

FINE-TUNING A SILAGE PROGRAM --- AND SAVING SOMEONE'S LIFE!



**Keith Bolsen Ph.D.
& Associates**



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Dairy / Feedlot



**Silage
Triangle**

Crop Grower

Silage Contractor

'SHRINK LOSS' is TOO HIGH, TOO OFTEN!



How much of the 2013-2014 corn silage will livestock producers lose to 'shrink'?

About 1.30 billion dollars!

Could be 600 million dollars!

What is the 'Market Value' of Corn Silage based on 'Shrink Loss' alone?

- **\$60.00 / ton ÷ 95.0% = \$63.15**
- **\$60.00 / ton ÷ 90.0% = \$66.67**
- **\$60.00 / ton ÷ 85.0% = \$70.59**
- **\$60.00 / ton ÷ 80.0% = \$75.00**
- **\$60.00 / ton ÷ 75.0% = \$80.00**
- **\$60.00 / ton ÷ 70.0% = \$85.71**

Forage In vs. Silage Out

Fine-tuning Silage Programs

- 1. Communicate & prepare**
- 2. Reach an optimum silage density**
- 3. Apply the best seal - Silostop**
- 4. Manage the delivery**



What can we learn from this PRODUCER? He had a MEETING! He had a plan!



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Dry Matter Loss as Influenced by Silage Density: Adapted from Ruppel et al. (1995)

Density, lbs of DM per ft ³	DM loss at 180 days, % of the DM ensiled
10	20
12	18
14	16
16	14
18	12
20	10

Avg. = 14.5

Targets:
16 lbs of DM
48 lbs of fresh weight

Case Study Feedlot



Spreadsheet Calculations of the Average Corn Silage Densities in a Bunker Silo at a **Case Study Feedlot**.¹

Component	Keith Bolsen Ph.D. & Associates		Predicted-135 1 packing	Predicted-135 2 packing
Bunker wall height, ft			12	12
Silage height above wall, ft			3	3
Forage delivery rate, fresh tons/hr			135	135
Forage DM content, %			33.3	33.3
Est. forage packing layer thickness, inches			9	5
1 tractor			55,000 (65) ²	55,000 (65) ²
2 tractors				50,000 (85)
				
				
Estimated avg. DM density, lbs/ft ³			11.2	16.9
Estimated avg. bulk density, lbs/ft ³			33.6	50.7

¹ Values above the line are user inputs. ² Estimated packing time as % of filling time.

Spreadsheet Calculations of the Average Corn Silage Densities in a Bunker Silo at a **Case Study Feedlot**.¹

Component	Keith Bolsen Ph.D. & Associates		Predicted-270 2 packing	Predicted-270 3 packing
Bunker wall height, ft			12	12
Silage height above wall, ft			3	3
Forage delivery rate, fresh tons/hr			270	270
Forage DM content, %			33.3	33.3
Est. forage packing layer thickness, inches			7.5	6
1 tractor			55,000 (70) ²	55,000 (70)
2 tractors			50,000 (85)	50,000 (85)
3 tractors				45,000 (95)
  				
9.6 28.8				
Estimated avg. DM density, lbs/ft ³			11.8	15.6
Estimated avg. fresh wt. density, lbs/ft ³			35.5	46.8

¹ Values above the line are user inputs. ² Estimated packing time as % of filling time.

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Sealing/covering Research at K-State and Field Trials with **Silostop**



- **Richard Porter (farmer, rancher & cattle feeder) from Reading, KS. He was a loyal supporter of the K-State sealing and surface spoilage research program (1989 – 2000).**
- **After Rich sealed his bunkers for the first time, his neighbors said, "Porter, you're crazy for covering those silage pits". Rich told them, "I can pay doctors and lawyers to cover my pits and make money"!**



Comparison of 6-mil black plastic & Silostop on pH, fermentation profile, estimated additional spoilage loss of OM, and ash content in corn silage (0 to 36 inches from the surface) and HM corn (0 to 18 inches from the surface) at approximately 240 days post-filling. From: Bolsen et al. (2006)

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**Trial 1 - Corn silage
0 to 36 inches**

**Trial 2 - HM corn
0 to 18 inches**

Item	Std plastic	Silostop	Std plastic	Silostop
DM content, %	29.2	31.6	72.3	73.2
pH	4.28	3.78	4.70	4.09
Est. OM loss ^{1,2}	34.8	17.8	12.1	6.7
Advantage for Silostop	---	+ 17.0	---	+ 5.4
----- % of the silage DM -----				
Lactic acid	2.7	6.8	0.86	1.08
Ash	11.2	9.1	2.13	1.98

¹ Estimated OM loss, calculated from ash content using equations by Bolsen et al. (1993).

