Capital Input Analysis 1

Last Updated: August 04, 2016; First Released: May 13, 2014)

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Version: DevTreks 2.0.0

A. Introduction

This reference explains how to start to collect, measure, and analyze, capital input cost data (**2***). DevTreks believes that every capital input, from the machinery used to grow crops to the x-ray machine used to diagnose bone breaks, has a story to tell and lessons to teach. Those lessons can only be learned when data about the input is collected, measured, aggregated, analyzed, explained, and stored in online knowledge banks. A full, uniform, and accurate accounting of the costs, benefits, and outcomes for capital investments made in tractors, robots, trucks, medical equipment, sewing machines, and cloud computing servers, should be one or two links away for everyone. If a business owner, worker, government official, or citizen needs to make a decision involving capital inputs, they should have ready access to the best data and advice available. This reference introduces another DevTreks way to build these types of knowledge banks.

B. Data

The *Ag Production Analysis 1*, *Construction Analysis 1, and Health Care Analysis 1* tutorials demonstrate how capital input data can be structured to support the analyses shown in this reference. The actual data used in this analysis was structured for the purpose of testing these analyzers.

The Analyzers demonstrated in this reference can be found at:

> https://www.devtreks.org/agtreks/preview/crops/linkedviewgroup/Machinery Analyzer Group/19/none/

This reference used the cloud deployment (Version 2.0.0) to document calculations.

C. Work Breakdown Structure (WBS) and Calculator Rules

DevTreks recommends classifying all data using Work Breakdown Structures. In addition, networks or clubs should establish standard rules for members to follow explaining how to manage capital input datasets. Those rules include guidance about setting calculator properties such as interest rates, horsepower, capacity options, energy prices, and labor use. The goal of the rules is to support the uniform aggregation and analysis of capital input data. Networks and clubs should provide written documentation and videos to their members explaining the rules.

D. Capital Input Calculations

The *Capital Input Calculators 1* reference documents the Input calculations that will be aggregated and analyzed in this reference (**3***). Separate analyzers are available for the base elements found in Operations, Components, Operating Budgets, and Capital Budgets. The *Calculator and Analyzer 1* reference documents how all DevTreks' Analyzers work. The Calculator Type property of analyzers is used to specify the capital input calculations to analyze. The current version supports the following calculators:

Agricultural Machinery Calculator: This calculator supports the analysis of agricultural and machinery capital inputs. Operating costs calculated by this calculator include fuel, lube, repair, and labor. Allocated overhead costs calculated by this calculator include capital recovery and taxes, housing, and insurance. As explained in the next section, this calculator ignores manual OCAmount and AOHAmount data entries. Even so, the quality of the base element data appears neater by setting these values equal to the calculated amounts.

NPV Joint Machinery Calculations: The *Capital Input 1 Calculator* reference explains that when power and nonpower machinery inputs are combined in an Operation or Component, and Net Present Value (NPV) Calculators are run, new machinery calculations are generated. The following images display the results of running separate input machinery calculations for a tractor and a chisel plow. Note the individual differences in area, fuel, labor, width, field efficiency, and horsepower properties.

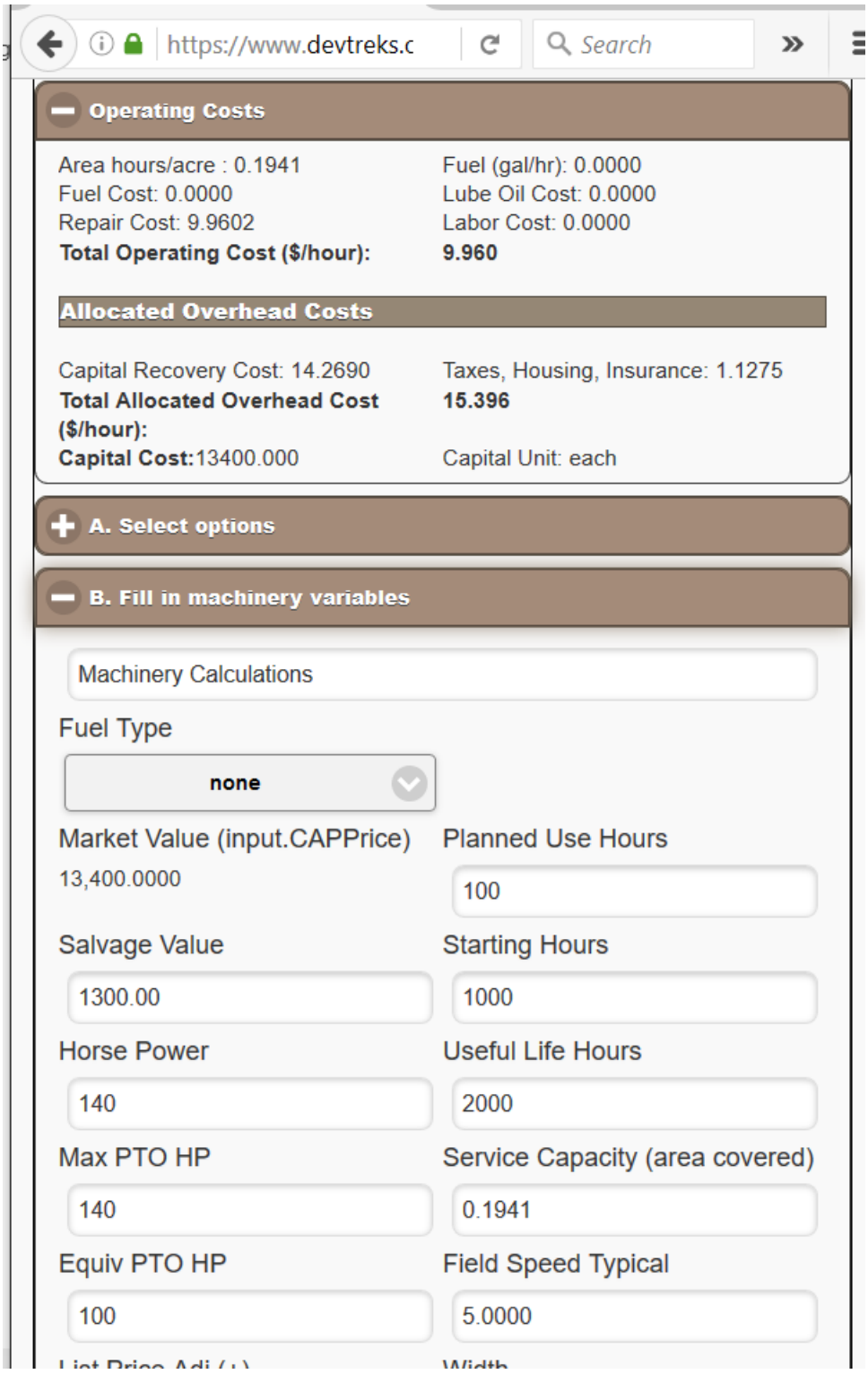
URLs:

https://www.devtreks.org/agtreks/preview/crops/inputseries/2002 Tractor, 4-Wheel Drive, 200-280 PTO HP/2147377908/none

