

18. Pasture Rainfall Insurance and Associated Issues**Monte Vandever**<montev@ksu.edu>

Monte Vandever joined the KSU Extension Farm Management team in February 2016 as the Southwest Area extension agricultural economist, based in Garden City. He grew up on a farm in south-central Kansas with wheat and cow-calf operations. He received B.S. and M.S. degrees in agricultural economics from Kansas State University and a Ph.D. in ag economics from Purdue University. Besides working for K-State Research and Extension, he also has experience working with the Economic Research Service, (USDA), the University of Nebraska-Lincoln's Extension Service, and volunteer service in Vietnam. He has a special interest in risk management, particularly crop insurance.

Abstract/Summary

Kansas has a pilot program for insuring pasture and perennial forage production that is backed by USDA's Risk Management Agency, just like traditional multi-peril crop insurance. This insurance product – Pasture, Rangeland, and Forage coverage, or PRF – covers only one peril, however: low precipitation. Learn how this area-based system works and whether it might be a suitable risk management tool for your operation.

Pasture, Rangeland, & Forage (PRF) Insurance: Rainfall Insurance for Livestock and Forage Producers

KSU Risk and Profit Conference
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Dr. Monte Vandever
KSU Extension Agricultural Economist, SW Area

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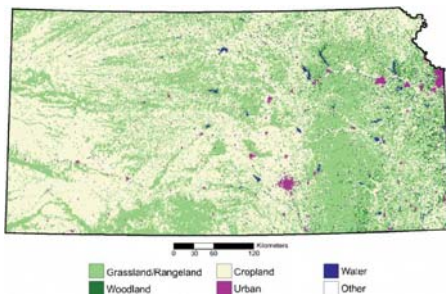
Insurance for pastures and perennial forage production?

- Pasture, Rangeland, and Forage (PRF) insurance available from RMA
 - What are pros and cons from a producer's perspective?
- Kansas has huge area devoted to grazing lands and perennial forages
- Drought is significant: major event 1 year in 5?

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How much land are we talking about?

15.5 million acres of permanent pasture
308,000 acres of woodland pastures
2.2 million acres of alfalfa, tame & wild hay
18.0 million acres eligible for PRF



Source: 2012 Census of Agriculture

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How much is 18 million acres? How many are insured?

Crop	Acres planted In 2015	Acres insured In 2015	% insured In 2015
Wheat	8.8 million	8.4 million	95
Grain sorghum	3.0 million	2.7 million	88
Corn	4.1 million	3.6 million	95
Soybeans	3.8 million	3.2 million	84
Total BIG 4 crops	19.7 million	17.9 million	91
Pasture & perennial forages	18.0 million	974,412	5.4

Source: Risk Management Agency, USDA

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PRF Insurance: background

- Program of Risk Management Agency (USDA)
 - Started in 2007, available in Kansas since 2009
 - Sold by private insurance agents
 - Significant premium subsidy: 51-59% paid by USDA
 - Can insure grazing land or perennial forages
 - Area-based: uses a grid system
 - Single peril: only insures precipitation

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PRF Insurance: more background

- Guarantee from 70% to 90% of normal rainfall
- Uses dollar coverage per acre
- Policy runs January to December
- Pick time periods you want to insure
 - at least two 2-month intervals and allocate \$ coverage
 - maximum of 60% of \$ coverage for any interval

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PRF uses a rainfall index

- Convert rainfall amounts to an index:
 - Simply express actual rainfall amount as a percent of long-term normal rainfall
- Example:

 - long term normal rainfall for two-month period is 6 inches
 - actual rainfall is 4.5 inches for that time
 - your index is 75 ($= 4.5/6 \times 100$)
- If actual rainfall index falls below guaranteed level, the insurance pays an indemnity

But why insure rainfall?

- **PROBLEM:** how can we insure forage production when we usually don't measure pasture / forage output?
- **ANSWER:** use another measure as a proxy for forage production
 - Precipitation: easy to measure, can't be concealed
 - Hopefully will closely reflect forage production

Rainfall insurance? Not a new idea...

