

AE-07043  
July 2007

## **Feasibility of a Shared Machinery Cooperative**

**Prepared for:**

**A Group of Oklahoma Hay Producers**

**Prepared by:**

**Phil Kenkel**

**Professor and Bill Fitzwater Cooperative Chair**

**Department of Agricultural Economics**

**Oklahoma State University**

**7-15-2007**

## **Executive Summary**

The following report is based on a feasibility study of a hay machinery cooperative requested by a group of Oklahoma hay producers. While the basic structure of the situation analyzed was retained, it was somewhat simplified for illustrative purposes.

The group of hay producers considering joint machinery ownership each had a relatively new compliment of hay equipment which had excess capacity relative to their current production situation. The feasibility of the machinery cooperative was based on the purchase of a compliment of new equipment with ample capacity to cover the producers' total acreage. The group also desired a structure in which the cooperative retained sufficient funds to replace equipment on a five year cycle with no additional equity contribution.

The results indicated that the producers' share of the equity needed for a machinery cooperative was less than their current equity investment in individual equipment. The cooperative could achieve a total cost savings of 45% relative to the cost of individual operation. A member investment of \$170/acre was required to establish the cooperative with a per acre fee of \$105 (\$95 net fee after projected cash refunds). This fee structure provided for machinery replacement and a projected increase of book value of the cooperative of almost \$100,000 by the end of the fifth year. With the exception of the single larger producer, this net fee was also lower than the current cost of operating individual equipment. It is therefore concluded that the basic concept of a hay machinery cooperative is feasible. If the group decides to pursue a machinery cooperative, the exact structure and operating procedures could be defined in more detail.

## **Project Overview**

The following study was conducted at the request of a group of four Oklahoma hay producers. All of the producers are currently managing 200-400 acres of hay acreage using individually owned equipment. Several of the producers had become intrigued with the concept of pooling their equipment in some sort of machinery sharing arrangement.

Under funding from the USDA Southern Region Risk Management Center, Oklahoma State University developed feasibility assessment software for machinery cooperatives. The software assist producers in analyzing the potential cost savings of machinery sharing and projects the equity investment, fee structure and cash flow of a machinery cooperative. The software can be obtained free of charge by contacting [phil.kenkel@okstate.edu](mailto:phil.kenkel@okstate.edu). The template was used to assess the feasibility of a machinery sharing cooperative for the four Oklahoma hay producers.

## **Advantages of Machinery Sharing**

Sharing ownership of agricultural machinery can allow participants to decrease their machinery investment and expenses while gaining access to larger scale, more efficient and technologically advanced equipment. The access to larger equipment may also increase operator labor efficiency. Machinery sharing may make it possible to economically manage a more rapid replacement cycle relative to an individual producer. More frequent replacement may reduce unanticipated repairs and equipment downtime. Some machinery sharing ventures also expand into other areas such as labor sharing, joint purchasing of inputs and pooled marketing. Some machinery sharing arrangements have evolved into a joint farming operation under which the participants collectively manage the entire crop land similar to if it was a single farming operation.

Machinery sharing can be accomplished under a variety of arrangements ranging from informal agreements, to formal contracts to the formation of a separate legal entity. The limited liability company (LLC) and the cooperative corporation are the most popular organizational forms for machinery sharing entities. Organizing a machinery venture as a separate legal entity has liability advantages and provides a better structure for asset replacement and the long-term viability of the venture. The LLC structure is a flexible legal form that can be structured for a machinery sharing venture.

The cooperative corporation is also a very logical choice for a machinery sharing venture. Most agricultural producers are familiar with the governance and equity retirement systems used by agricultural cooperatives. The basic structure of a cooperative in which investment and benefits are proportional to usage is appropriate for machinery sharing. The formal structure of a cooperative with well understood governance, dispute resolution and equity systems is also very helpful if the venture expands into additional equipment lines, or into labor sharing or joint purchase activities. In practice, many machinery sharing LLCs adopt operating structures which are similar to cooperatives. Understanding the formation process for a machinery cooperative is therefore helpful for designing any type of machinery sharing venture.

### Individual Equipment Compliments

The four producers considering a joint machinery venture had independently engaged in custom baling in previous years. They had now all four downsized their operations to encompass their owned land. Three of the four producers considering machinery sharing had approximately 100 acres of hay lands from which they harvested two cuttings of hay in a typical year. The fourth participant had roughly twice the acreage. All of the participants had a compliment of relatively new (3-5 year old) hay equipment. Because of their previous custom baling activities, all of the producers had an equipment compliment with excess capacity for their current operation. However, after operating newer equipment none of the individuals was interesting in trading down to older machines. The machinery compliments and estimated value are summarized in Table 1.

