

## 2023 Kansas County-Level Cash Rental Rates for Non-Irrigated Cropland

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### Purpose of these KSU Non-Irrigated Cash Rent Estimates

Determining cash rental rates is an important decision for nearly every farmer in the state since over 90 percent of Kansas farmers rent at least some of their farmland. Cash leases are often determined by competitive local markets, which may or may not reflect the ability of the land to support “going” market rental rates. This publication provides non-irrigated cash lease breakeven estimates that incorporate land productivity to provide renters and landowners another perspective when negotiating lease rates.

A **tenant’s residual method** is used to **estimate non-irrigated county breakeven cash rents for 2023** – incorporating county yield histories, recent grain prices, and KFMA farm expenses. These breakeven cash rent estimates can help farmland renters and owners determine equitable cash rentals rates for specific farms.

These Kansas State University estimates for 2023 county-level non-irrigated breakeven cash rental rates are found in Figure 5 and Tables 1, 2, and 3 at the end of this publication. These estimates incorporate the September 2022 NASS county non-irrigated cash rental rate estimates into the model.

### Intended Use of Breakeven Cash Rental Rate Estimates

**The rental rate estimates provided in this publication are intended for the 2023 crop year.** These estimates include an expectation of 2022 and 2023 farm profitability. Because the estimate is based on average yields for the county, actual lease rates could be higher or lower depending on actual yield history. Estimates are also a function of USDA-NASS cash rental rate surveys from 2022 to help smooth out the estimate – anchoring the numbers to recent cash rental rate history.

These breakeven cash rent estimates are intended to cover all expenses and not only the cash or direct cost of crop production. As such, these non-irrigated cash rental rate estimates represent what farm operators can pay and cover full economic cost of production with no extra profits. *IF* a crop producer’s crop yields, production costs or

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selling prices vary from these crop budget assumptions, *THEN* the full economic cost breakeven cash rental rate that can be paid in 2023 will vary from these estimates.

Given the assumptions involved in calculating them, it holds true that these non-irrigated cash rental rate estimates are also NOT an endorsement for what a tenant should actually pay to a landlord. Instead, they are provided to give a starting point in lease negotiations, with care and attention given to the yield, production cost, and price estimates that these breakeven cash rental rate estimates have used.

Any lease that a tenant and landlord willingly agree to in which they have both utilized the best information they have available to them in making a decision, is considered here to be a “fair” and/or “equitable” lease.

### **Changes in the Model from Last Year’s 2022 Estimates.**

In September of 2021, an estimate of 2022 cash rental rates for non-irrigated cropland was published. This paper uses a similar procedure with the following two changes. First, the weight of the NASS survey of cash rents was increased from 50% to 60%. Second, the weighting of years used to estimate future net farm income was adjusted to put more weight on next year’s estimate.

### **Background – Estimating Farmland Cash Rental Rates**

Farmers across the U.S. make extensive use of farmland leasing to provide a base of farmland for their operations. As shown in **Figure 1**, the median percentage of land rented is about 75% of the total cropland base on a farm (the red dashed line on the figure). There are very few crop and livestock producing farming operations in the United States that do not involved at least some rented cropland and/or pasture. Note that the green line in **Figure 1** shows that less than 10% of farms have no rented land. The data for **Figure 1** comes from an analysis of Kansas Farm Management Association (KFMA) farm records for the last 50 years. KFMA data is also used in the estimates of expenses that help determine the county level cash rents.

Part of the reason that so many farmers lease at least a portion of their farmland is the non-depreciable nature of farmland. Not only is land not depreciable but it typically appreciates in price. It is not unusual for half or more of a farm’s real net returns to occur as land appreciation. These characteristics of farmland result in an asset that will very seldom ever cash flow (Oltmans, 1995). That is, when a farmer purchases farmland, the income provided from that land will not cover the principle and interest payments. Thus, in order for a farmer to cashflow any new farmland purchase, the income from other land is needed to cover the cashflow needs.

There are at least two main approaches of estimating cash lease rates. The *first approach* is based on either **formal or informal surveys** of what others are paying. Discussions with neighboring farmers would be a type of an informal approach. A more formal approach is a survey like the type USDA-NASS uses to estimate cash lease rates each year. The main issues with the survey approach are whether responses are accurately reported, the delay in time to collect a survey (resulting in outdated lease rates), and whether the stated lease rate is actually something a tenant can pay and still cover all cash and non-cash expenses.

The *second approach* is to **estimate breakeven cash lease rates** based on soil productivity and market prices. These estimation methods have the advantage of looking forward rather than just using past experience. Also, a tenant can be more certain of covering all expenses if the calculations are developed correctly. The major disadvantage is that any forward projections are uncertain, and much more information is needed in order to develop an accurate cash lease estimate.