- Use rainfall as a proxy for crop output considered in some countries since 1980's
- Underlying issues:
 - Scant or unreliable yield records
 - Better data for rainfall histories for actuarial work
 - Difficulty in verifying yields
 - Concern over concealed output
 - Yields not usually measured (e.g., grazing)

Area-based coverage: find your grid

- 0.25 degrees longitude x 0.25 degrees latitude
- 17 miles N-to-S, 13 miles E-to-W
- If your land lies in 2 adjacent grids, you can insure it in one or the other, or split it into both
- Only one composite rainfall value for entire grid

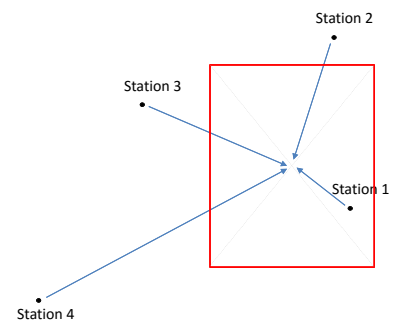


How is grid rainfall value calculated?

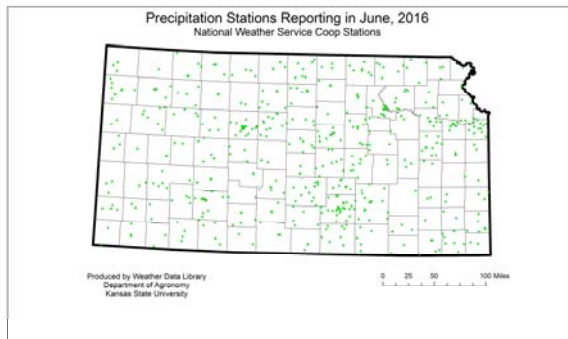
- Measure precipitation at NOAA weather stations
- Rainfall at four nearest reporting stations to center of grid are used to calculate the rainfall index
 - Weighted average of 4 stations; closest stations get greater weights
 - Coverage is area-based
 - Index is not for an individual farm or ranch or specific weather station

Weighted by distance from grid center

- Weight based on distance
- More distant stations get smaller weight
- Your location in the grid doesn't matter



Where are the reporting stations?



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Rainfall insurance has some issues...

- Other perils aren't insured
 - Fire
 - Heat
 - Disease
 - Hail
 - Insects
 - Plant vigor
- Rainfall is still only a proxy measure for forage production
 - 3 important "gaps"

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"Know the gaps"

- **Rainfall Proxy Gap:** rainfall doesn't precisely correspond to forage output
- **Distance/Basis Gap:** area (grid) rainfall index may not closely match one's own rainfall experience
- **Perennial Production Gap:** what happens this year may affect next year's production

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Actual PRF insurance process

- Producers identify:
 - intended use (grazing or haying)
 - acres to insure, grid location
 - rainfall guarantee level (70% to 90%)
 - dollars of protection (with Productivity Factor)
 - time periods to insure
 - allocation of coverage across time periods
- Coverage must be purchased by November 15.

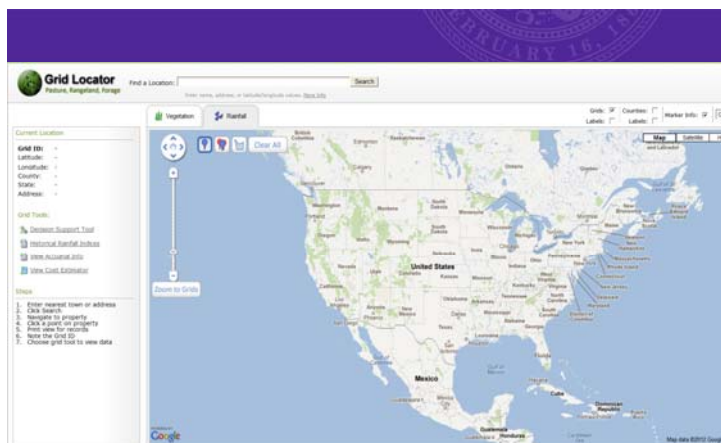
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EXAMPLE: Riley County Diversified Farm/Ranch

