Evaluating Mineral Supplementation
for Hawaii Beef Production
Risk Scenario Planning Analytics | RightRisk
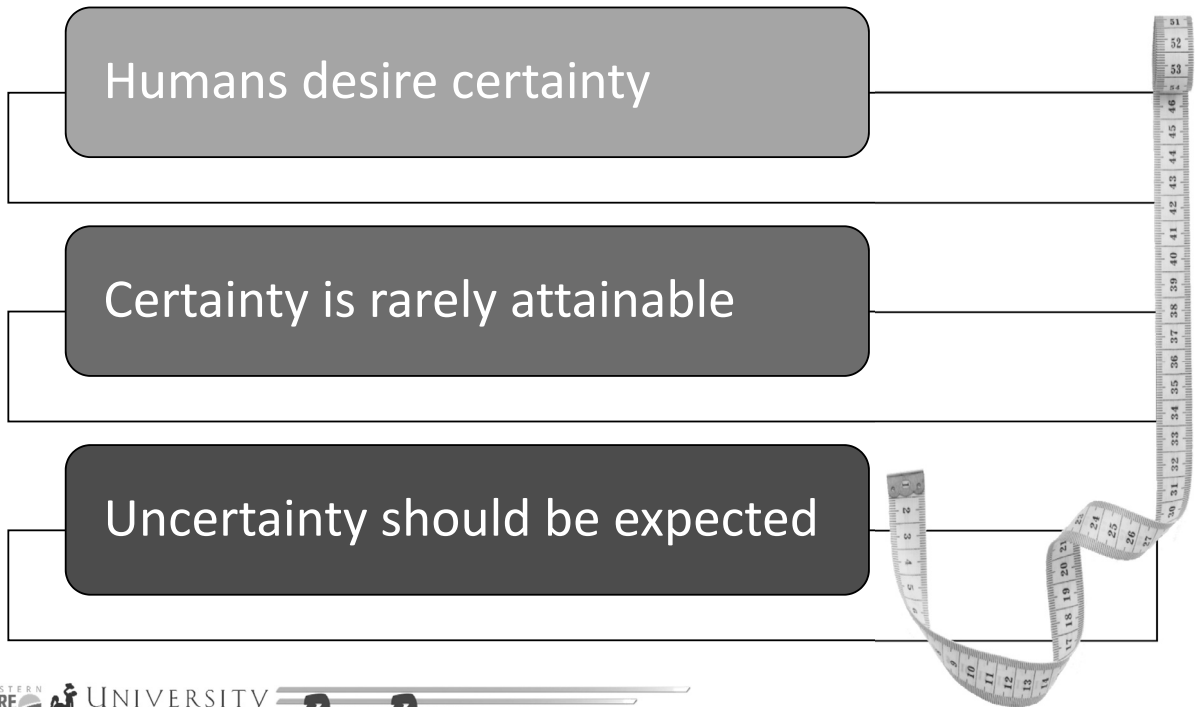
John P. Hewlett – University of Wyoming
Department of Agricultural & Applied Economics

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Challenges of predicting the future

- People are not "Risk Savvy"

- Risk management alternatives need not be complex

- Risk management is difficult

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Known future and unknown future

Humans desire certainty

Certainty is rarely attainable

Uncertainty should be expected

Known future and unknown future

Future is influenced by:

