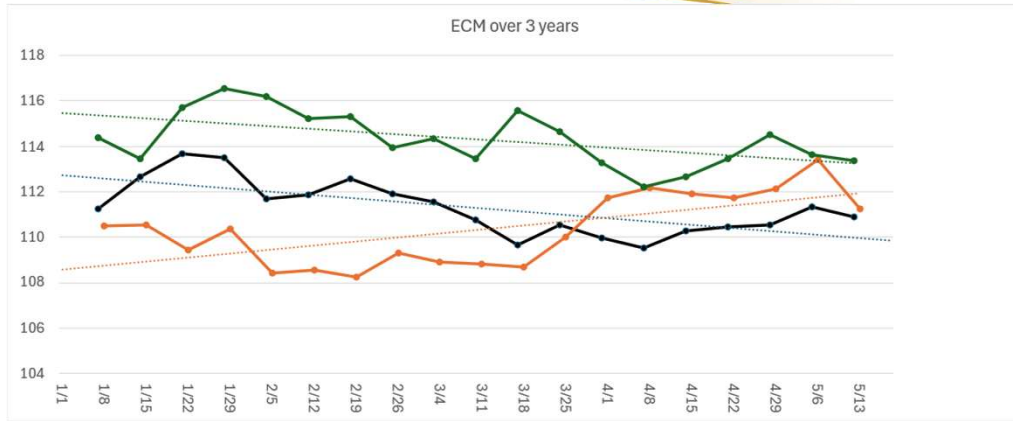
<sup>a,b</sup>Means in the same row with different superscripts differ ( $P < .05$ ).

<sup>1</sup>Treatment means were covaried on pretreatment means from d 8 to 14 after parturition.



