

Impact New Technologies and Rising Input Costs have on Equitable Crop Share and Cash Leases

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Department Agricultural Economics
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Winter 2006 meetings



Purpose of land talks

- Develop an understanding of the underlying economic principles and management aspects of land ownership and leasing
- Trying to reduce decisions to numbers
- Two decision tools:
 - *KSU-Lease.xls*
 - *KSU-Landbuy.xls*

Decision tools and related papers are found at
www.agmanager.info

In recent years, the majority of leasing questions received pertain to:

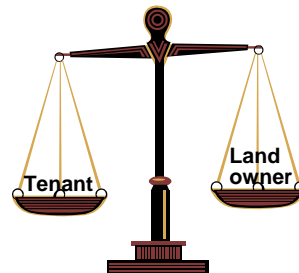
- **Impact of adopting new technologies**
- **Cash renting**
- **“Non-traditional” leases**
 - Net share rent
 - Flexible cash rent
 - Bushel rent
 - Combination cash/cropshare

... while current “hot topic” is slightly different, method of addressing questions has not changed.

3

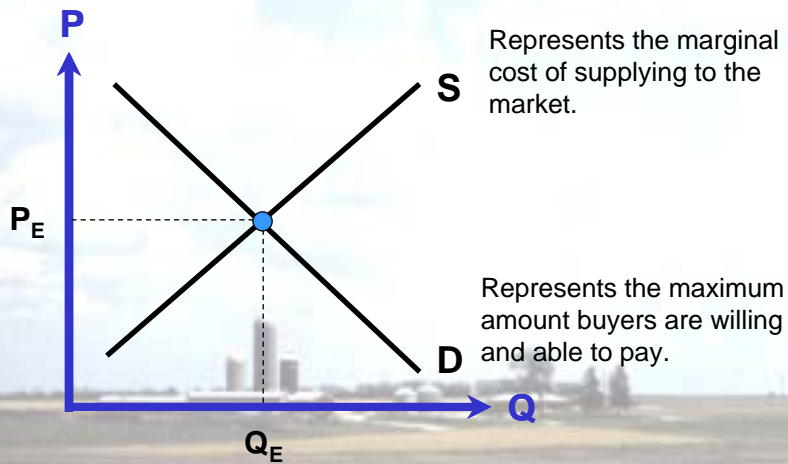
Determining the terms of a lease ...

How are cash lease rates or the terms of crop share leases established?



4

Market established rental rates ...

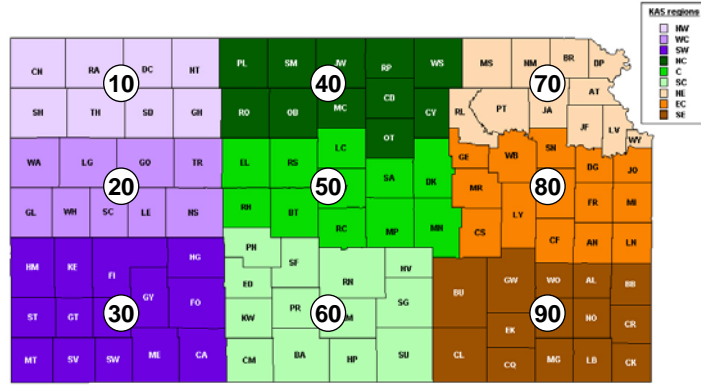


Market established rates...

- Land Use Value Project of the KSU Ag Econ Dept annually conducts one of four surveys (irrigated, non-irrigated, pasture, input costs)
- Kansas Agricultural Statistics (KAS) annually surveys landowners and producers regarding land values and cash rents
- Local and regional surveys of leasing practices
- With surveys there is often a trade-off between statistical validity and level of aggregation

Market going rate ...

- Kansas Agricultural Statistics (KAS) reports average cash rent values for non-irrigated, irrigated, and pasture land at the crop reporting district (CRD) level



KAS surveyed market rates ...

AGRICULTURAL LAND VALUES



Released: August 17, 2005

Kansas Farmland Values and Rents, 2005

Kansas' average value of all farmland and buildings for 2005 is estimated to be \$800 per acre. This compares with \$715 in 2004 and \$685 in 2003. Kansas' average value of all farmland and buildings increased by 11.9 percent from 2004 to 2005. This increase of \$85 per acre is the largest since a 17.2 percent increase from 1979 to 1980, when the average value increased by \$88 per acre. Irrigated cropland values rose 8 percent, non-irrigated rose up 14 percent, and pasture land values increased 16 percent.