❖ Risk

❖ Attitudes and

❖ Other factors

RISK

Future events are unknown

Variability
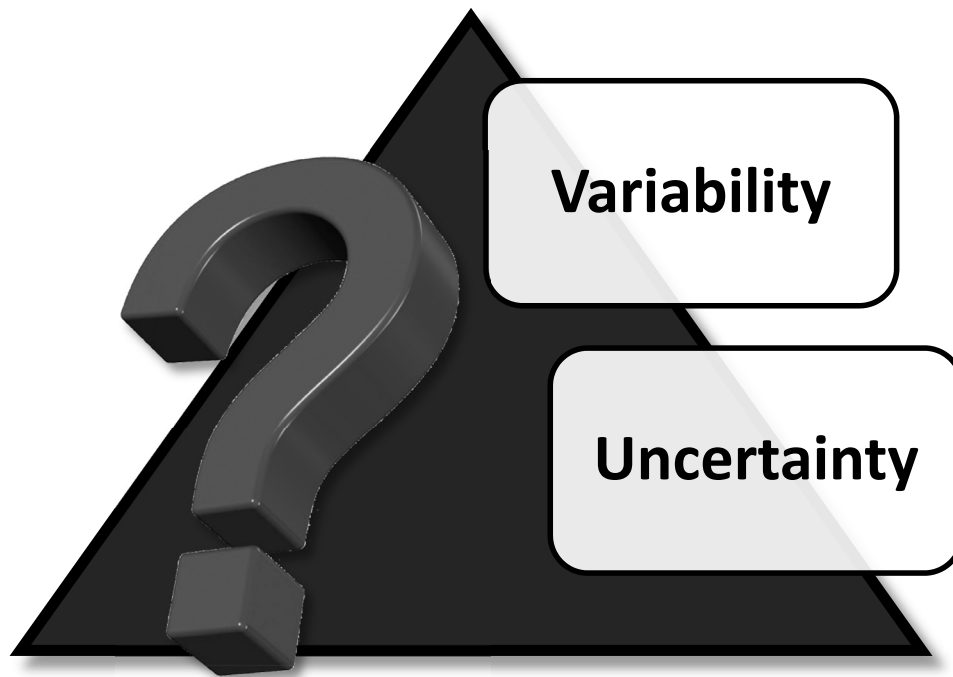
Uncertainty

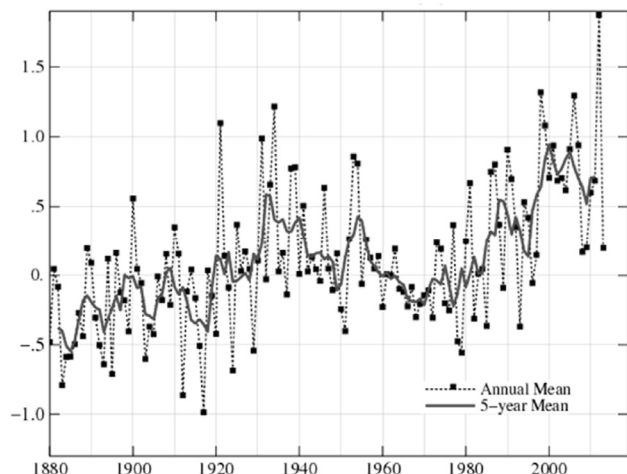
Future events are unknown

VARIABILITY:

- Different possible outcomes
  - ❖ Due to chance
  - ❖ Cannot be reduced
- Variability equals risk
- Not all risk is a substantial risk

..... Annual Mean
—— 5-year Mean

# Future events are unknown

UNCERTAINTY:

- A lack of knowledge of the future
    - ❖ Meaning of future events
    - ❖ Implications of future outcomes
- May represent subjective nature of the individual
- Uncertainty = indeterminability or ambiguity

Imperfect knowledge versus uncertain consequences

Knowledge about the future

* Imperfect

* Can be managed

Uncertain consequences

* Outcomes?

* Likelihood of outcomes?

* Both?
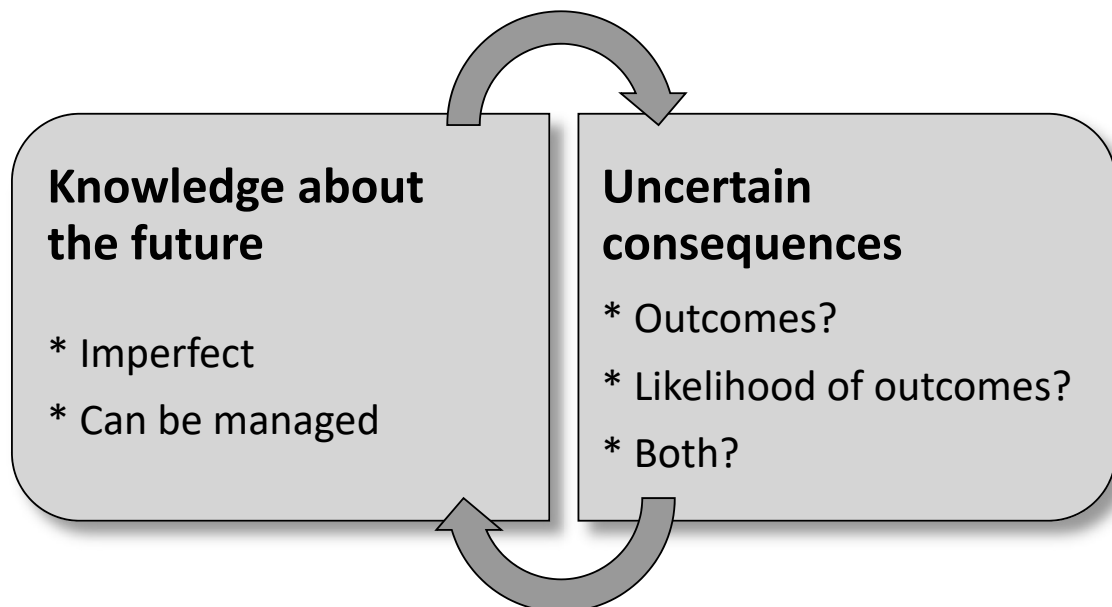
Known risk versus unknown risk

- **KNOWN RISK**
  - ❖ Outcomes are known
  - ❖ Likelihood of occurrence is known
- **UNKNOWN RISK**
  - ❖ Uncertainty
  - ❖ Indeterminability


Risk in agriculture

- **Influences of risk may be**
  - ❖ Distinctly separate
  - ❖ Additive

- **Risk versus opportunity**
  - ❖ Not all risk is bad
  - ❖ Agricultural producers speculate on risk
  - ❖ Risk offers potential rewards (profit)