² Ash content of the pre-ensiled samples was 7.6% for corn silage and 1.8% for HM corn.

Drive-over pile: 6 x 80 x 400 feet

4,000 to 4,600 tons
(Depending on densities)

Corn silage = **\$60/ton**

Sealing costs:

Standard plastic = **\$5,000**

Silostop = **\$7,800**

Net benefit for **Silostop** = **\$8,000 to \$12,000**

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12 ft apex height

A photograph of a large, conical pile of brown material, likely corn silage, under a clear blue sky. A green double-headed arrow points vertically from the base to the apex, with a text box in the middle indicating a height of 12 ft. Another green double-headed arrow points horizontally across the base of the pile, with a text box in the middle indicating a width of 80 ft.

80 ft base width



Feedlot in the High Plains



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16 x 75 x 60 x 750 ft = 21,000 tons

Corn silage = \$60/ton

Lost in the top 3 feet: Unsealed = 2,125 tons vs. Sealed = 875 tons

Sealing cost = \$10,500

Net silage saved by sealing = \$64,000 / bunker silo

Three bunkers = \$192,000 that could be saved by sealing!!

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We can do Better!

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1.

2.

3.



6.

5.

4.



7.



Surface-spoiled Corn Silage Research at Kansas State

Whitlock et al. (2000)

