Phantom Yield Loss

Background

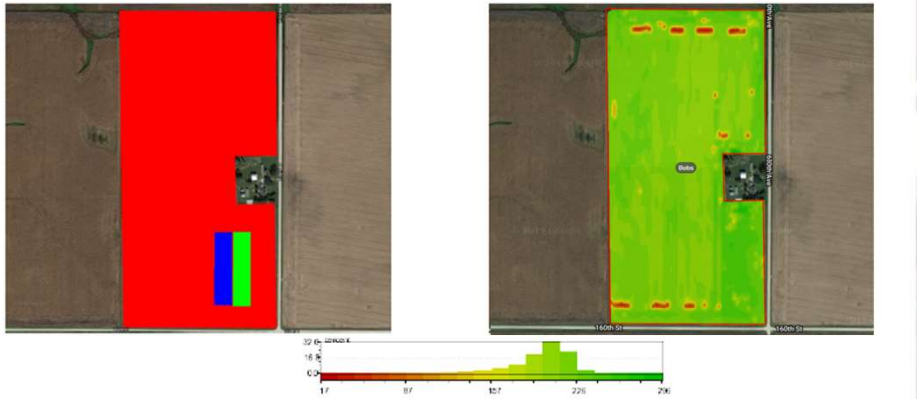
"Phantom yield loss" (PYL) is the controversial theory that dry matter is lost from the kernel while corn dries in the field. We say controversial because the agricultural community is decidedly split on this issue. Research on the subject reveals numerous scholarly articles from universities, seed companies, and ag tech companies with results ranging from no loss at all to as much as 2% yield loss/pt of field drying.

Several years ago our group began analyzing our operational costs and performing ROI analysis. During this process, we wanted to put a number to our long-held but unsubstantiated belief that "corn yields better when you harvest it wet". In analyzing the available literature we realized that most studies are not applicable at an operational level as we are not hand picking, shelling, and air drying the kernels in lab conditions. We needed to look at the broader picture and consider the multiple outside factors involved such as head shatter, ear drop, harvestability, and environmental factors. To do this, we analyzed years of data within our operation to find instances where we had harvested a portion of a field, were forced to move, and then finished harvest at a lower moisture. The side by side yield comparison revealed that our long-held belief was valid and allowed us to calculate a value for operational "PYL". Keep in mind, when we use "PYL" within our analysis we are including within that metric any possible dry matter loss as well as yield loss due to all the factors associated with harvest.

Below is an example from our data set, our results, and examples of how this metric is used within our operation.

Grower: Hill Howard
Farm: Farms
Field: Bobs

Crop: Corn
Year: 2018



Zone No.	Mgmt Zone Name	Range	Zone Name	Data	Avg Moisture%	Avg Yield	HarvestAcres	Area
Zone 2	Moisture 2018	Min - Max	2	Wet	18.74	216.21 bu/ac	2.06	2.06
Zone 3	Moisture 2018	Min - Max	3	Dry	16.46	206.91 bu/ac	2.03	2.03
Zone 1	Moisture 2018	Min - Max	1	Whole Field	16.63	190.21 bu/ac	70.28	70.28

Wet		Dry		Moisture Difference	Yield Difference	% Loss (Dry Yld Loss/Pt of Field Dry)
Moisture	Yield	Moisture	Yield			
18.74	216.21	16.46	206.91	2.28	9.3	1.97%

