Input Costs and Farm Leases
Determining Lease Rates and Bids

Clay County No-till Program
February 26, 2004 – Clay Center, KS

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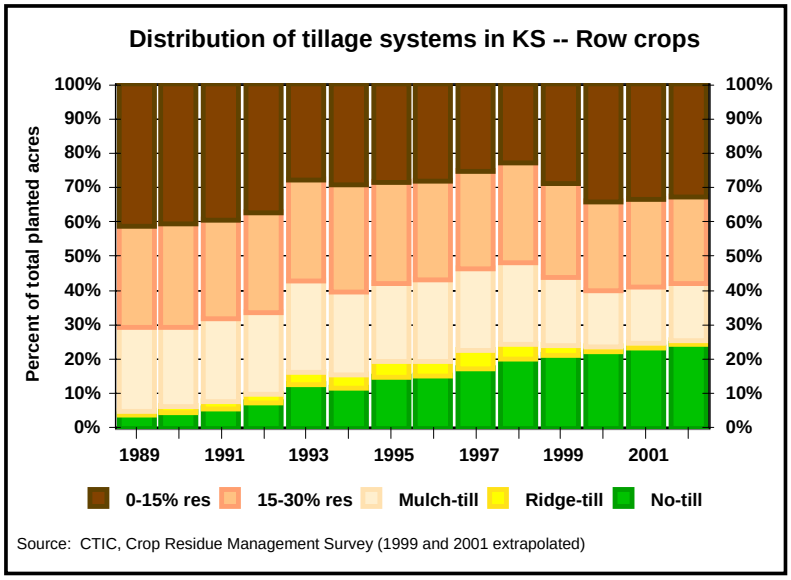
In recent years, the majority of leasing questions received pertain to:

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

Increasing acres of no-till ...



Source: CTIC, Crop Residue Management Survey (1999 and 2001 extrapolated)

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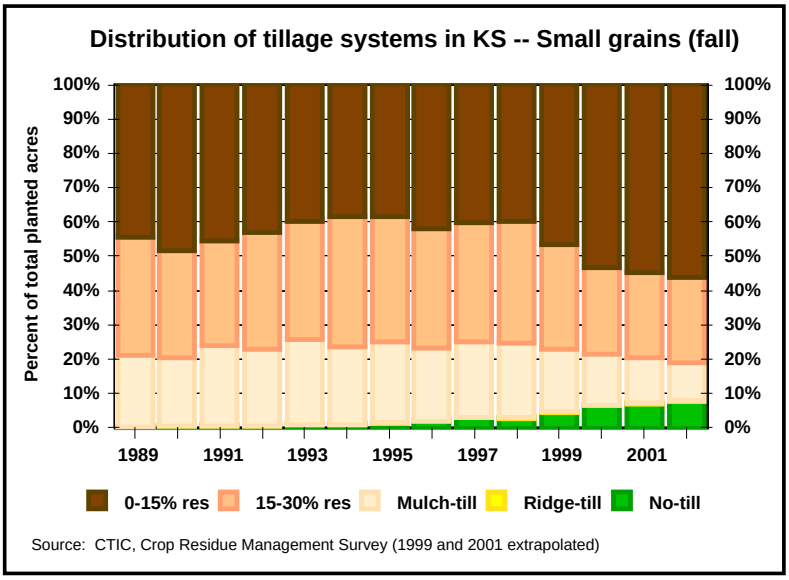

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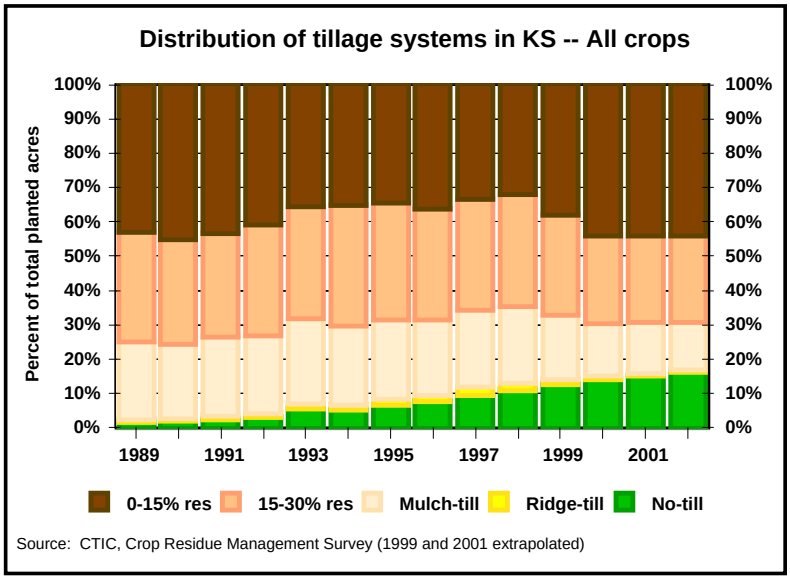
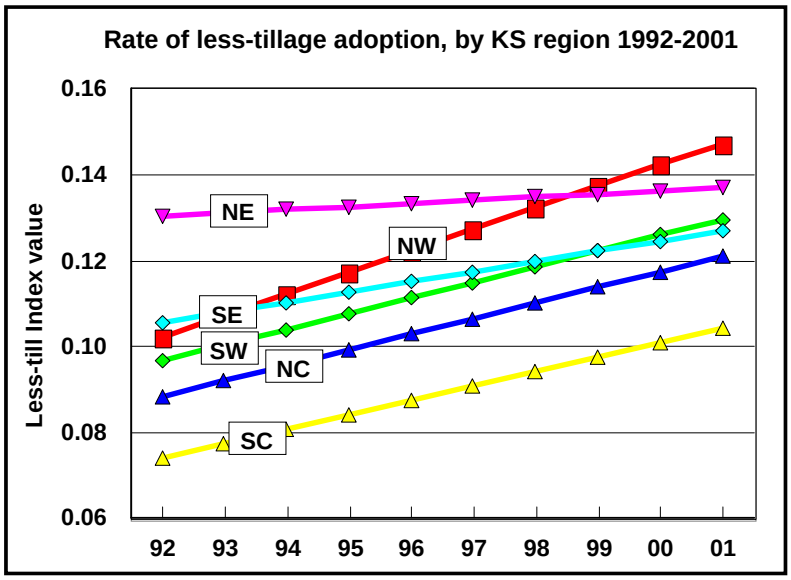


Source: CTIC, Crop Residue Management Survey (1999 and 2001 extrapolated)

Technology adoption …



Determining the terms of a crop lease ...

