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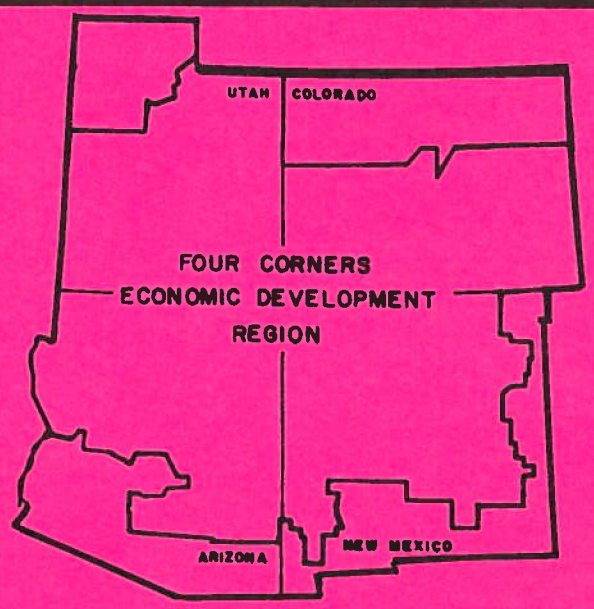
• Four Corners Agriculture and Forestry Development Study

FEASIBILITY OF

BALING WOOD SHAVINGS AND SACKING SAWDUST

IN THE FOUR CORNERS ECONOMIC DEVELOPMENT REGION



Report to
Four Corners Regional Commission

NEW MEXICO STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
In Cooperation
Stations of the University of Arizona
Colorado State University
and Utah State University

FOREWORD

Information reported in this publication was developed under Technical Assistance Contract - F.C.R.C. No. 601-366-051 Four Corners Regional Commission, "Development Opportunities for Agriculture and Forestry Resources in the Four Corners Region." The research was jointly financed by the Four Corners Regional Commission and the Agricultural Experiment Stations of New Mexico, Arizona, Colorado, and Utah. The Agricultural Experiment Station at New Mexico State University coordinated the study and served as prime contractor with the Four Corners Regional Commission. The other experiment stations served as subcontractors to New Mexico State University.

This report is one of several special reports on development possibilities for the agricultural and forestry sector of the Four Corners Economic Development Region. In addition to the special reports on resource inventories and development possibilities, there will be a final report.

The four-state study team consists of the following individuals:

W. P. Stephens
Project Administrative Adviser
Agricultural Experiment Station
New Mexico State University

William N. Capener,
Project Leader
New Mexico State University

University of Arizona
Thomas M. Stubblefield,
State Project Leader
John L. Fischer
William P. Gotsch

New Mexico State University
Thomas S. Clevenger,
State Project Leader
John D. Canady
Garrey E. Carruthers
Stephen W. Fuller
William D. Gorman
James R. Gray
Marlin L. Hanson
Robert R. Lansford
Alan J. Randall

Colorado State University
James A. Lewis,
Co-State Project Leader
Albert G. Madsen,
Co-State Project Leader
Donald Sorenson
Wilson Leeper
William M. Waneka

Utah State University
Jay C. Andersen,
State Project Leader
Lynn H. Davis
Herbert Fullerton
J'Wayne McArthur

The four-man team dealing with forestry opportunities consists of:

Thomas M. Stubblefield, University of Arizona
Albert G. Madsen, Colorado State University
J'Wayne McArthur, Utah State University
James R. Gray (Chairman), New Mexico State University

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FEASIBILITY OF

BALING WOOD SHAVINGS AND SACKING SAWDUST

IN THE FOUR CORNERS ECONOMIC DEVELOPMENT REGION

James R. Gray and John D. Canady
New Mexico State University

The forest products industry of the Four Corners Economic Development Region is experiencing difficulty in disposing of wood residues. Several kinds of residues are produced: edgings, board-end trim, slabs, shavings, sawdust, and bark. Recently, a pulp mill and two particleboard plants have been established in the southern half of the region and offer a ready market for slabs and shavings, provided sawmills and planing mills are within 100 to 150 miles. As large quantities of the two residues are required, more isolated sawmills and planing mills cannot dispose of their slabs and shavings at these pulp mills and particleboard plants because of high transportation costs. The remainder of the residues, sawdust and bark, cannot be utilized except in small quantities by sawdust-sacking plants and by nurseries selling bark as decorative work and other special uses. Previously, this material was burned in wigwam burners. Air pollution control regulations have forced some sawmill and planer operators of the larger mills to invest in costly high-temperature burners. Others are disposing of residues in landfills. Some mills have suspended operations pending a solution to the residue problem.