Marketing & Price Risks

Production Risks

Financial Risks

RISK

Institutional Risks

Human Risks

Risk management strategies

RISK MANAGEMENT

- Reduce bad outcomes
- Increase likelihood of good outcomes
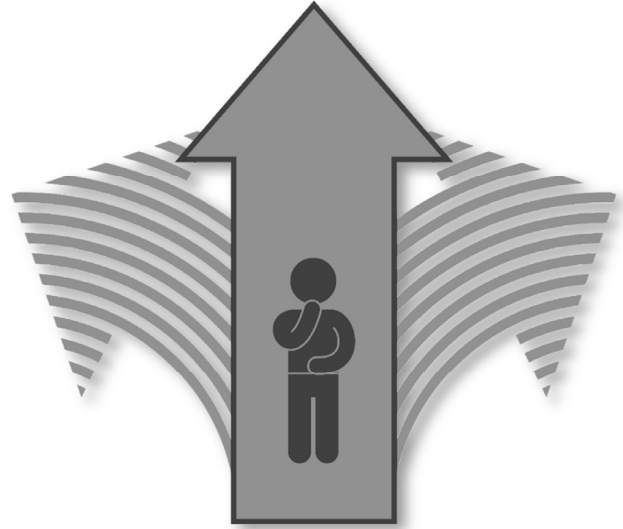
Risk management strategies

STRATEGIES

- Reduce risk
- Transfer risk
- Increase ability to bear risk

Transfer It · Reduce It · RISK · Avoid It · Accept It · MANAGEMENT · Build Capacity to Bear It

Evaluating Alternatives
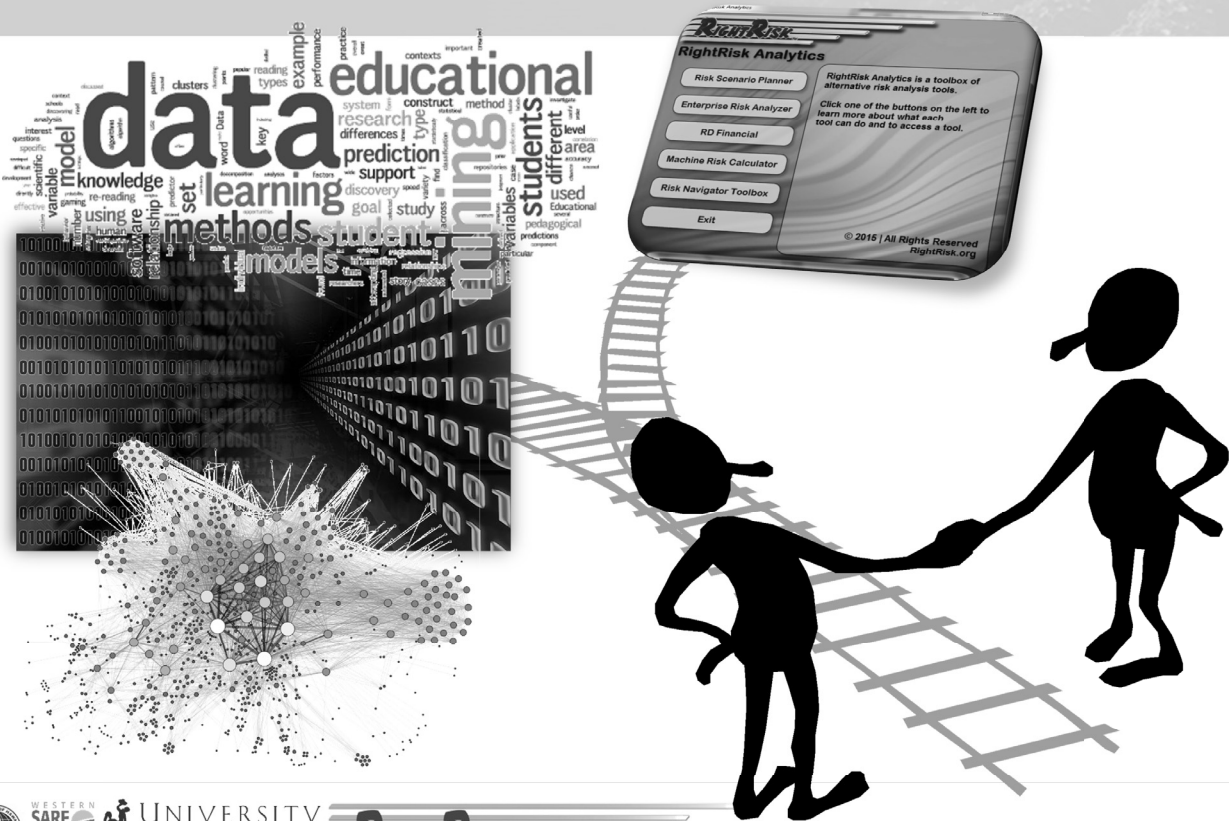
RightRisk Analytics:
~ *tools to evaluate alternatives*