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

A good crop share lease should follow five basic principles …

1. Yield increasing inputs should be shared
2. Share arrangements should be adjusted as technology changes
3. Total returns divided in same proportion as resources contributed

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4. Compensation for unused long-term investments at termination
5. Good landlord/tenant communications

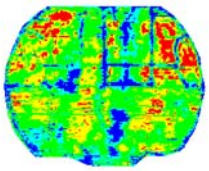
Principle #1:
Yield increasing inputs should be shared

The reason it is recommended that yield increasing inputs should be shared is this provides the economic signal for the economic optimal amount of the input to be used.

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)



Impact of new technologies …

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

Possible reasons for switching to reduced or no-till ...

- ✓ Increase profitability - ???
- ✓ Reduce labor requirements
- ✓ Reduce machinery cost/acre
- ✓ Increase acres farmed
- ✓ Reduce moisture stress/increase yield
- ✓ Conservation compliance
- ✓ Other (e.g., wildlife, carbon sequestration)

Profitability ...

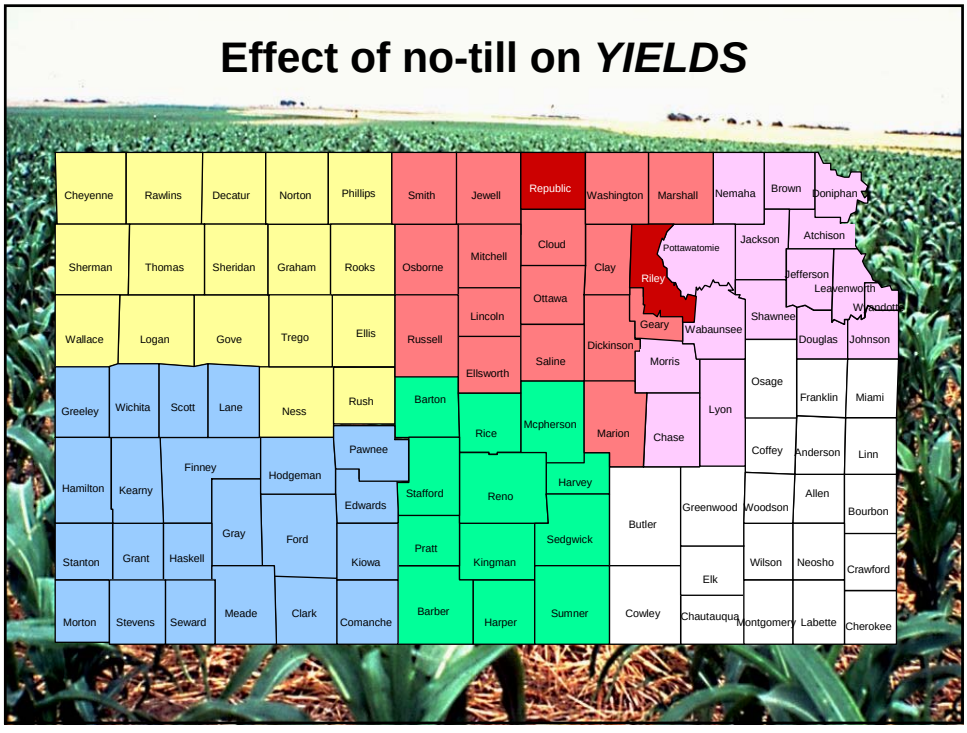
Revenue (yield x price)

- Cost (variable and fixed)

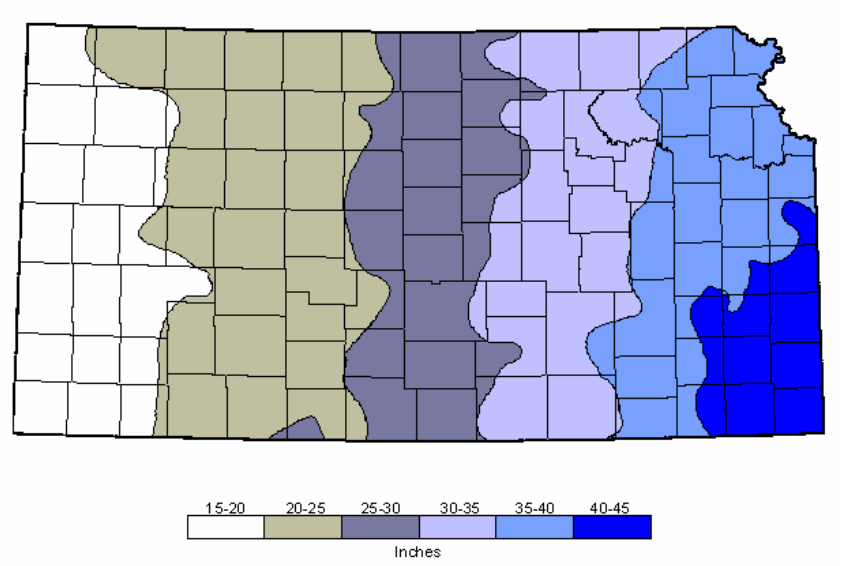
Profit or net returns

Tillage won't impact price, thus profitability will depend on how yields and costs are affected by reducing tillage.