Rent rates for both types of cropland increased \$1.00 per acre, while pasture rents rose \$.50 per acre.

Year	Cropland			Pasture and Rangeland		All Farmland and Buildings ^{1/}	
	Value Per Acre		Rent Per Acre	Value Per Acre	Rent Per Acre	Value Per Acre	Total Value
	Irrigated	Non-Irrigated	All Crop Land	Non-Irrigated	Irrigated	Value	Total Value
1994	873	549	597	35.00	341	13,200	23,543
1995	920	595	623	35.50	343	11,700	25,466
1996	968	607	638	36.50	341	11,900	26,268
1997	992	615	649	36.50	365	11,600	26,838
1998	1,010	620	655	37.00	367	13,000	27,408
1999	1,020	625	660	36.00	370	13,300	28,500
2000	1,040	630	666	37.00	380	12,800	29,688
2001	1,060	635	673	37.50	380	12,600	30,505
2002	1,080	640	679	37.00	400	12,600	31,455
2003	1,080	645	684	38.00	410	12,800	32,332
2004	1,110	665	705	37.50	430	13,300	33,748
2005	1,200	760	800	38.50	500	13,400	37,760

^{1/} Values per acre are for land and buildings. Rent rates are for land only. ^{2/} Significant data to publish.

The Land Values Survey-Background

The Agricultural Land Values Survey was conducted during May/June 2005. Survey respondents were asked to provide information on the values of the land they operate and the rental rates for any land they rented. Additional land value and rent data were collected in the June Agricultural Survey.

The Census provides the official base for estimates of all farmland values. However, the Census occurs once every five years and only estimates the value of all

agricultural land and buildings. The Land Values Survey and Agricultural Survey provide data to make annual estimates of both market values and rental rates for different categories of farmland.

The average values in this report encompass a wide range of soil types and pastures. These data are more appropriate for studying overall trends and should not be used to establish rental rates or market values.

Farm Management Guide

MF-100

Kansas Land Prices and Cash Rental Rates

Department of Agricultural Economics



Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Scott C. Dreyer
Agricultural Economist
Farm Management

Theris L. Eastman
Agricultural Economist
Crop Production

This Farm Management Guide reports Kansas land prices and cash rents for 1985-2004. These data are useful to farm managers in determining cash rental rates, to landlords in determining the value of their land, and to investors who have experience in land values and prices. The average prices in this guide encompass parcels of land that vary widely in productivity. Thus, these data are more appropriate for analyzing trends than for establishing market value or rental rates for specific tracts of farmland.

non-irrigated cropland, irrigated cropland, and pasture. This information is contained in two additional land groupings: all cropland and all land in farms. While these two groupings do not represent a particular type of land (i.e., irrigated cropland), they provide a broader classification of amount. The land values reported also include the value of any buildings that may be on the land. The value of the buildings represents a small portion of the total value, however, and this reporting method does not significantly affect the accuracy of land value reported.

Kansas Agricultural Statistics
For reporting purposes, Kansas Agricultural Statistics Service has divided the state into nine agricultural statistical districts. The districts are: Northwest (NW), West Central (WC), Southwest (SW), North Central (NC), Central (C), South-Central (SC), Southeast (SE), East Central (EC), and South (S). Since 1976, Kansas Agricultural Statistics has collected price information on three types of land:

