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Cornhusker Economics

Payoff of Corn/Soybean Rotation in Western Nebraska

Market Report	Year Ago	4 Wks Ago	9-/2/16
Livestock and Products,			
Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	*	120.00	110.00
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	248.96	*	153.46
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	218.29	151.95	144.22
Choice Boxed Beef, 600-750 lb. Carcass.	241.06	198.71	195.67
Western Corn Belt Base Hog Price Carcass, Negotiated	68.43	63.46	59.52
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	85.09	77.10	76.82
Slaughter Lambs, woolled and shorn, 135-165 lb. National.	155.64	164.50	163.13
National Carcass Lamb Cutout FOB.	359.79	351.65	353.73
Crops,			
Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	3.95	2.96	2.70
Corn, No. 2, Yellow Nebraska City, bu.	3.36	3.00	2.84
Soybeans, No. 1, Yellow Nebraska City, bu.	8.62	9.40	9.03
Grain Sorghum, No.2, Yellow Dorchester, cwt.	5.54	4.54	4.35
Oats, No. 2, Heavy Minneapolis, Mn, bu.	2.78	2.36	2.28
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	177.00	163.75	147.50
Alfalfa, Large Rounds, Good Platte Valley, ton.	85.00	70.00	72.50
Grass Hay, Large Rounds, Good Nebraska, ton.	87.50	75.00	*
Dried Distillers Grains, 10% Moisture Nebraska Average.	137.50	120.00	115.00
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	45.75	33.25	33.50
* No Market			

Corn and soybeans are the two most common crops grown in Nebraska. Some farmers in the western part of the state plant continuous corn with few that plant continuous soybeans. In most cases some type of corn/soybean rotation is practiced. Idealistically speaking crop rotations should be producer and site specific, matching physical geography, resource availability and management capability. This work focuses on the difference in profitability among four possible rotations.

This work evaluates the economic effects of two different corn/soybean crop rotations compared to continuous cropping of both corn and soybeans. The original rotational work, which captures the physical variation in productivity, was done at the University of Minnesota and published in the *Agronomy Journal* in 1991 (Crookston et al.). Historical annual corn and soybean yields for Lincoln and Keith Counties in west central Nebraska, along with the Crookston et al. information, were used to create a series of electronic trend-adjusted simulations based on percent changes. This research is a series of four rotations: continuous corn (R1), continuous soybeans (R2), corn and soybeans alternated annually (R3) and corn and soybeans alternated bi-annually (R4). An “L” or “K” was used to differentiate between the two counties. For example: LR1 for Lincoln and KR1 for Keith County signifying Lincoln and Keith Counties continuous corn rotation, respectively.

The R4 rotation (bi-annually alternated corn and soybeans) was included since the first year rotation effects are different than the second consecutive year of the same crop. Rotations were modeled using years where all rotational effects relative to a specific year were maintained across all rotations. Each year crops were assumed to be harvested and marketed at that year's end, using a historical December average price for randomly drawn years between 1995 and 2015. Although this naïve marketing plan is a simplification and is not the most realistic method of selling the crop, it provided a consistent framework to uniformly evaluate the rotations.

The average of the 500 simulated net returns per acre for LR1, LR3 and LR4 in Lincoln County slightly exceeded the KR1, KR3 and KR4 in Keith County (Table 1). Keith County KR2 averages exceeded Lincoln Counties LR2 average net returns. Table 1 indicates that R3 has the highest weighted average net returns in both counties, with the additional bonus that R3 in both counties had the least number of negative net returns. R4 ranked second behind R3 with less than half of its net returns, simulated as negative. The fact that these two rotations required less fertilizer and had higher average yields contributed to its dominance. Rotations R1 and R2 both resulted in having more than 50 percent of their simulated net returns being negative. (Table 2)

The net returns of R2 exceeded R1 about 86 percent of the time for both counties. Furthermore, R1 and R2 were found to always have a lower net return than the R3 and R4 rotations. This fact supports the idea that the R3 and R4 rotations reduce risk when compared to R1 and R2 rotations regardless of county.

In order to capture the positive outcomes seen here, a producer needs to assure that the effects modeled here would be in effect; that is, gains in yield and a reduction in production costs. The difference between the annual rotation and the bi-annual rotation is the added costs of production similar to the instances when continuous culture is practiced, and a drop in relative yields in that second year. In addition, it was assumed that the majority of producers use like methods of production and incur similar costs, which is not true or completely realistic. It would be wise to carefully think and experiment with any proposed practice before adopting it. Logically speaking the advantages from crop rotation are sound, but whether they work for any specific individual depends on the circumstances by which they are managed and used.

Table 1. Weighted average, minimum and maximum recorded \$/acre net returns for the 500 simulated rotations, by county and rotation.

	Keith County Nebraska				Lincoln County Nebraska			
	<i>KR1</i> (CCCC)	<i>KR2</i> (SSSS)	<i>KR3</i> (CSCS)	<i>KR4</i> (CCSS)	<i>LR1</i> (CCCC)	<i>LR2</i> (SSSS)	<i>LR3</i> (CSCS)	<i>LR4</i> (CCSS)
Average	2.07	17.34	69.78	56.91	4.15	14.92	71.15	58.45
Minimum	-136.42	-134.20	-85.95	-113.51	-145.91	-134.86	-95.93	-119.92
Maximum	351.73	202.74	436.27	424.02	423.11	204.15	491.48	480.33
Standard Deviation	132.35	96.44	123.56	119.80	150.65	92.51	131.96	128.66
Difference between Lincoln and Keith Counties Average Net Returns (This is the average difference from the first line above.)					2.09	2.42	1.37	1.54

Table 2. Percent of the 500 simulated net returns which were negative by county and rotation.

Keith County Nebraska				Lincoln County Nebraska			
<i>KR1</i> (CCCC)	<i>KR2</i> (SSSS)	<i>KR3</i> (CSCS)	<i>KR4</i> (CCSS)	<i>LR1</i> (CCCC)	<i>LR2</i> (SSSS)	<i>LR3</i> (CSCS)	<i>LR4</i> (CCSS)
KR1	KR2	KR3	KR4	LR1	LR2	LR3	LR4
62%	55%	40%	44%	62%	55%	40%	45%

Reference:

Crookston, R. K., J. E. Kurlle, P. J. Copeland, J. H. Ford, W. E. Lueschen. 1991. Rotational Cropping Sequence Affects Yield of Corn and Soybean. *Agron. J.* 83:108-113

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