

*Risk Management*

## Determining Cropland Share Rental Arrangements

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Many crop producers rely heavily on rented land in their farming operations. The rental arrangements between landowners and producers can significantly affect risk and profitability, and producers should understand those effects.

Rental arrangements often seem unresponsive to changes in production practices, and generally slow to change over time. Producers often work with multiple landowners and may be reluctant to change rental arrangements with any one landowner unless changes can be made with them all. Rental arrangements also may be slow to change because land is often rented from the same landowner for an extended time and the parties involved may feel the costs of renegotiating rental arrangements on a regular basis outweigh the benefits.

Crop land is typically rented in one of three ways: (1) cash rent; (2) crop share; or (3) cash/share combination. This publication describes crop share rental arrangements. For information on cash rental arrangements and land values, see RM 5-12, *Determining Cropland Cash Rental Arrangements*.

### ***Determining Crop Shares***

Producers often struggle with establishing terms for crop share rental arrangements. Economic theory says that an equilibrium rate occurs where the supply of land equals the demand for land. How do we arrive at an equilibrium price?

Typically, landowners and tenants negotiate to find a crop share lease arrangement that is “fair” and equitable to both parties.

An equitable crop share arrangement identifies all contributions made separately by a landowner and a tenant and then shares any income in this same proportion. In other words, each party is compensated according to what he or she contributed to the production process. The underlying assumption of an equitable lease is that returns to land are similar to the returns to non-land inputs. Thus, the shares going to each party need to change as relative contributions change, if the lease is to remain equitable.

### ***Principles of Crop Share Leases***

A good crop share lease should follow five basic principles (Langemeier): (1) yield-increasing inputs should be shared; (2) share arrangements should be adjusted as technology changes; (3) total returns should be divided in the same proportion as resources contributed; (4) long-term investments should be compensated when the lease is terminated; and (5) there must be good communication between landowner and tenant.

While all inputs increase yield (e.g. without seed there is no yield), principle #1 refers to inputs where yield is a continuous function of the use of the input. Examples of yield-increasing inputs are fertilizer, irrigation water, possibly herbicides in



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semi-arid regions, and possibly genetically modified seed and technology fees.

The optimal amount of an input to use is the amount reached when the value of an additional unit of input equals the cost of supplying an additional unit. In economic language, this is referred to as the point where the value of marginal product (VMP) equals the marginal input cost (MIC).

Table 1 shows optimal fertilizer application rates for alternative cost/income sharing arrangements. In this example, VMP is greater than MIC at 60 units of fertilizer but less than at 80 units, so total returns to fertilizer are maximized at 60 units. To determine the optimal amount of fertilizer a tenant would apply, VMP and MIC need to be adjusted to reflect the appropriate percentages. When the cost of the yield-increasing input is not shared by the landowner (2/3 inc./all cost column), the tenant has an economic incentive to under-fertilize and hence reduce total returns (returns to both landowner and tenant). Similarly, if the tenant pays none of the cost (2/3 inc./no cost), he has an incentive to over-fertilize, which also decreases total returns. When the cost of fertilizer is shared in the same proportion as the income (2/3 inc./2/3 cost) the tenant maximizes both his returns and total returns.

For relatively low-cost inputs, sharing them in the same percent as income may not be critical. As the cost of the yield-increasing input increases it becomes more important to share the cost because the economic incentive for the tenant to use either too little or too much of the input becomes greater. Thus, principle #1 helps to promote optimal production management.

Principle #2 simply states that technologies may affect share arrangements as they may change the relative contributions of the parties involved. Examples of tech-

nological changes are reduced tillage or no-till production, new crops and/or rotations, center pivot irrigation, hybrid seed, biotechnology, and precision agriculture (GPS).

A specific example of a technological change is the increased adoption of the wheat-sorghum-fallow rotation in western Kansas. Table 2 shows how the relative contributions change for the landowner and tenant by moving from a wheat-fallow (WF) to a wheat-sorghum-fallow (WSF) rotation based on a study conducted at Garden City, Kansas. With the WF rotation, the equitable crop share arrangement is landowner 1/3 and tenant 2/3, with the tenant paying for all herbicide. However, with the WSF rotation, if the tenant continues to pay all herbicide expense, the equitable arrangement would be a 30 percent/70 percent split. If the traditional 1/3 / 2/3 crop share is desired, it can be derived by having the landowner share the sorghum herbicide expense.