There are at least six methods of estimating a cash lease using the productivity approach. These are: 1) Average yields; 2) Corn suitability rating; 3) Share of gross crop value or revenue; 4) Return on investment; 5) Crop share equivalent; and 6) Tenant's residual. Iowa State University Extension has a publication detailing all of these methods and approaches (Plastina and Edwards, File C2-20).

NASS has been performing surveys of producers for cash rent expenses at the state level since 1994. They also have cash rent survey for individual counties but for a much shorter timeframe. **Figure 2** plots this state rental data for both irrigated and non-irrigated cropland.

Cash rental rates are correlated with farm profitability to some extent as shown by the net farm income per crop acre for western, central, and eastern Kansas. These net farm income numbers per crop acre are shown in **Figure 3**. Net farm income increased from 2005 until about 2013 before starting to decline. Net farm income reached a low point in 2015 but has increased every year since. A visual inspection of cash rents from NASS also show an increase in rates although there is some apparent delay and the rental rates are stickier, not increasing nor decreasing as quickly as net farm income changes.

### Approach

In this paper, the **tenant's residual approach** is used to estimate how much income the tenant has available for rent payments *after* subtracting all the tenant's costs associated with producing the crop. These costs include variable costs of production along with fixed costs of depreciation and interest, a charge to operator labor, and a management fee. Also needed is the expected revenue for the farm. Once all the costs

have been accounted for, the remaining amount that is available is assumed to be allocated for the payment of cash rent.

All of these calculations are taken down to the per acre basis for both irrigated and non-irrigated estimates. This paper estimates the **breakeven non-irrigated cash rental amount** using the tenant's residual approach method on a county basis for Kansas. A future companion paper will examine irrigated cropland breakeven cash rental rates on a county basis in Kansas.

### *Income*

To calculate gross revenue an estimate is needed of crop yields and crop prices for the county as well as an estimate of the government payments per acre. Because estimates are developed for both irrigated and non-irrigated cropland, yields need to be specified for both irrigated and non-irrigated crops. NASS used to provide this information but for the last several years, they only provide a single yield estimate per crop per county. Fortunately, the FSA does have this information by irrigated and non-irrigated crop per county. FSA also has the number of crops acres in a county.

### *Yields and prices and acres*

Because yields are expected to generally follow a trendline over time, the last five years of FSA yields were used to estimate the average yield per crop per year. With only 5 years of data, a true trend could not be estimated but the trendline yield over time should not vary much from the simple average for the most recent 5-year period.

Acres and crop prices do not follow a discernible trend pattern over the last 5 years. Thus, while the last 5 years of data were used, a weighted average approach was incorporated so that more recent years had more weight. Once the gross crop revenue was calculated, the revenue per acre was calculated based on the number of crop acres. For this analysis of Kansas non-irrigated cropland, only corn, soybeans, wheat, and grain sorghum were used in the calculation.

### *Expenses*

KFMA (Kansas Farm Management Association) crop enterprise data was used to estimate crop production expenses in this approach. Crop production expenses per crop were estimated at the Crop Reporting District (CRD) level. While KFMA has detailed whole farm numbers, the enterprise level data is limited. To get around this limitation, a similar approach to the estimate of net farm income was used (see <https://www.agmanager.info/farm-management/farm-profitability/may-2021-estimate-2021-kansas-net-farm-income-and-projection-2022>).

An entire farm's expense data from the KFMA database was used. However, these expenses were allocated to a specific crop by using the ratios of the KFMA state level

enterprise summaries. This procedure not only gave an expense item per crop, but it also allows for the calculation of total non-irrigated crop expenses. Any “extra” crop acres that were not part of the four major crops were rolled into extra soybean acres when calculating a cost per acre per crop per farm.

The next step was to calculate a representative cost per crop per Kansas CRD. With 1,000 KFMA farms in the KFMA database, there are adequate numbers of crop farms by CRD for these calculations to be credible. At this point the median expense per crop is calculated from those farms within that CRD. Government payments were estimated in a similar manner. As discussed above in revision section, counties along a CRD border had their crop expenses and government payment per acre blended with the neighboring CRD by using a ratio of two-thirds weight from a county’s home CRD and one-third weight from the neighboring county’s CRD. This last change helped to smooth the crop expenses per acre when moving from one CRD to a neighboring CRD.

### ***Revenue***

At this point, with gross revenue per crop per acre, government payments per acre, and expenses per crop per acre, a net income per acre can be calculated for each year. Because all expenses need to be accounted for, 75% of unpaid operator labor is included as well as a 2% management charge based on gross revenue. Only 75% of unpaid operator labor is used to account for other farm activities not related to crop production. The 2% management fee is for both management and the interest charge for any machinery equity on the farm.