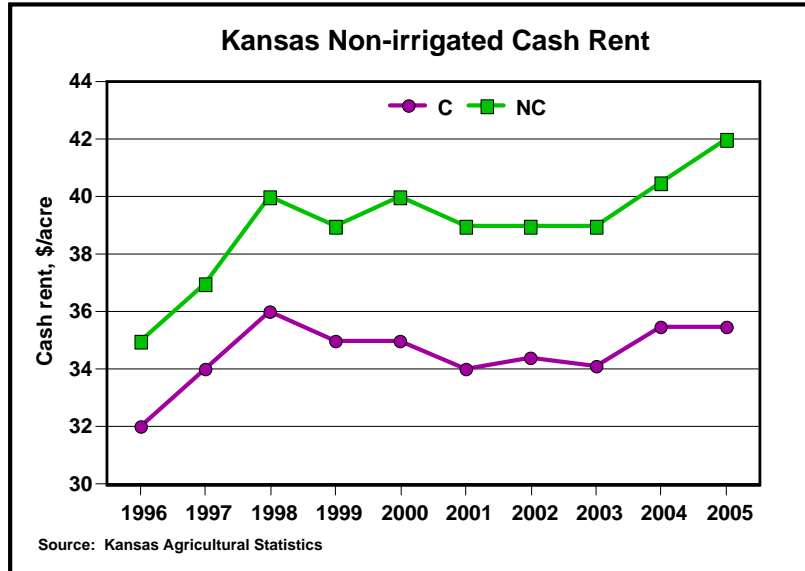
Tables 1 through 3 show average prices of land and buildings in each district and an average for the state for the most recent 20 years reported. Data are shown for each of the five land groupings: all land in farms, all cropland, non-irrigated cropland, irrigated cropland, and pasture. The annual data are based on April 1 for 1987 and February 1 for 1986-1989, and January 1 for 1990-2004.

Table 1. Price per acre of all land in farms and buildings, Kansas Agricultural Statistical Districts, 1985-2004.

Year	NW	WC	SW	NC	C	SC	SE	EC	S	State
1985	333	372	345	423	313	361	343	360	441	388
1986	337	372	345	370	451	323	327	410	311	415
1987	313	327	377	341	484	464	454	301	359	373
1988	338	328	421	390	446	513	485	395	373	413
1989	384	378	441	417	461	539	484	405	384	432
1990	395	361	440	468	496	556	527	425	400	430
1991	389	343	419	417	474	516	479	419	397	449
1992	378	366	411	445	462	499	514	482	394	460
1993	399	351	412	447	493	549	564	430	467	463
1994	435	384	451	521	498	561	628	487	449	503
1995	481	384	444	527	445	678	678	481	467	515
1996	488	399	469	526	521	554	611	548	548	533
1997	509	418	460	540	540	589	639	550	590	577
1998	489	418	490	550	540	589	639	550	590	577
1999	489	405	490	550	540	589	639	550	590	577
2000	539	415	525	645	630	649	629	550	620	625
2001	585	495	540	625	630	655	655	585	615	645
2002	559	489	550	640	660	685	696	620	690	665
2003	568	478	540	640	670	709	709	610	700	675
2004	589	499	590	690	690	725	1,045	685	750	715

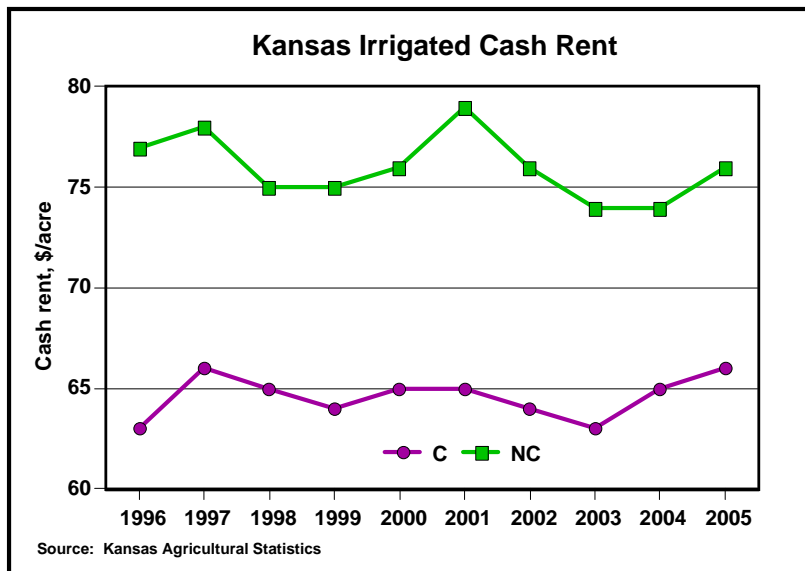
Land Economics 1 - Revised October 2004

Market going rate ...