In this example (Table 2), it worked out that the landowner would need to pay for 1/3 of the sorghum herbi-

**Table 2.**

	WF	WSF	WSF
Land	Landlord	Landlord	Landlord
Machinery	Tenant	Tenant	Tenant
Fertilizer	Shared	Shared	Shared
Herbicide*			
Wheat	Tenant	Tenant	Tenant
Sorghum		Tenant	Shared
Other operating	Tenant	Tenant	Tenant
Contributions	33.3/66.7	30.5/69.5	33.1/66.9

\*Herbicide expense only; application charge is included in other operating.

**Table 1.**

Units/acre	Yield (bu.)	Income \$4.00/bu.	VMP	MIC	Income and cost position of tenant			
					All inc. all cost	2/3 inc. all cost	2/3 inc. no cost	2/3 inc. 2/3 cost
0	35	\$78.75			\$78.75	\$52.50	\$52.50	\$52.50
20	55	\$123.75	\$45.00	\$8.00	\$115.75	\$74.50	\$82.50	\$77.17
40	70	\$153.00	\$29.25	\$8.00	\$137.00	\$86.00	\$102.00	\$91.33
60	73	\$164.25	\$11.25	\$8.00	\$140.25	\$85.50	\$109.50	\$93.50
80	74	\$166.50	\$2.25	\$8.00	\$134.50	\$79.00	\$111.00	\$89.67
100	75	\$168.75	\$2.25	\$8.00	\$128.75	\$72.50	\$112.50	\$85.83

cides in order to maintain the 1/3 / 2/3 crop share arrangement. However, it may be that paying for some other percentage of the herbicide would be appropriate in other cases. For example, if herbicide expense on the sorghum were higher, it may be that the landowner would only need to pay 1/4 of the sorghum herbicide costs to maintain a 1/3 / 2/3 equitable split between total costs and income.

How a lease is structured before the adoption of new technology also should be considered. Table 3 compares the equitable crop share percentages of going from furrow irrigation to sub-surface drip irrigation (SDI) on cotton in the Southern High Plains of Texas under three different scenarios. In the first scenario, the landowner shares no yield enhancing inputs and the equitable arrangement is approximately 1/5 / 4/5. In this case, switching to SDI, with no charge in the share rental arrangement, makes the contribution of the landlord increase from 19.8% to 24.2% while the share of income remains at 20%. A more equitable solution is found by switching to 1/3 / 2/3 with the landlord also sharing in the yield enhancing inputs fertilizer, insecticides, and tech fees. In this scenario the contribution landlord is 32.8%.

Tables 2 and 3 demonstrate that the effects of new technologies on equitable crop share arrangements will vary because of factors such as geographic region, specific technology being adopted, inputs shared initially, etc. The adoption of a new technology may increase, decrease, or have no effect on the equitable crop share percentage for either the landowner or the producer. Therefore, generalizations about the impact of new technologies on crop share arrangements are not always possible and such situations may need to be analyzed on a case-by-case basis. It is important that lease arrangements be flexible enough to accommodate changing technologies.

Principle #3 states that total returns should be divided in the same proportion as resources contributed, which is basically how a “fair” and equitable lease is defined. In order to identify what is contributed by each party, some type of budgeting process is required to account for all costs. Perhaps the most difficult part of this process is determining the annual contributions for capital assets such as land, machinery or irrigation equipment.

**Table 3.**

Furrow Irrigated vs. Sub Surface Drip Irrigated Cotton			
Contribution	Furrow 1/5	SDI 1/5	SDI 1/3
Land	Landlord	Landlord	Landlord
Machinery	Tenant	Tenant	Tenant
Fertilizer/insecticide	Tenant	Tenant	Share
Irrigation system	Landlord	Landlord	Landlord
Other	Tenant	Tenant	Tenant
Contributions	80.2/19.8	75.8/24.2	67.2/32.8

The annual land contribution is typically based on an average market value of land times some historical return to land. Machinery costs can be based on either an average investment or custom rates approach. With the investment approach, annual machinery costs to include are market (not tax) depreciation, interest, insurance, fuel and oil, and labor. The annual machinery contribution should be based on average machinery costs and not on specific costs of the party providing the machinery. The reason for this is that producers should not be penalized for having below average machinery cost, which is what would happen using an individual’s actual costs along with the contribution approach. Likewise, a producer who has high machinery costs because of inefficiencies or mismanagement should not benefit from these high costs by getting a higher share of the crop. Table 4 shows an example of how the land and machinery contributions are considered, where the machinery costs are based on an average investment per acre.

