Drought and Its Effects on Cow-Calf Operations in Wyoming: Can Insurance Mitigate this Risk?

Dillon M. Feuz, Shane Feuz, and John P. Hewlett

It is sometimes said that in the intermountain west ranchers are either preparing for a drought, in a drought, or recovering from a drought. Ranchers, who have failed to prepare for the next drought, may have experienced much more trying financial conditions and some may have even been forced to liquidate their cow herds and exit the ranching business. Recently, the USDA-Risk Management Agency (RMA) has introduced a pilot insurance program to help ranchers insure against drought and the economic and financial burdens that drought can place on an operation.

This fact sheet quantifies the frequency of drought in Wyoming and summarizes the literature on how drought impacts range productivity and the subsequent cow herd productivity. An analysis is then conducted using two model ranches in Wyoming of the effectiveness of two insurance products from the USDA-RMA: AGR-Lite and PRF insurance.

AGR-Lite (Adjusted Gross Revenue) is an insurance program based purely on total revenue. A producer's five year average gross revenue is set as their expected revenue. If this year's revenue falls far enough below the expected revenue, it triggers a payment.

For more information on AGR-Lite see their fact sheet online.

http://www.rma.usda.gov/pubs/rme/agr-lite.pdf

The PRF Insurance (Pasture, Rangeland, and Forage) is a pilot insurance program available in Wyoming and a number of other states. It is based on the Rainfall Index or the Vegetation Index. The program for Wyoming uses the Vegetation Index.

The Vegetation Index is not intended to measure individual's production. The state of Wyoming is divided into 4.8 x 4.8 mile grids, and the Vegetation Index measures the health of all vegetation within a grid using the Normalized Difference Vegetation Index (NDVI).

This insurance program is designed to be very flexible and customizable. There are five coverage levels from 70% to 90% and producers can chooses any protection rate from 60% to 150%. This should be based on their expected production relative to the rest of the land in the specific grid.

Also, producers do not have to insure all of their acres at the same time. The insurance policy is good for three month increments.

Producers can insure any number of acres in separate, non-overlapping time periods.

For more information on PRF Insurance see these fact sheets online:

Pasture, Rangeland, and Forage
http://www.rma.usda.gov/pubs/rme/prffactsheet.pdf

Vegetation Index
http://www.rma.usda.gov/pubs/rme/vegetation.pdf

How frequent are droughts in Wyoming?

A drought analysis was conducted based on precipitation data from the Water Resource Data System of the University of Wyoming. Precipitation data from 1895-2010 were used for the analysis. There are several climate regions in Wyoming and each region differs somewhat in precipitation patterns. However, to get a general picture of drought in Wyoming, the precipitation data from each climate region was standardized and classified according to the Standardized Precipitation Index (SPI).

Using this standardized precipitation data, revealed that on average Wyoming was in a drought 36% of the years since 1895. The severity of drought was classified as a moderate drought 26% of the years, and 10% of the years were classified as a severe drought. Essentially, three years out of every ten years will be a drought year and one of those will be a very severe drought.

A drought in one year does not significantly increase the chances that the next year will be in a drought. Single year droughts occur far more often than multiyear droughts. In fact, since 1895 there have been about twice as many single year droughts compared to multiyear droughts.

What are the effects of drought on range production and cow-herd productivity?

In a mild to moderate drought years, producers can expect range forage losses to be between 10%-30%. Depending upon stocking rates and the amount of forage typically left standing following grazing, few if any management changes may need to be made in these years. Providing water in certain areas or additional herding may be required to get cattle to utilize forage that may not typically be grazed.

The worst drought years may result in forage losses as high as 50% (Smith, 2007). During these drought years, more management changes will be required. Frequently the number of cattle turned out on the range will have to be reduced and/or a producer will have to reduce the number of days grazing the range resource. This may necessitate more days of feeding hay or other supplemental feeds to replace the loss in grazing. When this occurs, costs will certainly be higher, but will revenue change?

Research and anecdotal evidence suggest that calf weaning weights are largely unaffected by mild to moderate droughts. In fact, if they are impacted at all, they are likely a little heavier. The nutrient density of slightly dryer grasses is greater than wetter grasses and the calves may therefore consume more total nutrients in their daily grazing.

