Grain Delivery Comparison Model

This program aids users in comparing net revenues associated with delivering grain to three different locations. This tool also computes the chance of obtaining prices above breakeven prices and the probability of receiving certain cash prices.

The Grain Delivery program allows users to enter data for three elevators pertaining to storage, drying, and shrink schedules.

The Report on Revenue from Delivery Alternatives section compares net proceeds of grain to three delivery points. The alternative with the highest "Net Revenue" is generally regarded as the most economical delivery point.

The information needed to run this program includes:

- Grain storage costs
- Grain drying costs
- Moisture/shrink factors
- Prices from the Chicago Board of Trade (www.cbot.com)

Program Buttons

About Opens a screen that provides a brief description of the program.

Print Allows the user to print the input and report sections of the program.

Help Opens a screen that briefly explains each section on the main page.

Price Module>> Takes the user to the Project Price Module of the tool.

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Input Sections
All required input information is in blue font with a yellow background.

Grain for Delivery
The box below requests information describing the delivered grain.

Grain for Delivery

Wet bushels for delivery:	1,000	
Delivery moisture level:	24.0%	
Interest rate:	8%	**Yr:**
Month of delivery:	Oct	2004
Current cash price:	$1.85	

Wet bushels for delivery equals the number of bushels that will be delivered. This value should be in wet bushels at the moisture level indicated in the "Delivery moisture level" input. In the box above, 1,000 bushels of corn is delivered.

Delivery moisture level gives the moisture level of the delivered grain. In the example, the 1,000 bushels delivered is testing at 24% moisture.

Interest rate is used to calculate storage costs. If grain storage is debt financed, the interest rate on the loan is an appropriate entry. A rate of return on a bank savings account or other investment accounts in which proceeds from grain sales will be placed is appropriate when grain storage is not debt financed. The interest rate used for this example is 8%.

Month of delivery states the month in which the grain is delivered. In the example, the 1,000 bushels are delivered in October.

Current cash price is used to calculate the breakeven price in the report section. This entry should be in dry bushels. This example uses a "Current cash price" of $1.85.

Inputs for Alternative Delivery Points
Inputs in this section describe three grain delivery points. Each column lists a delivery alternative. Entries are made for each alternative.

Input for Alternative Delivery Points

Name of delivery point	Elevator 1	Elevator 1	Elevator 2
Month of grain sale (End of mo.)	On Delivery	Sep	Jan
Sales price ($/bu.)	$1.85	$2.35	$2.25
Moisture/shrink factors			
Shrink factor:	1.4	1.4	1.4
Handling shrink:	0.0%	0.0%	0.0%
Cash sale moisture level:	15.0%	15.0%	15.0%
Storage moisture level:	Inputs Do Not Apply	15.0%	14.0%
Pay drying to storage moist?:		Yes	Yes
Transportation costs			
Cost per wet bu:	$0.06	$0.06	$0.07
Drying costs			
Based on wet or dry bu.	Wet	Wet	Wet
Charges vary by moisture level:	Yes	Yes	Yes
Drying charges ($ per point):	Schedule	Schedule	Schedule
Storage costs			
Drop charges ($/bu.):	Inputs Do Not Apply	$0.00	$0.13
Monthly storage charge begins in:		Oct	Jan
Monthly storage costs ($/bu.):		$0.0250	$0.0225

Name of delivery point identifies the location the grain is delivered to. The example above lists two locations: Elevator 1 and Elevator 2.

Month of grain sale indicates the month in which the grain is sold. Selecting “On Delivery” means that grain is sold immediately, no storage costs are incurred, and grain is dried to the “Cash sale moisture level”. Entries of months mean that grain is stored for later sale, storage costs are incurred, and grain is dried to the “Storage moisture level”.

In the example, entries for Elevator 1 show sale of grain on delivery (column one) and sale of grain in September (column two). The third column shows inputs for Elevator 2 where grain is sold in January.

Sales price indicates the sales price of the grain. The example shows Elevator 1 paying $1.85 on delivery and $2.35 for selling in September. Elevator 2 pays $2.25 for grain sold in January.