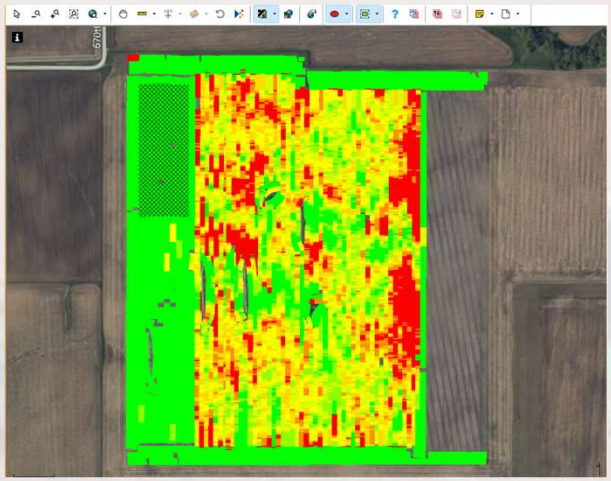
The Bottom Line

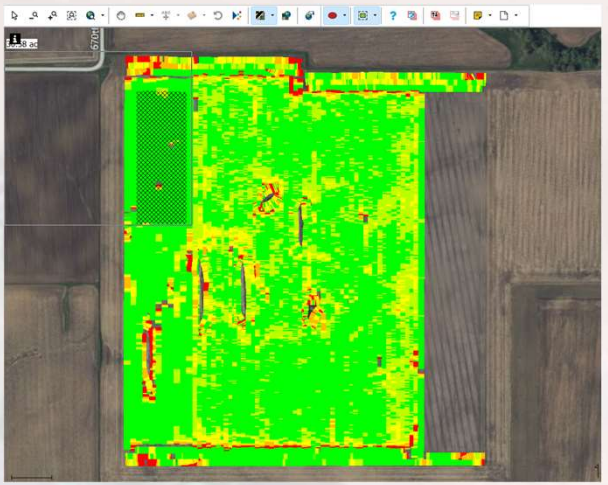
After compiling 12 data points using the method shown on the left, we eliminated the highest and lowest values as outliers and averaged the remaining. From this data we concluded that, on average, we lost **2.2%** dry yield/pt of field drying. In the interest of being conservative (and being the pessimistic farmers that we are) we chose to use **1.1%** for future calculations.

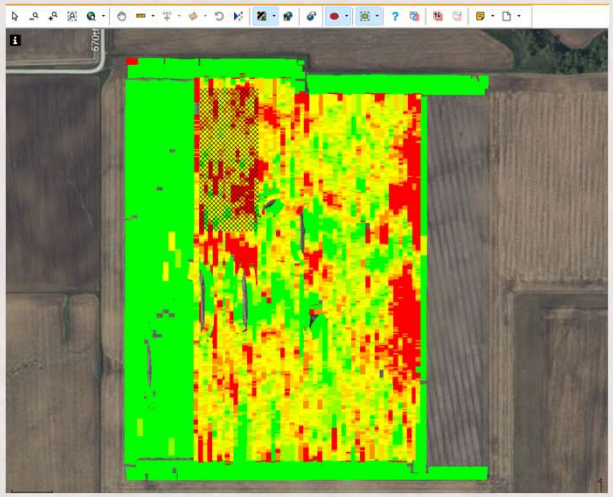
To put that number in perspective:
The drying cost breakeven with a 1.1% loss factor and 200 BPA corn at a $4.25 selling price is about $.047/pt

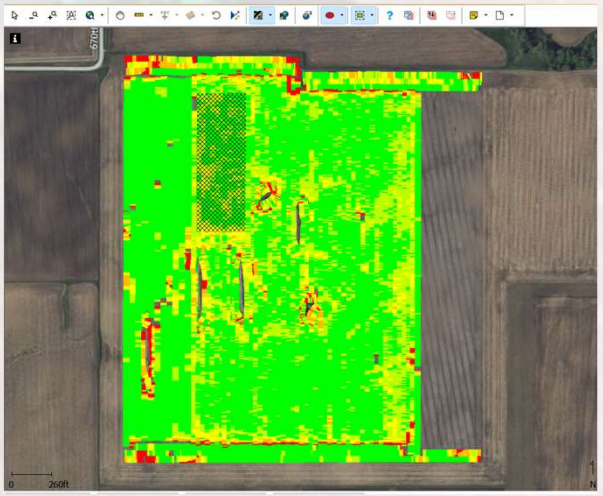
Harvest 2023 Example

Wet		Dry		Moisture Difference	Yield Difference	% Loss (Dry Yld Loss/Pt of Field Dry)
Moisture	Yield	Moisture	Yield			
19.30	264.21	15.5	238.79	3.8	25.42	2.80%









Cashflow Analysis For The New Binsite

APH bu inc/yr	Acres	Basis/Carry Gain ($/Bu)	Storage Rental ($/Bu)	Price of Corn ($/Bu)	LOC Interest Rate (%)	Avg Length of Storage (Months)
1.8	2000	$0.40	$0.15	$5.00	8.50%	5.0