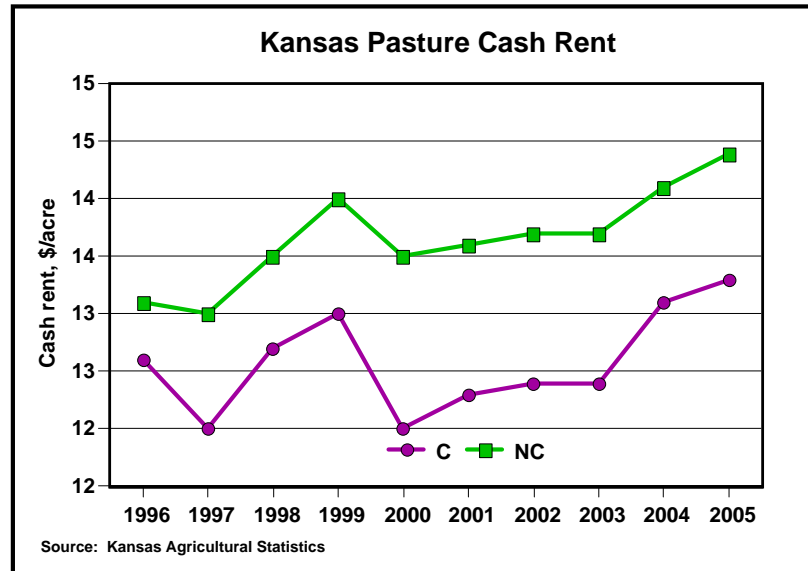
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Market going rate ...



10

Market going rate ...



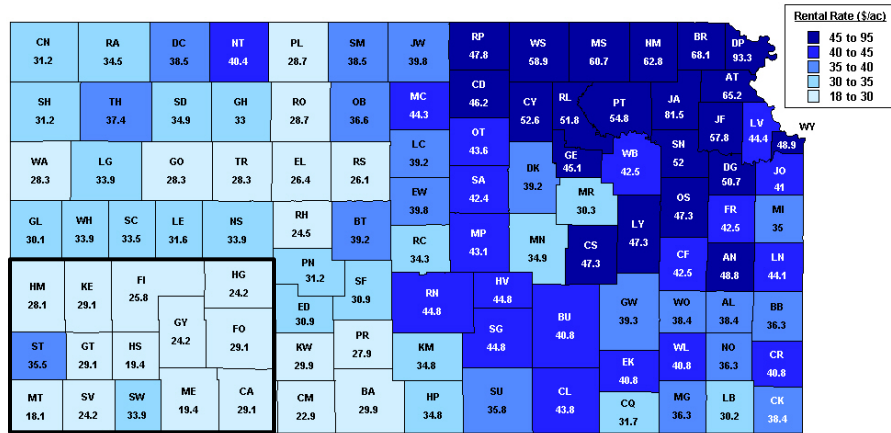
11

County-level cash rents ...

- County-level cash rents were estimated for non-irrigated crop and pasture land based upon the KAS reported CRD values
- CRD values prorated to individual counties based on 3-year average of county-level rents from FSA and 2002 census acreage data
- Weighted average county-level cash rents are exactly equal to the KAS reported district value
- Similar procedure was done on land values

12

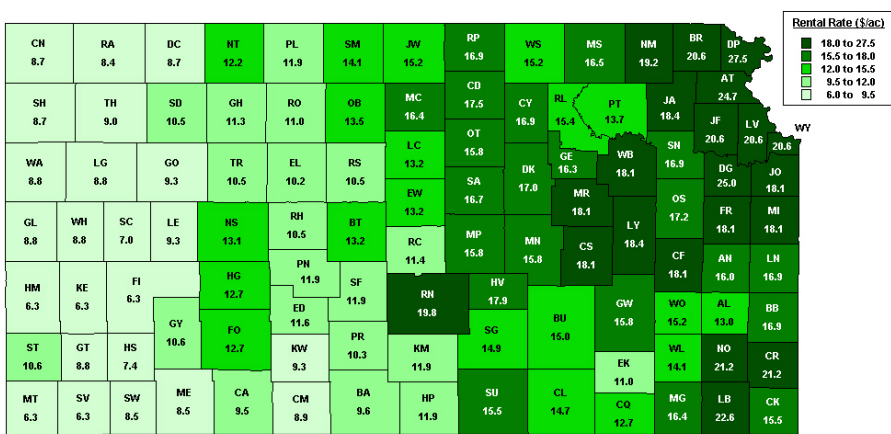
Kansas county-level non-irrigated crop cash rents...