Moisture/Shrink Factors

Shrink factor is used to calculate dry bushels. In the example, both elevators use a shrink factor of 1.4.

Handling shrink is shrink based on gross bushels. Handling shrink for both locations is zero percent.

Cash sales moisture level states the moisture level grain is dried to when it is sold on delivery. The example shows that grain sold on delivery is dried to 15%.

Storage moisture level states the moisture level grain is dried to when it is stored. To indicate grain is stored, select a month in the "Month of grain sale" input. In the example, the two elevators have different storage moisture levels. If grain is stored, Elevator 1 charges for drying grain to 15% while Elevator 2 uses a 14% moisture level. This input does not apply to column 1 because grain is sold on delivery.

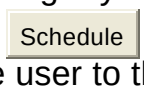
Pay drying to storage moisture level applies when grain is stored. An entry of "Yes" indicates that drying charges apply to the storage moisture level, which is the case for both delivery alternatives. This input does not apply to column 1 because grain is sold on delivery.

Transportation Costs

Transportation cost per wet bushel is used to calculate transportation costs. Transportation costs equal cost per wet bushel multiplied by the number of wet bushels. In this example, transportation costs are $.06 per wet bushel for delivering grain to Elevator 1 and $.07 per wet bushel for delivery to Elevator 2.

Drying Costs

Drying costs based on wet or dry bushels can refer to either wet bushels or dry bushels. If "Wet" is selected, wet bushels are multiplied by per bushel costs to determine total drying costs. If "Dry" is chosen, dry bushels are multiplied by per bushel costs to determine total drying costs. In the scenario on the previous page, drying costs are calculated based on wet bushels.

Charges vary by moisture level is a "Yes" or "No" entry. "Yes" means that a schedule must be completed indicating drying charges by different moisture levels. When "Yes" is selected, the 

button appears directly below this input. Pressing the button takes the user to the Drying Schedule (graphic on following page) where drying charges are entered. If "No" is selected, the "Drying charge" input (next entry to be described) must be completed.

As seen in the example below, because the two elevators charge different amounts for drying depending on moisture level, the user as chosen to enter the drying charges in the Drying Schedule for both elevators.

Return

Drying Schedule

Enter drying charge per percentage point between the moisture level indicated in the "Moisture Level Range" columns. Levels in the "Moisiture Level Range" columns can also be modified.

Moisture Level Range		Drying Charge per Point ($ per bu)		
Low	High	Elevator 1	Elevator 1	Elevator 2
14.0%	15.0%	0.0250	0.0250	0.0275
15.0%	16.0%	0.0250	0.0250	0.0275
16.0%	17.0%	0.0250	0.0250	0.0275
17.0%	18.0%	0.0250	0.0250	0.0275
18.0%	18.5%	0.0250	0.0250	0.0200
18.5%	19.0%	0.0250	0.0250	0.0200
19.0%	19.5%	0.0250	0.0250	0.0200
19.5%	20.0%	0.0250	0.0250	0.0200
20.0%	20.5%	0.0250	0.0250	0.0200
20.5%	21.0%	0.0250	0.0250	0.0200
21.0%	21.5%	0.0250	0.0250	0.0200
21.5%	22.0%	0.0200	0.0200	0.0200
22.0%	22.5%	0.0200	0.0200	0.0200
22.5%	23.0%	0.0200	0.0200	0.0200
23.0%	23.5%	0.0200	0.0200	0.0150
23.5%	24.0%	0.0200	0.0200	0.0150
24.0%	24.5%	0.0200	0.0200	0.0150
24.5%	25.0%	0.0200	0.0200	0.0150
25.0%	25.5%	0.0200	0.0200	0.0150
25.5%	26.0%	0.0200	0.0200	0.0150
26.0%	26.5%	0.0200	0.0200	0.0150

The Drying Schedule states that Elevator 1 charges $.025 per percentage point to dry grain between 14% and 21.5% moisture levels and $.02 per point above 21.5%. Elevator 2 charges $.0275 per point for moisture levels between 14% and 18%, $.02 per point between 18% and 23%, and $.015 per point for moisture levels above 23%.