Two enterprises--baling of shavings and sawdust-sacking--require relatively low levels of investment and would permit disposal of a large share of these residues. The raw material requirements for these two enterprises, singly or combined, are relatively modest compared to particleboard plants or pulp mills. This report attempts to determine the feasibility of establishing additional baling and sacking enterprises in addition to those presently concentrated in the Utah portion of the region.

POTENTIAL USES OF SHAVINGS AND SAWDUST

Perhaps the major problem to be solved by baling and sacking operators is to locate a market for these products. Both materials have such a low price per unit of bulk that the geographical market for these products is limited by transportation costs. The present and potential uses of these products will be explored here.

Shavings

Providing suitable bedding or litter for livestock and poultry is often a difficult problem for producers. Combinations of sand and straw have been a major bedding in the southern portion of the region, and straw, either alone or in combination with corn cobs, has been used in the northern and eastern portions. Consumer acceptance of shavings has been good, although supplies have been local and erratic. Recently, prices of straw at $22 to $33 per ton approached alfalfa hay prices in some areas of the region.

The advantages of wood shavings over straw have been pointed out by Monahan (8) and Sowles:[1]

Straw is in short supply, while shavings are often a liability at many mills.

Straw is not a good moisture absorbent and requires frequent replacement, while shavings absorb moisture readily and dry rapidly.

Dust and offensive odors commonly occur when straw and cobs are used, while shavings are odorless.

Straw is difficult to clean out of pens because it tends to mat.

Shavings are cleaner than straw with less dust and soil and do not heat or mold when wet.

Only half the volume of shavings, compared to straw, is needed for bedding.

Shavings last two to three times longer and are cheaper to use than straw.

After serving as bedding or litter, shavings can be used as a soil mulch and decay more rapidly in the soil than straw.

Weed seed problems do not exist in shavings when used as a mulch.

Animals show no discomfort and find soft, sure footing when bedded on shavings, whereas straw becomes slippery when wet.

Animals prefer shavings to straw for bedding.

Monahan (8) listed 14 potential uses of shavings: sale barns, state and county fairgrounds, poultry litter, floor covering for trucks hauling livestock, pet bedding, packing material, insulation, barbecue combustibles, pavement for nature trails, mulches for garden, cover for weed suppressant, composition board, machinery displays, fertilizer (soiled shavings), and hatcheries.

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[1]Sowles, Kenneth M. and T. J. Loring, "The Potential Market for Wood Shavings and Sawdust in New Mexico", New Mexico Department of State Forestry manuscript, 1968, 16 pp.

Sawdust

Sawdust is a product that has many uses. The major ones are as a soil conditioner or mulch, floor sweeping compound, bedding, packing, and soil cover. Straw and corn cobs compete with sawdust in some of these uses, while various plant residues, manufactured paper packing materials, and various kinds of materials for decorative cover compete in other uses. But, in general, sawdust is the cheapest.

Sawdust competes with straw as bedding. While sawdust is cheaper than straw and superior to it in the same ways as shavings, shavings are superior to sawdust as bedding mainly because of the caking tendencies of sawdust when it is saturated with moisture and manure. However, sawdust is more readily available than shavings in most areas. (Sawdust is a primary residue of sawmills, while shavings are the primary residue of planing mills, and sawmills are more numerous and more dispersed than planing mills.)

Sawdust also has several disadvantages as a mulch or soil conditioner. When fresh sawdust is used for this purpose, it competes with growing plants for available nitrogen; in large concentrations, sawdust may contain some materials toxic to plants; and soil temperature increases are also slower following cold periods (2). Many of these disadvantages are avoided if the sawdust is at least three years old. Baxter, who compiled crop responses when sawdust was used as a mulch, concluded that when nitrogen is added at the rate of two to two and a half percent for decomposition of the wood material, crop responses were favorable (1).