	Producer 1	Producer 2	Producer 3	Producer 4
Tractor	95 HP	85 HP	85 HP	85 HP
Mower	10' Rotary Disc	10' Rotary Disc	10' Rotary Disc	10' Rotary Disc
Rake	20' folding	20' folding	20' folding	20' folding
Baler	5' Round Baler	5' Round Baler	4' Round Baler	4' Round Baler
Current Value	\$87,000	\$82,000	\$82,000	\$82,000
Equity Investment	\$43,500	\$42,000	\$41,000	\$41,000
Equity/acre	\$435	\$205	\$410	\$410

The OSU Machinery Cooperative Feasibility Template estimates field time for both the defined set of individual equipment and the equipment compliment selected for the cooperative. The mowing operation was indicated to be the most time intensive operation. However, even the 200 acre producer could complete mowing in approximately 7 days/year (3.5 days/cutting). It was the consensus of the group that a two week time window was available for each cutting in most years.

The OSU Machinery Feasibility Template was also used to estimate the machinery related fixed and operating costs for the individual producers. For the purposes of comparison, the producer's machinery debt was not considered. Instead, the cost calculations assumed that each producer had financed 50% of their equipment value, a capital structure identical to the potential cooperative.

	Producer 1	Producer 2	Producer 3	Producer 4
Fuel and lube	\$8.30	\$7.43	\$5.48	\$7.43
Repair and Maintenance	\$1.57	\$2.78	\$1.33	\$1.54
Total Variable	\$9.87	\$10.21	\$7.82	\$8.96
Insurance and housing	\$18.20	\$8.58	\$17.16	\$17.16
Interest	\$16.77	\$7.90	\$15.95	\$16.01
Property tax	\$4.55	\$2.14	\$4.29	\$4.29
Depreciation	\$91.93	\$43.32	\$86.65	\$86.65
Total Fixed	\$131.45	\$61.95	\$124.05	\$124.10
Total Cost	\$141.32	\$72.16	\$131.87	\$133.06
Annual Cost	\$14,132	\$14,432	\$13,187	\$13,306

The fixed costs of machinery ownership were the major cost factor with the current structure of individual ownership. Not surprisingly, the producer with 200 acres had a significantly lower cost of machinery ownership and operation. Ignoring the non-cash cost of depreciation the 100 acre producers had a cost of approximately \$50/acre or around \$11/bale based on anticipated production.

### **Cooperative Structure**

The machinery sharing venture analyzed was organized as a closed cooperative. A compliment of hay equipment which was capable of completing hay operations on the total hay acreage of the members was identified. The hay equipment identified consisted of two 95HP 2WD tractors, a 14 ft. rotary mower, a 30 ft. folding side delivery rake and a 5 ft round baler. The feasibility template indicated that, not counting intra-farm transportation time, the equipment could complete the operations on the entire acreage in approximately 8 days per cutting. This was well within the 14 day window of available field time reported by the producers.

The structure of two 95 HP tractors was recommended by the producers. The two tractor compliment was anticipated to enhance labor sharing by allowing one member to manage all of the mowing operations without having to coordinate for equipment. The producers also felt the two tractor compliment would enhance their ability to expand the cooperative into other machinery functions.

The equipment had an estimated cost of \$170,000. It was assumed that the cooperative would have an initial capital structure of 50% equity and 50% debt. This implied initial equity needs of \$85,000 for the cooperative. Under a typical structure for a closed machinery cooperative the members would be expected to sign usage agreement for their projected acreage and to make an initial equity investment in proportion to their share of the cooperative's total project acreage. The initial equity investment was projected at \$170/acre or \$17,000 for the members with 100 acres and \$33,000 for the member with 200 acres.

	Member 1	Member 2	Member 3	Member 4
Projected Acreage	100	200	100	100
Initial Investment	\$17,000	\$34,000	\$17,000	\$17,000
Investment/acre	\$170	\$170	\$170	\$170

The feasibility template was used to project the income and expenses of the machinery cooperative. A trial and error process was used to determine the appropriate fee structure of \$105/acre. This provided the cooperative slightly over \$53,000 in income in the initial year. Variable expenses were \$5,511 and fixed expenses were projected to be \$23,031. This left the cooperative with a surplus of slightly over \$24,000. A structure of 20% cash patronage refund, 75% stock patronage refund and 5% unallocated reserves was applied to the surplus.