As discussed above, yields are a 5-year average while the rest of the inputs to the model are a weighted average. 2021 has a weight of 0.25, while the years 2020 through 2018 have weights of 0.20, 0.15 and 0.10 respectively. Although numbers don’t exist for 2022 yet, an earlier estimate of 2022 net farm income is predicting a 72% decrease in net farm income. Thus, this 72% decrease is used for the 2022 part of this model. The 2022 estimate is given a 0.30 weight. In theory, cash rents should be based on an expectation of future NFI. Here, we are making the assumption that the past 4 years (plus an estimate of this next year) are a guide to future NFI.

The tenant’s residual per acre calculated is further adjusted by incorporating a relationship to the NASS 2022 reported county cash rent. If the calculated residual is above the 2022 estimate, then the final per acre number is 60% of the NASS 2022 estimate and 40% of the calculated value. If the calculated residual is below the NASS number, then the NASS number is used. This residual calculation is further constrained to be no more than a 40 percent increase from the 2022 reported NASS number.

The final step in estimating a tenant’s residual was to adjust for land use intensity. In western Kansas, there are fallow acres and in southeast Kansas there are double crop

acres. To adjust for this, all KFMA farms within a CRD are used to calculate a land use percentage by dividing the number of harvested crop acres by the total number of physical crop acres. This fraction is multiplied by the previous tenant's residual to get the final value.

### ***Range for tenant's residual***

A range of values was estimated to account for various crop yield differences within a county. Using the same mix of farms by CRD, a net farm income per crop acre was calculated. The 25th and 75th percentiles were calculated in the crop reporting district, which were then compared to the estimated tenant's residual value. These differences were used to calculate a low and high range for each county.

The calculated difference really represents two sources of variation; variation within a county and variation between counties. It was assumed that the two sources of variation were equal and thus the calculated percent difference was divided in two.

## **Results**

**Tables 1, 2, and 3**, along with **Figure 5** show the results of estimating a potential breakeven cash rent for 2023 using a Tenant's residual method. The 2022 NASS cash rental rate survey estimate is shown along with the predicted KSU value and the potential ranges for cash rents. For comparison, the 2021 NASS estimate is also shown along with the KSU prediction from last year.

**Figure 5** shows the predicted KSU value on a color-coded state map of Kansas counties. The figure is capped at the ends so any county with a predicted cash rent above \$150 per acre shows the darkest color and any county with a predicted rent below \$40 per acre shows the lightest color.

**Figure 4** shows the 2022 reported NASS survey estimates of cash rental rates for the state on a color-coded map similar to Figure 5. Given that KSU values incorporate the NASS survey numbers, producers should be interested in seeing these survey results.

**Table 4** shows a comparison of the KSU and NASS estimates by Crop Reporting District (CRD). These CRD numbers are the average of the counties within a CRD.

## **Discussion**

Net farm income has been rising for 5 years in a row, so it should be expected that cash rents have been trending upward as well. While these estimates are calculated with full costs in mind, tenants and landlords sometimes likely also have other economic and some non-economic considerations in mind when negotiating leases.

For example, rented cropland located adjacent to a farmer might have more value to a particular farmer just because of location. Likewise, a landlord may have developed trust in a particular tenant and adjusts rent accordingly.

Communication and full information are needed in any discussion of cropland leases. This publication has been developed to help both tenants and landlords make as fully informed decisions as possible when negotiating cash rental rate agreements for the 2022 year.

### References

- Oltmans, A W. 1995. Why farmland cannot, will not and should not pay for itself. *Journal of the American Society of Farm Managers and Rural Appraisers*, 59(1): 57–67.
- Plastina, A, and W. Edwards. 2021. “Computing a Cropland Cash Rental Rate.” File C2-20. <https://www.extension.iastate.edu/agdm/wholefarm/pdf/c2-20.pdf>