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

I N C R E A S I N G   C H A N G E
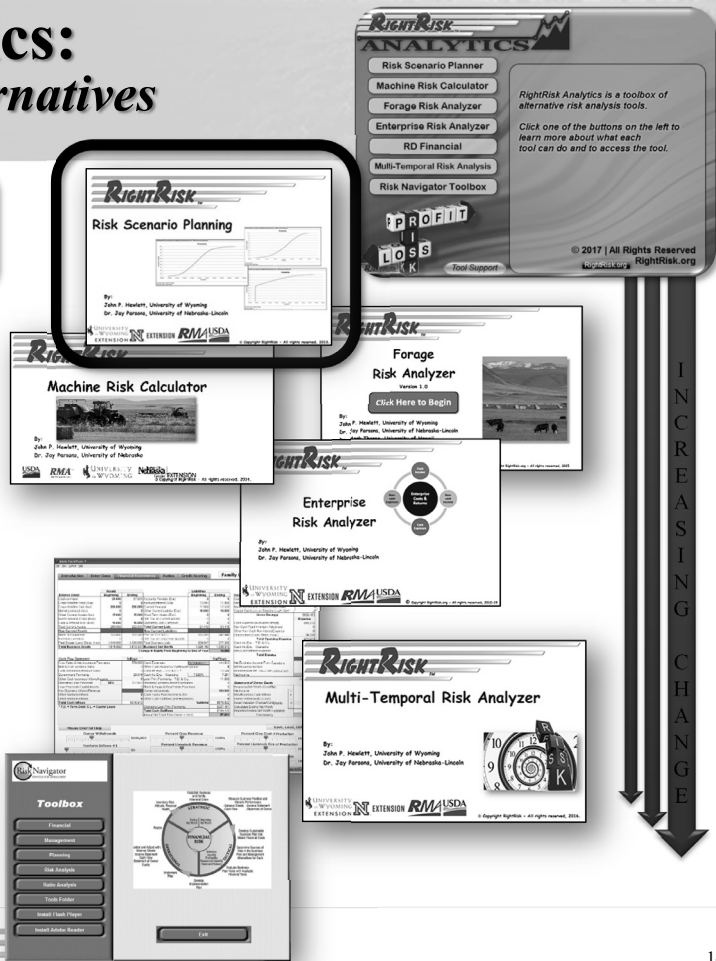
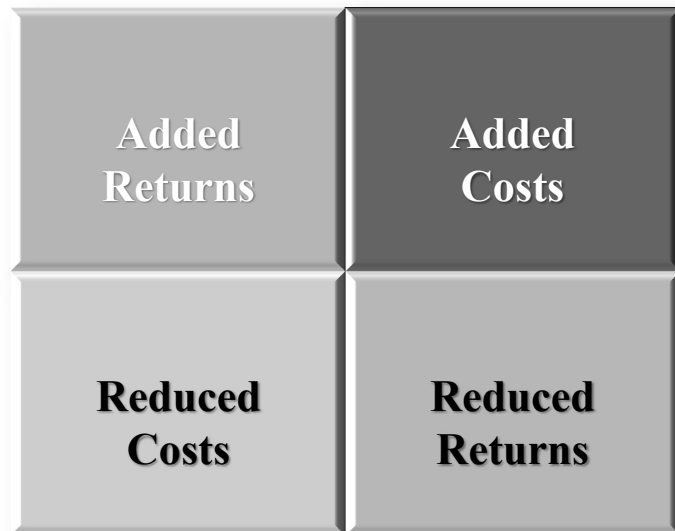# Partial Budget Framework

A partial budget is a tool used to analyze the **financial effect** of simple management changes

- **Positive Effects**
 - *Added Returns*
  - *Reduced Costs*

- **Negative Effects**
  - *Added Costs*
  - *Reduced Returns*

Added Returns	Added Costs
Reduced Costs	Reduced Returns

Case 1: Convert to Commercial Mineral Mix

- JR Land and Livestock, a 200 cow/calf operation near Koloa, has not followed any regular or organized program for mineral supplementation of their cattle over the past 15 or so years.

- Recent work by the UH Cooperative Extension Service has found that mineral program using a ***commercial mineral mix*** could provide much of the mineral supplementation they need at around $31.89/cow/year.
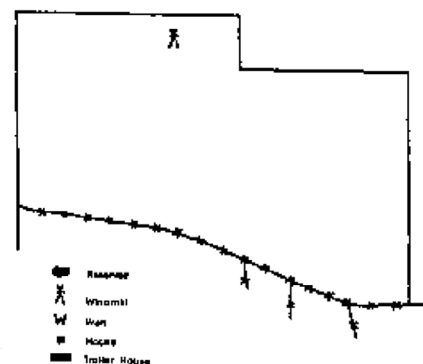
Case 1: Convert to Commercial Mineral Mix

- *Labor* to distribute the mineral is expected to cost around $20/hour, including all payroll taxes and benefits. They estimate that 3/4 of an hour per week or around 42 hours would be needed for the year.

- Two new *mineral bunks* (1 bunk/100 head) would be needed at an estimated cost of $500 each and are expected to last 10 years. Currently they are paying about 7 percent interest on their operating capital.

- *Other expenses* for additional fuel, vehicle maintenance and miscellaneous costs are expected to increase about $300/year.

- They also anticipate *management costs* will increase around $250/year to manage the new mineral program.

Case 1: Convert to Commercial Mineral Mix

- After visiting extensively with one of the neighboring ranch families, JR L&L managers have learned that the benefits from supplementing the needed mineral should result in the ranch selling an additional 40 *weaned calves* at 6 months of age, weighing around 400 lbs/head. Prices are currently around $135/cwt on these lighter calves.

- Furthermore, their annual *veterinary costs* ($6,015) are expected to decrease by 10 percent ($602) per year.

Case 1: Convert to Commercial Mineral Mix

- Another expected change is a cut in their culling rate. They expect to sell 17 fewer **cull females** each year, at a value of $704/head. This is a reduction in revenue, but they would also save on **transportation and marketing costs** for these cull animals, usually costing the ranch around $740/year.

- Finally, after some additional thought, the managers realize that they should expect an increase in **transportation and marketing cost** associated with the added calves. They estimate this additional cost at $536/year.

Case 1: Convert to Commercial Mineral Mix

- Based on past prices, they find that the **commercial mineral mix** prices have varied between $29.46 and $39.86/cow/year.