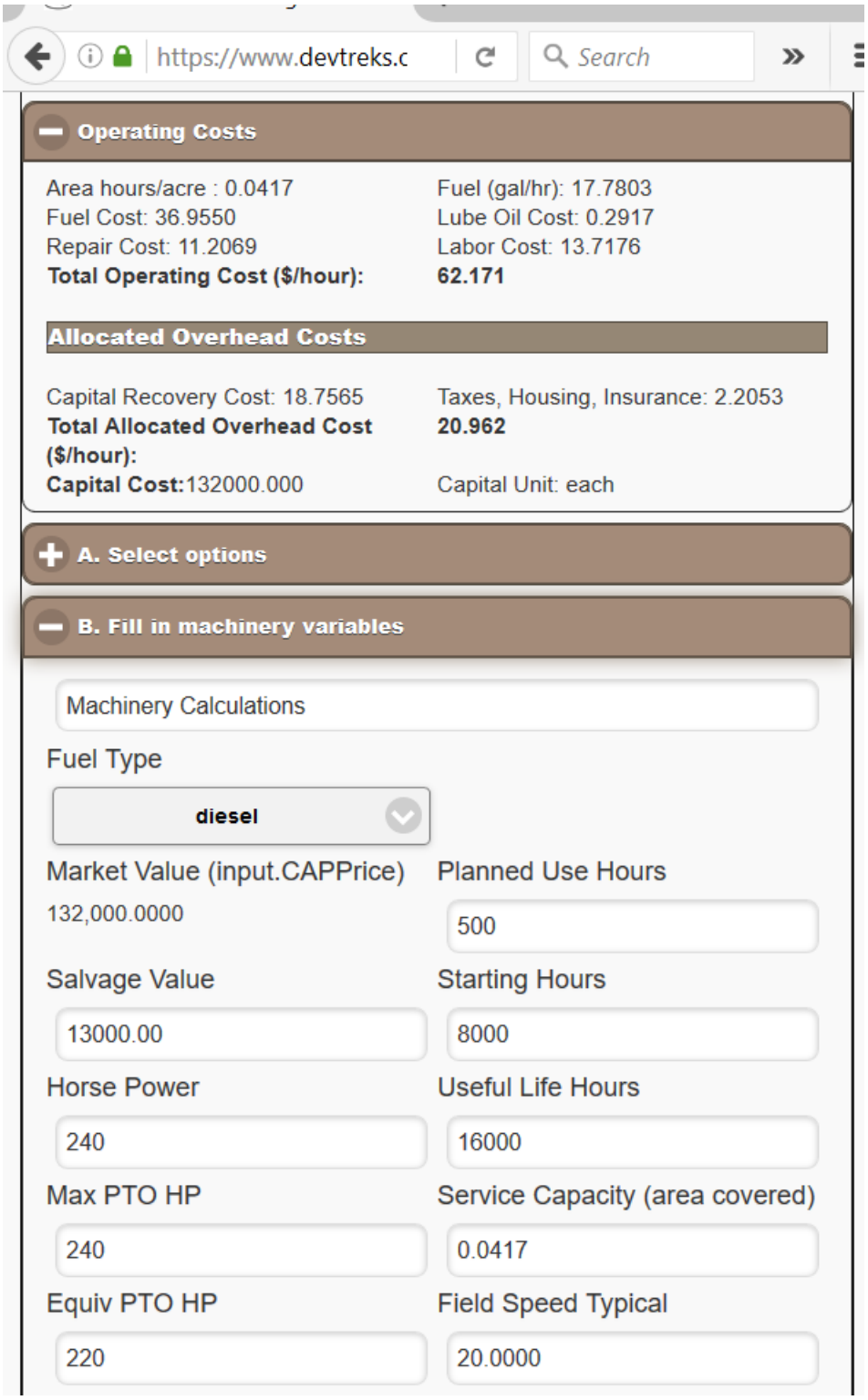
https://www.devtreks.org/agtreks/preview/crops/inputseries/2002 Chisel Plow, Maximum 1 foot depth, Chisel or Sweep Type, Drawn or Moun/2147377820/none

https://www.devtreks.org/agtreks/preview/crops/operation/Tillage, First, 2003, Chisel Plow, NASS machinery/2091544565/none

Chisel Plow

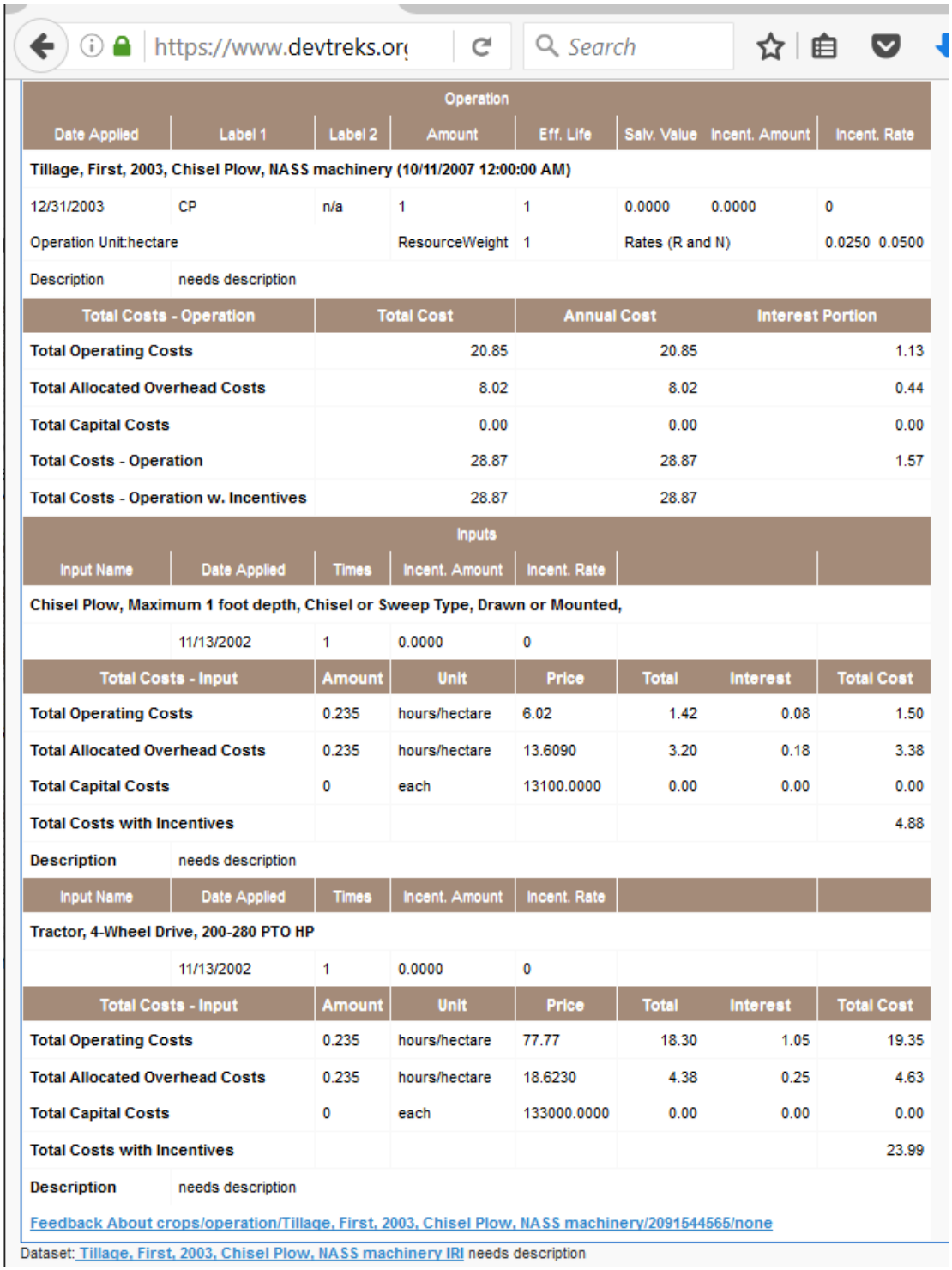

https://www.devtreks.c
Search
Operating Costs
Area hours/acre : 0.1941
Fuel (gal/hr): 0.0000
Fuel Cost: 0.0000
Lube Oil Cost: 0.0000
Repair Cost: 9.9602
Labor Cost: 0.0000
Total Operating Cost ($/hour): 9.960
Allocated Overhead Costs
Capital Recovery Cost: 14.2690
Taxes, Housing, Insurance: 1.1275
Total Allocated Overhead Cost ($/hour): 15.396
Capital Cost:13400.000
Capital Unit: each
A. Select options
B. Fill in machinery variables
Machinery Calculations
Fuel Type
none
Market Value (input.CAPPrice)
13,400.0000
Planned Use Hours
100
Salvage Value
1300.00
Starting Hours
1000
Horse Power
140
Useful Life Hours
2000
Max PTO HP
140
Service Capacity (area covered)
0.1941
Equiv PTO HP
100
Field Speed Typical
5.0000

Tractor


https://www.devtreks.c
Search
Operating Costs
Area hours/acre : 0.0417
Fuel (gal/hr): 17.7803
Fuel Cost: 36.9550
Lube Oil Cost: 0.2917
Repair Cost: 11.2069
Labor Cost: 13.7176
Total Operating Cost ($/hour): 62.171
Allocated Overhead Costs
Capital Recovery Cost: 18.7565
Taxes, Housing, Insurance: 2.2053
Total Allocated Overhead Cost ($/hour): 20.962
Capital Cost:132000.000
Capital Unit: each
A. Select options
B. Fill in machinery variables
Machinery Calculations
Fuel Type
diesel
Market Value (input.CAPPrice)
132,000.0000
Planned Use Hours
500
Salvage Value
13000.00
Starting Hours
8000
Horse Power
240
Useful Life Hours
16000
Max PTO HP
240
Service Capacity (area covered)
0.0417
Equiv PTO HP
220
Field Speed Typical
20.0000

The following image displays the results of running a NPV Calculator for an Operation that combines the two inputs. Both inputs now have the same OCAmounts and AOHAmounts that reflect joint calculations. The joint calculations also changed all OCPrices and AOHPrices. The prices that change depend on the base calculation parameters. The implement's width, field efficiency, and equivalent horsepower, and the tractor's maximum horsepower were used in the joint calculations.