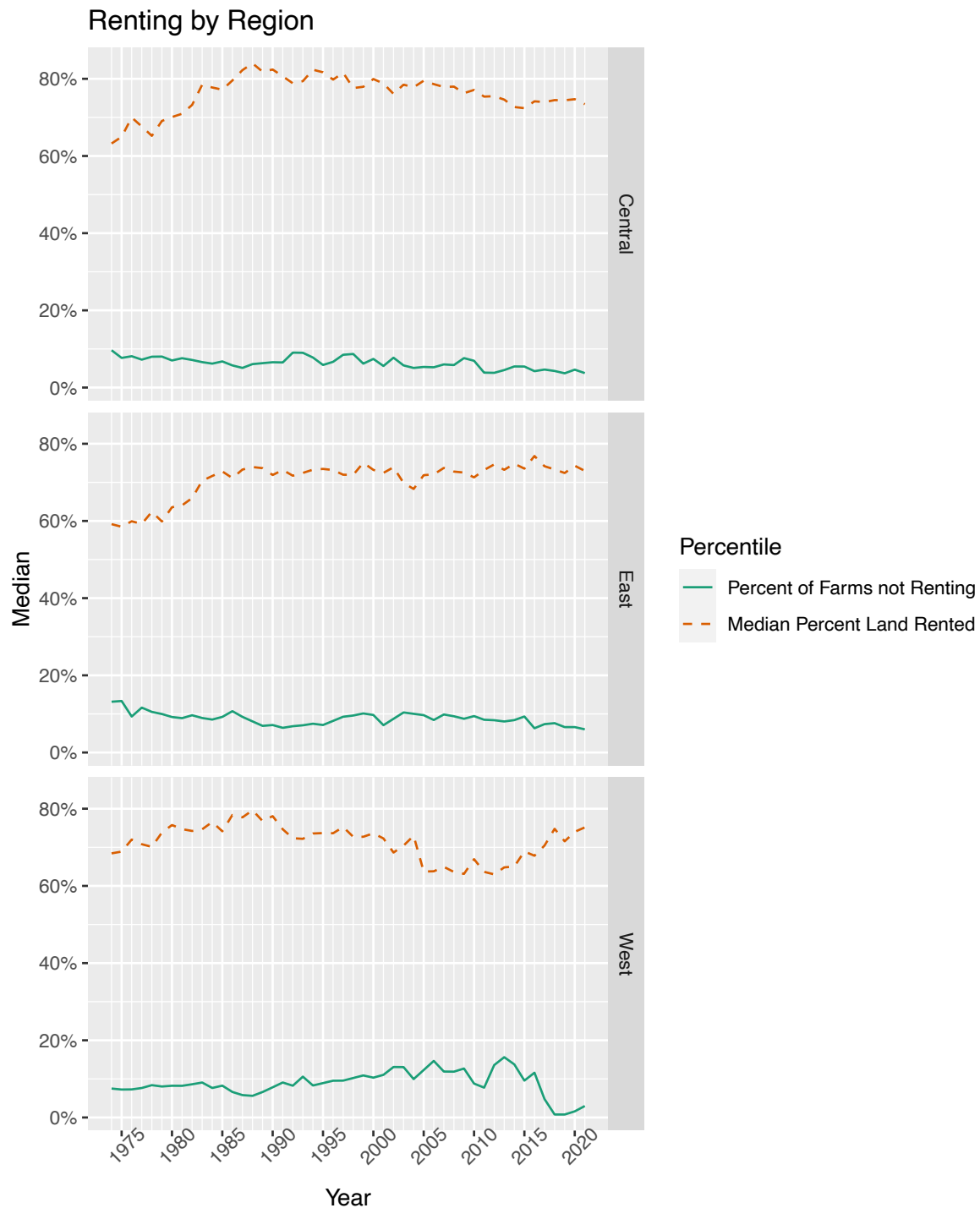


Figure 1. Percentage of Land Rented by Farm and the Percentage of Farms with no Rented Land