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# Farm Data

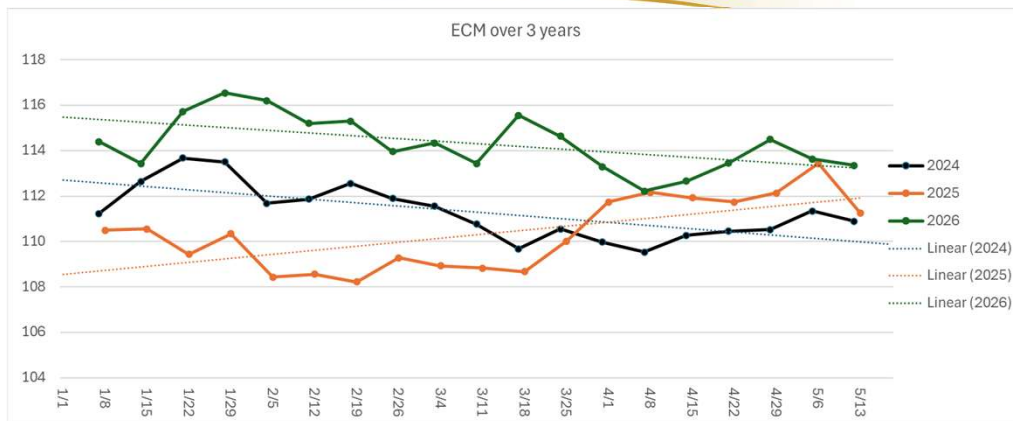


Processor Data combined with flow meter (daily) - ~2000 cows, 40% over on stalls



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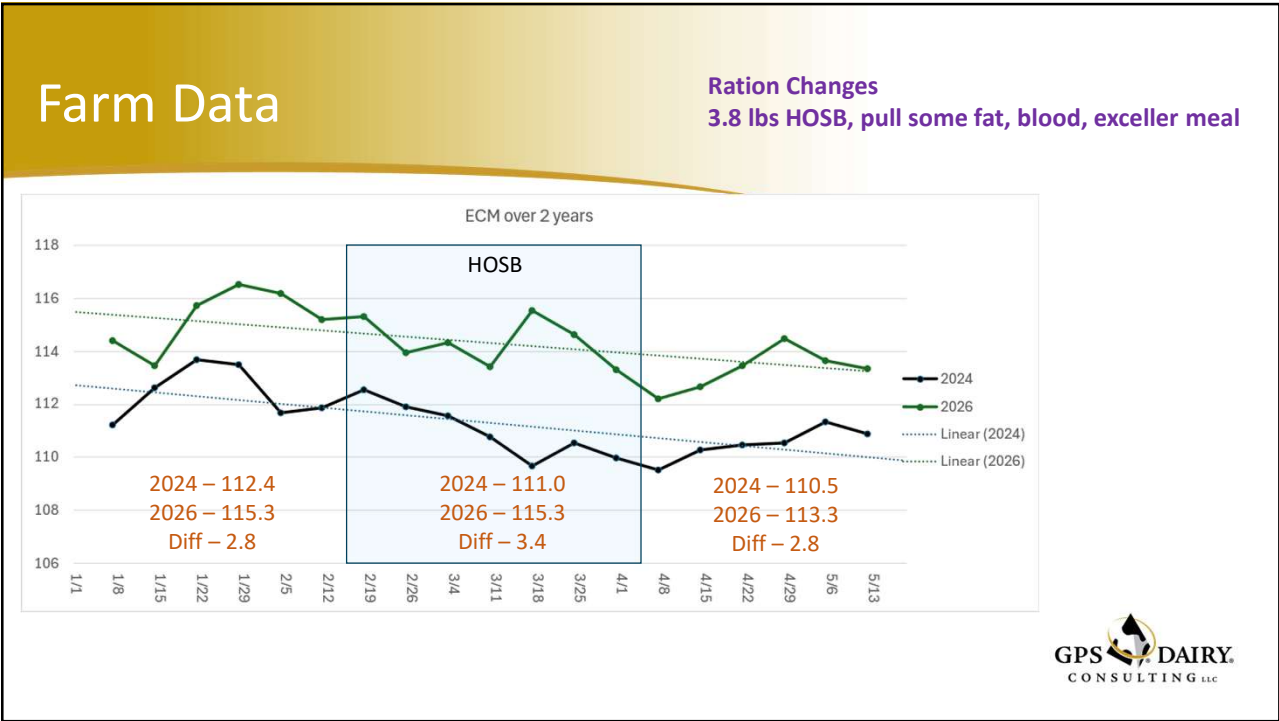
# Farm Data



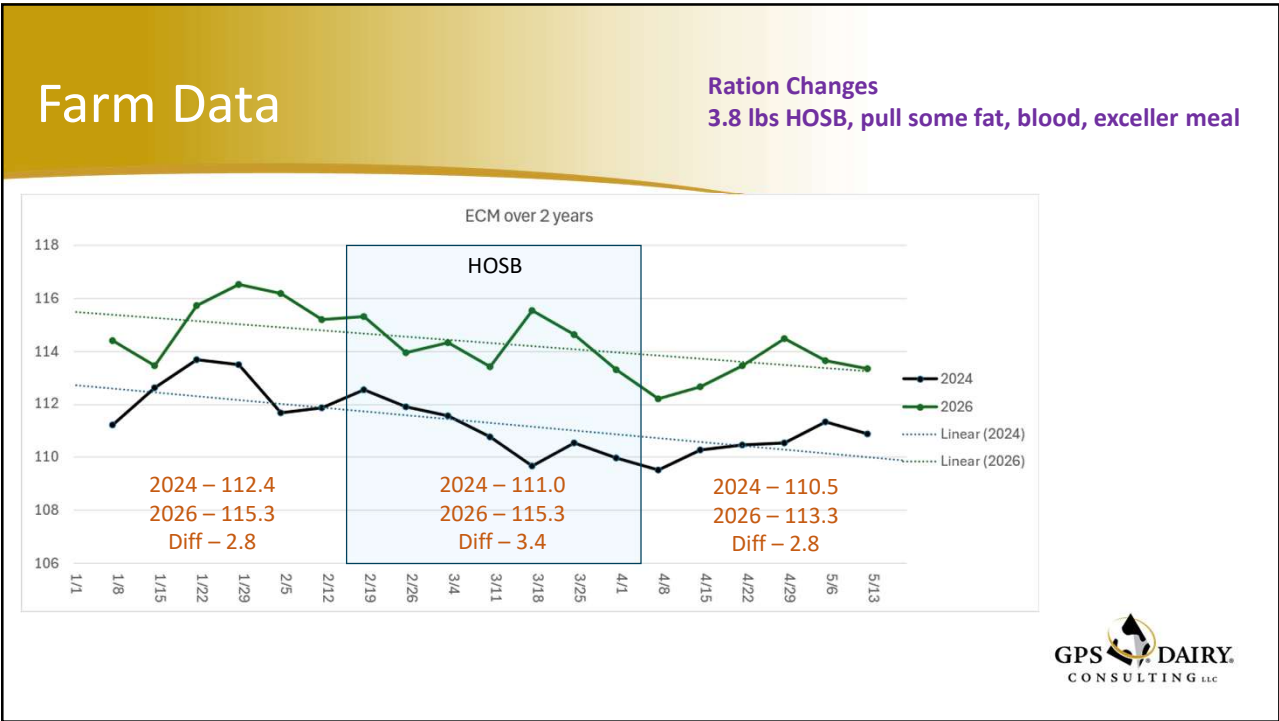
Processor Data combined with flow meter (daily) - ~2000 cows, 40% over on stalls