Effect of no-till on *YIELDS*



Kansas Annual Precipitation, 1961-90



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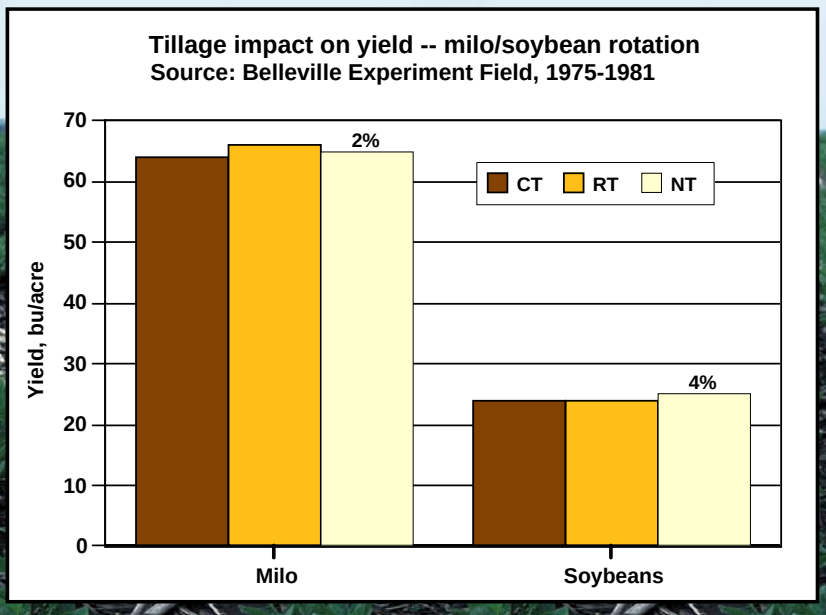
K-State research data, 7-year average



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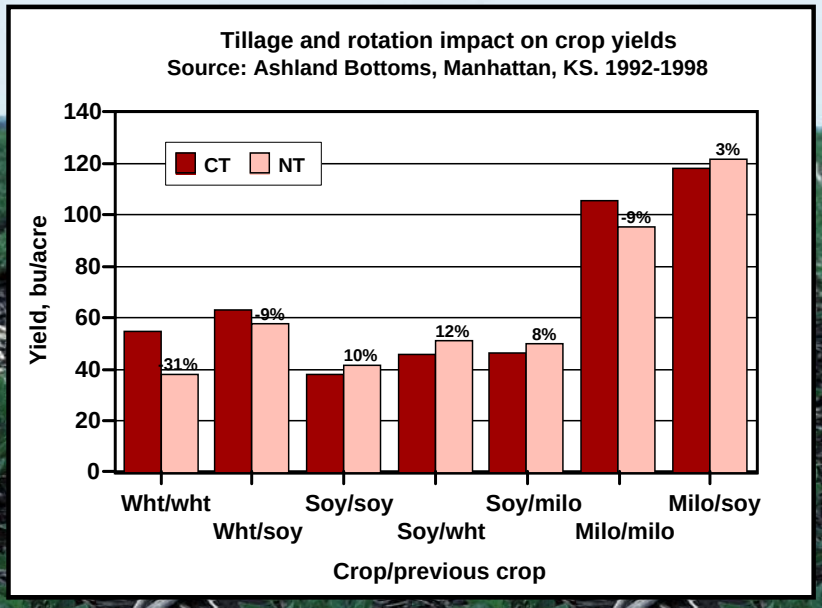
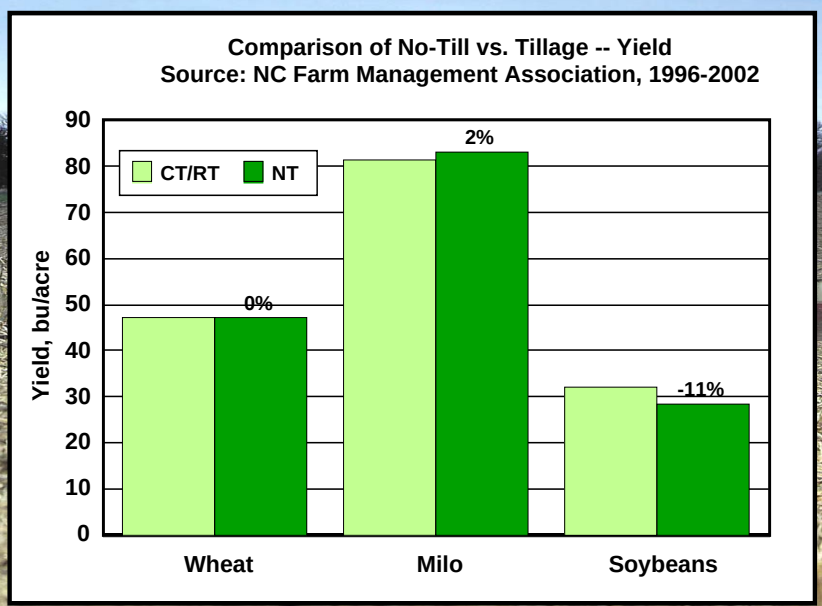


Farm-level data, 7-year average



Effect of tillage on yields?