Kansas Cash Rents – USDA

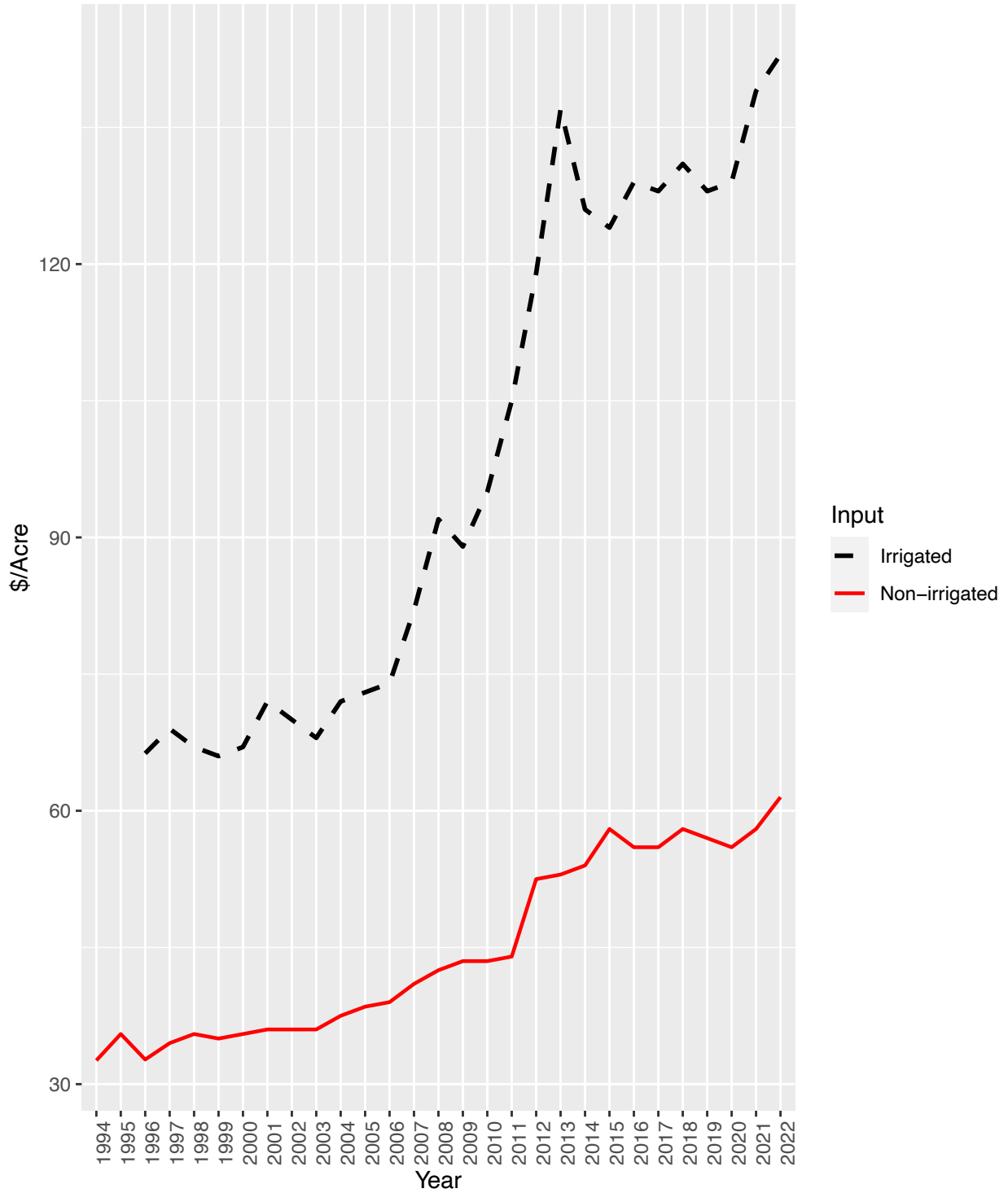


Figure 2. USDA-NASS Estimate of Kansas Irrigated and Non-Irrigated Cash Lease Rates