Chisel Plow Operation



https://www.devtreks.org Search

Operation							
Date Applied	Label 1	Label 2	Amount	Eff. Life	Salv. Value	Incent. Amount	Incent. Rate
Tillage, First, 2003, Chisel Plow, NASS machinery (10/11/2007 12:00:00 AM)							
12/31/2003	CP	n/a	1	1	0.0000	0.0000	0
Operation Unit:hectare			ResourceWeight	1	Rates (R and N)		0.0250 0.0500
Description	needs description						

Total Costs - Operation	Total Cost	Annual Cost	Interest Portion
Total Operating Costs	20.85	20.85	1.13
Total Allocated Overhead Costs	8.02	8.02	0.44
Total Capital Costs	0.00	0.00	0.00
Total Costs - Operation	28.87	28.87	1.57
Total Costs - Operation w. Incentives	28.87	28.87	

Inputs							
Input Name	Date Applied	Times	Incent. Amount	Incent. Rate			
Chisel Plow, Maximum 1 foot depth, Chisel or Sweep Type, Drawn or Mounted,							
	11/13/2002	1	0.0000	0			

Total Costs - Input	Amount	Unit	Price	Total	Interest	Total Cost
Total Operating Costs	0.235	hours/hectare	6.02	1.42	0.08	1.50
Total Allocated Overhead Costs	0.235	hours/hectare	13.6090	3.20	0.18	3.38
Total Capital Costs	0	each	13100.0000	0.00	0.00	0.00
Total Costs with Incentives						4.88
Description	needs description					

Input Name	Date Applied	Times	Incent. Amount	Incent. Rate			
Tractor, 4-Wheel Drive, 200-280 PTO HP							
	11/13/2002	1	0.0000	0			

Total Costs - Input	Amount	Unit	Price	Total	Interest	Total Cost
Total Operating Costs	0.235	hours/hectare	77.77	18.30	1.05	19.35
Total Allocated Overhead Costs	0.235	hours/hectare	18.6230	4.38	0.25	4.63
Total Capital Costs	0	each	133000.0000	0.00	0.00	0.00
Total Costs with Incentives						23.99
Description	needs description					

Feedback About crops/operation/Tillage, First, 2003, Chisel Plow, NASS machinery/2091544565/none

Dataset: Tillage, First, 2003, Chisel Plow, NASS machinery IRI needs description

Irrigation Power Calculator: This calculator supports the analysis of irrigation power capital inputs. Operating costs calculated by this calculator include fuel, lube, repair, labor, and water.

Allocated overhead costs calculated by this calculator include capital recovery and taxes, housing, and insurance. This calculator is rerun when NPV calculators are run and will ignore manual OCAmount and AOHAmount data entries. Even so, the quality of the base element data appears neater by setting these values equal to the calculated amounts.

General Capital Calculator: This calculator supports the analysis of generic capital inputs. The operating costs calculated by this calculator include fuel, repair, and labor. Allocated overhead costs calculated by this calculator include capital recovery and taxes, housing, and insurance. This calculator is rerun when NPV calculators are run and will ignore manual OCAmount and AOHAmount data entries. Even so, the quality of the base element data appears neater by setting these values equal to the calculated amounts.

Timeliness Penalty Calculators: Step 2 of the Machinery Calculator can be used to set up to 5 feasible combination of machinery properties that can be to determine penalties for not completing machinery operations or components in a timely manner. Step 2 of NPV Operation or Component NPV Timeliness Penalty calculators must be used to set properties for calculating the timeliness penalty.

E. Multipliers

Machinery totals are multiplied by Input.Times, Operation.Amount, Component.Amount, and TimePeriod.Amount properties. This restores some of the customization taken away by not being able to manually change OCAmount or AOHAmount properties in some calculators.

F. Net Present Value (NPV) Calculators

With the exception of Input base elements, NPV calculators must be run prior to running capital input analyzers. The NPV calculated document contains the data that will be analyzed.

G. Capital Input Benefits

This reference does not explicitly include an analysis of capital input benefits (**2***). Instead, their benefits have to be indirectly inferred from the Outputs and Outcomes included in Operating and Capital Budgets.

H. Capital Input Analyses

The Analysis Type property of analyzers is used to specify the type of analysis to run. The current version supports the following analyses:

1. Totals Analysis

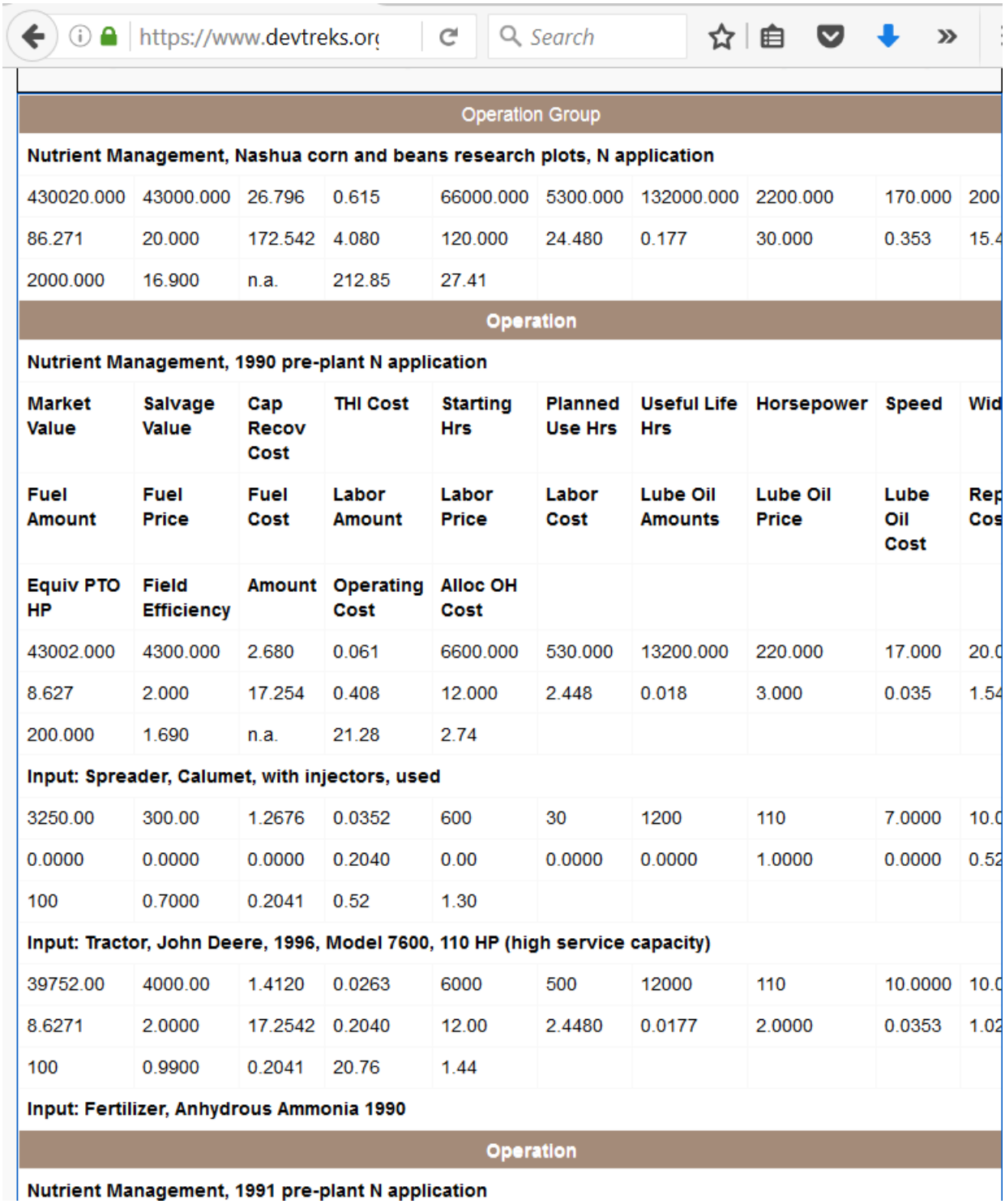
A *Totals Analysis* sums capital input calculations for every base element in an analysis. No *Aggregate Using* or *Compare Using* properties are offered in the analyzers because basic totals should be documented before more complicated types of analyses are run. All analyzers run this analysis for each aggregated base element before carrying out additional calculations. This analysis is available for the Machinery, Irrigation, and General Capital calculators. The Operating and Allocated Overhead total costs displayed in this calculator is a summation of the non-discounted individual costs calculated by the calculator.