Year	APH	Total Bushels	Current Forced to Fall Market Bu	Basis/Carry Gain/(Loss)	Money Cost to Store	Storage to Rent	Rental Income	GH Advantage	Harvest Loss Advantage	Yearly Cashflow
2023	190.0	380,000	294,000	$117,600.00	($52,062.50)	20,000	$3,000.00	$7,980.00	$20,900.00	($45,175.59)
2024	191.8	383,600	297,600	$119,040.00	($52,700.00)	16,400	$2,460.00	$8,055.60	$21,098.00	($44,639.49)
2025	193.6	387,200	301,200	$120,480.00	($53,337.50)	12,800	$1,920.00	$8,131.20	$21,296.00	($44,103.39)
2026	195.4	390,800	304,800	$121,920.00	($53,975.00)	9,200	$1,380.00	$8,206.80	$21,494.00	($43,567.29)
2027	197.2	394,400	308,400	$123,360.00	($54,612.50)	5,600	$840.00	$8,282.40	$21,692.00	($43,031.19)
2028	199.0	398,000	312,000	$124,800.00	($55,250.00)	2,000	$300.00	$8,358.00	$21,890.00	($42,495.09)
2029	200.8	401,600	315,600	$126,240.00	($55,887.50)	0	$0.00	$8,433.60	$22,088.00	($41,718.99)
2030	202.6	405,200	319,200	$127,680.00	($56,525.00)	0	$0.00	$8,509.20	$22,286.00	($40,642.89)
2031	204.4	408,800	322,800	$129,120.00	($57,162.50)	0	$0.00	$8,584.80	$22,484.00	($39,566.79)
2032	206.2	412,400	326,400	$130,560.00	($57,800.00)	0	$0.00	$8,660.40	$22,682.00	($38,490.69)
2033	208.0	416,000	330,000	$132,000.00	($58,437.50)	0	$0.00	$8,736.00	$22,880.00	($37,414.59)
2034	209.8	419,600	333,600	$133,440.00	($59,075.00)	0	$0.00	$8,811.60	$23,078.00	($36,338.49)
2035	211.6	423,200	337,200	$134,880.00	($59,712.50)	0	$0.00	$8,887.20	$23,276.00	($35,262.39)
2036	213.4	426,800	340,800	$136,320.00	($60,350.00)	0	$0.00	$8,962.80	$23,474.00	($34,186.29)
2037	215.2	430,400	344,400	$137,760.00	($60,987.50)	0	$0.00	$9,038.40	$23,672.00	($33,110.19)
2038	217.0	434,000	348,000	$139,200.00	($61,625.00)	0	$0.00	$9,114.00	$23,870.00	($32,034.09)
2039	218.8	437,600	351,600	$140,640.00	($62,262.50)	0	$0.00	$9,189.60	$24,068.00	($30,957.99)
2040	220.6	441,200	355,200	$142,080.00	($62,900.00)	0	$0.00	$9,265.20	$24,266.00	($29,881.89)
2041	222.4	444,800	358,800	$143,520.00	($63,537.50)	0	$0.00	$9,340.80	$24,464.00	($28,805.79)
2042	224.2	448,400	362,400	$144,960.00	($64,175.00)	0	$0.00	$9,416.40	$24,662.00	($27,729.69)
2043	226.0	452,000	366,000	$146,400.00	($64,812.50)	0	$0.00	$9,492.00	$24,860.00	($26,653.59)
2044	227.8	455,600	369,600	$147,840.00	($65,450.00)	0	$0.00	$9,567.60	$25,058.00	$117,015.60
2045	229.6	459,200	373,200	$149,280.00	($66,087.50)	0	$0.00	$9,643.20	$25,256.00	$118,091.70
2046	231.4	462,800	376,800	$150,720.00	($66,725.00)	0	$0.00	$9,718.80	$25,454.00	$119,167.80
2047	233.2	466,400	380,400	$152,160.00	($67,362.50)	0	$0.00	$9,794.40	$25,652.00	$120,243.90
2048	235.0	470,000	384,000	$153,600.00	($68,000.00)	0	$0.00	$9,870.00	$25,850.00	$121,320.00
2049	236.8	473,600	387,600	$155,040.00	($68,637.50)	0	$0.00	$9,945.60	$26,048.00	$122,396.10
2050	238.6	477,200	391,200	$156,480.00	($69,275.00)	0	$0.00	$10,021.20	$26,246.00	$123,472.20
2051	240.4	480,800	394,800	$157,920.00	($69,912.50)	0	$0.00	$10,096.80	$26,444.00	$124,548.30
2052	242.2	484,400	398,400	$159,360.00	($70,550.00)	0	$0.00	$10,172.40	$26,642.00	$125,624.40
2053	244.0	488,000	402,000	$160,000.00	($70,833.33)	0	$0.00	$10,248.00	$26,840.00	$126,254.67
				$4,314,400.00	($1,910,020.83)		$9,900.00	$282,534.00	$739,970.00	

Loan Workspace

Principal	$1,400,000
Years	20
Rate	8.00%
Yearly Payment	**$142,593.09**
Total Loan Cost	**$2,851,861.85**
Interest	**$1,451,861.85**