Drying charges states the cost of drying grain. Drying charges are reported on a per percentage point basis. For example, an entry of $.03 means that it costs $.03 per percentage point to dry grain. Drying grain from 20% moisture to 15% moisture means that grain is dried 5 points and would cost $.15 per bushel given that the drying charge is $.03 per point (5 points x $.03 per point = $.15).

Storage Costs

Note that storage costs do not apply to column one because grain is sold on delivery at Elevator 1.

Drop charges are incurred when grain is stored. This amount is applied as a per bushel cost no matter how long the grain is stored. Drop charges apply whenever a month is selected in the "Month of grain sale" input. In this example, Elevator 1 does not charge for placing grain in storage, while Elevator 2 charges $.13 per bushel for storing grain.

Monthly storage charges begin in states the month storage charges begin. The example shows that storage charges for Elevator 1 begin in October and storage charges for Elevator 2 start in January.

Monthly storage costs states the per dry bushel costs for storing grain. In the example, Elevator 1 charges $.025/bushel for each month grain is stored and Elevator 2 charges $.0225/bushel per month for storing grain in January and beyond.

Report on Revenue from Delivery Alternatives

Based on the input information given in the previous pages, the tool compares the three delivery alternatives in the below report.

Report on Revenue from Delivery Alternatives			
	Elevator 1	Elevator 1	Elevator 2
Wet bushels delivered	1,000.0	1,000.0	1,000.0
Dry bushels sold	874.0	874.0	860.0
Revenue from sales	$1,616.90	$2,053.90	$1,935.00
Projected costs			
Transportation	$60.00	$60.00	$70.00
Drying	212.50	212.50	225.00
Storage	0.00	262.20	131.15
Interest	0.00	129.35	43.12
Total costs	$272.50	$664.05	$469.27
Net revenue	$1,344.40	$1,389.85	$1,465.73
Net revenue per wet bu.	$1.34	$1.39	$1.47
Net revenue per dry bu.	$1.54	$1.59	$1.70
Price to break-even with a $1.85 sale at delivery:	NA	$2.30-Sep	$2.11-Jan

Wet bushels delivered states the number of bushels delivered. This number is taken from the "Wet bushels for delivery" input in the Grain for Delivery section.

Dry bushels sold states the number of bushels sold. Dry bushels sold equals Wet bushels for delivery x (1 – (Delivery moisture level – Dry moisture level) x Shrink factor) – Wet bushels for delivery x Handling shrink. The "Dry moisture level" equals "Cash sale moisture level" when grain is sold on delivery or equals the "Storage moisture level" when grain is sold later.

In the example above, Elevator 1 has a higher number of bushels sold (874 bushels) compared to Elevator 2 (860 bushels) because Elevator 2 shrinks the bushels to a lower moisture level (15% for Elevator 1 compared to 14% for Elevator 2).

Revenue from sales equal "Dry bushels sold" multiplied by "Sales price". In the example, selling grain on delivery to Elevator 1 yields revenue of $1,616.90 while storing the grain to sell in September earns revenue of $2,053.90. Selling grain at Elevator 2 in January grosses $1,935 in revenue.

Projected Costs

Transportation costs equal "Transportation costs per wet bushel" multiplied by "Wet bushels for delivery". The example shows that transportation costs for delivering grain to Elevator 1 is $60 and to Elevator 2 is $70.

Drying costs equal Wet or Dry bushels x (Delivery moisture level – Dry moisture level) x Drying charge x 100 when drying charges do not vary by moisture level. "Wet or Dry bushels" will be wet bushels if "Wet" is selected in the "Based on wet or dry bushels" input. Otherwise, dry bushels are used. When drying costs vary by moisture level, drying charges are calculated using the input from the Drying Schedule. The "Dry moisture level" equals the "Storage moisture level" when grain is stored and the "Pay drying to storage moisture" input equals "Yes". Otherwise, the "Dry moisture level" equals the "Cash sale moisture level".

In the example, drying costs for Elevator 1 are $212.50 for both on delivery sale and January sale. Drying costs for Elevator 2 are $225.