The following Machinery *Totals* Operation Analysis displays typical results for agricultural machinery used in crop operations.

https://www.devtreks.org/agtreks/preview/crops/operationgroup/Nutrient Management, Nashua corn and beans research plots, N application/326/none

Note how the 10 crop operations in this example all have equal machinery costs. Also note how the Operation Group's costs verify that they are a summation of the 10 children machinery operations. This is likely to be an example of an expeditious, but not necessarily fully accurate, machinery analysis. The same machinery was used in each crop operation even though 10 years of crop operations are being analyzed. Networks need to provide thorough guidance about the data standards employed by their clubs. In general, high quality data does not employ

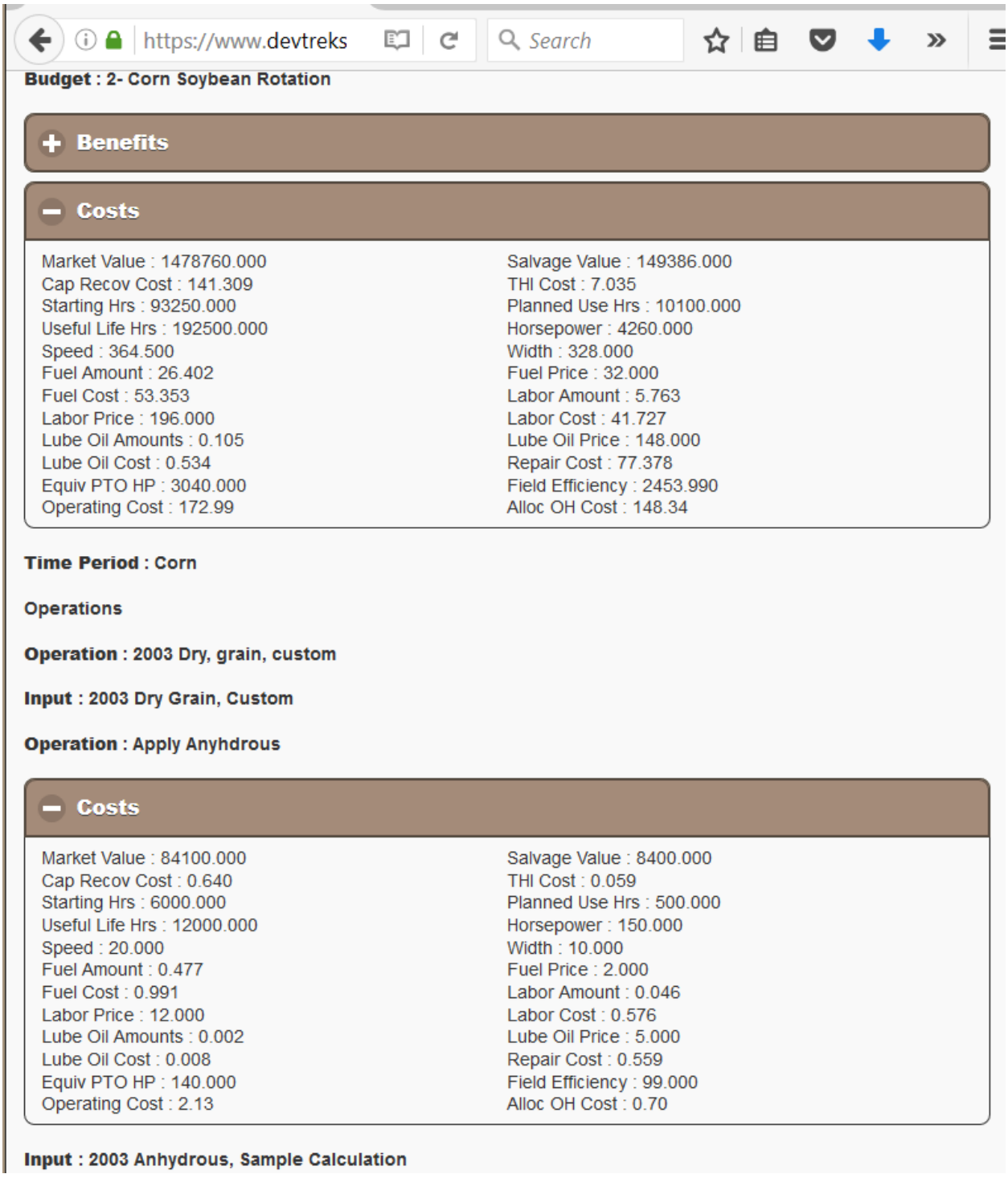
expeditious techniques. It might be forgiven in this example because 10 years of machinery data was simply not available and the analysis was mainly concerned about nutrient management, not machinery management.



Operation Group									
Nutrient Management, Nashua corn and beans research plots, N application									
430020.000	43000.000	26.796	0.615	66000.000	5300.000	132000.000	2200.000	170.000	200
86.271	20.000	172.542	4.080	120.000	24.480	0.177	30.000	0.353	15.4
2000.000	16.900	n.a.	212.85	27.41					
Operation									
Nutrient Management, 1990 pre-plant N application									
Market Value	**Salvage Value**	**Cap Recov Cost**	**THI Cost**	**Starting Hrs**	**Planned Use Hrs**	**Useful Life Hrs**	**Horsepower**	**Speed**	**Wid**
Fuel Amount	**Fuel Price**	**Fuel Cost**	**Labor Amount**	**Labor Price**	**Labor Cost**	**Lube Oil Amounts**	**Lube Oil Price**	**Lube Oil Cost**	**Rep Cos**
Equiv PTO HP	**Field Efficiency**	**Amount**	**Operating Cost**	**Alloc OH Cost**					
43002.000	4300.000	2.680	0.061	6600.000	530.000	13200.000	220.000	17.000	20.0
8.627	2.000	17.254	0.408	12.000	2.448	0.018	3.000	0.035	1.54
200.000	1.690	n.a.	21.28	2.74					
Input: Spreader, Calumet, with injectors, used									
3250.00	300.00	1.2676	0.0352	600	30	1200	110	7.0000	10.0
0.0000	0.0000	0.0000	0.2040	0.00	0.0000	0.0000	1.0000	0.0000	0.52
100	0.7000	0.2041	0.52	1.30					
Input: Tractor, John Deere, 1996, Model 7600, 110 HP (high service capacity)									
39752.00	4000.00	1.4120	0.0263	6000	500	12000	110	10.0000	10.0
8.6271	2.0000	17.2542	0.2040	12.00	2.4480	0.0177	2.0000	0.0353	1.02
100	0.9900	0.2041	20.76	1.44					
Input: Fertilizer, Anhydrous Ammonia 1990									
Operation									
Nutrient Management, 1991 pre-plant N application									

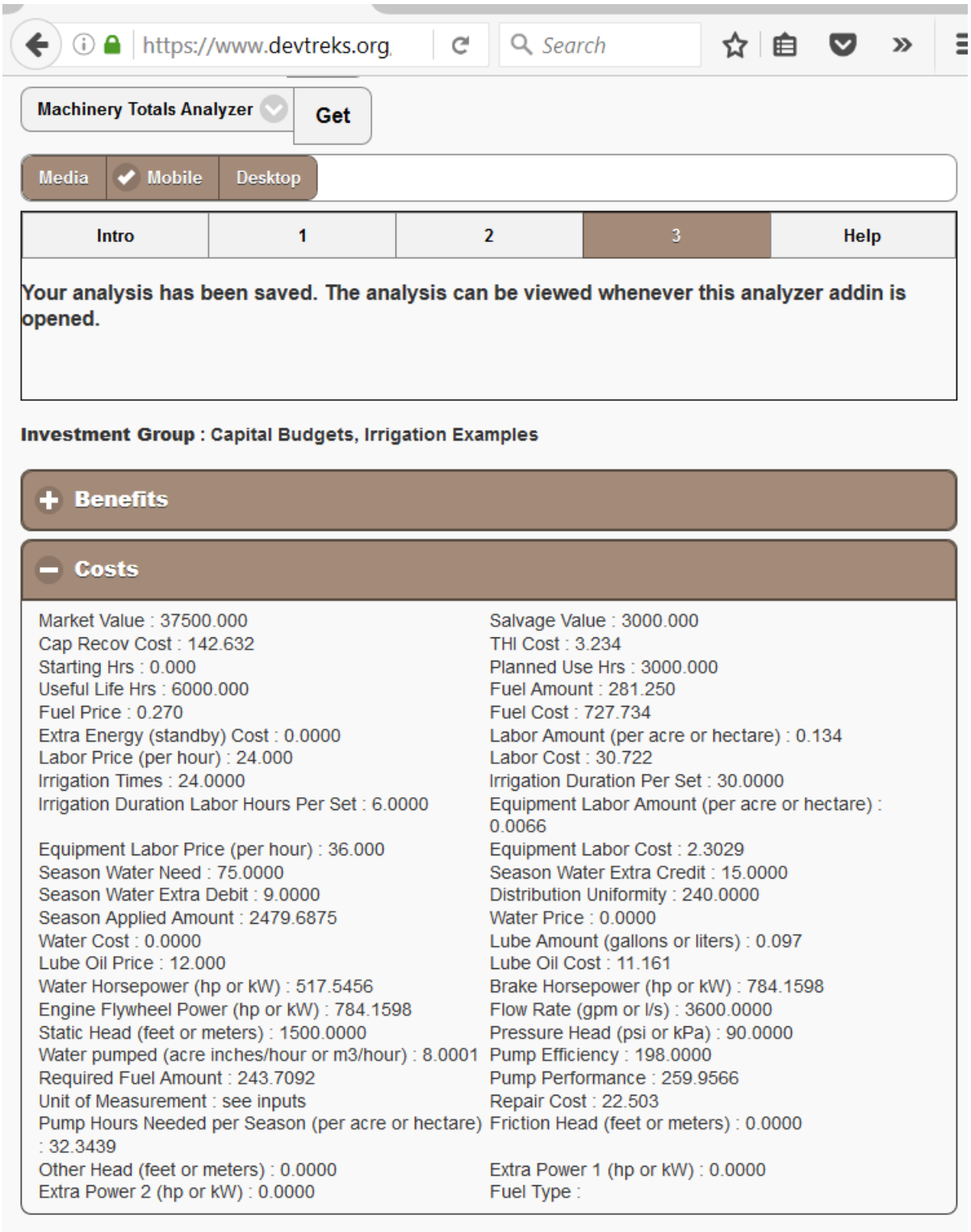
The following *Totals* Operating Budget Analysis displays typical results for the farm equipment used in a corn soybean rotation.