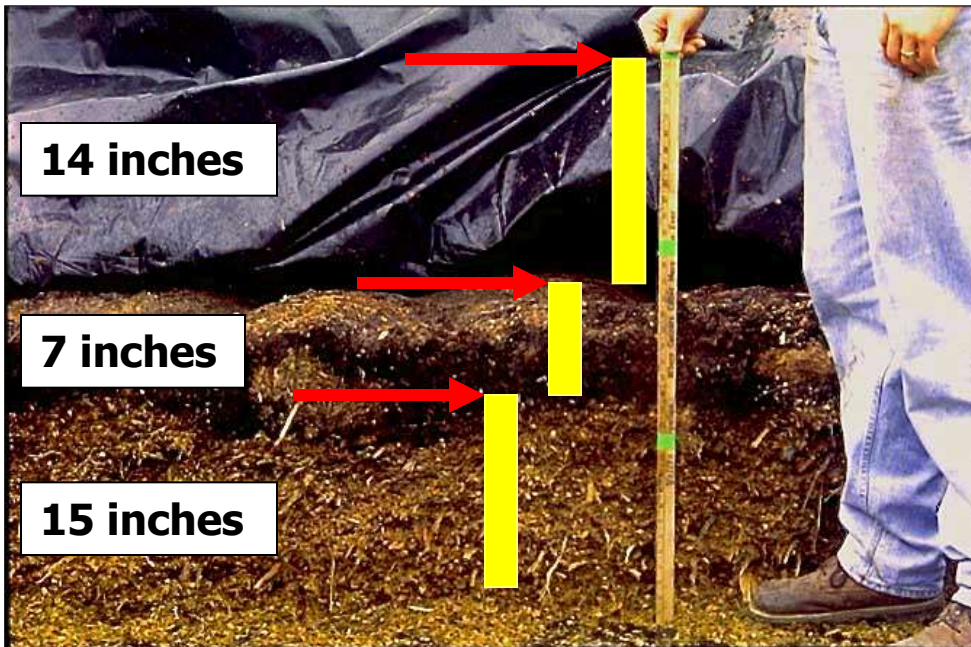


'Slime' in the ration

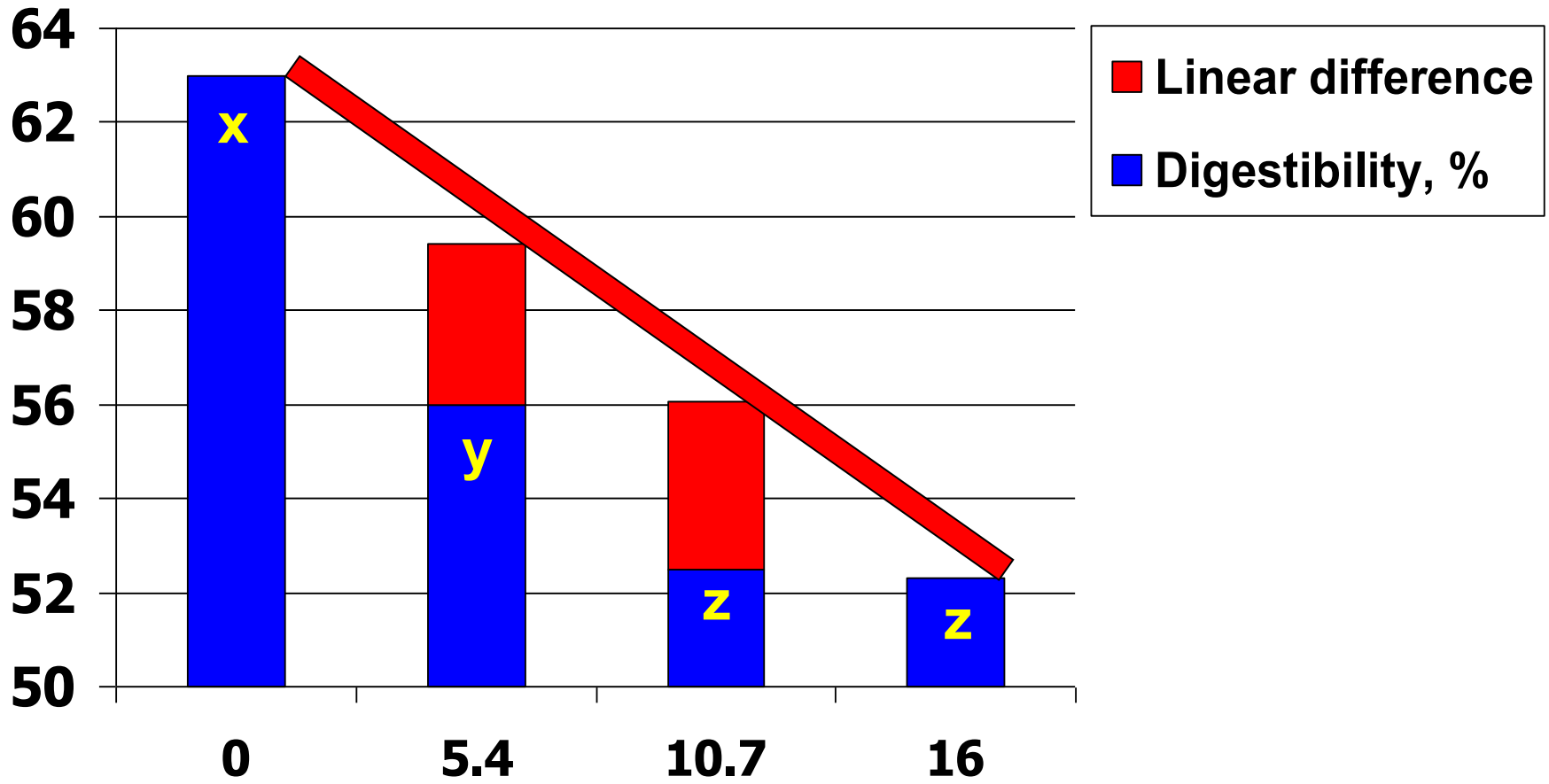
0, 5.4, 10.7 & 16.0 %

- ✓ Depressed **DM intake**.
- ✓ Destroyed the **forage mat** in the rumen.
- ✓ Reduced **fiber digestibility** dramatically.

