Description of Decision Support Tool: CCRAT

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Cow Calf Risk Analysis Tool (CCRAT) is a web based decision support tool for cow calf producers to use to evaluate pricing and insurance alternatives available for a cow-calf enterprise. Historically many cow-calf producers have not used the CME Feeder Cattle futures or options to hedge the sale price of their calves. Several reasons have been given for this: (1) the Feeder Cattle contract specifications don't fit a weaned calf and basis variability for this cross hedge may be too large for an effective hedge; (2) the fixed contract size (50,000 lbs.) does not work well for smaller producers; (3) producers don't like margin calls on futures and premiums for options are too expensive.

In 2002 the USDA-Risk Management Agency (USDA-RMA) introduced Livestock Risk Protection (LRP) insurance for feeder cattle. A fact sheet is available at:
http://www.rma.usda.gov/pubs/2007/lrp-feedercattle.pdf   This insurance product is very similar to purchasing a put option. However, producers can insure as few as one head if they desire; thus overcoming the size of contract issue with the feeder cattle contract. Furthermore, the insurance premium is subsidized by the federal government which may lower the cost of this insurance relative to a similar priced put option.

For an excellent discussion of the mechanics of using the futures to hedge prices, or buying a put to protect against lower prices or buying LRP insurance the reader is encouraged to read the publication by Darrell Mark at the following location:
http://livestockinsurance.unl.edu/pdfs/unl_ec05-835-revised.pdf

The futures, options and LRP insurance are all tools to help producers manage price risk. None of these tools offer protection against production risk. However, the USDA-RMA more recently introduced Adjusted Gross Revenue-Lite insurance (AGR-Lite) as another insurance product that cow-calf producers could use to insure against risk. A fact sheet is available at:
http://www.rma.usda.gov/pubs/rme/agr-lite.pdf
This product insures against an unexpected decline in gross revenue, which can occur because of lower than expected prices or lower than expected production. Therefore, AGR-Lite insures against both price and production risk.

CCRAT is a decision support tool to help producers effectively analyze the net income risk involved in running a cow-calf operation and to provide a comparison of hedging with the futures market, buying a put option, buying LRP insurance, or buying AGR-Lite insurance. The analysis tool asks for basic information such as number of head of cattle you are running as well as weaning percents, weaning weights, and expected price.

Based on the information provided by the user, the tool will then perform a simulation analysis. CCRAT performs 1000 simulations of net returns to the cow-calf enterprise, based on data supplied by the users. There are four variables in the simulation that are stochastic: Weaning Percent, Steer Calf Weight, Market Steer Price and Basis. All four of these variables are simulated based on a triangle distribution. For Weaning Percent, Steer Calf Weight and Market Steer Price the user is asked to supply the Minimum, Expected and Maximum values to establish the triangle distributions. Users

enter their expected Basis and the minimum and maximum values are calculated based on the historical variability of basis at the Salina, Utah Auction Market for the weight of the steer calf entered. Users are able to enter any basis value they want; it could represent another location within Utah or some other location in the US. However, the variability will be consistent with the Salina, Utah market.

It is important to note that the purpose of this tool is not to calculate nor to predict the net income of any given year. It is designed rather to quantify the amount of risk inherent in the cash market, as well as production risk, and quantify the reduction of risk available through the various pricing and insurance options.

CCRAT can be accessed at: http://cattlemarketanalysis.org/ccrat.html A screen capture of the home page is shown below. It gives a brief description of the program and provides menu choices across the top of the page.

CCRAT Inputs

To begin using the decision support tool, users select the "Analysis" link. There are two short input forms to fill out (both are displayed on the following page). The first input page asks users for information on their cow herd and their market outlook. The following information must be supplied by the user:

Cows: The number of head of cows to calve. (CCRAT is primarily designed for comparing returns for weaned calves. However it can also be used to consider a retained ownership decision that results in a heavier feeder calf to sell. Just enter the number of calves to retain.)

Weaning Percent: This number can be entered as either a decimal or a percent i.e. .85 will be treated the same as 85. The poorest, the typical or expected, and the best weaning percent over the last 10 years should be entered to accurately portray risk.

