



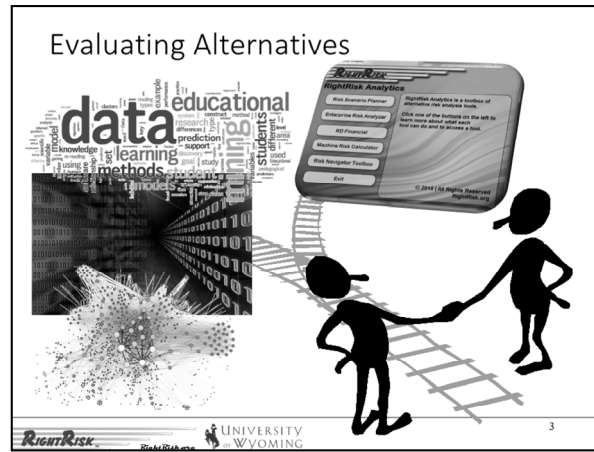
Evaluating risk management alternatives can be challenging, especially without the right tools. The RightRisk Team has been working for nearly 20 years to develop the right tools to assist managers of agricultural operations to make the best decisions, even when the information at hand is incomplete or difficult to interpret.

## Risk Management

*Risk management is an active learning process that involves considering tradeoffs and making decisions to alter or not alter the probability distribution for a future event...*



Risk management is essentially a choice on the part of the manager to attempt to either alter the probabilities for future events or not. You might ask “Why not?” Well, some tradeoffs are too costly or offer too few benefits to worry about. Successful risk managers spend time thinking through which risks are worth managing before attempting strategies that may prove ineffective.



Once risk data has been organized into some sort of a consistent framework and we are confident that it is relevant for our situation, the next challenge is to follow one approach or another (maybe several) to interpret that data and what it may mean for our management.

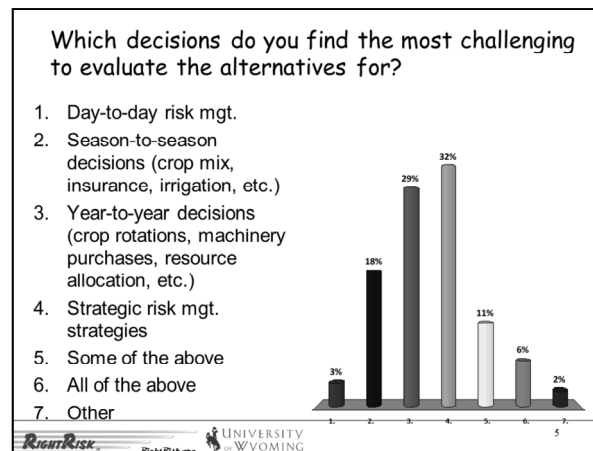
The RightRisk Team has built numerous tools to assist managers to sift through the data and alternative management strategies to identify those that have the best chance of moving them and their operation towards their goals. The RightRisk Analytics toolbox is available for download at the RightRisk website at no cost. Each tool includes written guides to help with application. Some have dedicated online courses or videos outlining their use and application.

This presentation will explore the tools currently available and the general approach followed for each.

Which decisions do you find the most challenging to evaluate the alternatives for?

1. Day-to-day risk mgt.
2. Season-to-season decisions (crop mix, insurance, irrigation, etc.)
3. Year-to-year decisions (crop rotations, machinery purchases, resource allocation, etc.)
4. Strategic risk mgt. strategies
5. Some of the above
6. All of the above
7. Other

Before we get into the specifics, it might be good to reflect, “Which decisions do YOU find most challenging to evaluate for your operation?”



At a recent program in the mid-west with over 70 agricultural managers in attendance, we took a poll using an audience response system with these results.

Nearly a third indicated they struggle most with Strategic Decisions regarding which risk management strategy to follow.

Almost another third reported that they find Year-to-Year decisions more difficult. This choices involve choosing crop rotations, machinery purchases, and general resource allocation.

The remaining third of managers suggested that Season-to-Season decisions are the most challenging and those who indicated more than one of the choices offered.

It is interesting that active managers of large mid-western farms find bigger picture-type decisions the most challenging. I suspect this may be true for operators elsewhere. The real question is, “Where do we get help with these types of decisions?”

Our position is that many, if not most of these decisions are risk management decisions, and the reason we find them difficult to make is that they involve uncertainty. Uncertainty that all humans find difficult to deal with.

**RightRisk Analytics:**  
*tools to evaluate alternatives*

- **Risk Scenario Planner**  
relatively minor changes, risk analysis
- **Machine Risk Calculator**  
machine costs, custom rates, risk analysis
- **Forage Risk Analyzer**  
lease arrangements, forage supply, housing costs
- **Enterprise Risk Analyzer**  
larger enterprise-level, enterprise mix changes
- **RDFinancial**  
substantial changes, whole farm budgets, financial analysis, credit scoring
- **Multi-Temporal Risk Analysis**  
partial budgets incorporating time, risk analysis
- **Risk Navigator**  
strategic risk planning and analysis

<https://RightRisk.org> > tools

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With all the challenges of making sound risk management decisions, the RightRisk Team has dedicated a great deal of time and resources to developing risk analytics tools. They are intended to assist managers in evaluating alternative risk management strategies.