- 2,500 Acres Rangeland/Pasture
- 250 Acres Alfalfa/Grass Hay
- Look at 1980-2015 (36 years)
- Use the RMA Decision Support Tool

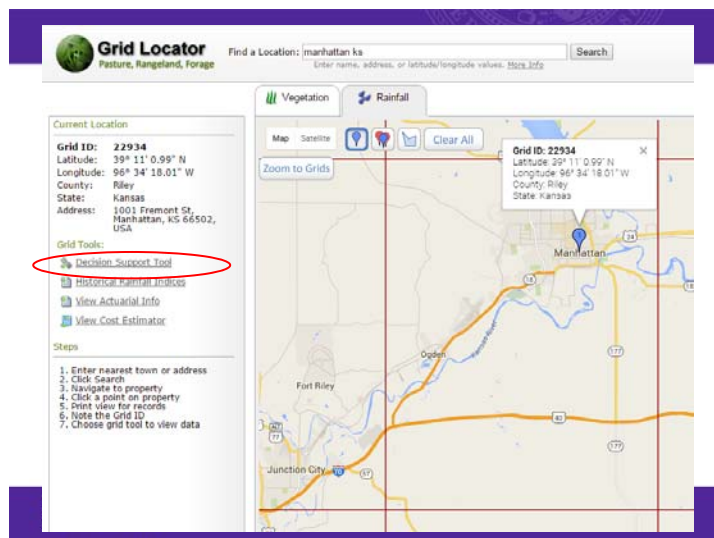
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www.rma.usda.gov/policies/pasturerangeforage/



<http://maps.agforceusa.com/prf/ri>

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Decision Support Tool
Pasture, Rangeland, Forage

Please Select a Location: State: County: Grid:

Protection Information

Intended Use:

Coverage Level (%):

Productivity Factor (%):

Insurable Interest (%):

Insured Acres:

Sample Year:

Index Interval	Percent of Value (%)	Policy Protection per Unit	Premium Rate per \$100	Total Premium	Premium Subsidy	Producer Premium	Actual Index Value	Indemnity
Jan-Feb		\$0	22.77	\$0	\$0	\$0	18.4	\$0
Feb-Mar		\$0	19.25	\$0	\$0	\$0	40.1	\$0
Mar-Apr		\$0	13.23	\$0	\$0	\$0	95.3	\$0
Apr-May	N/A	\$0	13.49	\$0	\$0	\$0	51.6	\$0
May-Jun	60	\$78,975	12.73	\$10,054	\$5,127	\$4,927	54.3	\$31,327
Jun-Jul	N/A	\$0	16.59	\$0	\$0	\$0	52.2	\$0
Jul-Aug	40	\$52,650	16.59	\$8,735	\$4,455	\$4,280	78.1	\$6,962
Aug-Sep	N/A	\$0	15.59	\$0	\$0	\$0	107.4	\$0
Sep-Oct		\$0	19.63	\$0	\$0	\$0	51.6	\$0
Oct-Nov		\$0	17.48	\$0	\$0	\$0	34.9	\$0
Nov-Dec		\$0	24.51	\$0	\$0	\$0	45.8	\$0
Per Acre	N/A	N/A	N/A	\$7.52	\$3.93	\$3.68	N/A	\$15.32
Policy Total	2,500	\$131,625	N/A	\$18,788	\$9,582	\$9,206	N/A	\$38,289

County Base Value: \$39.00
Dollar Amount of Protection: \$52.65
Total Insured Acres: 2,500
Total Policy Protection: \$131,625
Subsidy Level: 51.0%
Maximum Percent of Value per Index Interval: 60.0%

prf.agforceusa.com/ri

Protection Information

Intended Use:

Coverage Level (%):

Productivity Factor (%):

Insurable Interest (%):

Insured Acres:

Sample Year:

Intended Use:
- haying or grazing

Coverage Level:
- 90% to 70%

Productivity Factor:
- 60% to 150%

Insurable interest:
- 100% = full ownership

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County Base Value	\$39.00
Dollar Amount of Protection	\$52.65
Total Insured Acres	2,500
Total Policy Protection	\$131,625
Subsidy Level	51.0%
Maximum Percent of Value per Index Interval	60.0%

COUNTY BASE VALUE =
base \$ value of production per acre; set by RMA

DOLLAR AMOUNT OF PROTECTION =
County Base Value x Productivity Factor % x Guarantee Level %

TOTAL POLICY PROTECTION =
\$ Amount of Protection x Total Insured Acres

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Index Interval	Percent of Value (%)
Jan-Feb	
Feb-Mar	
Mar-Apr	
Apr-May	N/A
May-Jun	60
Jun-Jul	N/A
Jul-Aug	40
Aug-Sep	N/A
Sep-Oct	
Oct-Nov	
Nov-Dec	

INDEX INTERVALS

- Time periods for which you insure rainfall
- Must choose at least two intervals
- Must allocate % of coverage to each (max 60%, min 10%)

CHOOSE PERIODS WHICH ARE KEY FOR PRODUCTION

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Index Interval	Percent of Value (%)	Policy Protection per Unit	Premium Rate per \$100	Total Premium	Premium Subsidy	Producer Premium
Jan-Feb		\$0	22.77	\$0	\$0	\$0
Feb-Mar		\$0	18.25	\$0	\$0	\$0
Mar-Apr		\$0	13.23	\$0	\$0	\$0
Apr-May	N/A	\$0	13.49	\$0	\$0	\$0
May-Jun	60	\$78,975	12.73	\$10,054	\$5,127	\$4,927
Jun-Jul	N/A	\$0	16.59	\$0	\$0	\$0
Jul-Aug	40	\$52,650	16.59	\$8,735	\$4,455	\$4,280
Aug-Sep	N/A	\$0	15.59	\$0	\$0	\$0
Sep-Oct		\$0	18.63	\$0	\$0	\$0
Oct-Nov		\$0	17.48	\$0	\$0	\$0
Nov-Dec		\$0	24.51	\$0	\$0	\$0
Per Acre	N/A	N/A	N/A	\$7.52	\$3.83	\$3.68
Policy Total	2,500	\$131,625	N/A	\$18,788	\$9,582	\$9,206

Index Interval	Percent of Value (%)	Policy Protection per Unit	Actual Index Value	Indemnity
Jan-Feb		\$0	118.4	\$0
Feb-Mar		\$0	140.1	\$0
Mar-Apr		\$0	95.3	\$0
Apr-May	N/A	\$0	51.6	\$0
May-Jun	60	\$78,975	54.3	\$31,327
Jun-Jul	N/A	\$0	52.2	\$0
Jul-Aug	40	\$52,650	78.1	\$6,962
Aug-Sep	N/A	\$0	107.4	\$0
Sep-Oct		\$0	51.6	\$0
Oct-Nov		\$0	34.9	\$0
Nov-Dec		\$0	45.8	\$0
Per Acre	N/A	N/A	N/A	\$15.32
Policy Total	2,500	\$131,625	N/A	\$38,289

RESULTS FOR 2012

Coverage level = 90%

May-Jun:
Actual Index = 54.3

Payment Factor =
 $\frac{90 - 54.3}{90} = .3967$

Indemnity =
Payment Factor x
\$ Policy Protection
= .3967 x \$78,975
= \$31,327

Insuring Perennial Forages

- Perennial hay crops can be insured
- Winter feed is critical to many operations
- PRF insurance helps compensate for loss

Protection Information

Intended Use:

☐ Irrigated ☒ Non-Irrigated

Coverage Level (%):

Productivity Factor (%):

Insurable Interest (%):

Insured Acres:

Sample Year:

County Base Value	\$166.00
Dollar Amount of Protection	\$224.10
Total Insured Acres	250
Total Policy Protection	\$56,026
Subsidy Level	51.0%
Maximum Percent of Value per Index Interval	60.0%