- Lastly, after some market research, they feel that **calf prices** are likely to range between $120 and $165/cwt. over the next few years.

RSP Input Page

Case 1: Convert to Commercial Mineral Mix – TOTAL/year

RightRisk™ — Partial Budget For: CONVERT to Commercial Mineral Mix Supplementation (200 cows/year)

Positive Effects

Added Returns	Quantity	Value	Total
Calf sales: 40 head or 0.80 cwt/cow/year	160	$ 135.00	$ 21,600.00
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -

Negative Effects

Added Costs	Quantity	Value	
Commercial mineral: $31.89/cow/year	200	$ 31.89	$ 6,378.00
Mineral labor: $4.20/cow/year	200	$ 4.20	$ 840.00
Other expenses (fuel, maintenance, etc)	200	$ 1.50	$ 300.00
Mineral bunk costs: $0.50/cow/year	200	$ 0.50	$ 100.00
Opportunity interest: $0.18/cow/year	200	$ 0.18	$ 36.00
Added management: $1.25/cow/year	200	$ 1.25	$ 250.00
Transportation and marketing for			$ -
40 added calves: $2.68/cow/year	200	$ 2.68	$ 536.00

Reduced Costs	Quantity	Value	
Vet and medicine: $3.01/cow/year	200	$ 3.01	$ 602.00
Transportation and marketing for			$ -
17 fewer cull females: $3.70/cow/year	200	$ 3.70	$ 740.00

Reduced Returns	Quantity	Value	
Cull female sales: $59.84/cow/year	200	$ 59.84	$ 11,968.00
			$ -
			$ -

Total Positive Effects
(Added Returns + Reduced Costs) $ 22,942.00

Total Negative Effects
(Added Costs + Reduced Returns) $ 20,408.00

Net Benefit of: CONVERT to Commercial Mineral Mix Supplementation (200 cows/year) $ 2,534.00

Case 1: Convert to Commercial Mineral Mix – Per COW/year

RightRisk™				CONVERT to Commercial Mineral Mix Supplementation (per cow/year)			
		Partial Budget For:					
Positive Effects				**Negative Effects**			
Added Returns	Quantity	Value	Total	Added Costs	Quantity	Value	
Calf sales: 40 head or 0.80 cwt/cow/year	0.8	$ 135.00	$ 108.00	Commercial mineral: $31.89/cow/year	1	$ 31.89	$ 31.89
			$ -	Mineral labor: $4.20/cow/year	1	$ 4.20	$ 4.20
			$ -	Other expenses (fuel, maintenance, etc)	1	$ 1.50	$ 1.50
			$ -	Mineral bunk costs: $0.50/cow/year	1	$ 0.50	$ 0.50
			$ -	Opportunity interest: $0.18/cow/year	1	$ 0.18	$ 0.18
			$ -	Added management: $1.25/cow/year	1	$ 1.25	$ 1.25
			$ -	Transportation and marketing for		$ -	
			$ -	40 added calves: $2.68/cow/year	1	$ 2.68	$ 2.68

Reduced Costs	Quantity	Value		Reduced Returns	Quantity	Value	
Vet and medicine: $3.01/cow/year	1	$ 3.01	$ 3.01	Cull female sales: $59.84/cow/year	1	$ 59.84	$ 59.84
Transportation and marketing for			$ -				$ -
17 fewer cull females: $3.70/cow/year	1	$ 3.70	$ 3.70				$ -

Total Positive Effects
(Added Returns + Reduced Costs) $ 114.71

Total Negative Effects
(Added Costs + Reduced Returns) $ 102.04

Net Benefit of: CONVERT to Commercial Mineral Mix Supplementation (per cow/year) $ 12.67

Case 1: Convert to Commercial Mineral Mix - RSP Input Screen

Risk Scenarios

Uncertain Value 1		☑ Include
Description	Cell	
Commercial mineral mix	H6	
Current Value (Most Likely)	31.89	
Minimum Value	29.46	
Maximum Value	39.86	

JR L&L wants to make the price of the ***commercial mineral mix*** uncertain:

- The current value of $31.89/cow/year is in cell H6 of the Risk Scenario Planning tool. We enter "Commercial Mineral Mix" as the description and "H6" as the cell under Uncertain Value 1

- Then enter $31.89 as the current value,

- $29.46 as a possible minimum value, and

- $39.86 as a possible maximum value.

Case 1: Convert to Commercial Mineral Mix - RSP Input Screen

Risk Scenarios

Uncertain Value 1		☑ Include	Uncertain Value 2		☑ Include
Description	Cell		Description	Cell	
Commercial mineral mix	H6		*Added calf sales*	D6	
Current Value (Most Likely)	31.89		Current Value (Most Likely)	135	
Minimum Value	29.46		Minimum Value	120	
Maximum Value	39.86		Maximum Value	165	

JR L&L also wants to make the price of the ***price of calves*** uncertain:

- The current price of $135/cwt is in cell D28 of the Risk Scenario Planning tool. We enter "Added calf sales" as the description and "D28" as the cell under Uncertain Value 1
- Then enter $135 as the current value,
- $120 as a possible minimum value, and
- $165 as a possible maximum value.
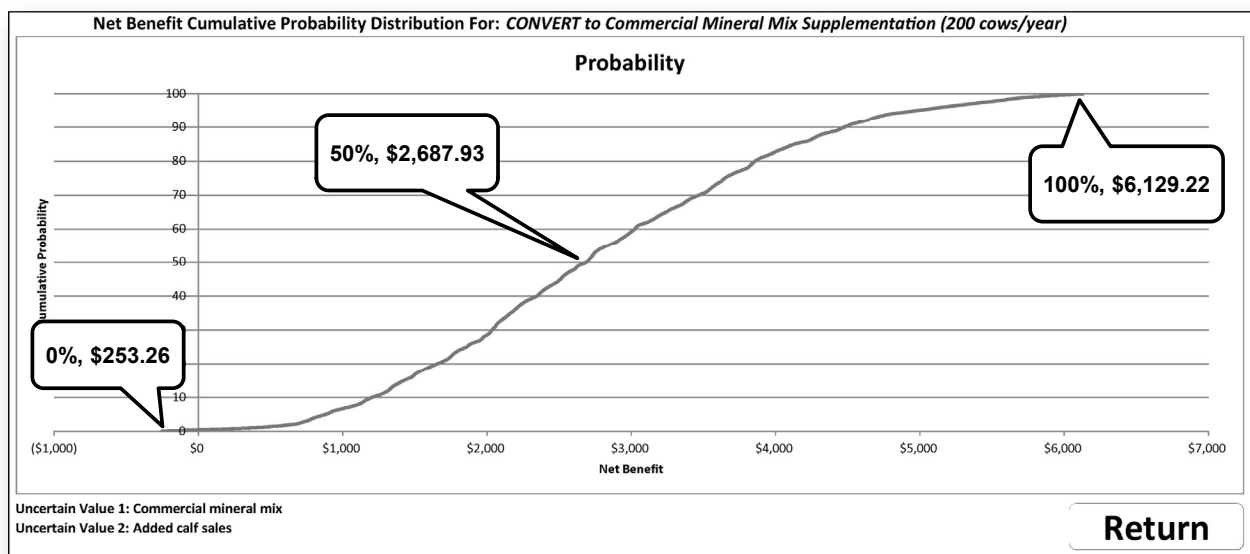
Case 1: Convert to Commercial Mineral Mix

Net Benefit Cumulative Probability Distribution For: *CONVERT to Commercial Mineral Mix Supplementation (200 cows/year)*

- A cumulative distribution graph gives the probability of earning a net return at or below any certain value.

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Strategy Impacts

Panel 1: Same Mean, Less Dispersion
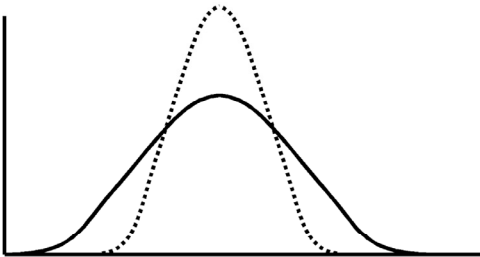
Panel 2: Same Dispersion, Higher Mean
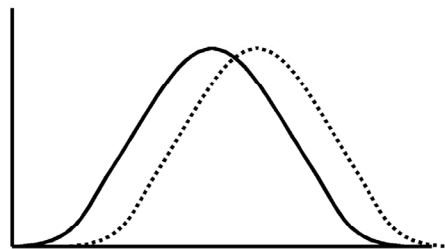
Panel 3: Skewing the distribution
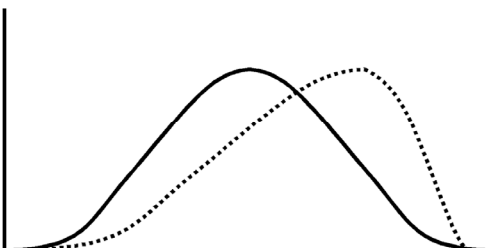
Panel 4: Truncating the Distribution

Risk Treatment: Options

- *Avoiding* the risk
- Deciding to *start* or *continue* an activity likely to create or enhance the risk
- *Removing* the source of the risk
- Changing the *nature* and *magnitude* of the likelihood
- Changing the *consequences*
- *Sharing* the risk with another
- *Retaining* the risk

Not all options are mutually exclusive

Not all options are appropriate in every circumstance

Risk Treatment

- Selecting one or more *options for modifying risks* and implementing those options
- Involves a *cyclical process* of assessing a risk treatment and deciding whether residual risk levels are acceptable
- If not, then selecting a *new risk treatment* and assessing the effect of that treatment until the residual risk matches the risk goal(s)

Case 2: Convert to Free-Choice Mineral Supplementation

- The X Bar Ranch, a 500 cow/calf operation near Koloa, has been supplementing their cattle with a commercial mineral mix for over the past 10 years.

- Current prices for commercial mineral mix runs about $31.89/cow/year. Recent work by the UH Cooperative Extension Service has found that an individual, *cafeteria-style mineral*
- *program* may reduce the cost of supplementation to about $13.10/cow/year.

Case 2: Convert to Free-Choice Mineral Supplementation

- Five new *mineral bunks* (1 bunk/100 head) would need to be constructed at an estimated cost of $1,000 each and are expected to last 10 years. Currently they are paying about 7 percent interest on their operating capital.

- They anticipate they will spend an average of about 1 additional hour per week putting out mineral following the free-choice approach. *Labor cost* is around $20/hour, including all payroll taxes and benefits.