In the more severe drought years, calf weaning weights may decline around 6% (Nagler et.al.). For calf weaning weights around 500 pounds that is a reduction of about 30 pounds. How much calf weaning weight decline will depend a great deal on what other management decisions were made (supplemental feeding, for example). There may also be an impact on subsequent calf crops if cows are allowed to get too thin. Research has shown that this results in more cows being open, or re-breading later in the season which would have the effect of reducing both the number of calves and the weight of those calves in the following year. However, these effects are more difficult to measure.

What can producers do to protect against these losses?

Two model ranches:

1. 400 head in Western Wyoming
2. 400 head in Eastern Wyoming

were used to evaluate AGR-Lite and PRF Insurance. Budgets were constructed for each typical ranch based on typical ranching practices in the area and typical performance measures. Precipitation data from 1989 to 2010 were used to determine productivity of the range forage resource and the subsequent cattle performance (weaned calf weight).

For both the western Wyoming ranch and the eastern Wyoming ranch, the 6% loss on calf weights does not affect gross revenue significantly enough to trigger a payment when AGR-Lite insurance is used. Net returns were reduced more than 6% due to increased feeding costs, but the AGR-Lite insurance policy does not protect against added costs, only reduced gross returns. So, the AGR-Lite policy is not a good option for a straight cow-calf operation with no other crops to cover losses from drought.

For the two model ranches using the PRF insurance the following assumptions were made:

1. The public grazing ranch from Western Wyoming insured 2800 acres from Jun-Aug.
2. The private grazing ranch from Eastern Wyoming insured 800 acres from Apr-Jun and 800 acres from Jul-Sep.

Although the PRF pilot insurance program has only been around since 2008, NDVI has been measured since 1989. Using that data, and using the same premiums for every year, the total premiums paid, and the total indemnity payments received were calculated. They are shown in the tables below along with the percentage of total payments compared to total premiums.

Western Wyoming Public Grazing Coverage Level 70%				
Protection Rate	**75%**	**100%**	**125%**	**150%**
Premiums	$9,130	$12,166	$15,202	$18,238
Payments	$36,873	$49,159	$61,454	$73,746
Percent Return	304%	304%	304%	304%

Eastern Wyoming Private Grazing Coverage Level 70%				
Protection Rate	**75%**	**100%**	**125%**	**150%**
Premiums	$6,644	$8,866	$11,066	$13,288
Payments	$20,424	$27,234	$34,044	$40,855
Percent Return	208%	208%	208%	208%

If this insurance program was around since 1989, both of the model ranches would have received more money through indemnity payments than they would have paid in premiums.

The tables for the 70% coverage level are shown because they have the best payout percentage. For the Western Wyoming ranch, the 80% and 90% coverage levels had returns of 244% and 169% respectively. For the Eastern Wyoming ranch the returns were 147% and 104% respectively for 80 and 90% coverage.

These tables and statistics are based on a PRF Decision Support Tool from RMA and AgForce USA found at the following website:
http://agforceusa.com/rma/vi/prf/dst

Conclusions

Droughts of varying severity occur in about one of every three years in Wyoming. However, only in about one in ten years is the drought severe enough to have much of an impact on cow calf ranch gross returns.

Ranchers who are desirous of insuring against this loss should consider the new PRF pilot insurance from USDA-RMA. This insurance is subsidized by the federal government and over the last several years it appears that the subsidy is more than enough to offset producer premiums for this insurance product.

However, the AGR-Lite insurance product does not appear that effective at reducing revenue risk from a drought. It appears that the premiums relative to the expected payout are much too high for a cow calf ranch trying to insure against drought.

Other Resources

Nagler, A., C.T. Bastian, J.P. Hewlett, S. Mooney, S.I. Paisley, M.A. Smith, M. Frasier, W. Umberger and P.Ponnameneni. "Multiple Impacts – Multiple Strategies. How Wyoming Cattle Producers Are Surviving a Prolonged Drought" B-1178, April 2007, University of Wyoming Cooperative Extension Service, available at: http://www.wyomingextension.org/agpubs/pubs/B1178.pdf

Smith, M., 2007. "Recognizing and Responding to Drought on Rangelands." Univ. of Wyoming, Coop. Extension, MP-111.09. http://www.uwyo.edu/uwlivestockspt/Pubs/Drought/Recognizing%20and%20Responding%20to%20Drought%20on%20Rangelands.pdf

RMA Premium Calculator
http://www3.rma.usda.gov/apps/premcalc/

Wyoming Water Resource Data System
http://www.wrds.uwyo.edu/