Screen 1

Cow Calf Risk Analysis Tool

Home   Analysis   Suggestions   Help   Contact Us

Prior Day Futures Close

Barchart.com

Feeder Cattle
Aug 09	96.600s
Sep 09	96.825s
Oct 09	97.350s
Nov 09	97.500s
Jan 10	96.100s
Mar 10	95.500s

Helpful Links

Feeder Cattle Futures

Feeder Cattle Options

LRP Calculator

AGR-Lite Calculator

Utah Basis

Utah Costs

Your Historical Production Values & Your Expectations for the Current Year

Enter the number of cows you expect to calve, or cows that calved if you calving season is over. Then enter your expected weaning percent(this percent may be quite different depending upon if it is based on cows expected to calve or cows that have calved). The minimum should be based on your best and worst in the last 10 years. Enter your minimum, expected and maximum steer weaning weights(your best and worst should reflect your last 10 years). Enter your typical local basis for your weight of steer calf(the price you typically receive - the CME Feeder Cattle futures price). Enter your expected feed and other costs on a per head basis. For the current year and market conditions enter the minimum, expected, and maximum price you expect for your steer calves.

# of Head
Cows [ ]

Weaning Percent
Minimum [ ]   Expected [ ]   Maximum [ ]

Basis($/cwt)
Basis [ ]

Steer Calf Weight(lbs)
Minimum [ ]   Expected [ ]   Maximum [ ]

Costs($/head)
Feed Costs [ ]   Other Costs [ ]

Market Steer Price($/cwt)
Minimum [ ]   Expected [ ]   Maximum [ ]

Utah producers can click on the buttons to the left to get help with expected basis and with feed and other costs. Producers from other states are encouraged to check with their state cooperative extension to find relevant basis and cost information.

[Back] [Next]

Screen 2

Cow Calf Risk Analysis Tool

Home   Analysis   Suggestions   Help   Contact Us

Prior Day Futures Close

Barchart.com

Feeder Cattle
Aug 09	96.600s
Sep 09	96.825s
Oct 09	97.350s
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Helpful Links

Feeder Cattle Futures

Feeder Cattle Options

LRP Calculator

AGR-Lite Calculator

Utah Basis

Utah Costs

Risk Management Alternatives

Check the risk management alternatives that you want to consider and then enter the appropriate data. All prices and premiums should be entered in $/cwt. A Feeder Cattle contract is for 50,000 pounds. Current CME Futures and Options data and current RMA LRP and AGR-Lite information can be obtained by clicking on the appropriate buttons on the left of this form.

A Futures Hedge
[ ] Futures   Futures Price [ ]   # of Contracts [ ]

Buying a Put Option
[ ] Options   Option Strike [ ]   Premium [ ]   # of Contracts [ ]

Buying LRP Insurance
[ ] LRP   Coverage Price [ ]   Steer cost per CWT [ ]   # of Steers Insured [60]   Heifer cost per CWT [3]   # of Heifers Insured [37]

Buying AGR-lite Insurance
[ ] AGR-Lite   Approved Gross Revenue [ ]   Coverage ▼   Payment Rate ▼   Premium [ ]

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(If retaining ownership of calves, enter the expected percent of calves to sell after accounting for death loss, for example 96, 99, and 100)

Basis: Must be between -30 and 30 $/CWT. Basis = Your expected cash sale price - Feeder Cattle Futures for when you expect to sell. (The actual basis value for the simulation will be determined using a triangle distribution with the minimum and maximum value being set at a fixed distance from the given basis. This fixed difference is based on historical basis values from several auction markets and has been subdivided into different weight categories to provide an accurate measure of variability).

Steer Selling Weight: Enter the steer calf weight in pounds. Users should enter the lightest, the typical or expected, and the heaviest weaning weight of calves in the last 10 years to depict the risk involved.

Costs: should be entered in dollars per head. Do not include cost such as a premium for an insurance option as these will be factored in at a later time.
(For retained ownership, be sure to include the cost or value of the calf at the start of the retained ownership period as part of the costs.)