Kansas Median NFI per Crop Acre

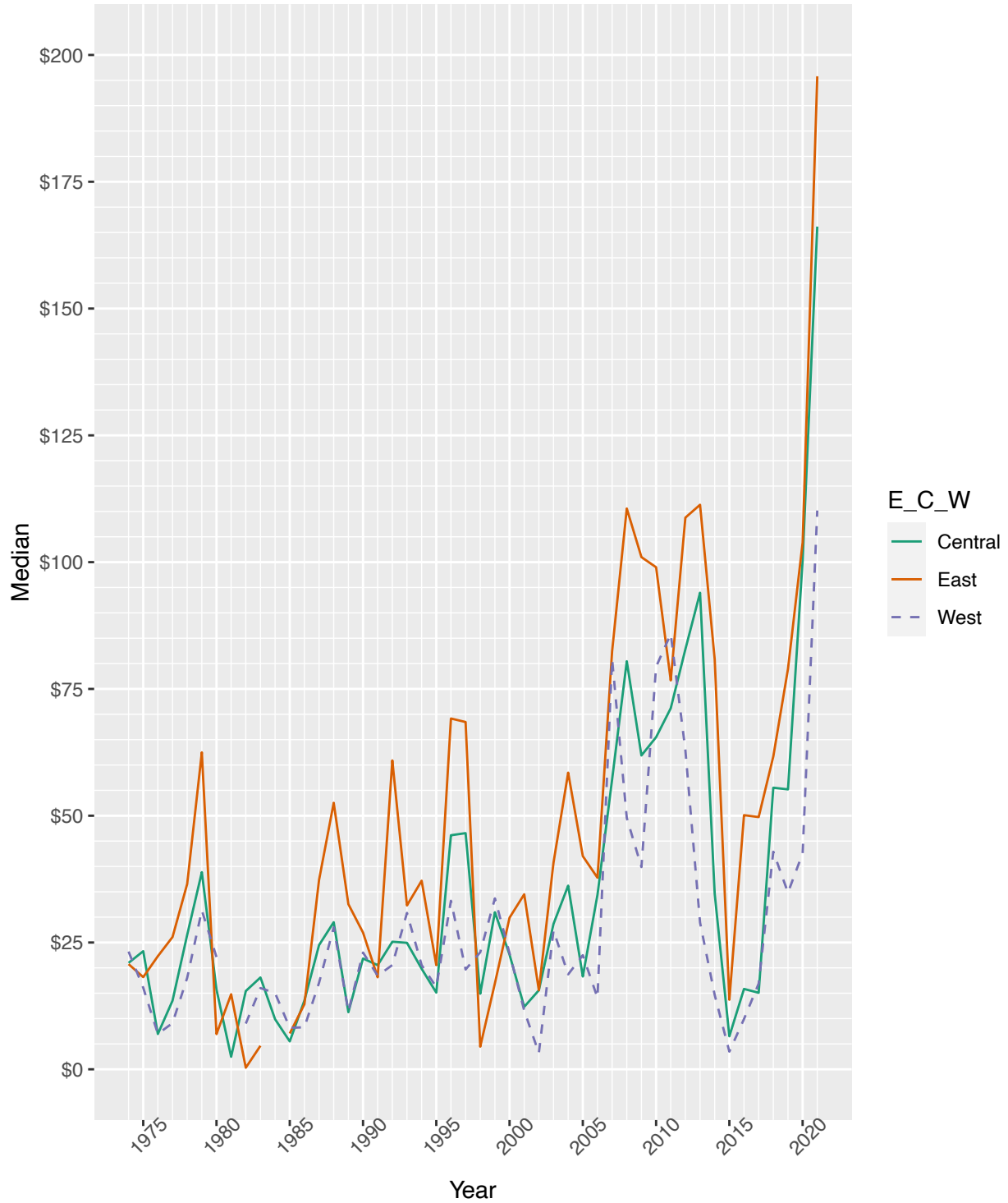


Figure 3. Median Kansas Net Farm Income per Crop Acre by Region

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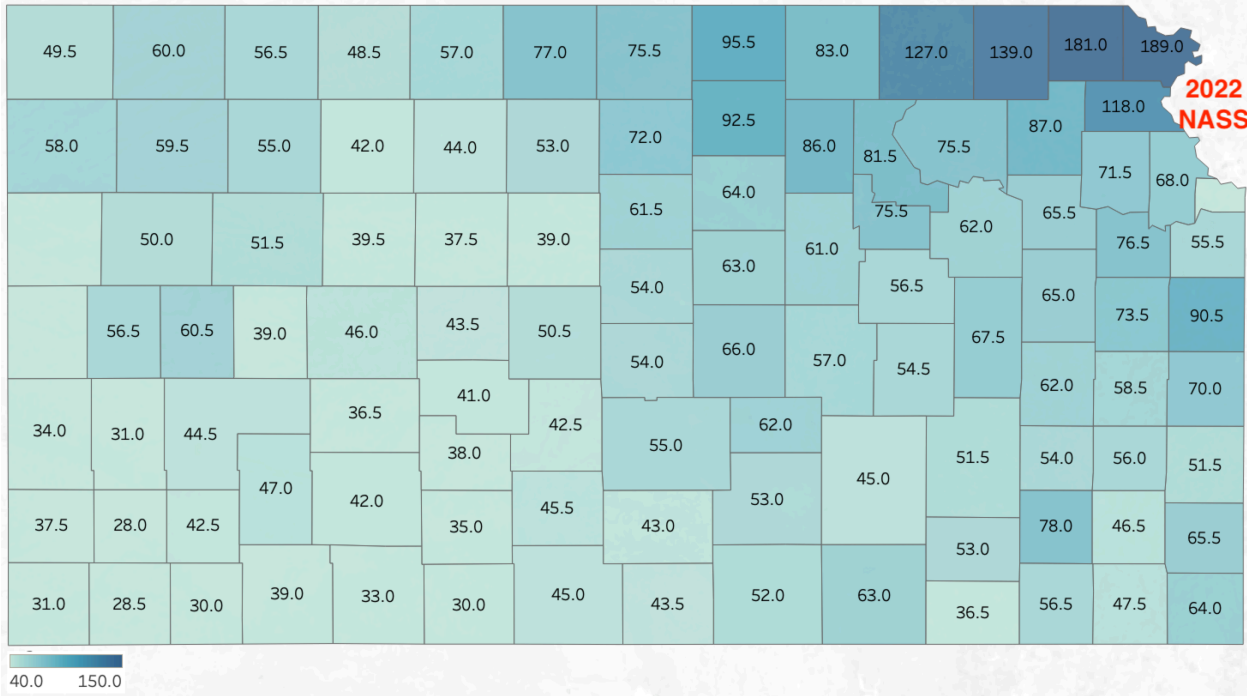


Figure 4. 2022 USDA-NASS Cash Lease Survey Results for Non-Irrigated Crop Land in Kansas. Color Code by (\$/ac).