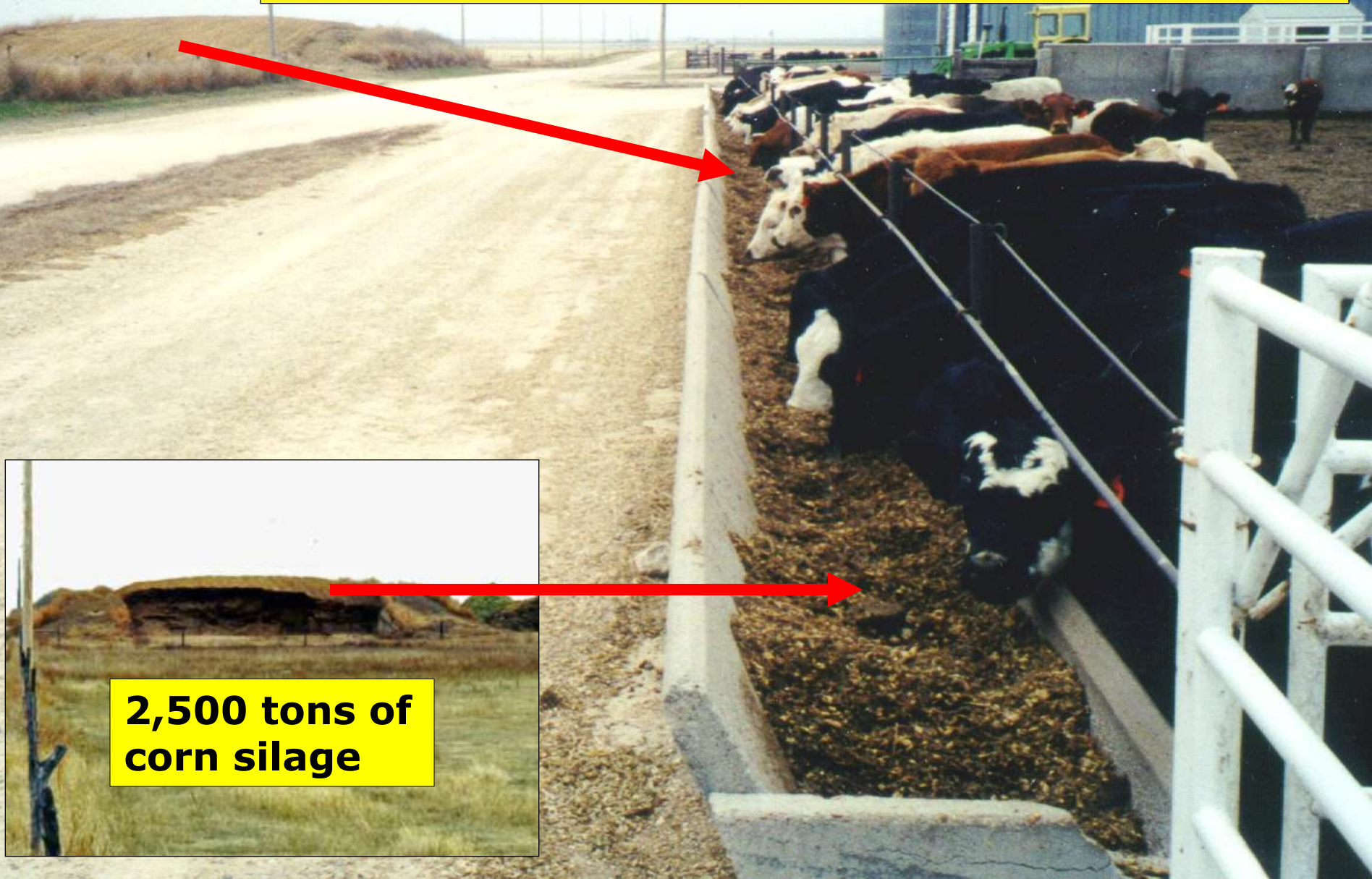
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NDF Digestibility



So ... How much was 'feeding surface spoilage' costing this growing operation?



**2,500 tons of
corn silage**

Economic Impact of Creating and Feeding Surface-spoiled Corn Silage to Growing Cattle.¹

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Ration & silage management combination

Item	A	B	C	D
Surface spoilage in the ration, % (DM basis)	0	2.7	2.7	2.7
Corn silage NEg , Mcal per lb of DM	0.45	0.45	0.425	0.40
DM recovery, % of the crop ensiled	87.5	87.5	82.5	77.5
DM intake, lbs per day	17.0	16.5	16.5	16.5
ADG, lbs	2.25	2.12	2.00	1.87
DM per lb of gain, lbs	7.55	7.80	8.25	8.70
Silage per lb of gain, lbs as-fed ²	19.84	20.50	21.67	22.86
Gain per ton of crop ensiled, lbs	88.2	85.4	76.2	67.8
Lost gain per ton of crop ensiled, lbs	---	2.8	12.0	20.4
Value of gain lost per ton of crop ensiled, \$	---	3.92	16.80	28.56

¹ Assumes an average cattle weight of **650 lbs** and a live weight price of **\$1.40** per pound.

² Assumes silage is **87.5%** of the ration (DM basis) and the silage is **33.3%** DM.

THINK SAFETY FIRST



**“We have nothing to lose
by practicing safety; but
we have everything to lose
by not practicing it.”**

**Dennis Murphy, Extension Safety
Specialist, The Pennsylvania State
University, State College, PA**



Don't do something **STUPID!**



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Photo: by Hay and Forage

Surviving A Silage *Avalanche*

**By Fae Holin,
Managing Editor**



Photo: by Doug DeGroff

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Boy Buried In Pile Of Feed For Up To 20 Minutes

POSTED: 7:37 am EDT April 25, 2010

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Take home message ...

It's really not about shrink loss, feed conversion, cost of gain, a close out, or milk over feed cost.

It's about sending everyone in your silage program home to their family safe ... EVERYDAY".

Thank You



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