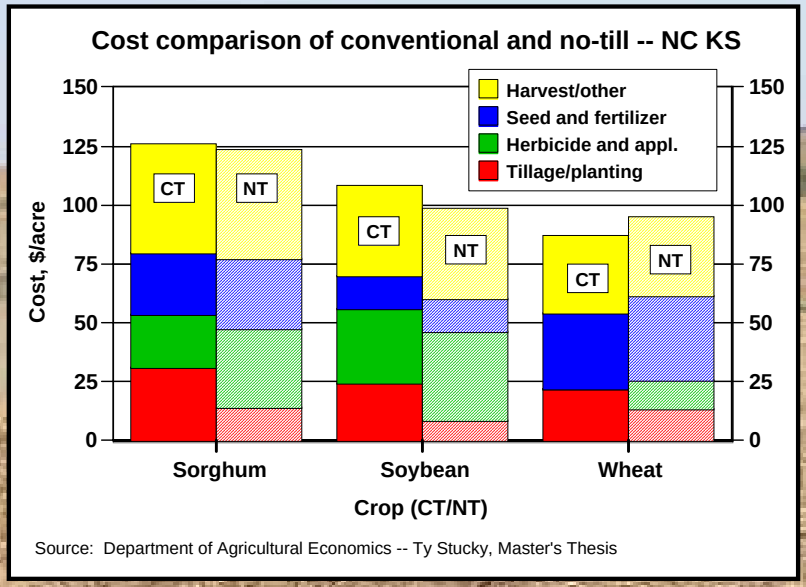
KSU research in central and eastern Kansas has generally shown little yield difference between tillage systems for wheat, sorghum, soybeans, and corn => NT cost driven.

Research in western Kansas has shown that yields of crops such as milo and corn grown in rotation with wheat increase as tillage is reduced => NT revenue driven.

Effect of no-till on *COSTS*

- Projected/simulated budgets
- Actual farm-level data

Projected budgets



Source: Department of Agricultural Economics -- Ty Stucky, Master's Thesis

Actual farm-level budgets

No-Till cost study - North Central Farm Management Association, 1996-2002

	$/tillable acre		$/harvested acre	
EXPENSE ITEM, $/acre	CT/RT	NT	CT/RT	NT
Direct input (seed, fert, chem, etc)	$39.04	$56.14	$40.31	$54.15
Machinery cost	$38.66	$35.44	$39.94	$34.17
Labor	$28.40	$24.05	$29.35	$23.19
Total asset charge	$37.93	$37.86	$39.19	$36.53
Building and conservation	$3.07	$2.03	$3.17	$1.96
Other	$11.40	$8.22	$11.78	$7.93
Total expense	$158.49	$163.75	$163.74	$157.95
Total acres	938	1,212	908	1,256
Harvested acres/tillable acres	xxxxx	xxxxx	96.8%	103.6%

Effect of no-till on costs

- Little change in total costs if acreage is held constant.
- Changes cost "structure" --- i.e., herbicide is substituted for tillage-related expenses.
- Fixed costs (land, machinery, management, etc.) will depend on acreage and thus will vary between producers.

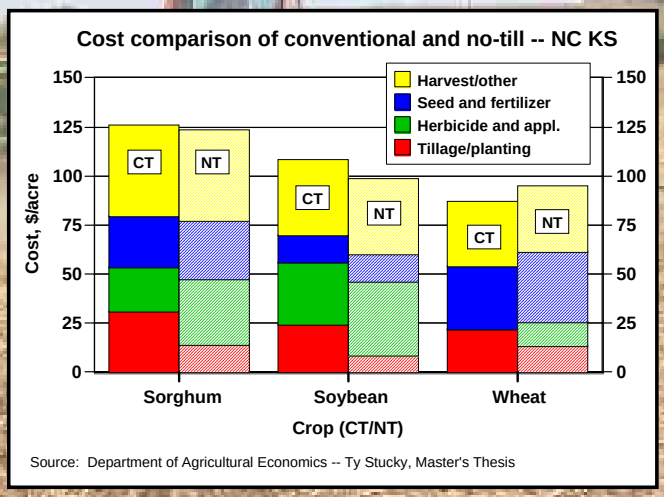
Technology adoption EXAMPLE:

Impact switching to no-till has on equitable lease arrangements

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
Herbicde	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?**

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
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Machinery	Tenant	Tenant	Tenant	Tenant
Fertilizer/insect.	Shared	Shared	Shared	Shared
Herbicde	Tenant	Tenant	Shared	Shared
Herbicide appl.	Tenant	Tenant	Shared	Shared
Burndown herbicde	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

Technology adoption EXAMPLE:

Impact of adding double crop soybeans to equitable lease

Equitable Crop Shares with W-M (NT) vs. W-M-DC B (NT) in NC Kansas[1]
(Costs are based on 2003 FM Guides)

	Alternative Arrangements for Sharing Various Inputs[2]					
	Wheat-Milo			Wheat-Milo-DC Beans		
Contribution	A1	B1	C1	A2	B2	C2
Land	L	L	L	L	L	L
Machinery	T	T	T	T	T	T
Fertilizer (N-P-K)	S	S	S	S	S	S
Lime	L	L	S	L	L	S
Herbicide	S	S	S	S	S	S
Fertilizer application	T	S	S	T	S	S
Herbicide application	T	S	S	T	S	S
Other	T	T	T	T	T	T
Contributions (L/T)	33.4/66.6	36.7/63.3	33.9/66.1	25.0/75.0	27.6/72.4	25.3/74.7

[1] Land value is held constant across rotations (100% of wheat acres planted to DC beans)

[2] L=Landlord, T=Tenant, S=Shared (equitably)

Percent of acres planted to dc beans matters ...