Based on KAS reported values for January 1, 2005

Acreage-weighted average of counties equals \$26.50 (KAS)

Kansas county-level non-irrigated crop cash rents...



Based on KAS reported values for January 1, 2005

Problem:

The market prices we observe (when they are available) often do not reflect individual situations.

That is, they reflect averages, but nobody is average...

... so what can we do to arrive at a price that is acceptable?



Way to find acceptable lease rates (crop shares and cash rents) ...

While landowners and tenants (i.e., the market) ultimately determine terms of crop share and cash leases, we use the equitable concept to arrive at a starting point for negotiations.

Principles embodied in an equitable lease ...

- Profit maximization (MR=MC)
- Economic profits (expected profit = 0)
- Opportunity costs
- Risk across lease types
- Equal rates of return on annual investment
(if economic profit = 0, then rate of return = 0)

17

A good crop share lease should follow five basic principles ...

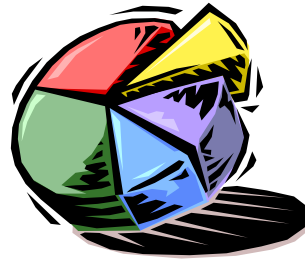
1. Yield increasing inputs should be shared
 2. Share arrangements should be reviewed as technology changes
 3. Total returns divided in same proportion as resources contributed
-
4. Compensation for unused long-term investments at termination
 5. Good landlord/tenant communications

18

**Principle #3:
Returns divided in same proportion as
resources contributed.**

**This requires annual contributions
of both parties to be identified
(budgeting type approach).**

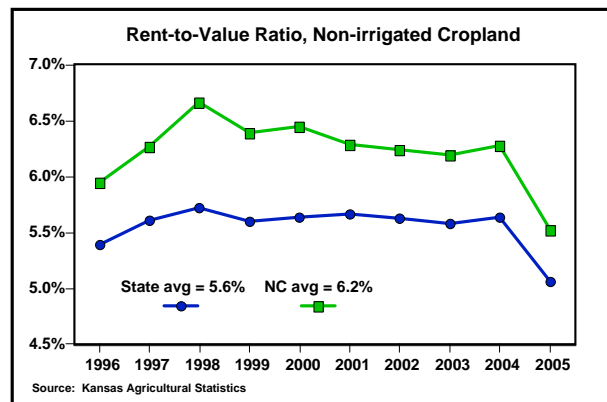
**Valuing inputs can depend on
whether the lease being
developed is a one-year lease
versus multiple-year lease.**



19

Land contribution ...

**The land contribution historically has been
based on an “average market value” for the land
along with an historical average return to land.**



20

Machinery contributions ...

Machinery contribution are generally based on average costs. Two methods for estimating the machinery contribution:

- 1. Machinery investment approach - annual contribution is based on depreciation, interest, repairs, fuel and oil, and labor.**
- 2. Custom rates approach - annual contribution is based on reported custom rates and the typical operations.**



21

Crop production input contributions ...

The value of contributions for input expenses such as seed, herbicides, insecticides, fertilizer, etc. are generally valued at current market prices and represent “typical” production practices.

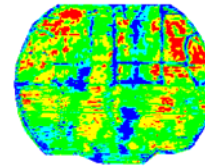
What is “typical” today? While current prices might not be what we expect long-term, can we afford to ignore them with regard to leases?

22

Principle #2:
Technology may affect share arrangements

Examples of technological change

- Reduced-/no-till
- New crops and/or rotations
- Center pivot irrigation
- Hybrid seed
- Bio-technology
- Precision agriculture (GPS)



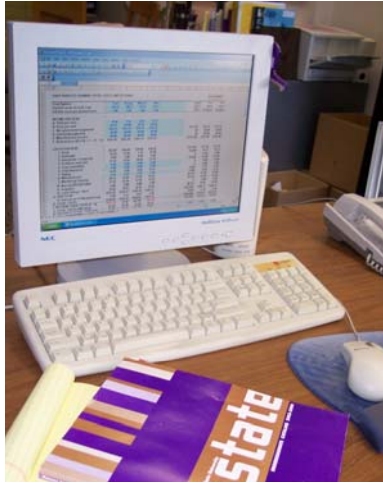
23

Impact of new technologies ...