https://www.devtreks.org/agtreks/preview/crops/budget/2- Corn Soybean Rotation/273071632/none



The following *Totals* Capital Budget Analysis displays typical results for the irrigation power equipment used in a center pivot irrigation investment. Footnotes 3 and 4 are particularly relevant for these types of analyses.

https://www.devtreks.org/agtreks/preview/cropsconservation/investmentgroup/Capital Budgets, Irrigation Examples/275505672/none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2
3
Help
Your analysis has been saved. The analysis can be viewed whenever this analyzer addin is opened.
Investment Group : Capital Budgets, Irrigation Examples
Benefits
Costs
Market Value : 37500.000
Salvage Value : 3000.000
Cap Recov Cost : 142.632
THI Cost : 3.234
Starting Hrs : 0.000
Planned Use Hrs : 3000.000
Useful Life Hrs : 6000.000
Fuel Amount : 281.250
Fuel Price : 0.270
Fuel Cost : 727.734
Extra Energy (standby) Cost : 0.0000
Labor Amount (per acre or hectare) : 0.134
Labor Price (per hour) : 24.000
Labor Cost : 30.722
Irrigation Times : 24.0000
Irrigation Duration Per Set : 30.0000
Irrigation Duration Labor Hours Per Set : 6.0000
Equipment Labor Amount (per acre or hectare) : 0.0066
Equipment Labor Price (per hour) : 36.000
Equipment Labor Cost : 2.3029
Season Water Need : 75.0000
Season Water Extra Credit : 15.0000
Season Water Extra Debit : 9.0000
Distribution Uniformity : 240.0000
Season Applied Amount : 2479.6875
Water Price : 0.0000
Water Cost : 0.0000
Lube Amount (gallons or liters) : 0.097
Lube Oil Price : 12.000
Lube Oil Cost : 11.161
Water Horsepower (hp or kW) : 517.5456
Brake Horsepower (hp or kW) : 784.1598
Engine Flywheel Power (hp or kW) : 784.1598
Flow Rate (gpm or l/s) : 3600.0000
Static Head (feet or meters) : 1500.0000
Pressure Head (psi or kPa) : 90.0000
Water pumped (acre inches/hour or m3/hour) : 8.0001
Pump Efficiency : 198.0000
Required Fuel Amount : 243.7092
Pump Performance : 259.9566
Unit of Measurement : see inputs
Repair Cost : 22.503
Pump Hours Needed per Season (per acre or hectare) : 32.3439
Friction Head (feet or meters) : 0.0000
Other Head (feet or meters) : 0.0000
Extra Power 1 (hp or kW) : 0.0000
Extra Power 2 (hp or kW) : 0.0000
Fuel Type :

The following *Totals* Capital Budget Analysis displays typical results for general capital inputs used in a simple capital investment analysis.

Base Resource (Input) Calculations To Analyze Type:

General Capital

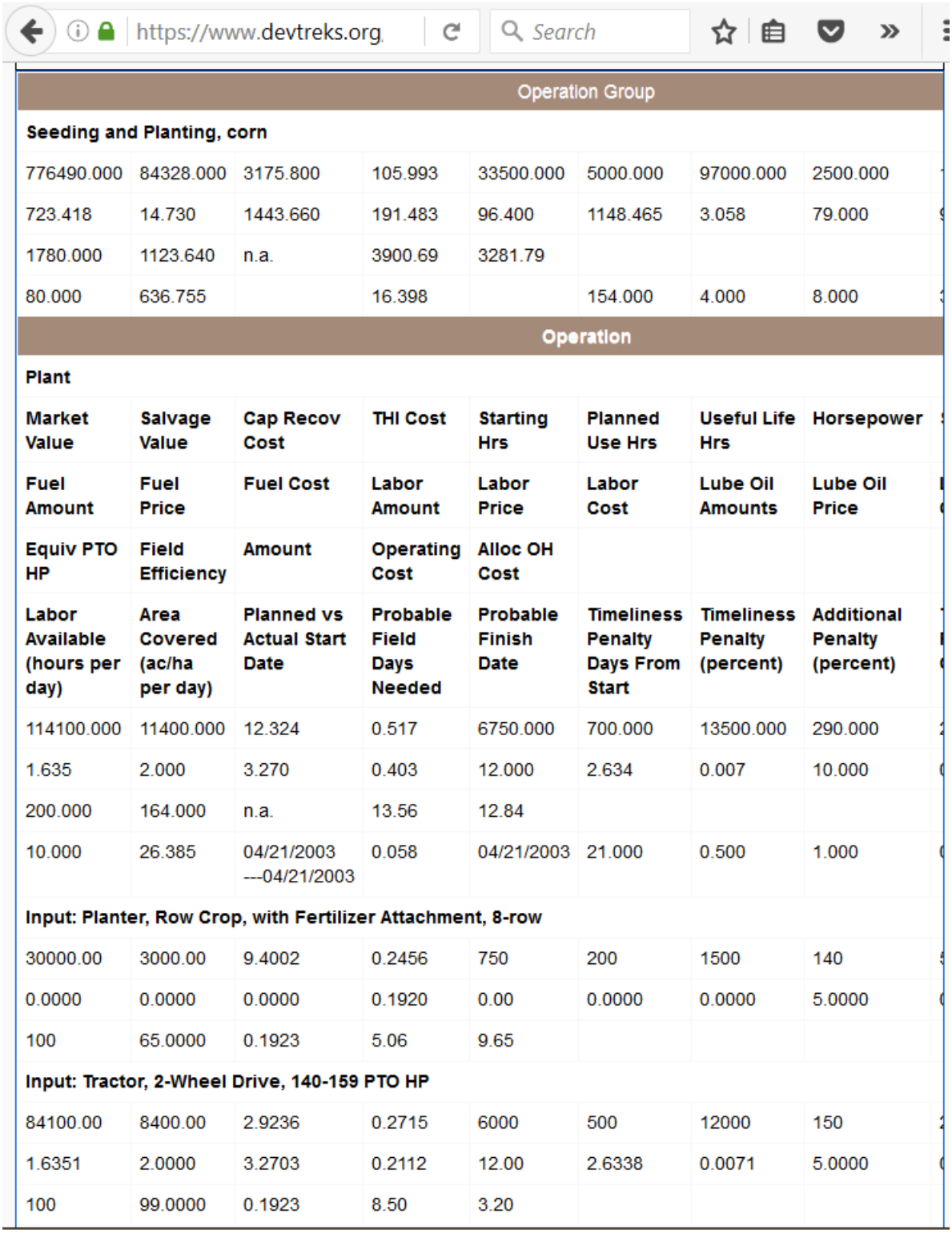
Investment Group									
Capital Budgets, Capital Input Examples									
Investment									
General Capital, Example 1									
Time Period									
Example 1, General Capital									
Outcomes									
Costs									
Market Value	**Salvage Value**	**Capital Recovery Cost**	**THI Cost**	**Starting Hrs**	**Planned Use Hrs**	**Useful Life Hrs**			
Fuel Amount	**Fuel Price**	**Fuel Cost**	**Labor Amount**	**Labor Price**	**Labor Cost**	**Energy Use Hr**	**Energy Efficiency**	**R and M Percent**	**Repair Cost**
Component									
General Capital, Example 1									
Costs									
1000.000	75.000	3.159	0.715	300.000	100.000	2000.000			
10.000	3.500	35.000	5.500	9.000	49.500	2.500	80.000	0.030	1.500
Input : Example 7- General Capital Input Calculator									
Costs									
1000.00	75.00	3.1585	0.7145	300	100	2000			
10.0000	3.5000	35.0000	5.5000	9.00	49.5000	2.50	80.0000	0.0300	1.5000
Time Period Totals									
Costs									
1000.000	75.000	3.159	0.715	300.000	100.000	2000.000			
10.000	3.500	35.000	5.500	9.000	49.500	2.500	80.000	0.030	1.500