The functions of sawdust as a mulch and soil conditioner were also tested by Bollen and Glennie (2). Unfavorable results of the tests were a decrease in pH if the material was strongly fermented and a packing of fine materials. Results favoring sawdust over straw or leaves were that sawdust was longer lasting, less susceptible to blowing and fire, and more pleasing in appearance (6). They concluded that the use of wood wastes, including sawdust and bark, is gaining wider acceptance.

Sawdust as a major component of floor-sweeping compounds is produced in considerable volume by manufacturers, chiefly in small plants, throughout the U.S. (3). Little equipment is needed other than a revolving tank similar to a concrete mixer. A tank for heating the oil mixture and screens for screening the sawdust also are required. The usual ingredients are paraffin oil, wax, salt, and mirbane oil or oil of sassafras.

A unique experiment was conducted in South Dakota to determine dairy calf preferences for bedding (14). The calves had free choice of solid floor stalls with sawdust or straw, slotted wood floors, and steel screened floors. The calves spent 34 percent of their time in the stall with sawdust, 19 percent in the straw-bedded stall, 18 percent in the slotted floor, and 16 percent in the steel screen stall.

One special use that might be made of sawdust in the Four Corners Economic Development Region is for a partial or complete cover of highway right-of-ways. Presently, straw or grass hay is used for this purpose. The advantages of using sawdust rather than straw or hay are:

1. Sawdust is cheaper when purchased in bulk and is no more expensive than straw or hay when purchased in sacks.

2. Sawdust is easier and cheaper to handle than straw and hay, both in transporting the material and spreading it.

3. The nitrogen absorption of sawdust tends to reduce growth of unwanted weeds, thus lowering the cost of weed control on highway right-of-ways. If grass is needed as a cover, the nitrogen additive of aged sawdust will enhance grass growth.

4. Sawdust has a more pleasing appearance than straw or hay and, to most people, has a more pleasant odor.

5. Fire danger is less for fresh sawdust than straw or hay and is no more of a hazard when dry.

6. Highway commissions, by using sawdust rather than straw or hay, will be enhancing the environment because they will be disposing of a potential air pollutant.

7. Use of hay for highway construction further increases hay prices during drought periods. During these stress periods, highway commissions are placed in a competitive position with livestock producers.

8. The use of sawdust would lessen the possibility of wild animals eating hay or straw on highway right-of-ways.

Another special use of sawdust in the Four Corners Economic Development Region possibly includes environmental enhancement. Where facilities and resources are not available to establish, promote, and control growth of natural plants, a layer of sawdust will suppress unsightly growth. Areas that would benefit in appearance from a sawdust blanket are rural cemeteries, seldom-traveled rural roads and lanes, back lots in rural and urban areas, rural parks and recreation areas, and chemical spills.

Many unimproved roads and trails are badly eroded in the region. Some forest trails in mountainous areas have become so badly eroded that in places the trails are nothing more than bare rock and stones. A layer of sawdust would permit some recovery in these areas by limiting soil movement. Also, the use of sawdust would provide better trails for bike and horseback riders.

Several additional uses of sawdust include its role as the major component of pressed logs for fireplaces, as molded plugs for paper rolls, as a blanket in road building, a component in a cement mixture, a playground cover, table tops, counters, wall panels, tiles, insulation, charcoal briquets, and a carrier for growing promising beneficial bacteria (7).

RAW MATERIAL SUPPLIES AND PLANT LOCATIONS

Raw material supplies of shavings are largest in the Arizona and New Mexico portions of the region (9), (10), (11), (12), (table 1). However, the concentration of pulp mills and a particleboard plant in Arizona has substantially reduced unused supplies of shavings.

Table 1. Estimated annual production of shavings and sawdust by state in Four Corners Economic Development Region, 1969

State Area	Annual Production		
	Shavings[1]		Sawdust
	Total	Unused	Total
	1,000 tons		
Arizona	39	23	205
Colorado[2]	12	9	63
New Mexico	23	23	121
Utah[3]	6	4	32
Four Corners total	80	59	421

[1]Based on production of sawdust and shavings in New Mexico and southern Colorado, 16 percent of the total production of shavings and sawdust was assumed to be shavings, and 84 percent sawdust.

[2]Sixty percent of Colorado's total production was included in the Four Corners Economic Development Region.