2012 RESULTS

Index Interval	Percent of Value (%)	Policy Protection per Unit	Premium Rate per \$100	Total Premium	Premium Subsidy	Producer Premium	Actual Index Value	Indemnity
Jan-Feb		\$0	22.77	\$0	\$0	\$0	118.4	\$0
Feb-Mar		\$0	18.25	\$0	\$0	\$0	140.1	\$0
Mar-Apr		\$0	13.23	\$0	\$0	\$0	95.3	\$0
Apr-May	N/A	\$0	13.49	\$0	\$0	\$0	51.6	\$0
May-Jun	50	\$28,013	12.73	\$3,566	\$1,819	\$1,747	54.3	\$11,112
Jun-Jul	N/A	\$0	16.59	\$0	\$0	\$0	52.2	\$0
Jul-Aug	50	\$28,013	16.59	\$4,647	\$2,370	\$2,277	78.1	\$3,704
Aug-Sep	N/A	\$0	15.59	\$0	\$0	\$0	107.4	\$0
Sep-Oct		\$0	18.63	\$0	\$0	\$0	51.6	\$0
Oct-Nov		\$0	17.48	\$0	\$0	\$0	34.9	\$0
Nov-Dec		\$0	24.51	\$0	\$0	\$0	45.8	\$0
Per Acre	N/A	N/A	N/A	\$32.85	\$16.76	\$16.10	N/A	\$59.26
Policy Total	250	\$56,026	N/A	\$8,213	\$4,189	\$4,024	N/A	\$14,816

Premiums & Indemnities for 2012

- Total Premiums \$13,230
 - Grazing \$9,206
 - Haying \$4,024
- Total Indemnities \$53,105
 - Grazing \$38,289
 - Haying \$14,816
- Net of \$39,875

Experience over 1980-2015

90% Coverage, 150% Productivity

- Paid 21 out of 36 years
- Annual Premium = \$13,230
- Average Annual Indemnity = \$19,167
- \$1.45 received for every \$1 spent

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Experience over 1980-2015

80% Coverage, 150% Productivity

- Paid 15 out of 36 years
- Annual Premium = \$7,932
- Average Annual Indemnity = \$12,822
- \$1.62 received for every \$1 spent

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Experience over 1980-2015

70% Coverage, 150% Productivity

- Paid 14 out of 36 years
- Annual Premium = \$4,227
- Average Annual Indemnity = \$8,077
- \$1.91 received for every \$1 spent

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We are now studying...

- Which time periods should be insured to provide the best risk reduction?
- How should coverage be allocated across the insured time intervals?
- How would PRF change our risk and returns?

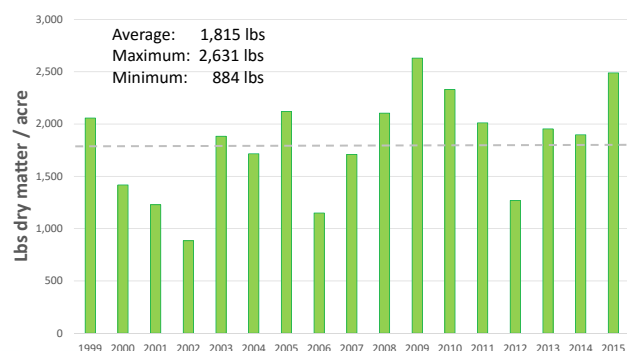
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Example: Barta Brothers Ranch

- Rock County, NE
 - Just west of Hwy 183, north-central Nebraska
 - Annual average rainfall of 22 inches
 - Mostly warm-season grasses
- Operated by University of Nebraska
- Forage yield data from 1999 to 2015

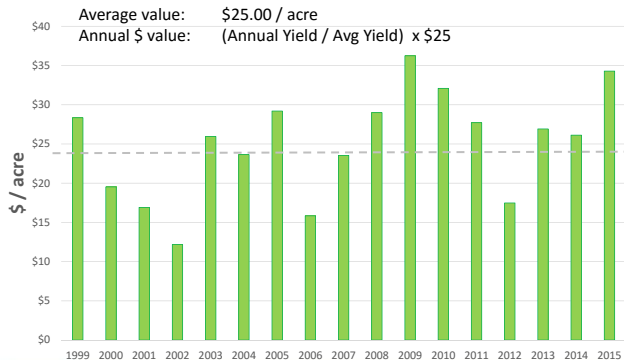
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Forage production, 1999-2015