Equitable Crop Shares with W-M (NT) vs. W-M-DC B (NT) in NC Kansas[1]
(Costs are based on 2003 FM Guides)

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	Wheat-Milo			Wheat-Milo-DC Beans		
Contribution	A1	B1	C1	A2	B2	C2
Land	L	L	L	L	L	L
Machinery	T	T	T	T	T	T
Fertilizer (N-P-K)	S	S	S	S	S	S
Lime	L	L	S	L	L	S
Herbicide	S	S	S	S	S	S
Fertilizer application	T	S	S	T	S	S
Herbicide application	T	S	S	T	S	S
Other	T	T	T	T	T	T
Contributions (L/T)	33.4/66.6	36.7/63.3	33.9/66.1	28.6/71.4	31.5/68.5	29.0/71.0

[1] Land value is held constant across rotations (50% of wheat acres planted to DC beans

[2] L=Landlord, T=Tenant, S=Shared (equitably)

If the goal is to have an "equitable" lease …

… then crops should be divided in the same proportion that inputs are provided, regardless of how any particular inputs (e.g., herbicides) are shared.

What is most important is ***communication***.

Adoption of new technologies …

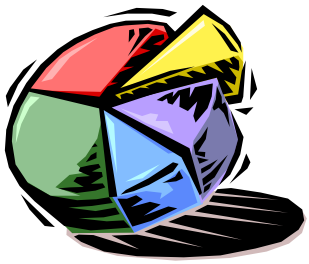
… tends to cause problems because traditional arrangements or rules-of-thumb are often not appropriate.

… 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).

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

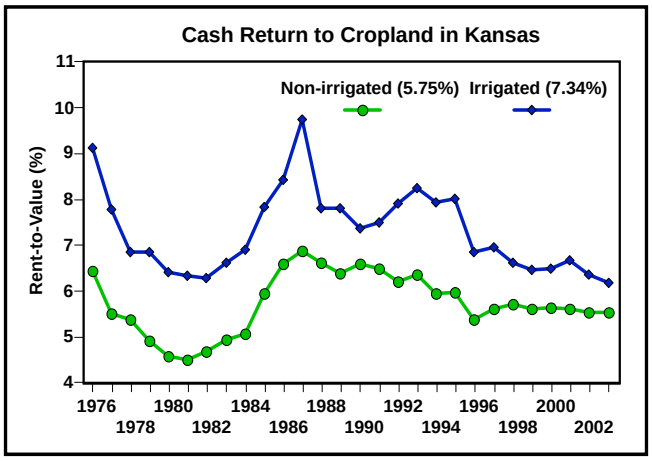
This requires annual contributions of both parties to be identified (budgeting type approach).



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

Land contribution …

The land contribution is typically based on an "average market value" for the land along with an historical average return to land.



Machinery contributions …

Machinery contribution should be 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 custom rates and the typical operations.

Crop production input contributions …

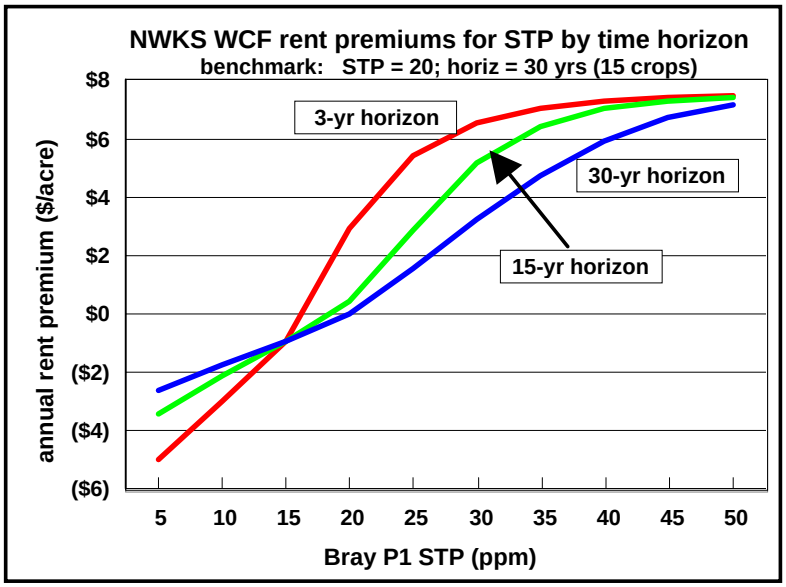
The value of contributions for input expenses such as seed, herbicides, insecticides, fertilizer, etc. are generally valued at current market prices and represent “typical” production practices.

Principle #4:
Compensation for unused long-term investments at lease termination.

It is generally recommended that landowners make long-term investments such as terraces, irrigation well, lime, alfalfa seed, etc.

If the tenant pays for long-term investments, or shares their cost, he should be compensated for his share of any value that remains when the lease is terminated

Fertility levels impact rents (land values) . . .



Expected yield: 75 corn 45 wheat; allowed for application savings when doesn't pay

Does no-till impact rents (land values) . . .

- What are the long-term impacts of NT on soil quality?
  - -- organic matter (fertilizer provider)
  - -- soil structure (water holding capacity)
  - -- reduced erosion
- Market rents early vs. late (extra N needed early?)
- Will tenants be compensated for improvements at lease termination?

Principle #5:
Good communications between the landlord and the tenant.

Because so many of the terms of a lease are based on negotiation between the landowner and the tenant, good communications are critical.

A lease is a legal contract in Kansas, thus it is suggested that terms of the lease agreed upon by both parties be put in writing. This becomes more important as the complexity of leases increases.

Increased interest in cash rents …

Some possible explanations for the current interest in cash rents …

- Increased cropping flexibility
- Landowners not wanting to share increased expenses of new tillage/cropping systems
- Landowners wanting fixed income
- Increasing farm size and landlords per farm
- Difficult to prorate technology costs (e.g., GIS)

Cash rents …

Numerous good reasons to go to cash rent, but landowners and producers need to recognize several things when doing so ...