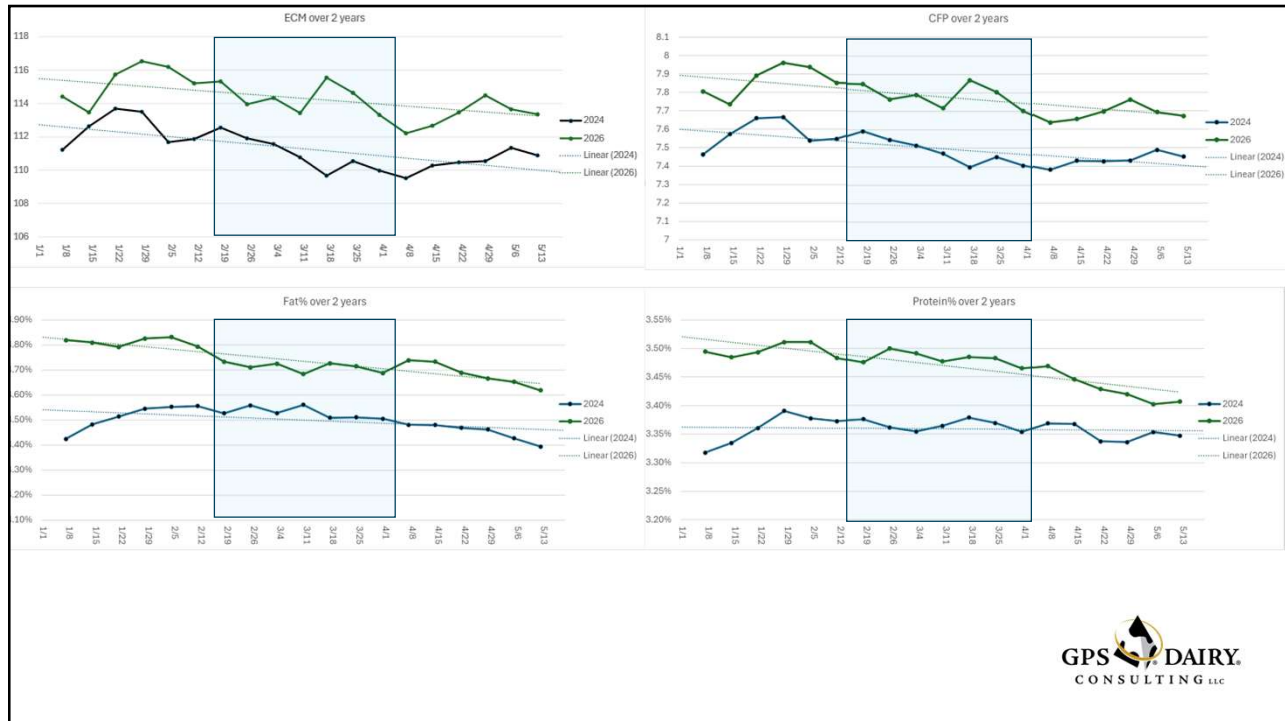
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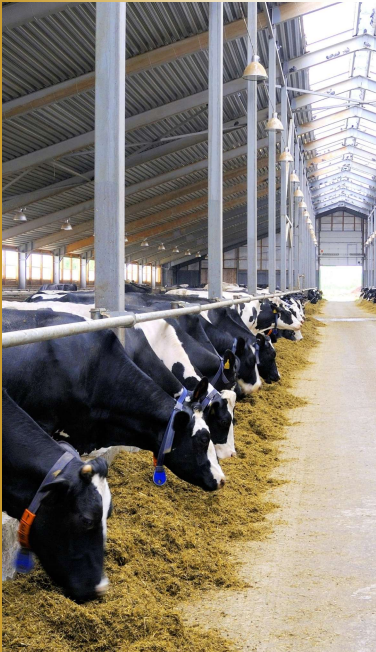
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## Economic Considerations