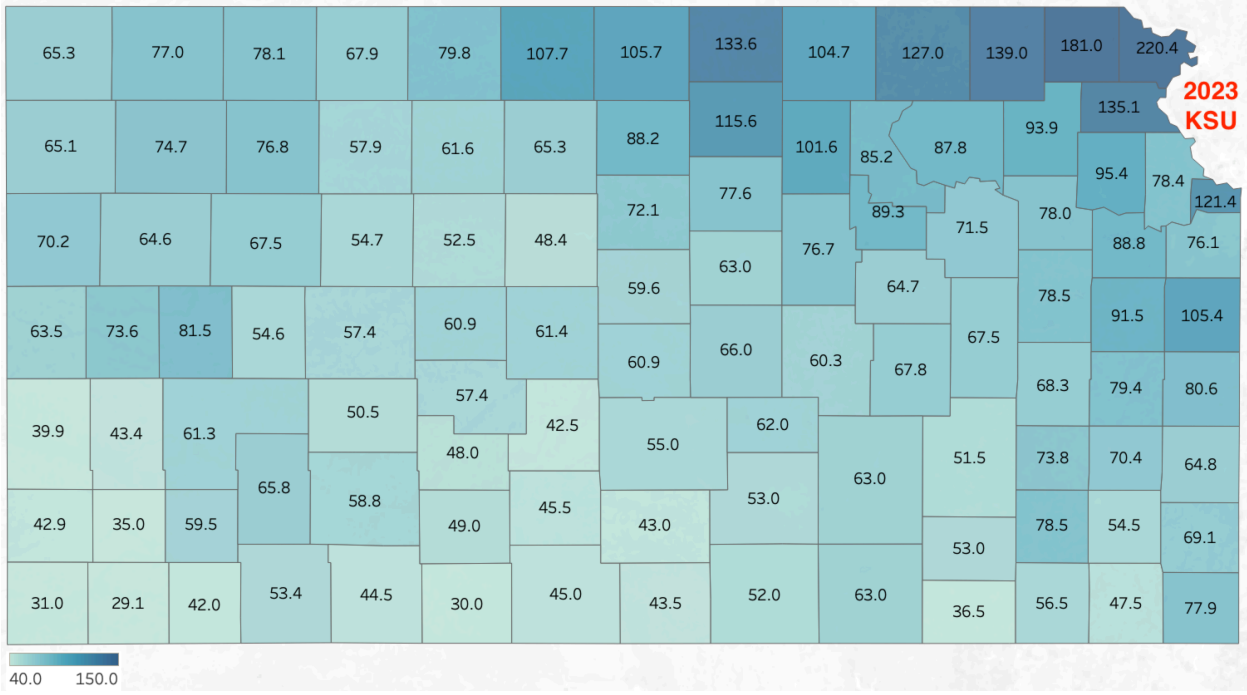


Figure 5. 2023 KSU Cash Lease Estimates for Non-Irrigated Crop Land in Kansas Using Tenant's Residual Approach. Color Coded by (\$/ac).

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Table 1. Estimated Cash Rental Rates for Non-Irrigated Cropland in Western Kansas

Region	County	2021	2022	2022	2023	25th	75th
		NASS	KSU	NASS	KSU	Percentile	Percentile
Northwest	Cheyenne	47	64	50	<b>65</b>	41	93
	Decatur	54	76	57	<b>78</b>	49	111
	Graham	40	40	42	<b>58</b>	36	82
	Norton	47	70	49	<b>68</b>	42	97
	Rawlins	57	76	60	<b>77</b>	48	109
	Sheridan	50	66	55	<b>77</b>	48	109
	Sherman	58	65	58	<b>65</b>	41	93
	Thomas	58	72	60	<b>75</b>	47	106
West Central	Gove	50	63	52	<b>68</b>	43	92
	Greeley	35	50	0	<b>63</b>	41	86
	Lane	36	53	39	<b>55</b>	35	74
	Logan	44	60	50	<b>65</b>	41	88
	Ness	36	48	46	<b>57</b>	37	78
	Scott	48	71	61	<b>81</b>	52	111
	Trego	0	48	40	<b>55</b>	35	74
	Wallace	0	74	0	<b>70</b>	45	95
	Wichita	45	68	57	<b>74</b>	47	100
Southwest	Clark	31	46	33	<b>44</b>	32	54
	Finney	41	62	45	<b>61</b>	44	75
	Ford	38	56	42	<b>59</b>	42	72
	Grant	31	47	28	<b>35</b>	25	43
	Gray	47	71	47	<b>66</b>	47	80
	Hamilton	32	35	34	<b>40</b>	29	49
	Haskell	36	53	43	<b>60</b>	43	72
	Hodgeman	32	48	37	<b>51</b>	36	62
	Kearny	31	46	31	<b>43</b>	31	53
	Meade	39	59	39	<b>53</b>	38	65
	Morton	38	38	31	<b>31</b>	22	38
	Seward	29	43	30	<b>42</b>	30	51
	Stanton	32	47	38	<b>43</b>	31	52
	Stevens	23	34	29	<b>29</b>	21	35

\* - KSU numbers are estimates of the tenant's residual approach to cash lease rates. NASS numbers are survey results