The purpose of both the stock patronage refund and the unallocated reserves was to allow the machinery cooperative build equity capital. The retained funds allow the cooperative to replace machinery without the members making additional equity investments. When a cooperative issues a stock patronage refund it retains a portion of the cash surplus and provides the producers with a similar value of additional stock. Because the retained surplus is allocated to particular members it provides a trail of ownership for the increased equity. This can be useful in determining a member's ownership if they desire to exit or tracking equity after multiple equipment replacement cycles. It should be noted that the collective value of a cooperative's stock may not match the value of its actual assets. A cooperative that allows a member to exit may offer a percentage of the accumulated stock value.

A cooperative can designate a stock patronage refund as either "qualified" or "non-qualified". A qualified refund is tax deductible for the cooperative and taxable income for the member in the year it is issued. A non-qualified refund is not deductible to the cooperative or taxable to the member until if and when it was redeemed for cash. It was assumed that the projected machinery cooperative would offer qualified stock patronage refunds. This minimized income tax at the cooperative level. Each member would have a small tax obligation for the combined amount of their cash and stock refund. This would serve as an offsetting adjustment to the tax deductible fees that they paid to the cooperative.

A cooperative can also retain funds in a general "unallocated" account. Because this system of retention is not tax deductible channeling funds to unallocated reserves creates taxable liability for the cooperative. One advantage of unallocated reserves is that they provide a cushion between the total book value of the cooperative and the total value of the member's stock. This cushion makes it more feasible to base a member's exit value to their accumulated stock value. In the case cooperative the firm was retaining approximately \$18,000/year via stock patronage refunds and around \$600/year through

unallocated reserves. This provided an accumulated cash reserve of \$77,000 at the end of year 4. It was projected that the cooperative could replace all of its equipment at a net cost, after trade in, of \$93,680 during the fifth year without additional equity from the members.

A machinery cooperative's retained equity can be held in a general fund not allocated particular members or the cooperative can issue the members additional shares of stock to reflect their claim on the retained funds. When a cooperative allocates surplus it may elect to pass the tax obligation on to the members. If the cooperative retains equity in a general unallocated fund it is taxable at the cooperative level. Issuing additional shares of stock (allocated patronage) may be helpful in the cooperative needs to value a member's equity after extended membership involving multiple equipment replacement cycles. Allocating retained patronage is also useful for cooperatives operating multiple pools of equipment since different pools of equipment may be generating different levels of surplus.

In the case of the hay equipment cooperative, the retention of funds through stock patronage and unallocated reserves increased the total book value of the cooperative from the original value of \$85,000 to \$182,830 by the end of the fifth year, and increase of \$97,830. During this same period of time the cooperative issued \$88,973 of additional stock to the four members. The remainder of the increase in book value is reflected in the cooperative's unallocated reserves (retained earnings).

### **Labor Sharing**

The concept of labor sharing including allowing individual members to specialize in the operation of the mowing and baling operations was considered a key component for the cooperative. One advantage of specialization in machinery operation is that it allows the member operating the equipment to manage the scheduling decisions.

At this exploratory stage the producers have not discussed a labor sharing arrangement. Some preliminary estimates of labor contributions, based on anticipated equipment operation, were used in the analysis. This resulted in some members providing slightly disproportionate labor. The labor under ages or surpluses was accounted for in transfer labor expenses between producers. Member labor was arbitrarily valued at \$10/hour. These calculations can be adjusted after the members define the labor sharing system.