Market Steer Price: Must be entered as $/CWT. To enforce this, no value less than $10 will be accepted. Do not underestimate market risk in entering minimum, expected and maximum market prices. It is not uncommon for actual fall calf prices to be $15 higher or lower than what was expected in the spring of the year.

Once these data have all been entered, selecting the next button at the bottom of the screen will take the user to the next input page. The second input page deals with the pricing and insurance alternatives that the user wants to consider.

Cash price risk will automatically be estimated and displayed for all users. By clicking the boxes, users can also choose to consider a futures hedge, a put option, purchasing LPR insurance, and purchasing AGR-Lite insurance.

The prior days feeder cattle futures market closes are displayed on the left of the screen, or by clicking the "Feeder Cattle Futures" link, users can get 10 minute delayed quotes.

Users may need to enter some or all of the following information depending upon which alternatives they wish to consider.

Futures Price: The current price of the futures contract ($/CWT) for the futures month when you will sell the calves. If there is not a futures contract for the month in which you plan to sell, enter the price of the next listed contract.

Number of Futures Contracts: Enter an integer value: 1, 2, 3, etc. Each contract represents 50,000 lbs or 500 CWT of production.

Put Option Strike: The available options strike prices can be found by selecting the "Feeder Cattle Options" link on the left of the web page. Enter the strike in $/CWT.

Put Option Premium: Are obtained at the same time the strike price is chosen. The premium should be entered as a positive value.

Number of Put Option Contracts: Enter an integer value: 1, 2, 3, etc. Each contract represents 50,000 lbs or 500 CWT of production.

LRP Coverage Price: This value is obtained by going to the RMA LPR Premium Calculator web site. It is accessed by clicking on the "LRP Calculator" link on the left. This value is entered in $/CWT as listed on RMA's site.

LRP Steer Premium: This is the "Cost per CWT" as listed on RMA's site for the associated level of coverage. The heifer premium is then calculated automatically and the correct value appears in the LRP heifer premium field.

Number of Steers Insured: This value is calculated automatically based on the number of cows expected to calve, your expected weaning rate, and a 50/50 chance of the calf being a steer vs. a heifer. This value may be adjusted manually if the user doesn't want to insure all their steers, or if they had a different steer to heifer ratio.

Number of Heifers Insured: This value is calculated automatically based on the number of cows expected to calve, your expected weaning rate, and a 50/50 chance of the calf being a heifer vs. a steer. A 15% cull calf rate is also assumed. If weaning percent is too low, the cull calf rate is ignored. This value may be adjusted manually if the user doesn't want to insure all their heifers, had a different heifer to steer ratio, or want to keep more or fewer calves as replacement heifers.

Approved Gross Revenue: This value can be determined from RMA's website by clicking on the "AGR-Lite Calculator" link. It is based on the users past years actual gross revenue. This value must be a positive number.

AGR-Lite Coverage Level: The AGR insurance model currently allows for two coverage levels, 65 or 75% of your approved gross income.

AGR-Lite Payment Rate: The AGR insurance model currently has two payment rates, 75 or 90% of the indemnity owed.

AGR-Premium: This value should be your total premium as listed on RMA's site. It should not be entered as cost per head.