In general, the tools at the top of this list address relatively small management changes, while those nearer the bottom consider the larger, multi-year, strategic decisions many wrestle with.

Lets take a closer look at what these tools offer.

## Risk Scenario Planning

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Partial Budget For: \_\_\_\_\_

LBP Insurance Decision

Added Returns			Added Costs		
Quantity	Value	Total	Quantity	Value	Total
0	\$ 0.00	\$	0	\$ 0.00	\$
1000	\$ 232.00	\$	1000	\$ 8,547.00	\$
2000	\$ 464.00	\$	2000	\$ 17,094.00	\$
3000	\$ 696.00	\$	3000	\$ 25,641.00	\$
4000	\$ 928.00	\$	4000	\$ 34,188.00	\$
5000	\$ 1,160.00	\$	5000	\$ 42,735.00	\$
6000	\$ 1,392.00	\$	6000	\$ 51,282.00	\$
7000	\$ 1,624.00	\$	7000	\$ 59,829.00	\$
8000	\$ 1,856.00	\$	8000	\$ 68,376.00	\$
9000	\$ 2,088.00	\$	9000	\$ 76,923.00	\$
10000	\$ 2,320.00	\$	10000	\$ 85,470.00	\$
<b>Total Added Returns</b>			<b>Total Added Costs</b>		
Quantity	Value	Total	Quantity	Value	Total
0	\$ 0.00	\$	0	\$ 0.00	\$
1000	\$ 2,320.00	\$ 2,320.00	1000	\$ 8,547.00	\$ 6,227.00
2000	\$ 4,640.00	\$ 4,640.00	2000	\$ 17,094.00	\$ 12,454.00
3000	\$ 6,960.00	\$ 6,960.00	3000	\$ 25,641.00	\$ 18,681.00
4000	\$ 9,280.00	\$ 9,280.00	4000	\$ 34,188.00	\$ 24,908.00
5000	\$ 11,600.00	\$ 11,600.00	5000	\$ 42,735.00	\$ 31,135.00
6000	\$ 13,920.00	\$ 13,920.00	6000	\$ 51,282.00	\$ 37,362.00
7000	\$ 16,240.00	\$ 16,240.00	7000	\$ 59,829.00	\$ 43,589.00
8000	\$ 18,560.00	\$ 18,560.00	8000	\$ 68,376.00	\$ 49,816.00
9000	\$ 20,880.00	\$ 20,880.00	9000	\$ 76,923.00	\$ 56,043.00
10000	\$ 23,200.00	\$ 23,200.00	10000	\$ 85,470.00	\$ 62,270.00
<b>Total Reduced Returns</b>			<b>Total Reduced Costs</b>		
Quantity	Value	Total	Quantity	Value	Total
0	\$ 0.00	\$	0	\$ 0.00	\$
1000	\$ 0.00	\$	1000	\$ 8,547.00	\$ 8,547.00
2000	\$ 0.00	\$	2000	\$ 17,094.00	\$ 17,094.00
3000	\$ 0.00	\$	3000	\$ 25,641.00	\$ 25,641.00
4000	\$ 0.00	\$	4000	\$ 34,188.00	\$ 34,188.00
5000	\$ 0.00	\$	5000	\$ 42,735.00	\$ 42,735.00
6000	\$ 0.00	\$	6000	\$ 51,282.00	\$ 51,282.00
7000	\$ 0.00	\$	7000	\$ 59,829.00	\$ 59,829.00
8000	\$ 0.00	\$	8000	\$ 68,376.00	\$ 68,376.00
9000	\$ 0.00	\$	9000	\$ 76,923.00	\$ 76,923.00
10000	\$ 0.00	\$	10000	\$ 85,470.00	\$ 85,470.00
<b>Total Positive Effects</b>			<b>Total Negative Effects</b>		
Added Returns + Reduced Costs	\$ 395,653.50		Added Costs + Reduced Returns	\$ 8,547.00	
<b>Net Benefit of LBP Insurance Decision</b>			<b>\$ 387,106.50</b>		

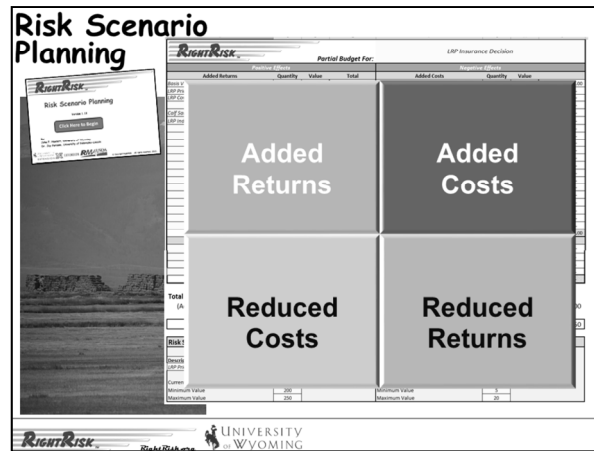
Uncertain Value 1		Uncertain Value 2	
Quantity	Value	Quantity	Value
0	\$ 0.00	0	\$ 0.00
1000	\$ 232.00	1000	\$ 8,547.00
2000	\$ 464.00	2000	\$ 17,094.00
3000	\$ 696.00	3000	\$ 25,641.00
4000	\$ 928.00	4000	\$ 34,188.00
5000	\$ 1,160.00	5000	\$ 42,735.00
6000	\$ 1,392.00	6000	\$ 51,282.00
7000	\$ 1,624.00	7000	\$ 59,829.00
8000	\$ 1,856.00	8000	\$ 68,376.00
9000	\$ 2,088.00	9000	\$ 76,923.00
10000	\$ 2,320.00	10000	\$ 85,470.00

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The first analytics tool is the Risk Scenario Planning tool. Many students of agricultural economics are introduced to this approach used by this tool early in their degree programs.