- Why do people adopt new technologies?
- What happens as “new” technologies become common practice?
- How does this impact relative contributions?

24

Using “KSU-Lease.xls” to determine equitable crop share and cash leases ...



Information/data required:

1. Crop rotation/mix
2. Income information
3. Production inputs
4. Machinery costs
5. Land value
6. Irrigation equipment
-
7. Contributor of input
8. Risk adjustment

25

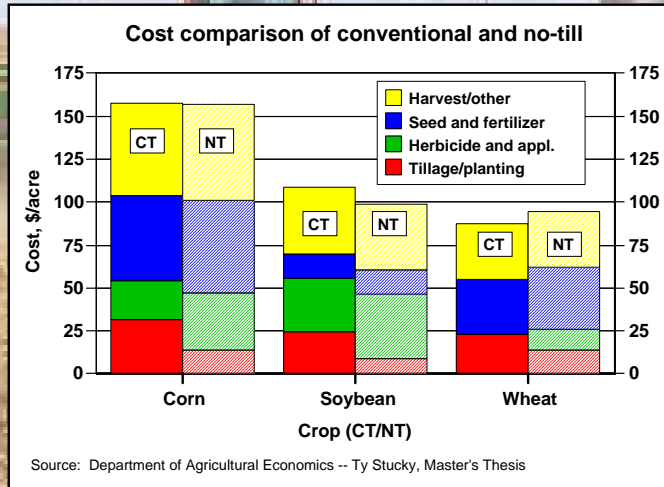
Technology adoption example:

Impact switching to no-till has on equitable lease arrangements

26

Lease examples of CT vs NT for NC Kansas

- Corn, soybean, wheat rotation projected budgets
- Average land values



Conventional (CT) vs. No-tillage (NT) Effect on Equitable Shares				
(Rotation = 50% W, 25% C, 25% S)				
Tillage system	Farm #1		Farm #2	
	CT	NT	CT	NT
Contribution	Contributor		Contributor	
Land	Landlord	Landlord	Landlord	Landlord
Machinery	Tenant	Tenant	Tenant	Tenant
Fertilizer/insect.	Shared	Shared	Shared	Shared
Herbicide	Tenant	Tenant	Shared	Shared
Herbicide appl.	Tenant	Tenant	Shared	Shared
Other	Tenant	Tenant	Tenant	Tenant
Contributions	32.5/67.5	33.1/66.9	36.3/63.7	40.6/59.4

If you were previously sharing herbicides ...

- Rather than change the crop share splits, many producers/landowners continue to share “non-burndown” herbicides and the tenant pays 100% of the burndown herbicides.
- Is this equitable?
- Is there a problem with this arrangement?

29

Conventional (CT) vs. No-tillage (NT) Effect on Equitable Shares				
(Rotation = 50% W, 25% C, 25% S)				
Tillage system	Farm #1		Farm #2	
	CT	NT	CT	NT
Contribution	Contributor		Contributor	
Land	Landlord	Landlord	Landlord	Landlord
Machinery	Tenant	Tenant	Tenant	Tenant
Fertilizer/insect.	Shared	Shared	Shared	Shared
Herbicide	Tenant	Tenant	Shared	Shared
Herbicide appl.	Tenant	Tenant	Shared	Shared
Burndown herbicide	Tenant	Tenant	Tenant	Tenant
Burndown appl.	Tenant	Tenant	Tenant	Tenant
Other	Tenant	Tenant	Tenant	Tenant
Contributions	32.5/67.5	33.1/66.9	36.3/63.7	36.7/63.3

If the goal is to have an “equitable” lease ...

... then crops should be divided in the same proportion that inputs are provided, regardless of whether or not herbicide costs are shared.

What is most important is communication.

31

Impact of specific technologies on equitable crop share and cash leases ...

- Roundup Ready
- bT, Gaucho
- Precision ag / irrigation system
- CSP / EQIP
- Hunting leases

41

Adoption of new technologies ...