Storage costs are incurred when grain is not sold on delivery. Storage costs equal Dry bushels sold x (Drop charge + Monthly storage costs x Months of storage). "Months of storage" equal the months between the "Month of grain sale" input minus "Monthly storage charge begins in" input.

The example shows that for grain sold in September, storage costs for Elevator 1 are $262.20 and storage costs for Elevator 2 are $131.15.

Interest costs equal Current cash price x Interest rate x Months of storage x Dry bushels sold. “Months of storage” are from delivery to “Month of grain sale”. Interest cost for Elevator 1 is $129.35 and for Elevator 2 is $43.12.

Total costs states the total costs for delivering and storing (if necessary) grain at all three alternatives. Total costs for selling grain on delivery at Elevator 1 are $272.50, while total costs for storing grain to sell in September at this location equal $664.05. Elevator 2 incurs total costs of $469.27 for storing grain until January.

Net revenue equals “Revenue from sales” minus “Total costs”. Choosing the alternative with the highest net revenue maximizes net proceeds from the three alternatives. In this example, storing grain in Elevator 2 until selling in January is the most preferred alternative because it has the highest net revenue.

Net revenue per wet bushels equals “Net revenue” divided by “Wet bushels delivered”. In the example, “Net revenue per wet bushels” for selling grain on delivery at Elevator 1 is $1.34 per wet bushel.

Net revenue per dry bushels equals “Net revenue” divided by “Dry bushels sold”. This value is $1.54 per dry bushel for selling grain on delivery at Elevator 1.

Price to break-even is calculated when the grain is not sold on delivery. Hence, this figure is not available for column one where grain is sold on delivery at Elevator 1. “Price to break-even” is the sales price needed to receive the same “Net revenue” from storage as from a sale at harvest at the “Current cash price”.

In the example, at least $2.30 per bushel must be received from Elevator 1 in September to have the same or higher revenue as selling grain in October for $1.85 per bushel. A $2.11 per bushel price is required to break even when selling in January at Elevator 2.

The below table lists monthly breakeven sales prices required to generate the same net revenue from storing grain as from selling the grain at harvest for the current cash price. Evaluating the table reveals that the user can tolerate a smaller breakeven price for Elevator 1 if the grain is sold sooner. A similar conclusion is drawn from Elevator 2. Thus, this analysis allows the user to determine the sales price needed to break even if considering selling grain between harvest and the intended sales month.

Break-Even Prices by Month	**Elevator 1**	**Elevator 1**	**Elevator 2**
October-04	NA	$1.89	$2.05
November-04	NA	$1.92	$2.07
December-04	NA	$1.96	$2.08
January-05	NA	$2.00	$2.11
February-05	NA	$2.04	$2.15
March-05	NA	$2.07	$2.18
April-05	NA	$2.11	$2.22
May-05	NA	$2.15	$2.25
June-05	NA	$2.19	$2.29
July-05	NA	$2.22	$2.32
August-05	NA	$2.26	$2.36
September-05	NA	$2.30	$2.40

Projected Price Module

This component of the program calculates expected cash prices for stored crops and compares them with breakeven prices. This tool also uses futures prices to estimate cash prices in future months. The projected price equals that month's futures price minus the basis. The probability data are generated using options prices and a Black-Scholes option-pricing model. The below input screen computes future cash prices for corn.

Date : 10/1/2004
Crop: corn
Default basis $0.25

Enter current futures prices for the following Chicago Board of Trade futures contracts:

Contract month	Futures Price	Basis	Expected Price
Dec-04	$1.95	$0.25	$1.70
Mar-05	$2.04	$0.25	$1.79
May-05	$2.11	$0.25	$1.86
Jul-05	$2.19	$0.25	$1.94
Sep-05	$2.26	$0.25	$2.01

Enter put option premium for the following Chicago Board of Trade put option contracts:

Contract month	Strike Price	Put Premium
Dec-04	$1.90	$0.01
Mar-05	$2.00	$0.05
May-05	$2.10	$0.09
Jul-05	$2.10	$0.09
Sep-05	$2.20	$0.13

The following is a brief explanation of inputs asked by the screen on the previous page.