Feedback About cropsconservation/investmenttimeperiod/Period 1, Capital Budget/2108448203/none

2. **Timeliness Penalty Analysis (4*)**

These analyses can be completed for Operations, Components, Operating Budgets, and Capital Budgets. Operations or Components that can't be completed in a timely fashion, as determined by the properties set in the underlying calculators, will be assessed a penalty based on the number of extra days needed to complete the operation. The following image displays a typical analysis.

https://www.devtreks.org/agtreks/select/crops/operationgroup/Seeding and Planting, corn/44/none



Operation Group							
Seeding and Planting, corn							
776490.000	84328.000	3175.800	105.993	33500.000	5000.000	97000.000	2500.000
723.418	14.730	1443.660	191.483	96.400	1148.465	3.058	79.000
1780.000	1123.640	n.a.	3900.69	3281.79			
80.000	636.755		16.398		154.000	4.000	8.000
Operation							
Plant							
Market Value	**Salvage Value**	**Cap Recov Cost**	**THI Cost**	**Starting Hrs**	**Planned Use Hrs**	**Useful Life Hrs**	**Horsepower**
Fuel Amount	**Fuel Price**	**Fuel Cost**	**Labor Amount**	**Labor Price**	**Labor Cost**	**Lube Oil Amounts**	**Lube Oil Price**
Equiv PTO HP	**Field Efficiency**	**Amount**	**Operating Cost**	**Alloc OH Cost**			
Labor Available (hours per day)	**Area Covered (ac/ha per day)**	**Planned vs Actual Start Date**	**Probable Field Days Needed**	**Probable Finish Date**	**Timeliness Penalty Days From Start**	**Timeliness Penalty (percent)**	**Additional Penalty (percent)**
114100.000	11400.000	12.324	0.517	6750.000	700.000	13500.000	290.000
1.635	2.000	3.270	0.403	12.000	2.634	0.007	10.000
200.000	164.000	n.a.	13.56	12.84			
10.000	26.385	04/21/2003 ---04/21/2003	0.058	04/21/2003	21.000	0.500	1.000
Input: Planter, Row Crop, with Fertilizer Attachment, 8-row							
30000.00	3000.00	9.4002	0.2456	750	200	1500	140
0.0000	0.0000	0.0000	0.1920	0.00	0.0000	0.0000	5.0000
100	65.0000	0.1923	5.06	9.65			
Input: Tractor, 2-Wheel Drive, 140-159 PTO HP							
84100.00	8400.00	2.9236	0.2715	6000	500	12000	150
1.6351	2.0000	3.2703	0.2112	12.00	2.6338	0.0071	5.0000
100	99.0000	0.1923	8.50	3.20			

Besides regular machinery properties, these analyses include the following properties:

- **Labor Available (hours per day):** This property is set in the NPV Calculators.
- **Area Covered (ac/ha per day)** = Field Capacity (ac/hour) / Labor Available (hours/day)
- **Planned versus Actual Start Date:** The Planned Date derives from the Start Date in the NPV Calculators. In Least Cost Analysis, the actual start date derives from an analysis of sequential feasible machinery operations/components.
- **Probable Field Days Needed =** Operation/Component Amount (or Time Period Amount) / Area Covered
- **Probable Finish Date**: Actual Start Date + (Field Days Needed / Probably Workdays from NPV Calculators)
- **Timeliness Penalties Days from Start:** This property is set in the NPV Calculators.
- **Timeliness Penalty (percent):** This property is set in the NPV Calculators.
- **Additional Penalty (percent):** This property is set in the NPV Calculators.
- **Total Revenue =** Operations and Components: Operation/Component.Amount * Output.Price * Output.Amount * Output.CompositionAmount * Output.Times
  Time Periods: The output with the highest revenue will be used in the following formula: TimePeriod.Amount * Outcome.Amount * Output.Price * Output.Amount * Output.CompositionAmount * Output.Times
- **Timeliness Penalty ($)** = ((Probable Field Days Needed - Timeliness Penalties Days from Start) * (Timeliness Penalty * Total Revenue)) + ((Probable Field Days Needed – Additional Timeliness Penalties Days from Start) * (Additional Timeliness Penalty * Total Revenue))
- **Timeliness Penalty Cost per Hour**: Timeliness Penalty / ((1 / Field Capacity) / * Operation/Component Amount (or Time Period Amount))

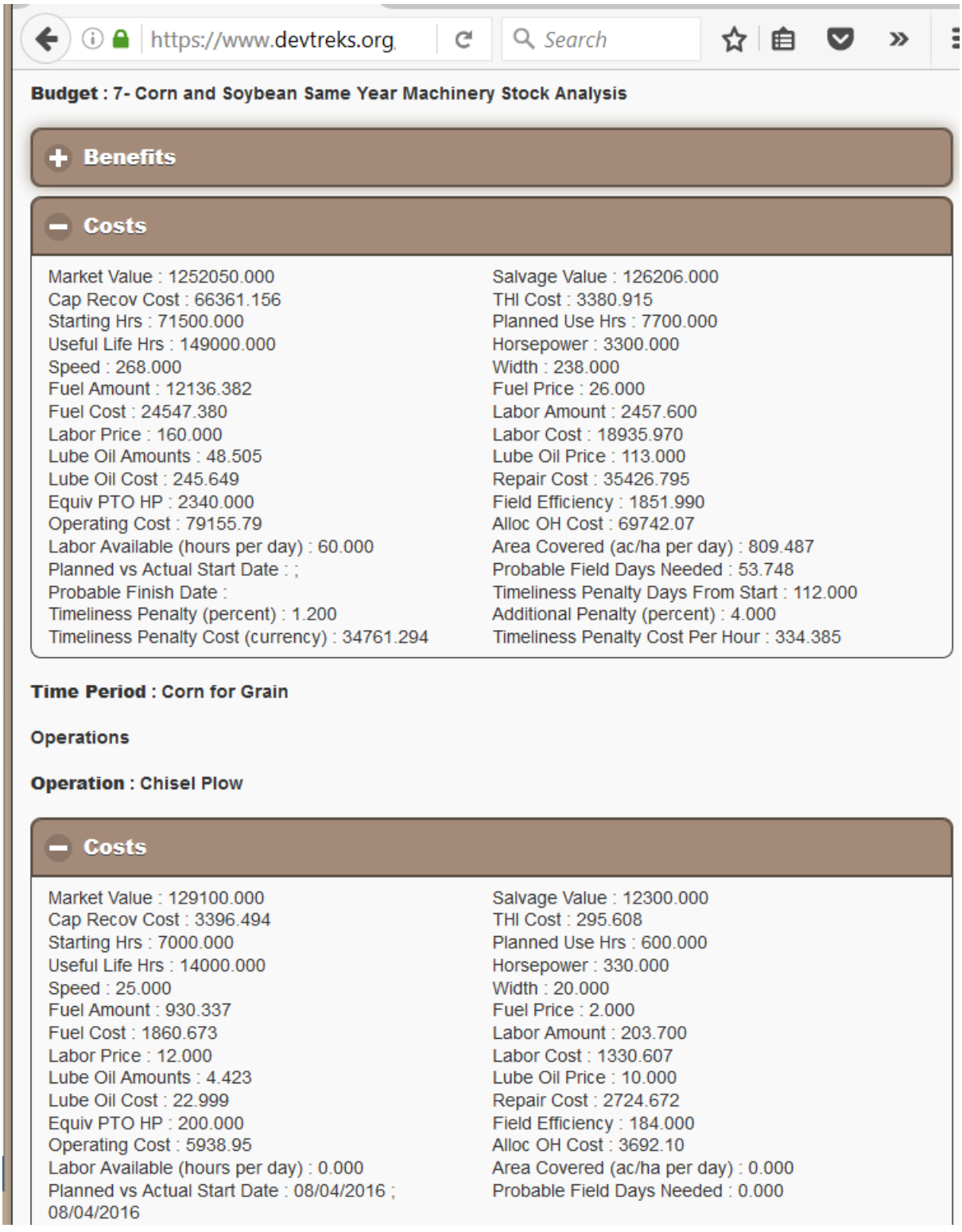
A numeric example can be found in the *Capital Input 1 Calculator* reference. Operation and Component Analyses use the Output properties set in their underlying NPV Operation or Component NPV Timeliness Penalty Calculator, to determine penalties. Operating and Capital Budgets use the Outputs in the budgets to determine the penalties. They use the Output with the

highest revenue that contains, or equals, the Operation/Component's Ouput.Name. They use the Outcome.Amount property in the revenue calculation but the Operation/Component's Amount property to compute penalty days. The TimePeriod.Amount property is a multiplier used in both calculations.

Actual Timeliness Penalty Analysis: These analyses can be completed for Operations, Components, Operating Budgets, and Capital Budgets. Operations or components that can't be completed in a timely fashion, as determined by the properties set in the underlying calculators, will be assessed a penalty based on the number of extra days needed to complete the operation. These analyses use the default, rather than size range, properties of machinery inputs to determine penalties.