[3]Ninety-four percent of Utah's total production was included in the Four Corners Economic Development Region.

Major Sources: Setzer, Theodore S., "Estimates of Timber Output and Plant Residues, Arizona, 1969," USDA Forest Service Research Note INT-130, March 1971, 4 pp. "Estimates of Timber Output and Plant Residues, Colorado, 1969," USDA Forest Service Research Note INT-131, March 1971, 4 pp. "Estimates of Timber Output and Plant Residues, New Mexico, 1969," USDA Forest Service Research Note INT-134, March 1971, 4 pp. "Estimates of Timber Output and Plant Residues, Utah, 1969," USDA Forest Service Research Note INT-135, March, 1971, 4 pp.

The raw material requirements for baled shavings and sawdust sacking plants are modest when compared to pulp mills and particleboard plants. McArthur and Warnick indicated that these plants would require the following annual totals (6):

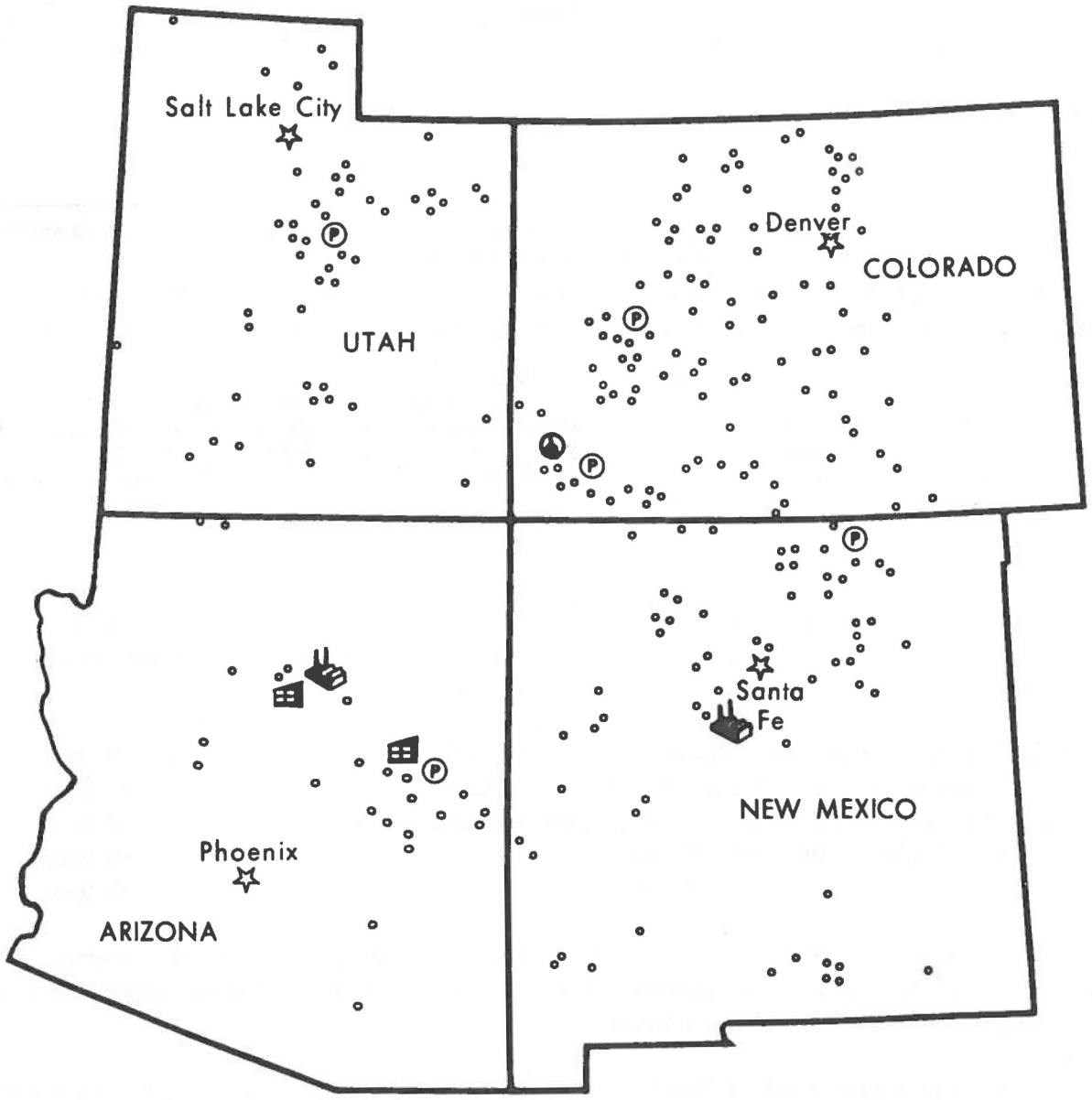
Baled shaving plant, full capacity, converted hay baler	1,536 tons
Baled shaving plant, full capacity, manufactured baler	2,688 tons
Baled shaving plant, part capacity, manufactured baler	800 tons
Sawdust sacking plant, full capacity	2,880 tons
Sawdust sacking plant, part capacity	1,008 tons