- ... tends to cause problems because traditional arrangements or rules-of-thumb are often not appropriate.
- ... think about what the technology (i.e., the “new input”) substitutes for and how that relates to what was previously being done.
- ... should not be a problem if we follow basic principles of a good lease.
- ... if problems persist as to what is equitable, can lead to alternative leasing arrangements (e.g., cash lease).

42

Impact of high costs on land values ...

KSU-Landbuy.xls is a tool that can be used to analyze the theoretical impact higher costs might have on land values in the long-run (i.e., assuming high costs persist in the future)

It is important to recognize that numerous factors impact land values and thus observed values likely won't match up with theoretical expectations

43

Microsoft Excel - KSU-Landbuy.xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

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A1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

KSU-Landbuy.xls - A spreadsheet program to analyze land purchase prices and land values in general.

Version -- 12.30.04

Print information

INPUTS vs CALCULATED VALUES
 In the *KSU-Landbuy* sheet all blue numbers are inputs and all other numbers are calculated from these inputs. The spreadsheet automatically recalculates every time an additional input is entered. Thus, it is important to wait until all data have been entered and reviewed before interpreting any of the calculated results (i.e., black numbers).

DESCRIPTION OF INPUTS
 The paper titled *Valuing and Buying Farmland* (paper at www.agecon.ksu.edu/kdhuyvetter) serves as a user's guide and provides a more detailed documentation of the concepts and formulas used in this spreadsheet. Also, several of the input cells (i.e., blue numbers) have a red diamond in the upper right hand corner of the cell (if the comments do not appear go to View / Comments on the Excel menu). By moving your mouse cursor over this diamond, a brief description of the input will be displayed on the screen.

Developed by: Terry L. Kastens, Extension Agricultural Economist, Kansas State University
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Intro \ KSU-Landbuy \ Guidelines

available on www.agmanager.info

start Land (max bid stuff) Microsoft PowerPoint... Microsoft Excel - KSU...

7:49 AM

Microsoft Excel - KSU-Landbuy (MP Co).xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

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B8

44

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Inputs					Print report				Label (refers to notation in <i>Valuing and Buying Farmland</i> publication)											
KS	KS	KS	KS	Average	State where land is located (enter as two letter abbreviation, e.g., Kansas = KS)	Ac	MV_0	PP	aR	Ptx	nR	T	Ibc	Cbc	I	F	gA	gNR	g	gNW
Crop	Pasture	Waste			-----	160	\$800	\$800	\$44.00	\$4.80	\$0.00	30	35%	15%	7.50%	40.0%	1.50%	0.00%	3.50%	1.97%
160	0	0		160	-----	\$800	\$800	\$800	\$44.00	\$4.80	\$0.00	30	35%	15%	7.50%	40.0%	1.50%	0.00%	3.50%	1.97%
\$800	\$350	\$0		\$800	-----															
\$800	\$350	\$0		\$800	-----															
\$44.00	\$12.00	\$0.00		\$44.00	-----															
\$4.80	\$2.10	\$0.00		\$4.80	-----															
\$0.00	\$0.00	\$0.00		\$0.00	-----															
30	30	30		30	-----															
35%	35%	35%		35%	-----															
15%	15%	15%		15%	-----															
7.50%	7.50%	7.50%		7.50%	-----															
40.0%	40.0%	40.0%		40%	-----															
1.50%	1.00%	0.00%		1.50%	-----															
0.00%	0.00%	0.00%		n/a	-----															
3.50%	3.50%	0.00%		3.50%	-----															
1.97%	2.48%	0.00%		1.97%	-----															