It may be simple in its approach but it offers powerful assistance to managers looking to compare alternatives.



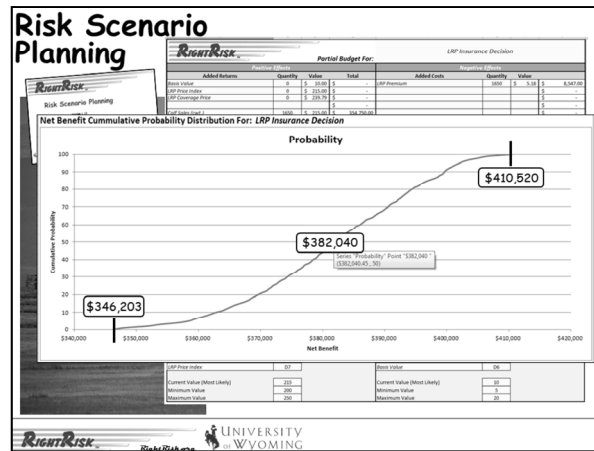
The tool uses the well-known partial budget approach to consider the financial impact of making a management change.

That change could be considering the application of more or less fertilizer, choosing to keep the calves on feed another 30 days, or culling just a few more cows. Each alternative will have different financial implications. Those implications are entered into a matrix of 4 quadrants. The tool is organized with the positive impacts on the left side: Added Returns and Reduced Costs, while the negative impacts are listed on the right as: Added Costs and Reduced Returns.

Of course not all decisions require entries in all 4 quadrants, we only make entries where they are required to adequately describe the impacts of the decision.







After clicking RUN, the tool evaluates possible outcomes by drawing at least 1,000 samples from the range of variation described by the user's input. These samples are then sorted to generate a probability distribution like the one on the screen. In this way, the output not only provides the user some idea of the range of possible values, but also the probability associated with those outcomes.

For example, in this graph we can see that the net benefit from an analysis of using Livestock Risk Protection. Ending net benefits range from:

A 100 percent probability of ending ABOVE \$346,203;

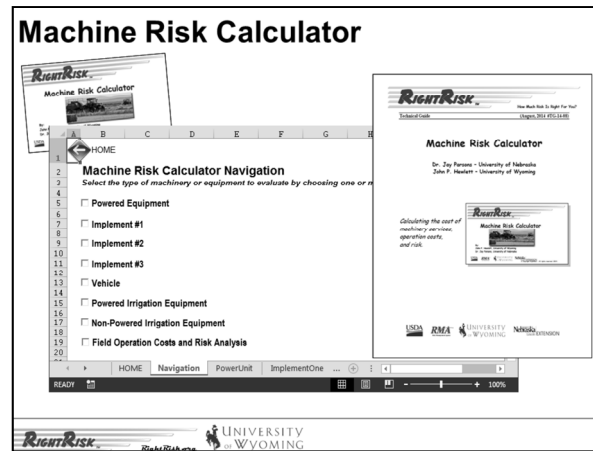
A 0 percent probability of ending ABOVE \$410,520 (or stated another way, 100% probability of ending BELOW \$410,520);

And a 50/50 probability of ending around \$382,040.

This middle value is the most likely outcome, with the probabilities declining as we move away from \$382,040 in either direction along the curve.

The results from a single run of the analysis may be enough to inform the manager about how to proceed. More likely, however, is that evaluating one alternative spurs the manager to ask yet another what if question. The values are easily adjusted and a second analysis run to learn what difference a slight adjustment might mean in terms of the ending net benefits, as well as resulting probabilities.

In this way, the Risk Scenario Planning tool can help a manager compare and evaluate alternative risk management strategies in order to make the best management decision possible with the information currently in hand.



The Machine Risk Calculator is another risk analytics tool designed to assist managers with decisions about machinery resources and their use in agricultural settings.

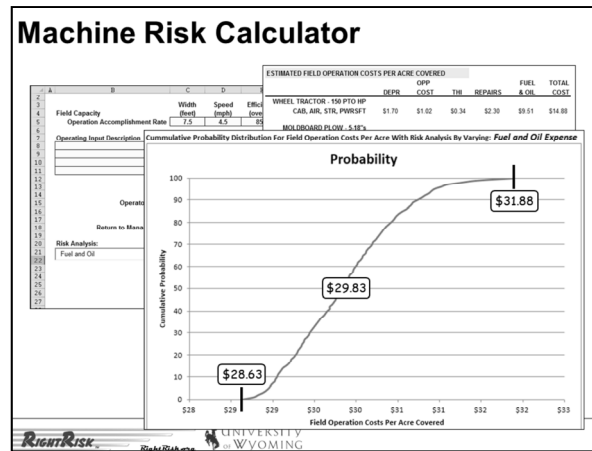
The tool will not only calculate the cost of owning and using powered equipment, like tractors, swathers, and combines, but will also do the same for implements or attachments pulled or used in conjunction with powered equipment.