- *Other expenses* for additional fuel, vehicle maintenance and miscellaneous costs are expected to increase about $250/year.

- They also anticipate *management costs* will increase around $500/year to manage the new mineral program.

Case 2: Convert to Free-Choice Mineral Supplementation

- Based on past prices, they find that the *free-choice mineral mix* could be expected range between $12.90 and $19.19/cow/year.

- After further reflection, they realize that *commercial mineral* mix prices have varied between $29.46 and $39.86/cow/year.

RSP Input Page

Case 2: Convert to Free-Choice Mineral Supplementation – TOTAL/year

RightRisk

Partial Budget For: CONVERT to Individual Free-Choice Mineral Supplementation (500 cows/year)

Positive Effects				Negative Effects				
Added Returns	**Quantity**	**Value**	**Total**	**Added Costs**	**Quantity**	**Value**		
			$ -	Free-choice mineral mix:	500	$ 13.10	$	6,550.00
			$ -	Mineral labor costs:	156	$ 20.00	$	3,120.00
			$ -	Other expenses (fuel, vehicle maint., etc.)	1	$ 1,000.00	$	1,000.00
			$ -	Mineral bunk costs:	5	$ 100.00	$	500.00
			$ -	Opportunity interest:	500	$ 0.35	$	175.00
			$ -	Added management:	10	$ 50.00	$	500.00

Reduced Costs	**Quantity**	**Value**		**Reduced Returns**	**Quantity**	**Value**		
Commercial mineral:	500	$ 31.89	$ 15,945.00				$	-
Mineral labor:	104	$ 20.00	$ 2,080.00				$	-
Other expenses (fuel, maintenance, etc)	1	$ 750.00	$ 750.00				$	-

Total Positive Effects
(Added Returns + Reduced Costs) $ 18,775.00

Total Negative Effects
(Added Costs + Reduced Returns) $ 11,845.00

Net Benefit of: CONVERT to Individual Free-Choice Mineral Supplementation (500 cows/year) $ 6,930.00

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Case 2: Convert to Free-Choice Mineral Supplementation – Per COW/year

RightRisk

Partial Budget For: CONVERT to Individual Free-Choice Mineral Supplementation (per cow/year)

Positive Effects				Negative Effects				
Added Returns	**Quantity**	**Value**	**Total**	**Added Costs**	**Quantity**	**Value**		
			$ -	Free-choice mineral mix: $13.10/cow/year	1	$ 13.10	$	13.10
			$ -	Mineral labor costs: $6.24/cow/year	1	$ 6.24	$	6.24
			$ -	Other expenses (fuel, vehicle maint., etc.)	1	$ 2.00	$	2.00
			$ -	Mineral bunk costs: $1/cow/year	1	$ 1.00	$	1.00
			$ -	Opportunity interest: $0.35/cow/year	1	$ 0.35	$	0.35
			$ -	Added management: $1/cow/year	1	$ 1.00	$	1.00

Reduced Costs	**Quantity**	**Value**		**Reduced Returns**	**Quantity**	**Value**		
Commercial mineral: $31.89/cow/year	1	$ 31.89	$ 31.89				$	-
Mineral labor: $4.16/cow/year	1	$ 4.16	$ 4.16				$	-
Other expenses (fuel, maintenance, etc)	1	$ 1.50	$ 1.50				$	-

Total Positive Effects
(Added Returns + Reduced Costs) $ 37.55

Total Negative Effects
(Added Costs + Reduced Returns) $ 23.69

Net Benefit of: CONVERT to Individual Free-Choice Mineral Supplementation (per cow/year) $ 13.86

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Case 2: Convert to Free-Choice Mineral Supplementation - RSP Input Screen

The X Bar wants to make the price of the *free-choice mineral* mix uncertain:

- The current value of $13.10/cow/year is in cell H6 of the Risk Scenario Planning tool. We enter "Free-choice Mineral Mix" as the description and "H6" as the cell under Uncertain Value 1

- Then enter $13.10 as the current value,

- $12.90 as a possible minimum value, and

- $19.19 as a possible maximum value.

Case 2: Convert to Free-Choice Mineral Supplementation - RSP Input Screen

The X Bar also wants to make the price of the *commercial mineral mix* uncertain:

- The current value of $31.89/cow/year is in cell D28 of the Risk Scenario Planning tool. We enter "Commercial Mineral Mix" as the description and "D28" as the cell under Uncertain Value 1

- Then enter $31.89 as the current value,

- $29.46 as a possible minimum value, and

- $39.86 as a possible maximum value.