- **Land tends to change hands more often**
- **Relative risks may change (with cash rent landowners have no yield or price risk)**

Farmland Leasing
South Dakota Farmland Leasing 2003, B739
Larry Janssen and Xuan Xu

Evaluation of leasing agreements and leasing market competition

Score/rank	(1)	(2)	(3)	(4)	
Fairness of lease:	**Poor**	**Adequate**	**Good**	**Excellent**	**Total**
Cash	2.8%	13.8%	43.6%	39.4%	**3.19**
Share	1.9%	10.4%	40.5%	45.4%	**3.26**
Satisfaction with Lease:	**Very dissatisfied**	**Somewhat dissatisfied**	**Generally satisfied**	**Very satisfied**	**Total**
Cash	2.1%	9.5%	53.9%	34.5%	**3.21**
Share	2.2%	2.2%	54.9%	40.7%	**3.34**
Leasing Competition:	**No competition**	**Slight competition**	**Moderate competition**	**Intense competition**	**Total**
Initial lease agreement	48.3%	19.9%	22.3%	6.1%	**1.79**
Renewal of lease	58.5%	20.9%	15.0%	2.4%	**1.55**

… communication is every bit as much important with cash rent.

Cash rents may not be much lower than cash equivalents of crop share rents because risk may not be that much different …

- Subsidized crop insurance
- Geographical spread of large farms
- Ad hoc disaster programs
- Non-insured assistance program (NAP)
- Landowners still have risk with cash rents

Cash rents may even be higher than cash equivalents of crop share rents …

- It may be easier to "bid away" land from other producers with cash rents (prevailing crop share arrangements are often "sticky")
- Cost of servicing lease is lower for tenant
  - Costs associated with billing landlord for inputs
  - Marketing landlord's crop
  - Reporting on crop progress
  - Educating landlord about new technologies

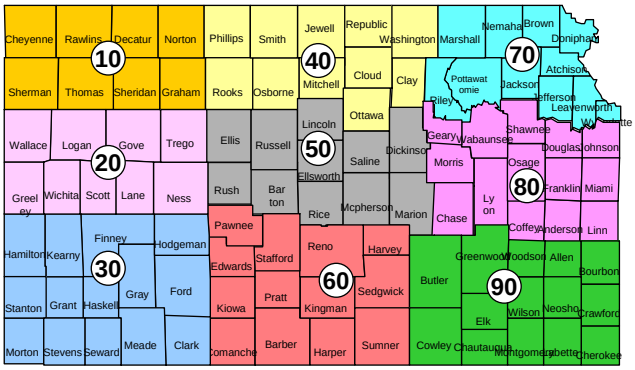
… cash rents are not just about risk/return, they are also about costs and revenues

Methods of establishing cash rent values …

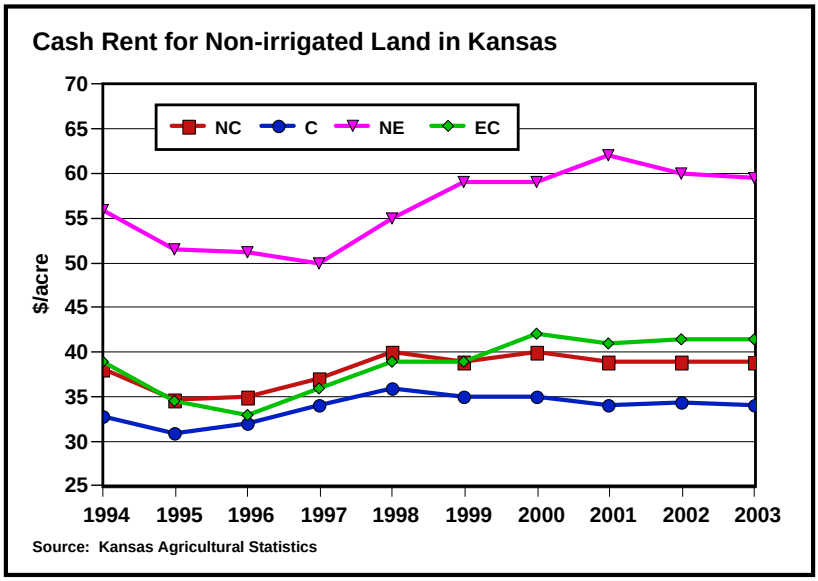
- **Market going rate (if available)**

Market going rate …

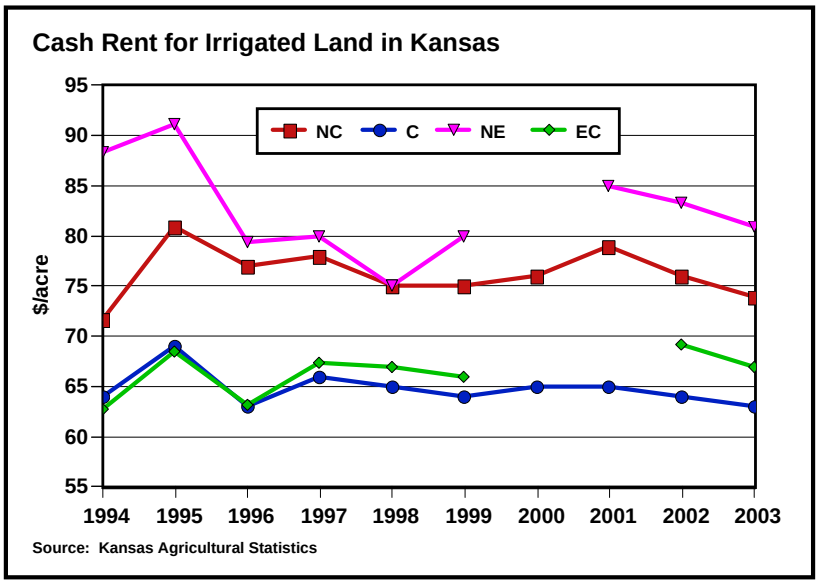
Kansas Agricultural Statistics (KAS) reports average cash rent values for non-irrigated, irrigated, and pasture land at the crop reporting district (CRD) level



Market going rate …



Market going rate …



Market going rate …

Farm Management Guide MF-1100

Kansas Land Prices and Cash Rental Rates

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Crop Production

This Farm Management guide reports Kansas land prices and cash rents for 1984-2003. These data are useful to farm managers in determining cash rental rates, to farmland appraisers in calculating indexes for making time adjustments to land prices, and to landowners and investors who base expectations on historical price and return levels for farmland. 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.

nonirrigated cropland, irrigated cropland, and pasture. This information is combined in two additional land groupings: all cropland and all land in farms. While these two groupings do not represent a particular type of land (e.g., nonirrigated cropland), they provide a broader classification of interest.