## Machine Risk Calculator

3		Width	Speed	Efficiency	Rate	
4	Field Capacity	feet	feet/hour	percent	Acres/hour	
5	Operation Accomplishment Rate	7.5	4.5	85%	3.43	
6						
7	Operating Input Description	Hours/acre	Cost/hour	Cost/acre		
8		0.00	\$0.00	\$0.00		
9		0.00	\$0.00	\$0.00		
10		0.00	\$0.00	\$0.00		
11		0.00	\$0.00	\$0.00		
12			TOTAL	\$0.00		
13						
14						
15						
16						
17						
18						
19						
20						
21	Risk Analysis:					
22	Fuel and Oil		Most Likely	Low	High	
23			\$33.09	\$25.78	\$45.62	
24						
25						
26						
27						

These stand alone estimates can also be combined within the software using labor and operating inputs to define and estimate the costs for various field operations, such as plowing, baling, and spraying.

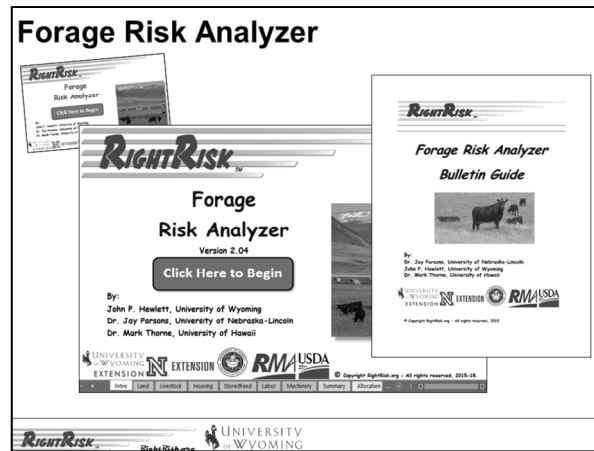




Finally, the Machine Risk Calculator will also allow the user to consider the changes to estimated costs, where one or another factor is allowed to vary. For example, if fuel costs are allowed to vary over a range of values, or interest rates, repair costs, or labor rates.

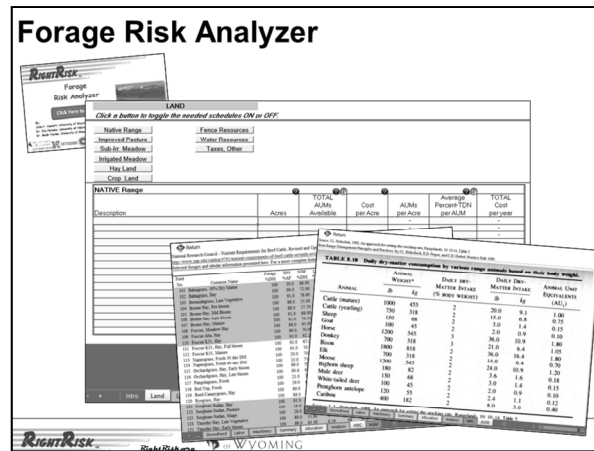
After clicking RUN, the tool evaluates possible outcomes by drawing at least 1,000 samples from the range of variation described by the user's input. These samples are then sorted to generate a probability distribution like the one on the screen. In this way, the output not only provides the user some idea of the range of possible values, but also the probability associated with those outcomes.

This graph shows possible Field Operation Costs Per Acre by allowing fuel and oil expenses to vary across low, most likely and high value estimates.



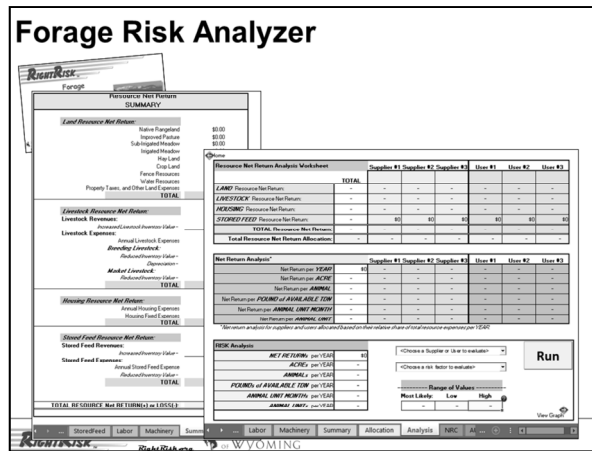
The Forage Risk Analyzer tool was developed to help the livestock owner and the land owner understand all the contributions each of them make to a livestock grazing lease arrangement.

It can be used to help design a fair and equitable lease agreement between two parties. As well as used by a single party to better understand the full set of components that contribute value to the harvested forage resource.



The Forage Risk Analyzer allows the user to define the type and extent of resources included through a series of tables. These include native range, irrigated pasture, fences, water points, among others. The tool includes National Research Council (NRC) tables for various feedstuffs and a table to help estimate forage demand by species.