Changes Workspace

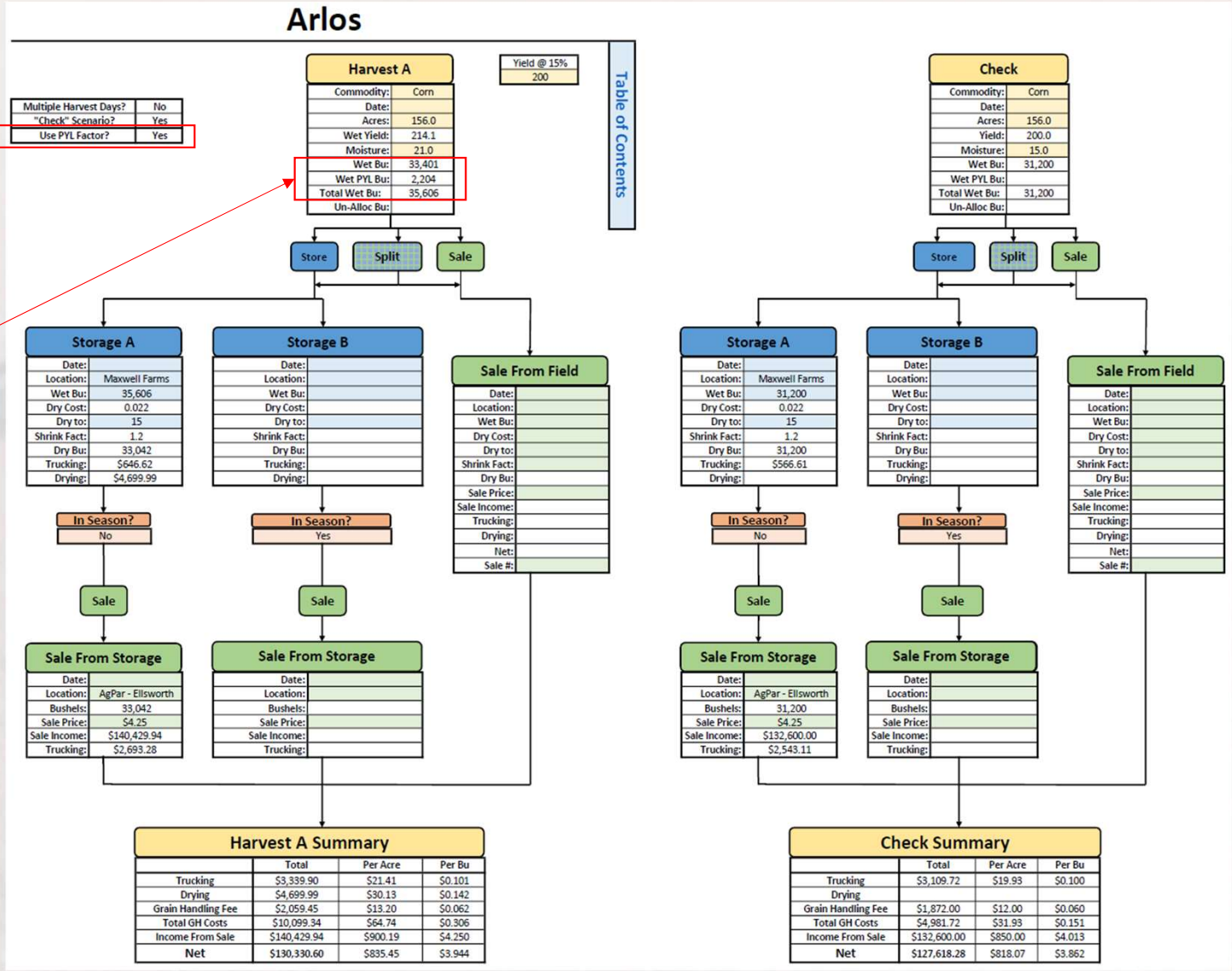
	Current	Proposed Add
Storage	86,000	400,000
Grain Handling/Bu	$0.236	$0.215
Avg Harvest Moisture	20.0	21.0

30 Year Investment

Total Loan Cost	($2,851,861.85)
Opp Cost Recovery	$4,314,400.00
Rental Income	$9,900.00
Storage cost of Money	($1,910,020.83)
GH Advantage	$282,534.00
Harvest Loss Advantage	$739,970.00
Net:	**$584,921.32**

By eliminating the bottleneck and inefficiencies of the current binsite we feel that we can increase our average harvest moisture by at least 1%, thus capturing a "PYL" Advantage

Another area where we incorporate the PYL factor is within our grain handling/movement analysis tool. This tool allows us to do side by side comparisons of grain movement strategies. Having the option to incorporate our PYL factor brings visual transparency to justify, in this case, the $30.13/A drying cost.



The Big Picture

The graph on the right* is an illustration of how increasing your average farm moisture incrementally can increase your revenue. As operations strive for efficiency, it is our belief that "PYL" highlights the benefits that come from operational efficiency beyond lowering expenses.

*The chart uses the following constants for its calculations

- "PYL"=1.1% dry yield loss/pt of field dry
- 200 bu/A Corn
- $4.25/bu
- Drying cost of $.022/pt