Crop
Select the grain stored for this analysis: corn or soybeans.

Basis
The basis is the estimated difference between a futures contract price and an expected cash price. For example, if the expected cash price for corn on December 1 is $2.00 per bushel and today's December futures contract is $2.10 per bushel, the basis is calculated by subtracting the expected cash price from the futures price: $2.10 - $2.00 = $.10. The input screen on the previous page shows a basis of $.25 because this user believes that on December 1 the cash price will be $1.70 per bushel while today's December futures contract is trading for $1.95 per bushel ($1.95 - $1.70 = $.25).

Futures Prices
Futures contract prices can be found at the Chicago Board of Trade website (www.cbot.com). They serve as estimates for the cash price for the month of the contract. *Enter today's current prices. Do not use the default prices as these correspond only to the example provided.*

Put Premiums
The put premiums are taken from the Chicago Board of Trade. The "Strike Price" is calculated from data entered. These premiums are used to estimate the variability of prices. *Be sure to enter current put premiums. Do not use the default put premiums as these correspond only to the example.*

Projected and Breakeven Prices
The table below estimates the expected profitability and risk of each of the three grain delivery alternatives. The below table provides data for Elevator 1, sale on delivery option. Click on the Elevator 1 box in the upper left corner of the table to select a different alternative to examine.

PROJECTED AND BREAKEVEN PRICES

Elevator 1

Month	Expected Price	Breakeven Price	Expected Profit *	Percent Time Price Will Be Below Breakeven Price
Dec-04	$1.70	$1.85	-$0.15	98%
Mar-05	$1.79	$1.85	-$0.06	65%
May-05	$1.86	$1.85	$0.01	51%
Jul-05	$1.94	$1.85	$0.09	43%
Sep-05	$2.01	$1.85	$0.16	39%

* Expected profit equals expected price minus breakeven price (per bu.).

The Projected and Breakeven Prices table is comprised of five columns:

1) Month: Sales month analyzed.

2) Expected Price: The expected cash price estimated by the model.

3) Breakeven Price: The sales price needed to receive the same net revenue from storage as from a sale at harvest at the current cash price.

4) Expected Profit: Equals the expected price minus the breakeven price. A positive value signifies that the expected price is greater than the breakeven price and a negative expected profit indicates that the expected price is less than the breakeven price.

5) Percent Time Price Will Be Below Breakeven Price: Estimates the likelihood that the cash price will be less than the breakeven price. The higher the probability, the greater the risk of receiving a cash price below the breakeven price.