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## Diet

### Swap undegradable protein sources

- Value of roasting
- Blood meal
- Heat treated bean meal products

### Remove purchased fat

- Value of HOSB = oleic fat
- Palm
- Calcium salts
- Other blended fat sources

### Adjust other protein sources like canola and SBM

- Compliment fiber/amino acid profile



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## Economics

### Commercially purchased roasted HOSB

- \$.10-\$.30 based on previous well-balanced diets

### Homegrown - evaluating

- Transportation to and from mill
- Storage
- Cost to roast at mill
- Cost of mobile roaster
- Cost of purchasing a roaster
- Opportunity Cost (1000 head, 25,000 bu, \$300K in inventory)



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# Economics

	Cost (\$/ton)	Feed Rate (as fed)			
		No HOSB	Some	More	
HOSB	\$ 480.00	0	3.2	5.0	\$10 SB + \$1.00
Exceller	\$ 349.00				
SBM	\$ 330.00				
Canola	\$ 260.00				
Blood	\$ 1,040.00				
Palm	\$ 1,780.00				
Other Fat	\$ 1,660.00				
<b>Total/hd Savings</b>		\$ 7.35	\$ 7.28 \$ 0.07	\$ 7.10 \$ 0.24	

	Cost (\$/ton)	Feed Rate (as fed)			
		No HOSB	Some	More	
HOSB	\$ 450.00	0	3.2	5.0	\$12 SB + \$1.00
Exceller	\$ 349.00				
SBM	\$ 330.00				
Canola	\$ 260.00				
Blood	\$ 1,040.00				
Palm	\$ 1,200.00				
Other Fat	\$ 1,200.00				
<b>Total/hd Savings</b>		\$ 7.15	\$ 7.14 \$ 0.01	\$ 6.99 \$ 0.16	

	Cost (\$/ton)	Feed Rate (as fed)			
		No HOSB	Some	More	
HOSB	\$ 450.00	0	3.2	5.0	\$10 SB + \$1.00
Exceller	\$ 349.00				
SBM	\$ 330.00				
Canola	\$ 260.00				
Blood	\$ 1,500.00				
Palm	\$ 2,000.00				
Other Fat	\$ 2,000.00				
<b>Total/hd Savings</b>		\$ 7.65	\$ 7.46 \$ 0.19	\$ 7.10 \$ 0.56	

	Cost (\$/ton)	Feed Rate (as fed)			
		No HOSB	Some	More	
HOSB	\$ 550.00	0	3.2	5.0	\$12 SB + \$1.00
Exceller	\$ 349.00				
SBM	\$ 330.00				
Canola	\$ 260.00				
Blood	\$ 1,040.00				
Palm	\$ 1,780.00				
Other Fat	\$ 1,660.00				
<b>Total/hd Savings</b>		\$ 7.35	\$ 7.39 \$ (0.04)	\$ 7.28 \$ 0.07	

	Cost (\$/ton)	Feed Rate (as fed)			
		No HOSB	Some	More	
HOSB	\$ 550.00	0	3.2	5.0	\$12 SB + \$1.00
Exceller	\$ 349.00				
SBM	\$ 330.00				
Canola	\$ 260.00				
Blood	\$ 1,500.00				
Palm	\$ 1,780.00				
Other Fat	\$ 1,660.00				
<b>Total/hd Savings</b>		\$ 7.55	\$ 7.59 \$ (0.04)	\$ 7.33 \$ 0.22	

Why Bother?  
Risk Management  
Opportunity Buys  
On Farm Feeds



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# Roast-A-Matic Gas Roaster

## Cost Analysis

Gas:		
\$1.50 per gallon @ 5 gallon per ton	=	\$ 7.50
Electric & Maintenance:		
	=	\$ 2.50
<b>Total</b>	=	\$ 10.00
Model 800 Roaster Base Price	=	\$ 145,000.00
Model 800 Cooler:	=	\$ 125,000.00
<b>Total</b>	=	\$ 270,000.00



## MODEL 800 IDEAL FOR LARGE MILLS AND LARGE FARMS

The Model 800 roaster is ideal for large commercial mills and farms. This roaster is our most powerful option, allowing it to roast 18-20 tons of grain each hour. This machine offers a continuous flow with a streamlined process that manages itself.