**Table 4.**

Land and machinery ownership costs		Landlord share	Annual charge	Landlord	Tenant
Total acres (include fallow)	812	100%			
Value of land/acre	\$650	—			
Rate of return	6.05%	—	\$39.00	\$39.00	\$0.00
Taxes/acre (0.50%)	\$3.25	—	\$3.25	\$3.25	\$0.00
Machinery inv/planted acre	\$238	0%			
Salvage value-percent	35.0%				
Depreciation-years	10	—	\$15.47	\$0.00	\$15.47
Rate of return	9.0%	—	\$14.46	\$0.00	\$14.46
Repairs/acre	\$15.40	0%	\$14.69	\$0.00	\$14.69
Management charge	0.0%	25%			
Total value of assets	\$888		\$0.00	\$0.00	\$0.00
Total ownership cost/leased acre			\$86.86	\$42.25	\$44.61
Cash payments between parties (total \$)			\$0	\$0	\$0

Production inputs such as seed and herbicide usually are valued at current values. Table 5 shows an example of production inputs, where insecticide and fertilizer are shared equitably (i.e., in the same proportion as income).

Table 6 shows the total costs provided by both parties as well as the percentage contributions, where this percentage represents how income and equitably shared expenses would be split.

If the objective of a crop share arrangement is to have a “fair” and equitable lease that compensates both parties

according to their relative contributions, then whether certain inputs are shared or not is not an issue (except as it applies to principle #1). Rather, what is important is that whoever pays for the input is compensated accordingly by adjusting the crop shares when necessary.

If landowners and tenants have preconceptions about which inputs should be shared, the actual amounts are then determined by the “fair” process, which simultaneously selects crop shares. On the other hand, if there are preconceptions about what crop shares should be, different items might be cost shared at different levels to make the “fair” process happen. In other words, crop share leases based on this “fair” and equitable concept can be developed based on either a predetermined share rate (e.g., 33/67, 40/60, 50/50) or a predetermined mixture of shared inputs (e.g., fertilizer and insecticide), but not on both as a general rule.

Principle #4 simply states that if a tenant pays for any long-term inputs (e.g., lime, alfalfa seed, irrigation system) he or she should be compensated for any unused portion of that investment when the lease is terminated. This would hold true whether the lease is a crop share or cash lease, and whether the input was paid entirely by the tenant or shared with the landowner.

Principle #5 says that a good lease is based on good communication between the landowner and the tenant. Whether the lease is cash rent or crop share, good communication and trust between the landowner and producer are more important than any other factor if the goal is to have a long-term arrangement that is in the best interest of both parties. It is especially important that landowners and tenants maintain good communication as production practices change so that rental arrangements can be evaluated and revised as economic conditions dictate.

**Table 5.**

Operating costs Sorghum	Landlord share	Annual charge	Landlord	Tenant
Labor (hrs.) 21.5	0%	\$23.22	\$0.00	\$23.22
Seed	0%	\$3.15	\$0.00	\$3.15
Herbicide	-33.3%	\$20.15	\$6.72	\$13.43
Insecticide	-33.3%	\$4.35	\$1.45	\$2.90
Fertilizer	-33.3%	\$23.10	\$7.70	\$15.40
Fuel and oil	0%	\$7.10	\$0.00	\$7.10
Irrigation energy	0%	\$0.00	\$0.00	\$0.00
Crop consulting	0%	\$0.00	\$0.00	\$0.00
Custom harvest and hauling	0%	\$0.00	\$0.00	\$0.00
Miscellaneous	0%	\$0.00	\$0.00	\$0.00
	0%	\$0.00	\$0.00	\$0.00
Interest on operating		\$3.65	\$0.71	\$2.93
Total operating cost/acre		\$84.72	\$16.58	\$68.13

**Table 6.**

Total costs and contributions				
Operating costs per planted acre (excluding labor)				
Crop	Acres	Total	Landlord	Tenant
Wheat	460	\$44.60	\$7.69	\$36.91
Sorghum	211	\$61.51	\$16.59	\$44.92
Soybean	141	\$61.66	\$12.72	\$48.93
Total for farm	812	\$42,190	\$8,831	\$33,359
<b>Ownership costs (including labor and mgmt.)</b>		\$87,173	\$34,307	\$52,866
Cash payments between parties (total \$)		\$0	\$0	\$0
Total costs (adjusted for cash payment)		\$129,363	\$43,138	\$86,225
Operating costs per leased acre		\$51.96	\$10.88	\$41.08
Ownership costs per leased acre		\$107.36	\$42.25	\$65.11
Total costs per leased acre		\$159.31	\$53.13	\$106.19
Percent contributed		100.0%	33.3%	66.7%

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## **References**

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