Once the user has entered all of the required data, clicking the "Next" tab at the bottom right of the page will initiate the simulation analysis. Depending upon the speed of the individual's computer this process may take a few seconds to complete.
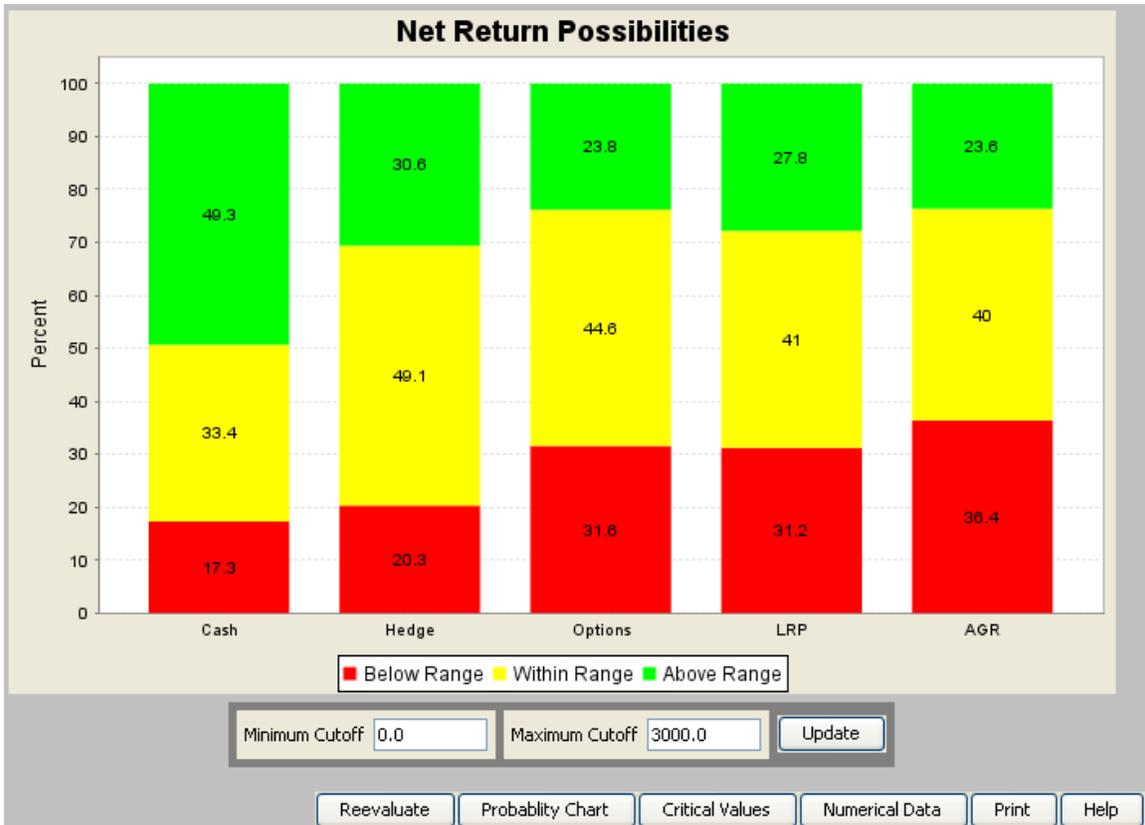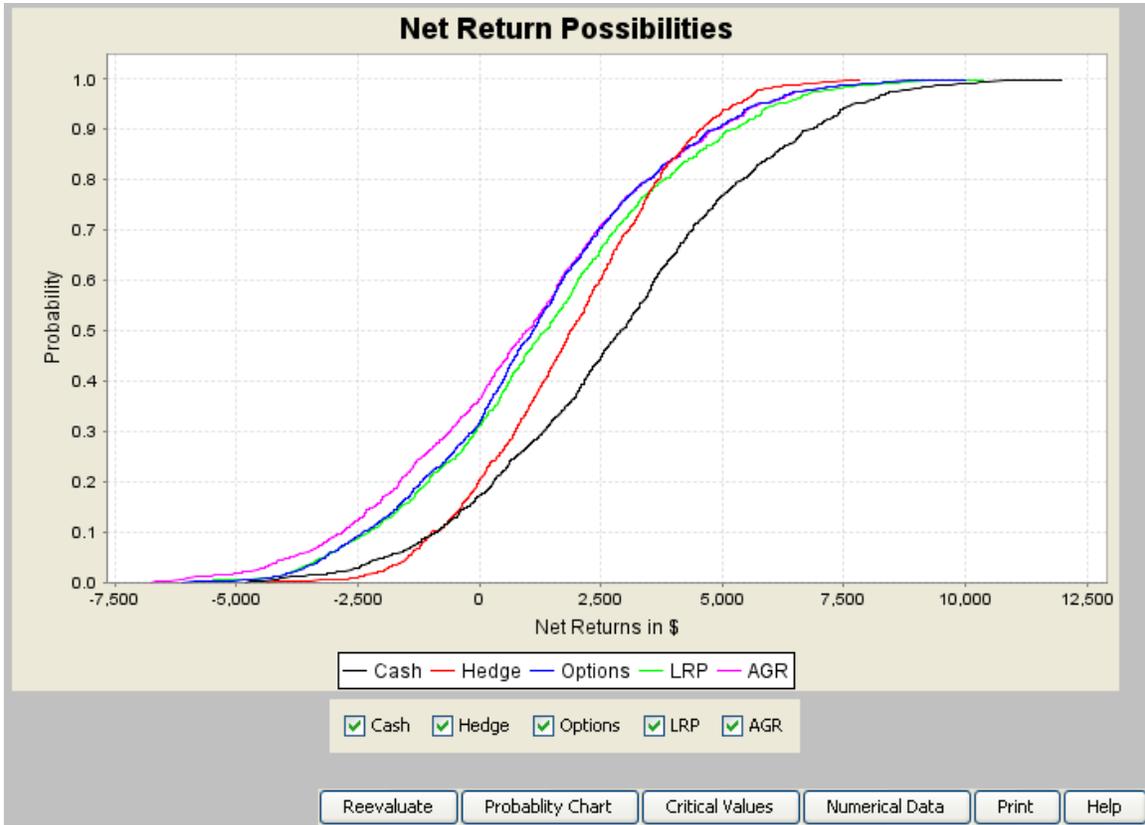
CCRAT Outputs