The following Actual Timeliness Penalty Operating Budget analysis displays basic machinery totals associated with a corn soybean rotation.

https://www.devtreks.org/agtreks/preview/crops/budget/7- Corn and Soybean Same Year Machinery Stock Analysis/273071763/none



Budget : 7- Corn and Soybean Same Year Machinery Stock Analysis

Benefits

Costs

Market Value : 1252050.000	Salvage Value : 126206.000
Cap Recov Cost : 66361.156	THI Cost : 3380.915
Starting Hrs : 71500.000	Planned Use Hrs : 7700.000
Useful Life Hrs : 149000.000	Horsepower : 3300.000
Speed : 268.000	Width : 238.000
Fuel Amount : 12136.382	Fuel Price : 26.000
Fuel Cost : 24547.380	Labor Amount : 2457.600
Labor Price : 160.000	Labor Cost : 18935.970
Lube Oil Amounts : 48.505	Lube Oil Price : 113.000
Lube Oil Cost : 245.649	Repair Cost : 35426.795
Equiv PTO HP : 2340.000	Field Efficiency : 1851.990
Operating Cost : 79155.79	Alloc OH Cost : 69742.07
Labor Available (hours per day) : 60.000	Area Covered (ac/ha per day) : 809.487
Planned vs Actual Start Date : ;	Probable Field Days Needed : 53.748
Probable Finish Date :	Timeliness Penalty Days From Start : 112.000
Timeliness Penalty (percent) : 1.200	Additional Penalty (percent) : 4.000
Timeliness Penalty Cost (currency) : 34761.294	Timeliness Penalty Cost Per Hour : 334.385

Time Period : Corn for Grain

Operations

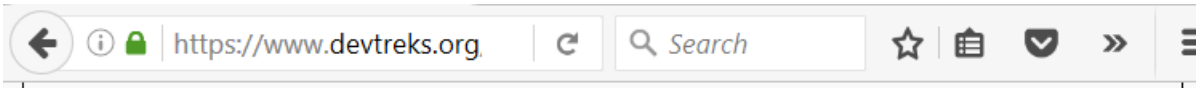
Operation : Chisel Plow

Costs

Market Value : 129100.000	Salvage Value : 12300.000
Cap Recov Cost : 3396.494	THI Cost : 295.608
Starting Hrs : 7000.000	Planned Use Hrs : 600.000
Useful Life Hrs : 14000.000	Horsepower : 330.000
Speed : 25.000	Width : 20.000
Fuel Amount : 930.337	Fuel Price : 2.000
Fuel Cost : 1860.673	Labor Amount : 203.700
Labor Price : 12.000	Labor Cost : 1330.607
Lube Oil Amounts : 4.423	Lube Oil Price : 10.000
Lube Oil Cost : 22.999	Repair Cost : 2724.672
Equiv PTO HP : 200.000	Field Efficiency : 184.000
Operating Cost : 5938.95	Alloc OH Cost : 3692.10
Labor Available (hours per day) : 0.000	Area Covered (ac/ha per day) : 0.000
Planned vs Actual Start Date : 08/04/2016 ; 08/04/2016	Probable Field Days Needed : 0.000

Feasible Timeliness Penalty Analysis (4*): A *Feasible Timeliness Penalty Analysis* can be completed for Operations and Components. Operations or components that can't be completed in a timely fashion, as determined by the properties set in the underlying calculators, will be assessed a penalty based on the number of extra days needed to complete the operation. These analyses use the default and size range properties of machinery inputs to determine penalties. All feasible combinations are analyzed. A non-power input's feasible Maximum Horsepower size range properties are used to limit the feasible combinations. Power inputs that are within +-10 Maximum Horsepower are considered feasible.

The following Feasible Timeliness Penalty Operation analysis displays basic machinery totals associated with a planting operation group. The difference in penalties shown here derives from implement width and tractor size. [These specific calculations were not proofed in Version 2.0.0. The source hasn't changed in that version and the general principle remains true]. The equipment used in the first Operation can plant at a rate of 0.24 hours per acre (implement width of 10 feet, 70 equivalent pto hp). The equipment in the second Operation can plant at a rate of 0.20 hours per acre (implement width of 12 feet, 85 equivalent pto hp). Although the tractor in the second Operation is more expensive than the first tractor, the total capital recovery costs per acre are allocated over a greater area (50.9 versus 42.4).



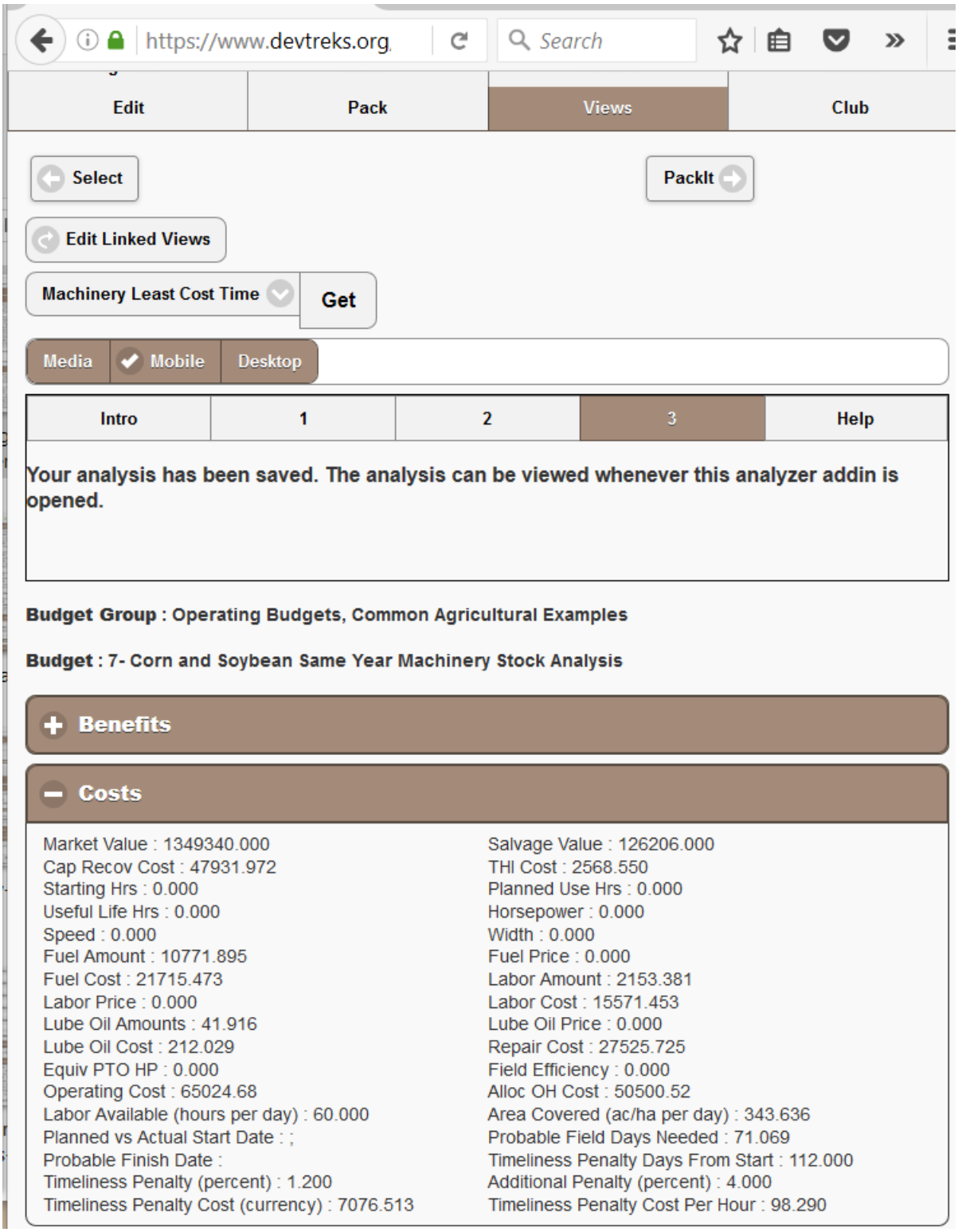
Operation Group							
Seeding and Planting, corn							
3300490.000	353698.000	2728.683	103.943	145250.000	22800.000	410500.000	11210.000
671.183	74.730	1341.681	193.382	456.400	1158.318	2.953	344.000
9325.000	5828.640	n.a.	3748.06	2832.63			
380.000	2380.364		77.623		714.000	19.000	38.000
Operation							
Plant							
Market Value	**Salvage Value**	**Cap Recov Cost**	**THI Cost**	**Starting Hrs**	**Planned Use Hrs**	**Useful Life Hrs**	**Horsepowe**
Fuel Amount	**Fuel Price**	**Fuel Cost**	**Labor Amount**	**Labor Price**	**Labor Cost**	**Lube Oil Amounts**	**Lube Oil Price**
Equiv PTO HP	**Field Efficiency**	**Amount**	**Operating Cost**	**Alloc OH Cost**			
Labor Available (hours per day)	**Area Covered (ac/ha per day)**	**Planned vs Actual Start Date**	**Probable Field Days Needed**	**Probable Finish Date**	**Timeliness Penalty Days From Start**	**Timeliness Penalty (percent)**	**Additional Penalty (percent)**
114100.000	11400.000	12.344	0.518	6750.000	700.000	13500.000	290.000
1.638	2.000	3.275	0.404	12.000	2.638	0.007	10.000
200.000	164.000	n.a.	13.58	12.86			
10.000	52.000	04/21/2003 ---04/21/2003	0.030	04/21/2003	21.000	0.500	1.000
Input: Tractor, 2-Wheel Drive, 140-159 PTO HP							
84100.00	8400.00	2.9283	0.2720	6000	500	12000	150
1.6377	2.0000	3.2755	0.2115	12.00	2.6380	0.0072	5.0000
100	99.0000	0.1923	8.51	3.20			
Input: Planter, Row Crop, with Fertilizer Attachment, 8-row							
30000.00	3000.00	9.4153	0.2460	750	200	1500	140
0.0000	0.0000	0.0000	0.1923	0.00	0.0000	0.0000	5.0000
100	65.0000	0.1923	5.07	9.66			