The part capacity estimates of McArthur and Warnick approximate the average output of the plants they studied. Part capacity is equal to 1,000 hours of annual usage, whereas full capacity is 1920 hours of annual wage.

If all shavings and sawdust residues were used, from 28 to 98 shavings plants and 145 to 417 sawdust plants could be established in the region, the number depending upon whether plants are full or part capacity (table 2). Because of the large number of both kinds of plants that could be established according to raw material supplies, no attempts were made to indicate locations except in a general way. A map showing locations of sawmill, pulpmill, and particleboard plants provides a key to shavings and sawdust plant locations (figure 1) (5).

In general, shavings plants will compete with pulpmill and particleboard plants. Therefore, they should be as far removed as possible from these plants. Shavings plants are feasible or already in operation in central Utah, south-central Arizona, northeastern New Mexico, southeastern New Mexico, northwestern New Mexico, and generally throughout the western two-thirds of Colorado.

Fig. 1. Mill and plant locations*



- Sawmill (as of 1966)
- Pulpmill (as of 1968)
- Plywood or veneer plant (as of 1968)
- Particleboard plant (as of 1971)
- Ⓟ Potential 100-ton particleboard plants

*In addition to the plotted sawmills, there were active sawmills that either did not furnish a report in the 1966 timber products survey, or whose report did not contain adequate information for locating on the map.

Major source: Theodore S. Setzer and Alvin K. Wilson, "Timber Products in the Rocky Mountain States, 1966," U. S. Department of Agriculture, U. S. Forest Service, Intermountain Forest and Range Experiment Station Resource Bulletin INT-9, 1970.

Table 2. Estimated numbers of shaving and sawdust plants that could be established based on raw material supplies, by state, Four Corners Economic Development Region, 1969

State	Shaving Plants						Sawdust Plants	
	Total Residues			Unused residues				
		Commercial baler			Commercial baler			
	Hay baler	Full capacity	Part capacity	Hay baler	Full capacity	Part capacity	Full capacity	Part capacity
	number			number			number	
Arizona	26	14	48	15	8	28	70	203
Colorado	8	4	15	6	3	11	22	62
New Mexico	15	8	28	15	8	28	42	120
Utah	4	2	7	2	1	5	11	32
Four Corners total	53	28	98	38	20	72	145	417

POTENTIAL MARKETS AND PRICES

Potential Markets

The potential markets for shavings and sawdust are based on studies or reports made by McArthur and Warnick (6), Monahan (8), Edmond,[2] Sowles,[1] and Loring.[3] Basically, the study by McArthur and Warnick was modified by the other authors to fit Utah conditions to local situations in Nebraska, Arizona, and New Mexico. The Nebraska study differs in that small diameter timber was used rather than shavings and sawdust.

McArthur and Warnick reported:

"Many homeowners are using wood residue in home beautification projects. This material can be used for mulches around flowers, or it may be added to the soil to increase humus. Wood residue can be distributed through lumber yards or shipping centers. One firm, for example, satisfied this demand by providing a self-service stand where customers can load their own sawdust, shavings, or other material of their choice from piles of loose material. Sacks are available if the buyer has no container.

Research indicates that potential sales volume and value would increase if additional outlets were developed outside the project area. Utah firms have shipped baled shavings up to 200 miles by truck. A large Ogden stockyard obtained part of its supply of shavings from California at $1.15 per bale. A cattle trucker hauled these baled shavings after delivering a load of cattle, using part

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[2]Edmond, Clarence D., "Economic Potentials for Commercial Use of Wood Shavings and Sawdust in Arizona", University of Arizona manuscript, June 1967, 8 pp.