The results of the simulation on net returns are displayed in two charts and a table. Examples of these are displayed on the following pages. A cumulative probability distribution is show for each pricing or insurance alternative on the first graph. The line graph displays the probability, the vertical axis, that net returns are expected to be less than the dollar value, horizontal axis. For example, on the graph displayed for the black or cash line there is a probability of 1.0 or 100% that returns will be less than about $12,000. There is a 0.50 or 50% probability that returns will be less than about $3,000 and the probability of net returns being less than $0 is about 0.18 or 18%.

The next chart is accessed by clicking on the "Critical Values" tab. It is a chart that is often referred to as a stoplight chart, for obvious reasons. The stoplight chart displays the probability that net returns will be below the minimum cutoff, red bar, between the minimum and maximum cutoff, yellow bar, or above the maximum cutoff, green bar. The minimum and maximum cutoff values for the Stoplight chart and table can be changed by simply typing in new values. The table and chart will both then be updated in real time.

The output table is accessed by clicking on the "Numerical Data" tab. The table displays the minimum, maximum, mean or average, and the standard deviation for each of the pricing and insurance alternatives. The numerical data for the stoplight chart are also listed in the table.

The tables and graphs are all printable. When you click the print button a single page showing only the current display i.e. the current graph or table, will be printed out. For best results set the page

Net Return Possibilities

Cash — Hedge — Options — LRP — AGR

☑ Cash ☑ Hedge ☑ Options ☑ LRP ☑ AGR

| Reevaluate | Probablity Chart | Critical Values | Numerical Data | Print | Help |

Net Return Possibilities

■ Below Range ■ Within Range ■ Above Range

Minimum Cutoff 0.0   Maximum Cutoff 3000.0   Update

| Reevaluate | Probablity Chart | Critical Values | Numerical Data | Print | Help |

Net Return Possibilities

Strategy	Minimum	Maximum	Mean	Std Deviation
Cash	$-4806.35	$11959.99	$2883.86	$2940.77
Hedge	$-4367.31	$7835.09	$1871.59	$2074.73
Option	$-6134.96	$9984.99	$1181.22	$2689.51
LRP	$-5799.35	$10366.53	$1403.47	$2814.38
AGR	$-6738.35	$10027.99	$951.86	$2940.77

Strategy	% Below Cutoff	% Within Cutoff	%Above Cutoff
Cash	17.3	33.4	49.3
Hedge	20.3	49.1	30.6
Options	31.6	44.6	23.8
LRP	31.2	41	27.8
AGR	36.4	40	23.6

Minimum Cutoff 0.0   Maximum Cutoff 3000.0   Update

Reevaluate   Probablity Chart   Critical Values   Numerical Data   Print   Help

layout to landscape. Alternatively you can print out the entire web page by clicking the print button in your internet browser.

A help file is incorporated into the program that describes the input variables and how to work with the outputs.