Machinery  
Cooperative

Projected Income, Expense and Cash Flows

	Year <u>1</u> Year <u>1</u>	Year <u>2</u> Year <u>2</u>	Year <u>3</u> Year <u>3</u>	Year <u>4</u> Year <u>4</u>	Year <u>5</u> Year <u>5</u>
<b>Income from Fees</b>	<b>\$53,025</b>	<b>\$53,555</b>	<b>\$54,091</b>	<b>\$54,632</b>	<b>\$55,178</b>
<b><u>Variable Costs</u></b>					
Fuel & Lube	\$5,064	\$5,115	\$5,166	\$5,218	\$5,270
Hired Labor	\$0	\$0	\$0	\$0	\$0
Repair & Maintenance	\$443	\$1,140	\$1,764	\$2,353	\$2,921
<b>Total Variable Costs</b>	<b>\$5,507</b>	<b>\$6,255</b>	<b>\$6,930</b>	<b>\$7,571</b>	<b>\$8,191</b>
<b><u>Fixed Costs</u></b>					
Insurance & Housing	\$3,400	\$3,434	\$3,468	\$3,503	\$3,538
Interest	\$2,610	\$2,147	\$1,656	\$1,136	\$585
Property Tax	\$850	\$859	\$867	\$876	\$885
Depreciation	\$17,170	\$17,342	\$17,515	\$17,690	\$17,867
<b>Total Fixed Costs</b>	<b>\$24,030</b>	<b>\$23,781</b>	<b>\$23,507</b>	<b>\$23,205</b>	<b>\$22,874</b>
<b>Total Cost</b>	<b>\$29,537</b>	<b>\$30,036</b>	<b>\$30,436</b>	<b>\$30,776</b>	<b>\$31,065</b>
<b>Net Income before patronage</b>	<b>\$23,488</b>	<b>\$23,519</b>	<b>\$23,655</b>	<b>\$23,856</b>	<b>\$24,113</b>
<b>Cash Patronage Refund</b>	<b>\$4,698</b>	<b>\$4,704</b>	<b>\$4,731</b>	<b>\$4,771</b>	<b>\$4,823</b>
<b>Stock Patronage Refund</b>	<b>\$17,616</b>	<b>\$17,639</b>	<b>\$17,741</b>	<b>\$17,892</b>	<b>\$18,085</b>
<b>Net Income after Patronage</b>	<b>\$1,174</b>	<b>\$1,176</b>	<b>\$1,183</b>	<b>\$1,193</b>	<b>\$1,206</b>
<b>Tax</b>	<b>\$587</b>	<b>\$588</b>	<b>\$591</b>	<b>\$596</b>	<b>\$603</b>
<b>Net Income after Taxes</b>	<b>\$587</b>	<b>\$588</b>	<b>\$591</b>	<b>\$596</b>	<b>\$603</b>
<b>Retained Earnings</b>	<b>\$587</b>	<b>\$1,175</b>	<b>\$1,767</b>	<b>\$2,363</b>	<b>\$2,966</b>
<b>Approximate Cash Flow</b>					
<b>Retained Earnings</b>	<b>\$587</b>	<b>\$1,175</b>	<b>\$1,767</b>	<b>\$2,363</b>	<b>\$2,966</b>
<b>Stock Patronage Refund</b>	<b>\$17,616</b>	<b>\$17,639</b>	<b>\$17,741</b>	<b>\$17,892</b>	<b>\$18,085</b>
<b>Depreciation</b>	<b>\$17,170</b>	<b>\$17,342</b>	<b>\$17,515</b>	<b>\$17,690</b>	<b>\$17,867</b>
<b>Principle Payment</b>	<b>\$15,079</b>	<b>\$15,983</b>	<b>\$16,942</b>	<b>\$17,959</b>	<b>\$19,037</b>
<b>Asset Purchase</b>					<b>\$93,680</b>
<b>Cash Flow</b>	<b>\$20,295</b>	<b>\$19,585</b>	<b>\$18,905</b>	<b>\$18,220</b>	<b>-\$76,162</b>
<b>Cumulative Cash Flow</b>	<b>\$20,295</b>	<b>\$39,880</b>	<b>\$58,785</b>	<b>\$77,005</b>	<b>\$842</b>
<b>Increase in Book Value</b>	<b>\$18,203</b>	<b>\$18,814</b>	<b>\$19,507</b>	<b>\$20,255</b>	<b>\$21,050</b>
<b>Accumulated Book Value</b>	<b>\$103,203</b>	<b>\$122,018</b>	<b>\$141,525</b>	<b>\$161,780</b>	<b>\$182,830</b>



### Projected Cost Savings

The OSU Machinery Cooperative Feasibility Template also provides cost comparison for the specified individual machinery compliment and the cooperative structure. The projections indicated a 45% total cost savings from cooperative ownership. Not surprisingly, the 100 acre producers received the majority of the benefit with their savings ranging from 50-55% of current costs. The 200 acre producer had a projected cost savings or around 9%. The cooperative's total cost/acre was projected at \$65. This was \$7/acre below the cost of the large producer and \$65-\$70/acre below the current cost of the 100 acre members. The cooperative net per acre fee (after cash refund) was estimated at slightly over \$95/acre. This implies that the 100 acre members could pay a fee lower than their current per/acre machinery costs and still be providing reserve funds to allow the cooperative to maintain a 5 year replacement cycle.