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, on average, and thus this reporting method does not significantly affect the accuracy of land values 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), Northeast (NE), East Central (EC), and Southeast (SE). Since 1976, Kansas Agricultural Statistics has collected price information on three types of land:

Kansas Land Prices

Tables 1 through 5 show average prices of land and buildings in each district and an average for the state for the most recent twenty years reported. Data are shown for each of the five land groupings: all land in farms, all cropland, nonirrigated cropland, irrigated cropland, and pasture. The annual data are based on April 1 for 1984-85 and February 1 for 1986-1989, and January 1 for 1990-2003.

Table 1. Price per acre of all land in farms and buildings, Kansas Agricultural Statistical Districts, 1984-2003.

Year	NW	WC	SW	NC	C	SC	NE	EC	SE	State
1984	$492	$500	$538	$541	$643	$777	$793	$611	$529	$597
1985	383	392	485	422	533	616	642	490	431	488
1986*	337	332	416	370	451	521	527	410	381	415
1987*	313	297	377	343	404	466	456	363	339	373
1988*	358	328	421	390	446	513	485	396	373	413
1989	384	339	441	417	461	530	484	405	384	429
1990	395	361	440	408	486	556	527	425	400	450
1991	389	363	419	419	474	515	530	439	397	449
1992	378	366	418	465	462	490	534	482	394	460
1993	399	351	412	447	493	540	586	430	407	463
1994	435	386	453	521	488	561	628	487	449	503
1995	491	386	464	527	545	579	800	633	503	535
1996	488	399	469	526	521	554	811	813	548	553
1997	500	410	480	540	540	570	810	790	575	565
1998	490	410	490	550	560	590	830	800	590	577
1999	510	415	490	560	570	610	825	790	585	580
2000	515	420	500	570	580	615	835	800	595	590
2001	530	425	510	580	590	640	875	825	640	610
2002	525	425	525	590	610	645	900	845	645	620
2003	520	430	520	595	610	640	910	850	645	620

Land Economics 1 — Revised October 2003

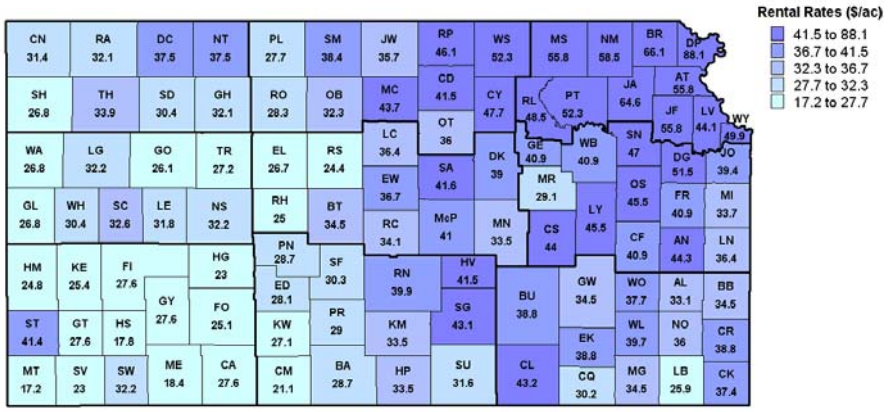
MF-1100 -- summary of historical KAS land values and cash rents by district and land type.

Available at www.agmanager.info

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 1997 census acreage data
- Weighted average county-level cash rents are exactly equal to the KAS reported district value
- Similar procedure done for land values

County-level non-irrigated crop cash rents …



Based on KAS reported values for January 1, 2003

Methods of establishing cash rent values …

- Market going rate (if available)

- -

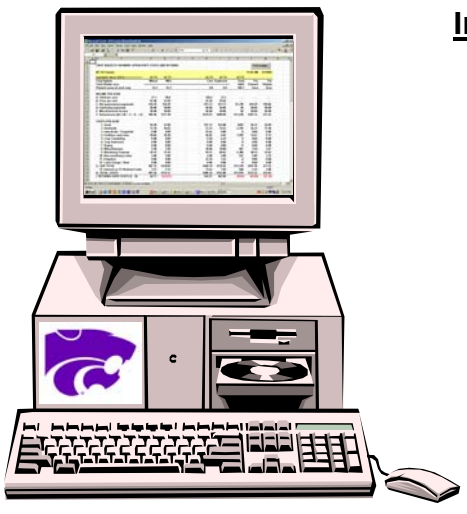
- Crop share equivalent (adjusted for risk)
- Landowner's cost
- Amount tenant can afford to pay

The last three require yield, price, and government payment projections (as well as cost information used for crop share).