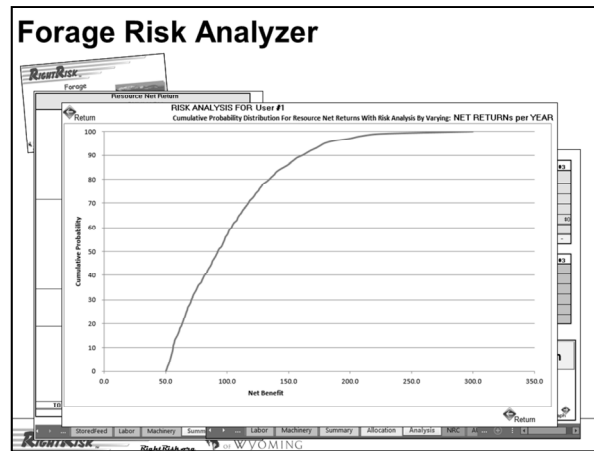




Once the resources and services provided by each party have been entered, the tool provides a Summary tab listing the total Net Return or Loss for each category.

The user may then describe the respective share each supplier or user in the arrangement has been assigned for each cost category. These details are summarized on the Analysis tab, that also offers information on the risks involved. The idea is provide the suppliers and users of the forage additional information to determine what is fair, given what each party is contributing to the livestock/land enterprise combination.

The lower section of this tab offers the user the chance to allow one element of the net return analysis to fluctuate between estimated low and high values, around a most likely estimate provided by the Forage Risk Analyzer.



After clicking RUN, the tool evaluates possible outcomes by drawing at least 1,000 samples from the range of variation described by the user’s input. The resulting probability distribution provides an estimated probability that the estimated net benefit will be at or below any given value on the resulting graph. Users may move their mouse along the curve to view individual estimates of net benefit and their corresponding probability.

In this example, we see Net Return per Year as it varies between the low, most likely and high values entered.

## Enterprise Risk Analyzer

	Cow-Calf	Native Hay	Out Hay	Alfalfa Establishment	Alfalfa - Baled
<b>FARM REVENUE</b>					
TOTAL FARM INCOME - CASH	121,759.00	12,380.00	2,802.00	2,306.00	25,040.00
TOTAL NON-CASH INCOME ADJUSTMENTS					
<b>GROSS FARM REVENUE</b>	<b>121,759.00</b>	<b>12,380.00</b>	<b>2,802.00</b>	<b>2,306.00</b>	<b>25,040.00</b>
<b>FARM EXPENSES</b>					
FARM EXPENSES - CASH	86,843.00	5,557.00	1,756.00	2,297.00	12,072.00
FARM EXPENSES - NON-CASH EXPENSE ADJUSTMENTS	98,550.00	11,246.00	2,299.00	2,538.00	15,331.00
<b>GROSS FARM EXPENSES</b>	<b>185,393.00</b>	<b>17,803.00</b>	<b>4,055.00</b>	<b>4,835.00</b>	<b>27,403.00</b>
<b>NET FARM INCOME FROM OPERATIONS</b>	<b>(63,634.00)</b>	<b>(5,422.00)</b>	<b>(1,253.00)</b>	<b>(2,527.00)</b>	<b>(2,363.00)</b>
<b>Break-Even PRICE Analysis</b>					
<b>YIELD PER ENTERPRISE UNIT</b>					
Maximum	400	1.75	4	4	4
Most Likely	373.97	1.5	3	2.54	3
Minimum	350	1	1.5	1.5	1.5
<b>BREAK-EVEN PRICE - CASH EXPENSES</b>					
Maximum	0.68	32.38	33.77	44.17	29.02
Most Likely	0.64	37.68	45.03	69.56	38.69
Minimum	0.68	56.53	80.05	117.79	77.38
<b>BREAK-EVEN PRICE - GROSS EXPENSES</b>					
Maximum	1.27	87.03	85.87	62.34	85.87
Most Likely	1.36	102.31	114.49	146.37	87.83
Minimum	1.45	153.47	228.57	247.85	175.66

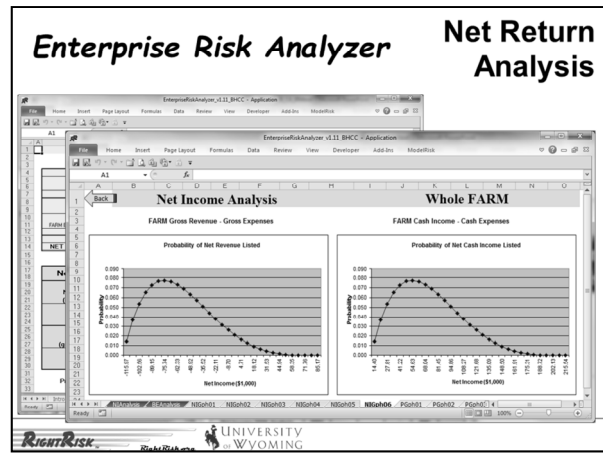
Probability Analysis (click button on right)

The Enterprise Risk Analyzer tool is designed to help managers of agricultural enterprises better understand the costs and returns from those enterprise activities.