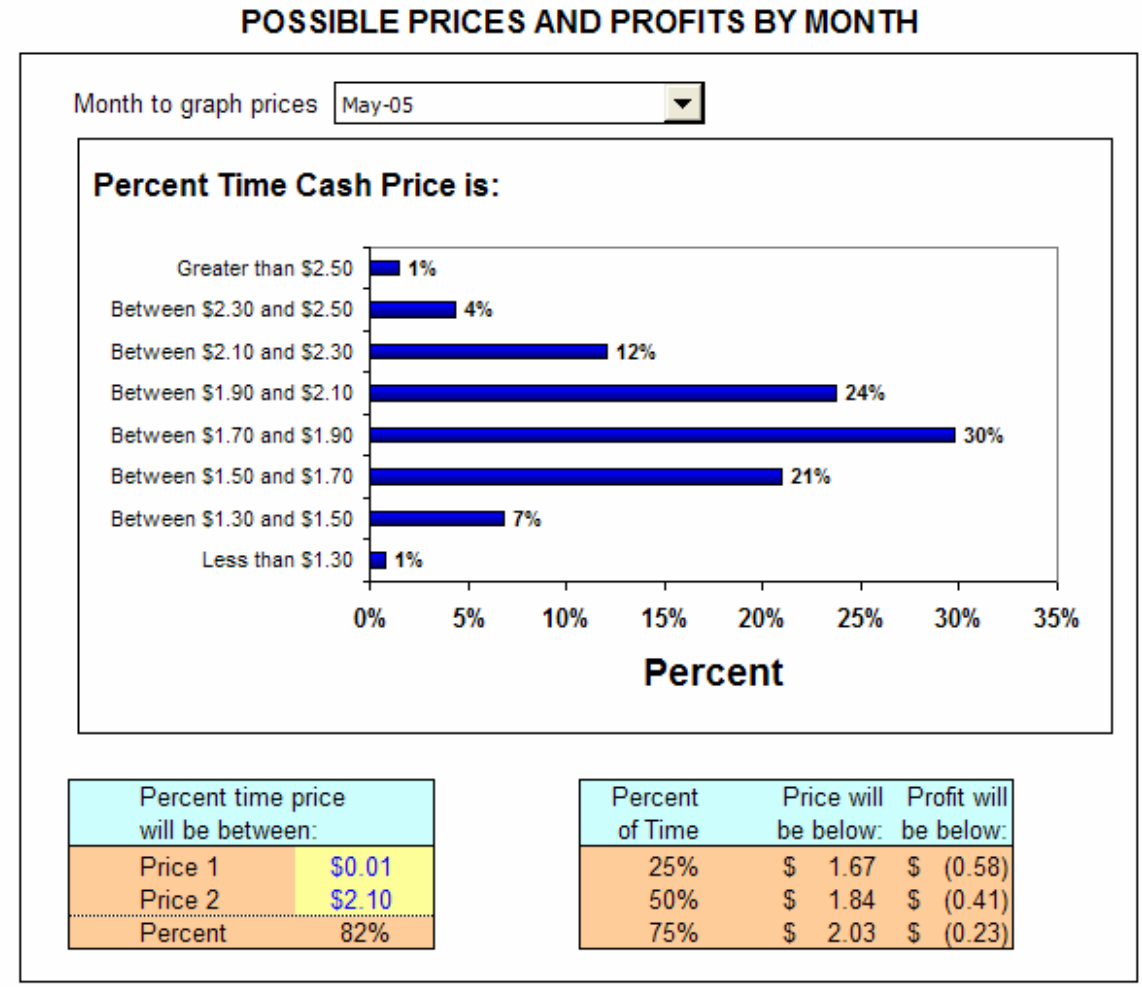
The example on the previous page assesses transporting grain to Elevator 1 and selling it upon delivery. The tool estimates the expected price in December 2004 at $1.70, while the breakeven price is $1.85. A -$.15 expected profit per bushel exists for December 2004 with a 98% chance that the cash price will be less than $1.85 in December 2004. In March 2005, the expected corn price is $1.79 with a breakeven price of $1.85. While a negative return is generated, only a 65% chance exists that the price will be below $1.85.

Possible Prices and Profits by Month

The chart on the following page estimates the likelihood of the average cash price for the month analyzed falling within a certain range. Clicking on the "Month to graph prices" drop-down box allows the user to select a different month. According to the model, there is a 1% chance that the average cash price for the month of May 2005 for corn will be higher than $2.50 per bushel and a 4% chance the average cash price will be between $2.20 and $2.30 per bushel.

The "Percent time price will be between" table, located in the lower left corner, estimates the probability of prices falling within the range of two selected prices in a chosen month. The probability (Percent) changes as prices are entered next to "Price 1" and "Price 2".

The table to the right estimates the likelihood that the cash price and profit will be below a certain price. The calculations change as "Price 1" and "Price 2" change.



Percent time price will be between:	
Price 1	$0.01
Price 2	$2.10
Percent	82%

Percent of Time	Price will be below:	Profit will be below:
25%	$ 1.67	$ (0.58)
50%	$ 1.84	$ (0.41)
75%	$ 2.03	$ (0.23)

The above chart reports a 30% chance that the average cash price for corn for May 2005 will be between $1.70 and $1.90. The “Percent time price will be between” table suggests there is an 82% likelihood of the May 2005 cash price being between $.01 and $2.10, while the table to the right indicates that 75% of the time the May 2005 cash price will be below $2.03 and profits will be less than -$.23 per bushel.