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Value of production, 1999-2015



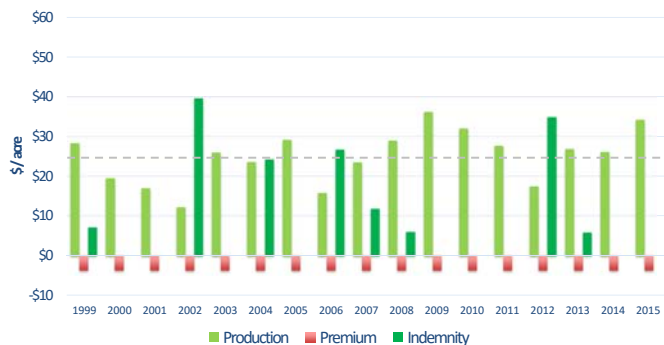
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Add PRF insurance...

- 2016 parameters:
 - \$41.00 /acre County Base Value
 - 150% Productivity Factor
 - 90% Coverage level
 - \$55.35 /acre Dollar Amount of Protection
 - 51% Premium Subsidy

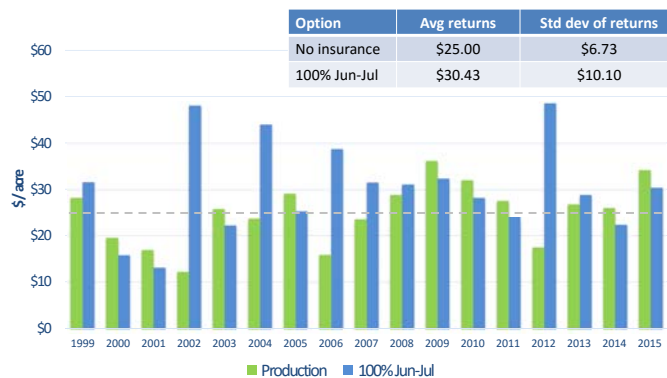
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Adding 100% Jun-Jul coverage



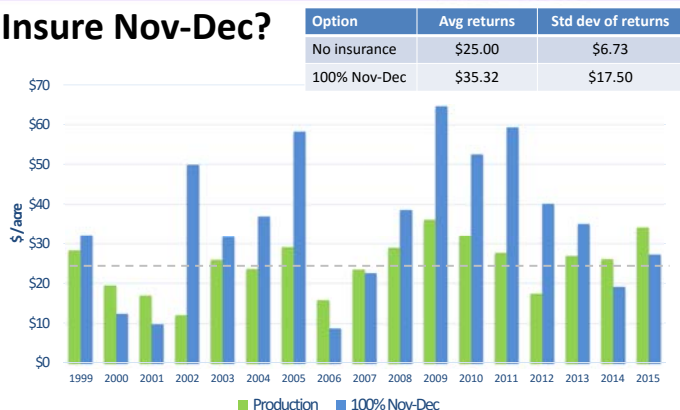
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Income stream becomes....



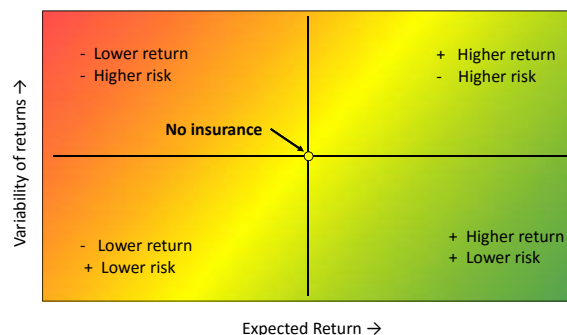
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Insure Nov-Dec?



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Comparing risk-return trade-offs



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Comments?
Thank you!

Dr. Monte Vandever
KSU Extension Agricultural Economist
Email: montev@ksu.edu
Phone: 620-275-9164