#### Per Acre Cost of Cooperative versus Individual Ownership

	Machinery				
	<u>Cooperative</u>	<u>Producer 1</u>	<u>Producer 2</u>	<u>Producer 3</u>	<u>Producer 4</u>
<b>Fuel &amp; Lube</b>	\$ 10.60	\$ 8.30	\$ 7.43	\$ 6.48	\$ 7.43
<b>Hired Labor</b>	\$ -		\$ 0.46		\$ (0.94)
<b>Transfer Labor</b>		\$ 0.01		\$ 0.01	
<b>Repair &amp; Maintenance</b>	\$ 3.45	\$ 1.57	\$ 2.78	\$ 1.33	\$ 1.54
<b>Total Variable Costs</b>	\$ 14.04	\$ 9.87	\$ 10.21	\$ 7.82	\$ 8.96
<b>Insurance &amp; Housing</b>	\$ 7.11	\$ 18.20	\$ 8.58	\$ 17.16	\$ 17.16
<b>Interest</b>	\$ 6.68	\$ 16.77	\$ 7.90	\$ 15.95	\$ 16.01
<b>Property Tax</b>	\$ 1.78	\$ 4.55	\$ 2.14	\$ 4.29	\$ 4.29
<b>Depreciation</b>	\$ 35.93	\$ 91.93	\$ 43.32	\$ 86.65	\$ 86.65
<b>Total Fixed Costs</b>	\$ 51.50	\$ 131.45	\$ 61.95	\$ 124.05	\$ 124.10
<b>Total Cost</b>	\$ 65.55	\$ 141.32	\$ 72.16	\$ 131.87	\$ 133.06
<b>Cooperative Fee</b>	\$ 105.00				
<b>Net Fee After Cash Refund</b>	\$ 95.25				

A summary of the investment and cost savings from the potential machinery cooperative are provided below. Assuming 50% debt financing, the producers currently have \$41,000 to \$43,000 of equity in their equipment compliments. This represents approximately \$400/acre for the 100 acre producers and \$200/acre for the larger producer. The projected investment in the cooperative was \$170/acre or \$17,000 and \$34,000 for the 100 and 200 producers respectively. The producers are currently all experiencing annual machinery costs (including depreciation) of around \$14,000. The projected structure would be quite attractive to the 100 acre members since their annual fee (part of which is used to build reserve funds) would be \$9,525. The 200 acre member would pay an annual fee that is \$5,500 higher than his current annual machinery cost.

**COMPARISON OF MACHINERY COOPERATIVE AND CURRENT INDIVIDUAL OWNERSHIP**

	<u>Producer 1</u>	<u>Producer 2</u>	<u>Producer 3</u>	<u>Producer 4</u>
<b>Current Equity Investment Individually</b>	\$43,500	\$41,000	\$41,000	\$41,000
<b>Current Equity Investment/acre</b>	\$435	\$205	\$410	\$410
<b>Current Annual Machinery Cost</b>	\$14,132	\$14,432	\$13,187	\$13,306
<b>Required Investment in Cooperative</b>	\$17,000	\$34,000	\$17,000	\$17,000
<b>Required Coop Investment/acre</b>	\$170	\$170	\$170	\$170
<b>Net Annual Fee in Cooperative</b>	\$9,525	\$19,051	\$9,525	\$9,525

**Summary of Cost Analysis**

The analysis of the proposed hay machinery cooperative shows substantial economic benefits from the cooperative venture. In total, the cooperative structure provides a 45% cost savings relative to the total cost of continued individual ownership and operation. If the estimated values of the currently owned machinery are accurate, all of the producers could liquidate their current equipment and invest in the cooperative while generating surplus funds. It appears that a fee structure of \$105/acre (\$95/acre after cash refund) would allow the cooperative to cover all costs while building reserve funds to replace equipment every 5 years. This would be attractive to the 100 acre members since it is lower than their projected costs from current structure.

The differential impact on the 200 acre member relative to the remaining participants is one of the challenges with the current cooperative structure. The 200 acre producer is currently experiencing significantly lower cost relative to the other producers. While the cooperative is projected to achieve an even lower per acre cost, the addition of a structure to build reserves for a 5 year replacement cycle indicates that the 200 acre producer's annual out-of-pocket outflow would increase. If the benefits of the cooperative in terms of labor sharing and/or access to newer equipment are not sufficient to interest the larger producer, the group may wish to address structural changes in the investment or cost allocation formulas.

## **Keys to Success**

The keys to a successful machinery cooperative are clearly to identify the economic benefits and to design a structure which can achieve those savings while meeting the participants' needs. As in any collective venture, the compatibility of the participants is the most essential ingredient for success. Careful and open discussion of all of the operating issues is also essential. This should be followed by the development of written agreements and policies.

Among the important issues that should be discussed during the planning stage are scheduling of operations, repairs and maintenance, policies on breakdowns resulting from careless operation, labor sharing arrangements, provision for exit and entry into the cooperative and procedures for dissolution. These and other issues are discussed in the OSU publication "Organizing a Machinery Cooperative".

*Support for this project was provided by the Southern Risk Management Education Center*