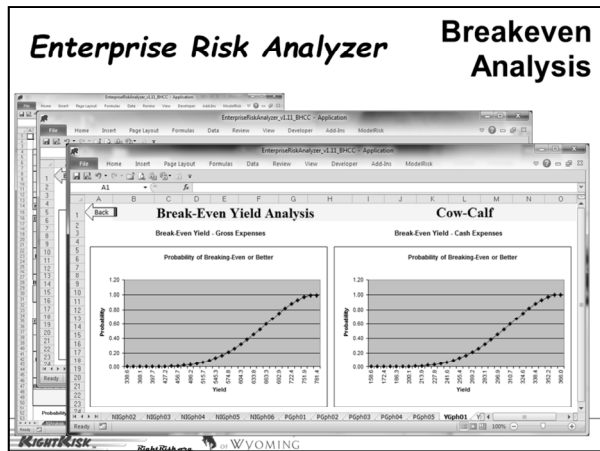
The tool is based on information readily found on most Schedule F tax forms. For more in-depth results, a set of schedules is available to further describe inventories, machinery, equipment, debt and other resources used.

The resulting summary outlines net return for the entire farm/ranch, as well as revenues and expenses for each enterprise.

Information entered by the user about variations in price and yield for each enterprise are used to estimate breakeven prices and yields for each enterprise activity. This provides the active manager with the detailed understanding required to make mid-year corrections to marketing plans, as well as production strategies.



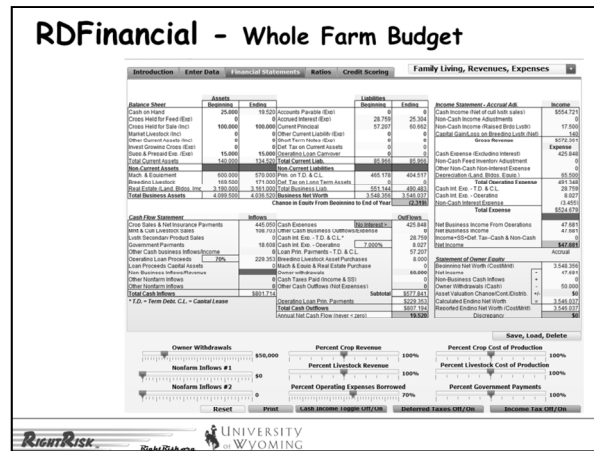
After clicking RUN, the tool evaluates possible outcomes by drawing at least 1,000 samples from the range of variation described by the user’s input. The resulting probability distribution provides users with estimates of the most likely Net Return on a Gross Farm-basis (all costs and returns), as well as a Cash Only-basis.



Additional tabs offer users probability analysis of breakeven price and yield for each enterprise.

Each distribution describes the probability of breaking even across the minimum, most-likely, and maximum values entered for price and yield tied to each enterprise. The analysis covers breakeven estimates on a Gross Farm-basis (all costs and returns), as well as a Cash Only-basis.

With an accurate set of results in hand, the manager is in a good position to evaluate: 1) how profitable each enterprise activity is on its own merit, 2) how profitable one enterprise activity is compared to others, and 3) what are the largest expense categories for each enterprise. This information is extremely helpful when identifying adjustments to enterprises activities with the goal of improving either enterprise profitability or the profitability of entire farm/ranch.

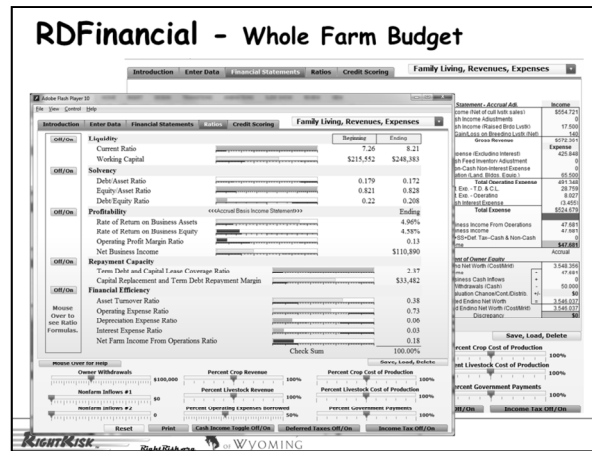


RDFinancial is a tool designed to help understand financial statements and how they interact to provide a measure of financial business position and performance.

RD in the name stands for Reader's Digest. Usually the information presented on financial statements is much more detailed and the reader is often lost in the details. The primary purpose of this tool is to provide opportunities to better understand the relationship of the information across the five financial statements, as well as how those values change when adjusted.

On one single screen, the user can view the Beginning and Ending Balance Sheets, the Cash Flow Statement, the Accrual Income Statement, as well as the Statement of Owner Equity.

The tool offers the chance to conduct what-if analysis through a set of drop down menus at the upper right, changing the sliders offered in the lower portion of the screen. Moving the sliders from left to right adjusts the value (for example Owner Withdrawals) higher or lower than the initial value. As this is done, the values on the linked financial statements change in response in real-time. In this way, the user is able to see what difference there may be with changes to a particular financial measure of performance (for example Net Income).

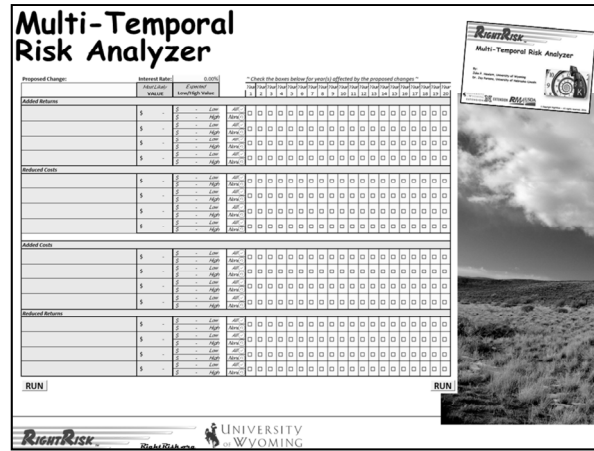


Other tabs allow the user to view the results from different perspectives. The first is a series of financial ratios and indexes commonly used to evaluate financial performance. These cover the five common categories of Liquidity, Solvency, Profitability, Repayment Capacity and Financial Efficiency.