SPECIFICATIONS	
CAPACITY	18-20/HR
LENGTH/HEIGHT/WIDTH	282"x101"x97"
SINGLE/THREE PHASE	Volts 230/460/380/575
AMPS	50/30
BTU'S	8,500,000
GAS PRESSURE	10-15 psi
GAS CONSUMPTION	4 gal/Hr
SHUT OFFS	High Temp



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## A.N. Martin Electric Roaster

### Cost/Roaster

Electric less than 3 kilowatt (kW) hours/bu  
 Electric cost up to \$.20/kW/hr

### Container system

5 ton finished product/day  
 Everything included to roast and grind  
 Auger required to move beans in and out  
 \$160,000.00

### Facility

Equipment: \$110,000.00  
 Additional roaster unit: \$52,000.00  
 Control panel capacity: 4 roasters

### Evaluating

Gas



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## Mobile Roaster - Millers

Millers Grain Roasting Pricing  
 12.5bu/min  
 750bu/hr  
 800bu Roaster  
 Includes Cooling (\$1.25 per min)/(\$-.10 per bushel)

Roast Time(min)	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr
500-1000 >40	\$ 13.50	\$ 13.60	\$ 13.70	\$ 13.80	\$ 14.50	\$ 15.00
1000-2000 40-80	\$ 13.40	\$ 13.50	\$ 13.60	\$ 13.70	\$ 14.00	\$ 14.50
2000-3000 80-160	\$ 13.30	\$ 13.40	\$ 13.50	\$ 13.60	\$ 13.80	\$ 14.00
3000-4000 160-240	\$ 13.00	\$ 13.30	\$ 13.40	\$ 13.50	\$ 13.60	\$ 13.70
4000-5000 240-300	\$ 12.90	\$ 13.00	\$ 13.30	\$ 13.40	\$ 13.50	\$ 13.60
5000-10000 320-400	\$ 12.60	\$ 12.90	\$ 13.00	\$ 13.30	\$ 13.40	\$ 13.50
10000+ 400-800	\$ 12.00	\$ 12.60	\$ 12.90	\$ 13.00	\$ 13.30	\$ 13.40
800+	\$ 12.00	\$ 12.60	\$ 12.90	\$ 13.00	\$ 13.30	\$ 13.40

- 2hr drive at 6,000 bushels is \$13.00/minute
- 6,000 bushels at 12.5 bushels / minute = 8 hours or 480 minutes
- 480 minutes X \$13/minute = \$6,240
- \$6,240/6,000 bushel = \$1.04/bushel for roasting and cooling
- \$.20 / bushel for roller mill
- \$1.24 roasted and ground or \$41.29/ton



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## Midwest Grain Roasters

- \$500 trip charge
- 10% moisture \$.90-96/bu
- 13% moisture \$1-1.20/bu
- Good day with low moisture 100 ton/day
- LP gas required by farm
- Roughly \$47.50/ton
- Requires steeping, cooling, and grinding



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U.S. Dairy Forage Research Center, Madison, WI, has established the following table evaluating an optimally heat-processed soybean for lactating dairy cattle:

PDI Range-Interpretation	Greater than 14 Underheated	13.99 - 11.01 Slightly Underheated	11.00 - 9.00 Optimum
This sample	[Redacted]	11.80	
	14		11

In addition to an optimum PDI value, a properly heat-processed soybean will have an urease activity (pH unit rise) of less than .02.

The interpretation range on this report applies to roasted soybeans. It does not apply to other heat roasted soy products.

U.S. Dairy Forage Research Center, Madison, WI, has established the following table evaluating an optimally heat-processed soybean for lactating dairy cattle:

PDI Range-Interpretation	Greater than 14 Underheated	13.99 - 11.01 Slightly Underheated	11.00 - 9.00 Optimum
This sample	[Redacted]	13.3	
	14		11

In addition to an optimum PDI value, a properly heat-processed soybean will have an urease activity (pH unit rise) of less than .02.

The interpretation range on this report applies to roasted soybeans. It does not apply to other heat roasted soy products.

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**Thank you!**

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