Case 2: Covert to Free-Choice Mineral Supplementation
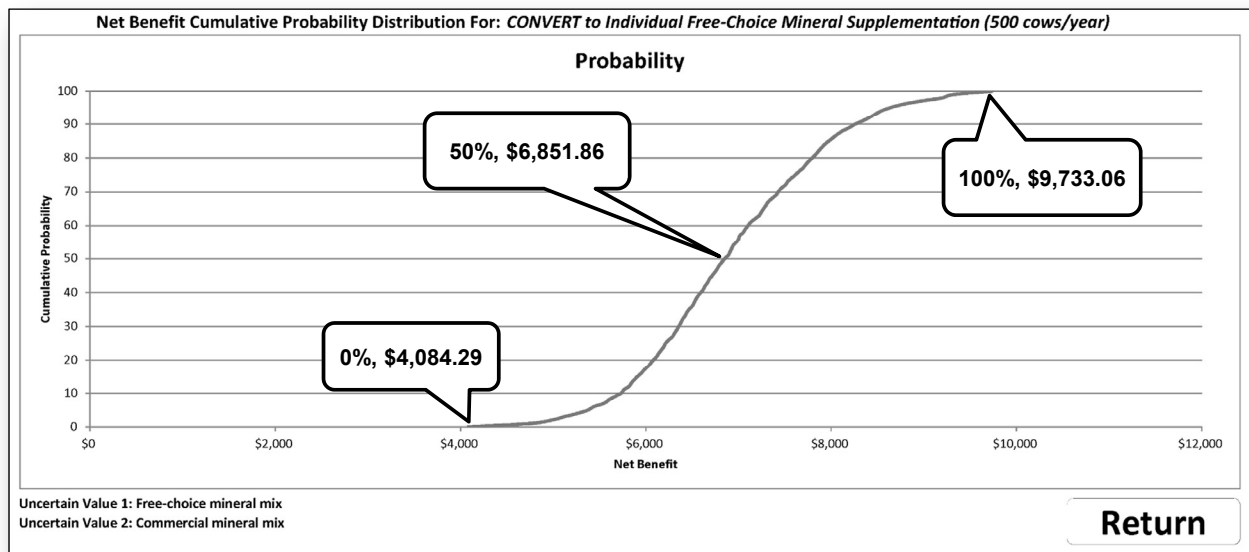
- A cumulative distribution graph gives the probability of earning a net return at or below any certain value.

Summary

The Risk Scenario Planning tool:

- Can be a useful tool for analyzing **management** strategies and decisions involving **risk**

- Represents a better way to handle the presence of **uncertainty** by thinking in terms of **distributions** of possible outcomes over time

- Results in more **informed** decision-making

- GUIDE offers **15-page** description of the tool and working examples

- Website offers examples for **download** and a place to get started
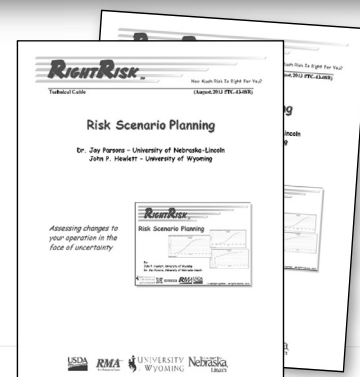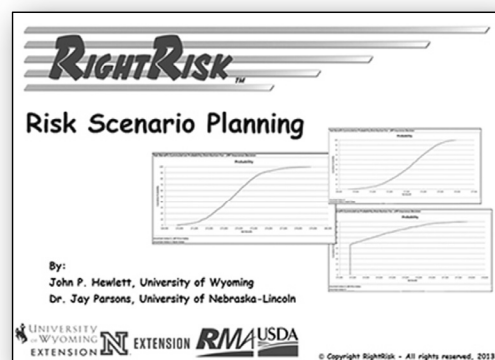
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http://RightRisk.org > tools

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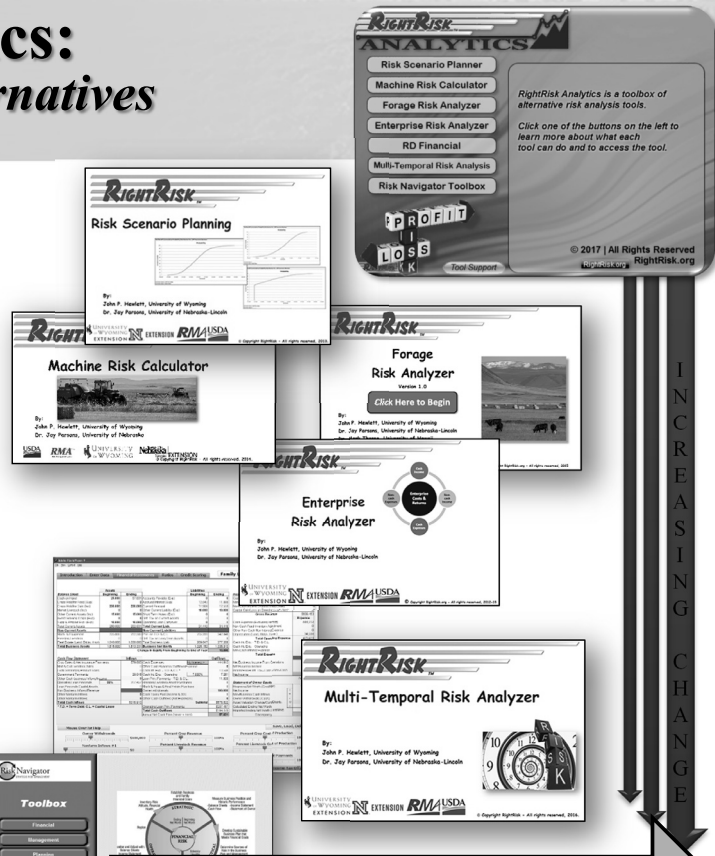
http://RightRisk.org > courses

Risk Management Profiles

http://RightRisk.org > RM Profiles

RightRisk Newsletter

http://RightRisk.org/News

Questions??

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