[3]Sowles, Kenneth M. and T. J. Loring, "The Potential Market for Wood Shavings and Sawdust in New Mexico", New Mexico Department of State Forestry manuscript, 1968, 16 pp.

[4]Loring, T. J., "A Study Relating to the Baling of Sawmill and Planer Residue", Forest Service, U. S. Department of Agriculture manuscript, February 1967, 6 pp.

of each load for bedding on the return trip to California. A meatpacker at Ogden purchased hardwood sawdust transported loose in boxcars from the Northwest."

Monahan estimated the potential market demand for shavings for sows' bedding at 3,233,332 bales (97,000 tons) per year in Nebraska (table 3). The potential shavings market for chicken litter was 887,332 bales (26,000 tons) per year (table 4).

Using Sowles' and Loring's usage factors, the maximum potential for shavings and sawdust in the Four Corners states is estimated to be 915,480 tons of mulch for orchards (table 5),

Table 3. Potential market for wood shavings as bedding in hog production in Nebraska, 1966

Nebraska Region	Sows Farrowed in 1965	Amount of Bedding[1]	60-Pound Bales per Year
	number	tons	number
Central	62,000	12,400	413,333
Northeast	215,000	43,000	1,433,333
East	126,000	25,200	840,000
Southeast	82,000	16,400	546,666
Total	485,000	97,000	3,233,332

[1] 400 pounds per sow per year

Table 4. Potential market for wood shavings as litter in egg production in Nebraska, 1966

Nebraska Region	Layers in 1965	Amount of Litter[1]	60-Pound Bales per Year
	number	tons	number
Central	513,000	2,565	85,500
Northeast	1,809,000	9,450	315,000
East	1,762,000	8,810	293,666
Southeast	1,159,000	5,795	193,166
Total	5,253,000	26,620	887,332

[1] 10 pounds per hen per year

Source: Ralph T. Monahan, January 1967, "The Potential in Manufacturing and Marketing Wood Shavings in Nebraska," College of Agriculture mimeograph, University of Nebraska.

Table 5. Potential market for wood shavings and sawdust as mulch in orchards in the Four Corners states, 1964

State	Area in Orchards in 1964	Mulch[1]	60-Pound Bales
	acres	tons	number
Arizona	48,107	481,070	16,035,667
Colorado	16,927	169,270	5,642,333
New Mexico	13,984	139,840	4,661,333
Utah	12,530	125,300	4,176,667
Total	91,548	915,480	30,516,000

[1] 10 tons per acre per year

Source: U. S. Department of Agriculture. Agricultural census data on computer tapes for 1964, obtained from the Economic Research Service.

157,100 tons of litter for cattle feeding operations (table 6), 43,050 tons of litter for milk cows (table 7), 16,400 tons of litter for hogs (table 8), and 10,245 tons of litter for laying chickens (table 9). This would be a potential maximum demand of 1,142,275 tons of wood shavings and sawdust for these five uses. According to these estimates, usage could readily absorb available residues if these potential markets could be tapped.

Table 6. Potential market for using wood shavings and sawdust as litter in cattle feeding operations in the Four Corners states, 1970

State	Cattle on Feed January 1, 1970	Litter[1]	60-Pound Bales
	number	tons	number
Arizona	510,000	51,000	1,700,000
Colorado	795,000	79,500	2,650,000
New Mexico	209,000	20,900	696,667
Utah	57,000	5,700	190,000
Total	1,571,000	157,100	5,236,667

[1] 200 pounds per head per year

Source: U.S. Department of Agriculture, Washington, D.C., "Livestock and Meat Statistics," Economic Research Service, Supplement for 1970 to Statistical Bulletin No. 333, 1971.

Table 7. Potential market for wood shavings and sawdust as litter in dairying in the Four Corners states, 1970

State	Milk Cows 1970	Litter[1]	60-Pound Bales
	number	tons	number
Arizona	54,000	8,100	270,000
Colorado	112,000	16,800	560,000
New Mexico	39,000	5,850	195,000
Utah	82,000	12,300	410,000
Total	287,000	43,050	1,435,000

[1] 300 pounds per cow per year

Source: U.S. Department of Agriculture, Washington, D.C., "Livestock and Meat Statistics," Economic Research Service, Supplement for 1970 to Statistical Bulletin No. 333, 1971.