Methods of establishing cash rent values …

- **Crop share equivalent (adjusted for risk)**
  - Converts equitable crop share rent to an expected dollar amount per acre
- **Landowner's cost**
  - Based on the premise of landowner's continuing to receive comparable returns to what has been received in the past
- **Amount tenant can afford to pay**
  - Residual approach – after tenant pays all expenses, whatever income is left represents cash rent

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

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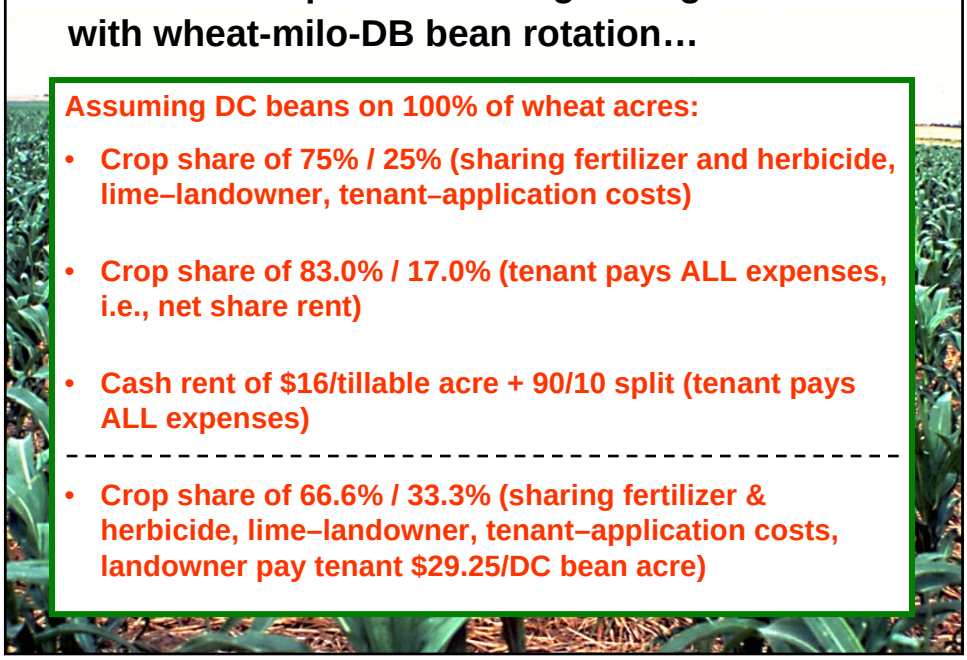
7. Contributor of input
8. Risk adjustment

Level of complexity …

- *KSU-Lease* is extremely flexible and can be used to generate leases with terms that are quite simple to extremely complex

- For example equitable percentages for …
  - -- net share lease (i.e., no inputs shared)
  - -- fertilizer shared equitably (i.e., same % as income)
  - -- fertilizer shared equitably, herbicides shared in some other proportion
  - -- different inputs shared differently for each crop
  - -- combination of crop share and cash rent

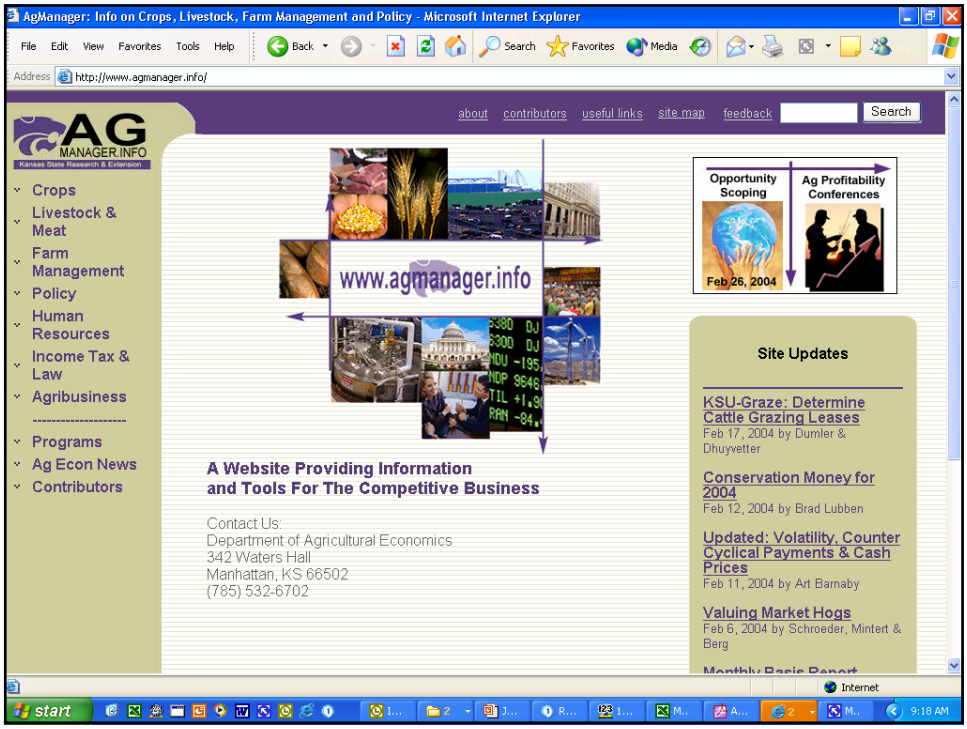
Alternative equitable leasing arrangements with wheat-milo-DB bean rotation…



Assuming DC beans on 100% of wheat acres:

- Crop share of 75% / 25% (sharing fertilizer and herbicide, lime–landowner, tenant–application costs)
- Crop share of 83.0% / 17.0% (tenant pays ALL expenses, i.e., net share rent)
- Cash rent of $16/tillable acre + 90/10 split (tenant pays ALL expenses)

- Crop share of 66.6% / 33.3% (sharing fertilizer & herbicide, lime–landowner, tenant–application costs, landowner pay tenant $29.25/DC bean acre)



Questions ???

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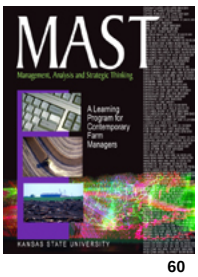

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