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Table 2. Estimated Cash Rental Rates for Non-Irrigated Cropland in Central Kansas

Region	County	2021	2022	2022	2023	25th	75th
		NASS	KSU	NASS	KSU	Percentile	Percentile
North Central	Clay	71	106	86	<b>102</b>	85	118
	Cloud	84	108	93	<b>116</b>	97	134
	Jewell	76	109	76	<b>106</b>	89	122
	Mitchell	64	75	72	<b>88</b>	74	102
	Osborne	51	53	53	<b>65</b>	55	76
	Ottawa	64	64	64	<b>78</b>	65	90
	Phillips	51	76	57	<b>80</b>	67	92
	Republic	92	133	96	<b>134</b>	112	155
	Rooks	42	62	44	<b>62</b>	52	71
	Smith	66	99	77	<b>108</b>	90	125
	Washington	74	93	83	<b>105</b>	88	121
Central	Barton	41	42	51	<b>61</b>	49	75
	Dickinson	57	85	61	<b>77</b>	61	94
	Ellis	38	44	38	<b>53</b>	42	64
	Ellsworth	43	43	54	<b>60</b>	48	73
	Lincoln	62	62	62	<b>72</b>	58	88
	Marion	51	52	57	<b>60</b>	48	74
	McPherson	64	64	66	<b>66</b>	53	81
	Rice	51	51	54	<b>61</b>	49	75
	Rush	38	46	44	<b>61</b>	49	75
	Russell	40	40	39	<b>48</b>	39	59
	Saline	62	62	63	<b>63</b>	50	77
South Central	Barber	45	45	45	<b>45</b>	37	56
	Comanche	32	32	30	<b>30</b>	25	38
	Edwards	41	42	38	<b>48</b>	39	60
	Harper	40	40	44	<b>44</b>	36	54
	Harvey	59	59	62	<b>62</b>	51	78
	Kingman	42	42	43	<b>43</b>	35	54
	Kiowa	37	48	35	<b>49</b>	40	61
	Pawnee	41	57	41	<b>57</b>	47	72
	Pratt	44	44	46	<b>46</b>	37	57
	Reno	50	50	55	<b>55</b>	45	69
	Sedgwick	54	54	53	<b>53</b>	44	66
	Stafford	40	40	43	<b>43</b>	35	53
	Sumner	50	50	52	<b>52</b>	43	65

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Table 3. Estimated Cash Rental Rates for Non-Irrigated Cropland in Eastern Kansas

Region	County	2021	2022	2022	2023	25th	75th
		NASS	KSU	NASS	KSU	Percentile	Percentile
Northeast	Atchison	107	116	118	135	104	173
	Brown	166	166	181	181	140	232
	Doniphan	178	215	189	220	170	282
	Jackson	82	82	87	94	73	120
	Jefferson	74	87	72	95	74	122
	Leavenworth	68	70	68	78	61	101
	Marshall	115	115	127	127	98	163
	Nemaha	142	142	139	139	107	178
	Pottawatomie	71	75	76	88	68	113
	Riley	76	76	82	85	66	109
	Wyandotte	0	103	0	121	94	156
East Central	Anderson	59	86	59	79	63	95
	Chase	63	66	55	68	54	81
	Coffey	60	63	62	68	54	81
	Douglas	74	83	77	89	71	106
	Franklin	74	94	74	91	73	109
	Geary	70	80	76	89	71	106
	Johnson	58	77	56	76	61	91
	Linn	76	80	70	81	64	96
	Lyon	63	63	68	68	54	80
	Miami	91	103	91	105	84	126
	Morris	51	56	57	65	51	77
	Osage	54	76	65	79	62	94
	Shawnee	54	70	66	78	62	93
	Wabaunsee	54	60	62	72	57	85
	Southeast	Allen	49	74	56	70	51
Bourbon		45	61	52	65	47	86
Butler		45	68	45	63	46	84
Chautauqua		43	43	37	37	27	48
Cherokee		71	80	64	78	57	103
Cowley		55	55	63	63	46	84
Crawford		61	68	66	69	50	92
Elk		47	47	53	53	39	70
Greenwood		52	52	52	52	38	68
Labette		50	50	48	48	35	63
Montgomery		49	49	57	57	41	75
Neosho		51	57	47	54	40	72
Wilson		70	70	78	79	57	104
Woodson		56	74	54	74	54	98

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Table 4. Comparison of KSU and NASS Estimates for Non-Irrigated Cropland by CRD

		<b>KSU</b>	<b>NASS</b>
EAST	Northeast	124	114
	East Central	79	67
	Southeast	61	55
CENTRAL	North Central	95	73
	Central	62	53
	South Central	48	45
WEST	Northwest	70	54
	West Central	65	38
	Southwest	47	36