Stoplight representation (green, yellow, red) for each measure provides feedback on whether the measure is good (green), warrants additional attention (yellow), or suggests there is real concern for the future of the business (red).

A second set of results allows the user to view their situation from a lender’s perspective under the Credit Scoring tab.

Each set of results is adjustable by dragging the sliders selected in the lower portion of the screen to learn through what-if analysis how a change in one factor will influence various measures of financial performance.

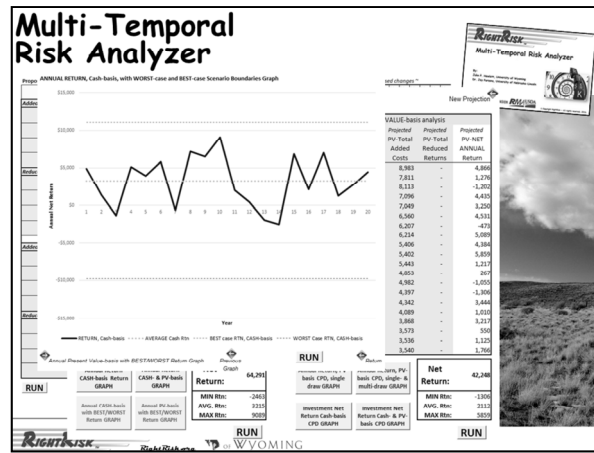


The Multi-Temporal Risk Analyzer tool is designed to provide financial analysis of multi-year management strategies and decisions involving risk. Examples include investment decisions, changes in production practices, adding and subtracting enterprises, and other decisions that involve multiple years to come to fruition or a multi-year commitment in order to see a positive economic return.

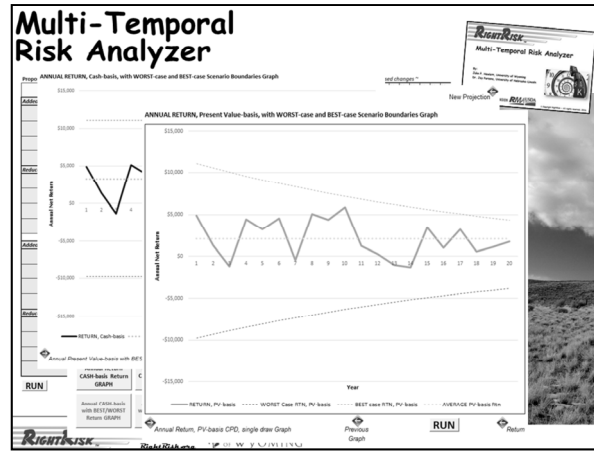
Similar to the Risk Scenario Planning tool each management alternative is described by entries across a matrix of 4 quadrants. The tool is organized with the positive impacts listed as: Added Returns and Reduced Costs, while the negative impacts are entered as: Added Costs and Reduced Returns.

The difference with this tool is that financial implications of any management change can take place more than once over the 20-year horizon. The user simply ticks a box to indicate which years apply.





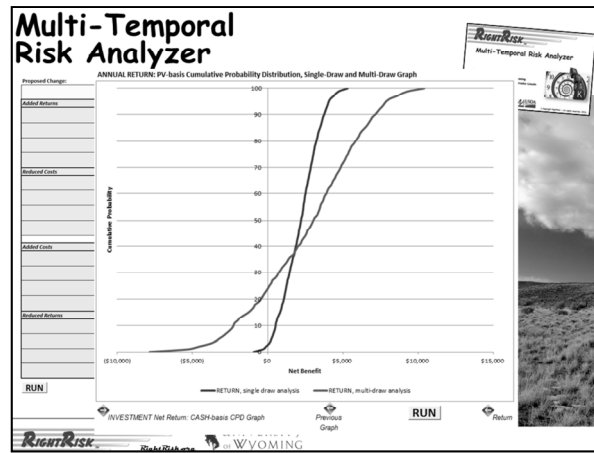
One set of results describes the Net Return for those management changes on a Cash Only, year-by-year basis via tables or graphs.



Another set of results depicts the Net Returns on a Net Present Value, year-by-year basis. This approach includes the implications of including the time value of money or interest implications for those management changes.

The Multi-Temporal Risk Analyzer can also consider variability in the financial estimates. Each estimated change (added returns, reduced cost, reduced return, or added cost) can include a description of low, most-likely, or high value that might reasonably be expected over the next 20 years.

After clicking RUN, the tool evaluates possible outcomes by drawing at least 1,000 samples from the range of variation described by the user’s input. Green and red lines in the graph indicate the best and worst case scenarios, with the most likely forecast indicated by a gold line.