Least Cost Timeliness Penalty Analysis (5*): A *Least Cost Timeliness Penalty Analysis* can be completed for Operating Budgets and Capital Budgets. Operations or components that can't be completed in a timely fashion, as determined by the properties set in the underlying calculators, will be assessed a penalty based on the number of extra days needed to complete the operation. These analyses use the size range properties of machinery inputs to determine penalties. This analysis returns the least cost combination of machinery. Unlike the Actual and Feasible Penalty Analyzers, this analyzer uses the Operation/Component.Amount, rather than Outcome.Amount, in the Revenue calculation.

Budgets use the TimePeriod.Date property to specify the sequential priority of time period budgets. Enterprises, or Practices, with earlier dates are considered more important than ones with later dates and will be completed first.

The following Least Cost Timeliness Penalty Operating Budget analysis displays basic machinery totals and penalties associated with the same corn soybean rotation as displayed for the Actual Timeliness Penalty Analysis. The soybean crop being grown in this rotation has lower priority than the corn crop, but this analysis is able to use the feasible combinations of machinery for each Operation and select the lowest cost combination.

https://www.devtreks.org/agtreks/preview/crops/budget/7- Corn and Soybean Same Year Machinery Stock Analysis/273071763/none


https://www.devtreks.org
Search
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PackIt
Edit Linked Views
Machinery Least Cost Time
Get
Media
Mobile
Desktop
Intro
1
2
3
Help
Your analysis has been saved. The analysis can be viewed whenever this analyzer addin is opened.
Budget Group : Operating Budgets, Common Agricultural Examples
Budget : 7- Corn and Soybean Same Year Machinery Stock Analysis
Benefits
Costs
Market Value : 1349340.000
Cap Recov Cost : 47931.972
Starting Hrs : 0.000
Useful Life Hrs : 0.000
Speed : 0.000
Fuel Amount : 10771.895
Fuel Cost : 21715.473
Labor Price : 0.000
Lube Oil Amounts : 41.916
Lube Oil Cost : 212.029
Equiv PTO HP : 0.000
Operating Cost : 65024.68
Labor Available (hours per day) : 60.000
Planned vs Actual Start Date : ;
Probable Finish Date :
Timeliness Penalty (percent) : 1.200
Timeliness Penalty Cost (currency) : 7076.513
Salvage Value : 126206.000
THI Cost : 2568.550
Planned Use Hrs : 0.000
Horsepower : 0.000
Width : 0.000
Fuel Price : 0.000
Labor Amount : 2153.381
Labor Cost : 15571.453
Lube Oil Price : 0.000
Repair Cost : 27525.725
Field Efficiency : 0.000
Alloc OH Cost : 50500.52
Area Covered (ac/ha per day) : 343.636
Probable Field Days Needed : 71.069
Timeliness Penalty Days From Start : 112.000
Additional Penalty (percent) : 4.000
Timeliness Penalty Cost Per Hour : 98.290

3. Other Analyses

Future releases will include additional types of analyses.

I. Performance Analysis

The data generated by the Capital Input Analyzers can be used in Performance Measures to support decisions related to capital inputs. These Measures, which include Net Returns, Net Savings, Return on Investment, Output per Unit Input, and Input per Unit Output, are documented in the *Performance Analysis 1* reference.

J. Comparative Analysis

DevTreks does not currently support the comparative analysis of capital input data.

K. Sample Data Sets (6*)

This section contains links to sample data sets that display the results of running these analyzers. Keep in mind that these data sets were structured for the purpose of testing the analyzers. The data is fictitious and no weight should be assigned to the absolute numbers –pay attention to the aggregation techniques only. Refer to Footnote 1. These date sets also contain the exact same NPV calculators and analyzers. All of the capital input cost data found in the NPV totals derive from the calculated capital input results.

https://www.devtreks.org/agtreks/select/crops/operationgroup/Seeding and Planting, corn/44/none/

https://www.devtreks.org/agtreks/preview/crops/budgetgroup/Operating Budgets, Common Agricultural Examples/2140761538/none/

L. Multimedia (Resources)

Pictures and videos of the capital input should be part of all stories that accompany capital input calculations. Videos that explain how to manage the capital input should also accompany stories.

M. Stories (Linked Views)

Machinery specifications, such as pdf files, can be part of the all stories that accompany capital input calculations. The story should explain the significance of the capital input analysis.

N. Knowledge Bank Standards

All capital input analyses should be entered into online knowledge banks (i.e. production servers as contrasted to development servers) that can be used to analyze the costs, benefits, and performance of capital inputs. That structured evidence must be passed down to future generations. These knowledge banks aggregate and analyze all of the data in a network. Future references will demonstrate how these knowledge banks will evolve (i.e. semantic data, forecasts) to support future decision making needs. The flexibility offered by DevTreks in documenting capital input costs means that networks need to develop “rules” explaining the “standards” that should be followed by clubs in their network. The “standards” make it possible to build knowledge banks.

Summary

Clubs using DevTreks can start to carry out the basic analysis of certain capital inputs. Clubs can solicit help understanding and managing capital inputs. Networks can build knowledge banks that explain why some capital inputs fit better than others. They can pass that knowledge down to future generations. The result may be farmers that conserve scare water resources better, hospitals that treat patients more affordably, software programmers who access international audiences quicker, factories that balance workers and machines fairly, and people who improve their lives and livelihoods.

Footnotes

1. While employed as a county supervisor for the USDA, Farmers Home Administration, the author routinely appraised the value of farms, farm machinery and chattel property. He also managed up to 5100 acres of capital intensive farmland (irrigated Imperial Valley, CA, USA inventory cropland) that required managing capital inputs (irrigation pumps). While employed as an agricultural economist for the USDA, Natural Resources Conservation Service, the author routinely built tools that analyzed the costs of capital inputs, especially farm equipment.
2. Capital Input Analysis has a long tradition that includes more advanced analytic techniques than those used in this reference. Future releases will include some of these techniques.
3. In the past, the author has mostly worked with multi-disciplinary teams to build these types of calculators. In the recent past, DevTreks focus has been IT first, rather than multi-disciplinary first. These types of calculators will continue to evolve and improve over the years –especially as customers provide feedback or contract with us for new or improved tools.
4. The types of calculations in this example help to explain why farmers often seek to expand their acreage.
5. This supplements Footnote 3. A potential customer identified the need for these types of analyses when DevTreks was still in beta testing. Optimization algorithms use a wide

variety of techniques –this algorithm uses an extremely simple sorting technique. These types of algorithms can do a particularly good job of analyzing resource allocation data. They'll expand over the years.

6. These calculators and analyzers were tested using limited, sample data sets. Full industry support should be tested using larger data sets. Email us if you'd like to pursue that avenue.

References

References for Capital Input analysis can be found in the introductory *Capital Input Calculators 1* reference.

References Note

We try to use references that are open access or that do not charge fees.

Improvements, Errors, and New Features

Please notify DevTreks (devtrekkers@gmail.com) if you find errors in these references. Also please let us know about suggested improvements or recommended new features.

Video tutorials explaining this reference can be found at:

https://www.devtreks.org/commontreks/preview/commons/resourcepack/Machinery Costs 1/437/none/

https://www.devtreks.org/commontreks/preview/commons/resourcepack/Irrigation Costs 1/443/none/

https://www.devtreks.org/commontreks/preview/commons/resourcepack/General Capital Costs 1/465/none/