Calculated Outputs					Label	
4.88%	4.88%	4.88%	4.88%	4.88%	(1-Ibc)	After-tax interest rate on land loans (discount rate)
\$25.48	\$6.44	\$0.00	\$25.48	-----	-----	After-tax rent, \$/acre (now property taxes are removed as well)
\$479.07	\$113.52	\$0.00	\$479.07	PVRA	-----	Discounted value of all future after-tax ag rents
\$0.00	\$0.00	\$0.00	\$0.00	PVRN	-----	Discounted value of all future after-tax non-ag rents
\$2,245.43	\$982.38	\$0.00	\$2,245.43	-----	-----	Projected land value in 30 years, based on market price and ag & non-ag growth
\$1,250.46	\$471.75	\$0.00	\$1,250.46	-----	-----	Projected land value in 30 years, based on market price and only ag growth
\$486.45	\$212.82	\$0.00	\$486.45	PVS	-----	Discounted value of land sale in 30 years (after capital gains tax)
\$283.65	\$108.74	\$0.00	\$283.65	PVSA	-----	Discounted value of land sale in 30 years (after capital gains tax) -- if only ag growth
\$965.52	\$326.34	\$0.00	\$965.52	PVL	-----	Present value of land purchase
79%	68%	n/a	79%	AMVP	-----	Ag market value percent implied by non-ag rent and
32%	47%	n/a	-----	AMVP	-----	Ag market value percent implied by Ag Rent-to-Value
\$165.52	\$23.66	\$0.00	\$165.52	-----	-----	Present value less market price
\$165.52	\$23.66	\$0.00	\$165.52	-----	-----	Present value less purchase price
8.94%	7.03%	n/a	8.94%	-----	-----	Approximate pre-tax rate of return on assets
9.90%	6.72%	n/a	9.90%	-----	-----	Approximate pre-tax rate of return on equity

Rent = \$44.00/acre
 PVL = \$966/acre

Intro \ KSU-Landbuy \ Guidelines

start KSU-L... Micro...

6:23 AM

Microsoft Excel - KSU-Landbuy (MP Co).xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

36.5

Inputs	Print report	Label	(refers to notation in Valuing and Buying Farmland publication)
KS	KS	KS	KS
Crop	Pasture	Waste	Average
160	0	0	160
\$800	\$350	\$0	\$800
\$800	\$350	\$0	\$800
\$36.50	\$12.00	\$0.00	\$36.50
\$4.80	\$2.10	\$0.00	\$4.80
\$0.00	\$0.00	\$0.00	\$0.00
30	30	30	30
35%	35%	35%	35%
15%	15%	15%	15%
7.50%	7.50%	7.50%	7.50%
40.0%	40.0%	40.0%	40%
1.50%	1.00%	0.00%	1.50%
0.00%	0.00%	0.00%	n/a
3.50%	3.50%	0.00%	3.50%
1.97%	2.49%	0.00%	1.97%

Calculated Outputs					
4.88%	4.88%	4.88%	4.88%	(1-ib)	After-tax interest rate on land loans (discount rate)
\$20.61	\$6.44	\$0.00	\$20.61	-----	After-tax rent, \$/acre (now property taxes are removed as well)
\$387.41	\$113.52	\$0.00	\$387.41	PVRA	Discounted value of all future after-tax ag rents
\$0.00	\$0.00	\$0.00	\$0.00	PVRN	Discounted value of all future after-tax non-ag rents
\$2,245.43	\$982.38	\$0.00	\$2,245.43	-----	Projected land value in 30 years, based on market price and ag & non-ag growth
\$1,250.46	\$471.75	\$0.00	\$1,250.46	-----	Projected land value in 30 years, based on market price and only ag growth
\$486.45	\$212.82	\$0.00	\$486.45	PVS	Discounted value of land sale in 30 years (after capital gains tax)
\$283.65	\$108.74	\$0.00	\$283.65	PVSA	Discounted value of land sale in 30 years (after capital gains tax) -- if only ag growth
\$873.86	\$326.34	\$0.00	\$873.86	PVL	Present value of land purchase
77%	68%	n/a	77%	AMVP	Ag market value percent implied by non-ag rent and
66%	47%	n/a	-----	AMVP	Ag market value percent implied by Ag Rent-to-Value
\$73.86	-\$23.66	\$0.00	\$73.86	-----	Present value less market price
\$73.86	-\$23.66	\$0.00	\$73.86	-----	Present value less purchase price
8.14%	7.03%	n/a	8.14%	-----	Approximate pre-tax rate of return on assets
8.57%	6.72%	n/a	8.57%	-----	Approximate pre-tax rate of return on equity

Rent = \$36.50/acre
PVL = \$874/acre

Intro \ KSU-Landbuy \ Guidelines

AgManager: Providing Agricultural Economic Information on Crops, Livestock, Marketing and Outlo - Microsoft Internet Explorer

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Address http://www.agmanager.info/

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- Energy Prices
- Farm Management
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- Programs
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Management Analysis and Strategic Thinking

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