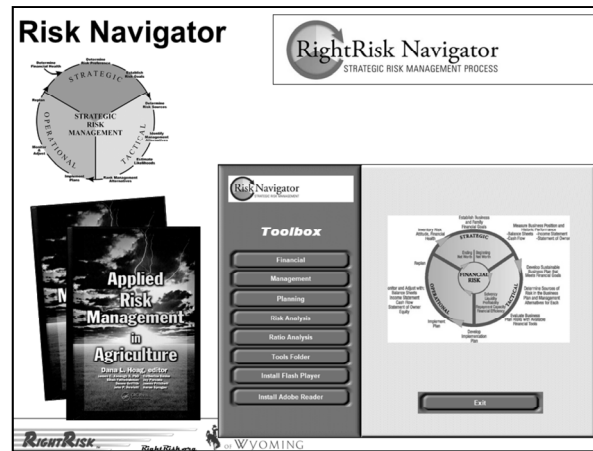


The Multi-Temporal Risk Analyzer tool adds real power to the analysis by generating probability distributions for Net Returns over the range of possible annual results. This graph contains one of these results comparing the range of Net Present value (green curve) to annual returns for one sample draw (brown curve) .

The green curve represents all of the possibilities for any annual NPV return given thousands of possible random draws. The worst case scenario is -\$7,841 and the best case scenario is +\$10,388 on a NPV basis for any one year. Or described another way, the green curve includes the very best of the best possible outcomes, while also including the very worst of the worst possible outcomes, as well as everything in between.

The brown curve represents one possible annual NPV return from one sample draw (all 20 years).

Recalculating the Multi-Temporal Risk Analyzer tool produces a new brown curve based on a new sample draw. And, since the green curve represents all possible draws it does not change, while the brown curve will always be bounded on the left and the right by the end points of the green curve.



Risk Navigator and associated Strategic Risk Management Process outline a 10-step risk management program.

A self-guided Strategic Risk Management 101 course is available on the companion website.

The first three steps of the Strategic Risk Management Process involve your ability and preference to tolerate risk to set risk management goals. Your tolerance for risk will depend on your financial health and personal preferences. The middle steps are tactical, which include identifying risks and the outcomes for various management actions, determining the likelihood of each outcome, and making an informed decision about how to manage any risks. The operational stage assures that what was done is evaluated and periodically reconsidered, and that the process is repeated with course correction as needed.

The Risk Navigator tool box offers an extensive risk management library of over 20 risk tools. The tools help to accomplish the planning and analysis needed to complete each step of the Strategic Risk Management Process.

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relatively minor changes, risk analysis
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machine costs, custom rates, risk analysis
- **Forage Risk Analyzer**  
lease arrangements, forage supply, housing costs
- **Enterprise Risk Analyzer**  
larger enterprise-level, enterprise mix changes
- **RDFinancial**  
substantial changes, whole farm budgets, financial analysis, credit scoring
- **Multi-Temporal Risk Analysis**  
partial budgets incorporating time, risk analysis
- **Risk Navigator**  
strategic risk planning and analysis

<https://RightRisk.org> > tools

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Again, the RightRisk Analytics tools are designed to help decision makers take risk into account when considering management changes as they plan for the future.

The tools are intentionally designed to address everything from relatively small management changes, to those involving larger, multi-year, strategic decisions.



The RightRisk Team has also developed an extensive online library of self-paced courses on risk management.

Topics cover a wide range of issues from record keeping, financial statements, and financial analysis, to management transition and end-of-life planning, to evaluating risk strategies, and understanding risk in agriculture.

All are available online, free of charge, with no registration required.



A series of print and online publications offers users a chance to dig in further on various risk topics.

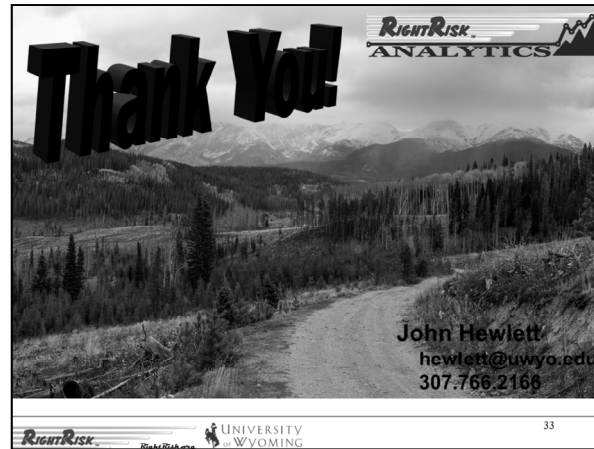
- \* Risk Management Profiles outline various risks or management decisions faced by example operations and a description of the tools and strategies they use to address the risk;
- \* Applied Risk Analytics describe the application of RightRisk Analytics tools to evaluate risk alternatives for example operations; and
- \* Risk Concepts offers an overview of various organizational structures, comparing each across 7 alternative criteria.



The RightRisk Team also produces a monthly newsletter on a variety of risk management topics. The newsletter is available by email or online, with archived copies available from 2013 forward.

The newsletter is free of charge and may be one additional method for keeping up with the many risk management approaches and strategies available to today's risk managers.





Thank you for taking time to review this brief presentation on Evaluating Risk Alternatives. There are indeed many competing alternatives for evaluating and managing risk in today's world, as well as plenty of uncertainty making it necessary.

We would be happy to help you move your risk management forward to the next stage. Our contact information is on the screen or we invite you to join us online at [RightRisk.org](http://RightRisk.org).