Table 8. Potential market for wood shavings as bedding in hog production in the Four Corners states, 1970

State	Breeding Hogs December 1, 1970	Bedding[1]	60-Pound Bales
	number	tons	number
Arizona	12,000	2,400	80,000
Colorado	51,000	10,200	340,000
New Mexico	10,000	2,000	66,667
Utah	9,000	1,800	60,000
Total	82,000	16,400	546,667

[1] 400 pounds per sow per year

Source: U.S. Department of Agriculture, Washington, D.C., "Livestock and Meat Statistics," Economic Research Service, Supplement for 1970 to Statistical Bulletin No. 333, 1971.

Table 9. Potential market for wood shavings as litter in egg production in the Four Corners states, 1970

State	Layers 1970	Litter[1]	60-Pound Bales
	number	tons	number
Arizona	529,000	2,645	88,167
Colorado	430,000	2,150	71,667
New Mexico	356,000	1,780	59,333
Utah	734,000	3,670	122,333
Total	2,049,000	10,245	341,500

[1] 10 pounds per hen per year

Source: U.S. Department of Agriculture, Washington, D.C., 1970 Livestock and Poultry Inventory, Statistical Reporting Service, February 1970.

Table 10. Prices for varied types of sawdust and shavings charged by one Utah firm, April 1, 1965

Bedding sawdust, in bulk:

Picked up minimum 100 to 299 cubic feet	$0.05 per cubic foot
300 or over	.04
Delivered minimum 480 cubic feet	.05

Butcher sawdust, packed in paper bags 28 - 30 lbs. each and garage sawdust, packed in paper bags 32 - 35 lbs. each:

1 to 4 bags	$0.95 per bag	20 to 124 bags	$0.75 per bag
5 to 9	.85	125 to 329	.65
10 to 19	.80	330 or more	.60

Colored green or red sawdust, packed in paper bags, weight not available:

1 to 4 bags	$1.45 per bag	10 to 19 bags	$1.20 per bag
5 to 9	1.30	20 or over	1.10

Flour sawdust, packed in paper bags 35 - 40 lbs. each:

1 to 4 bags	$1.10 per bag	20 to 119 bags	$0.90 per bag
5 to 9	1.00	120 to 259	.80
10 to 19	0.95	260 or over	.75

Hardwood unscreened sawdust, packed in paper bags, weight not available:

1 to 4 bags	$2.10 per bag	10 to 19 bags	$1.85 per bag
5 to 9	1.95	20 or over	1.75

Fluff shavings, packed in paper bags 30 - 35 lbs. each:

1 to 4 bags	$0.85 per bag	20 to 89 bags	$0.70 per bag
5 to 9	.80	90 to 199	.65
10 to 19	.75	200 or over	.60

Screened shavings, packed in 32-inch bales 60 - 65 lbs. each:

	Wrapped	Unwrapped		Wrapped	Unwrapped
1 to 4 bales	$1.50	$1.35 per bale	20 to 44 bales	$1.30	$1.15 per bale
5 to 9	1.40	1.25	45 to 99	1.20	1.05
10 to 19	1.35	1.20	100 or over	1.15	1.00

All prices f.o.b. Salt Lake City. Minimum delivery five bags or bales. Minimum pickup 100 cubic feet. Add 10 cents per bag or bale and one cent per cubic foot for deliveries to points in Davis, Salt Lake, Tooele, Utah, and Weber counties.

Prices

Prices were reported in detail by McArthur and Warnick for a sawdust and shavings plant in Utah (6). Their prices, reproduced in table 10, were those charged in 1965. Bulk prices were 60 cents per 28-35 pound bag of sawdust, and one dollar per 60-65 pound unwrapped bale of shavings. In the budgets that followed, McArthur and Warnick used 30 cents for a 36-pound sack of sawdust, and 60 cents per 80-pound bale of shavings.

In Nebraska, prior to establishment of plants in that state, all shavings were shipped in from Missouri, Wisconsin, Colorado, Minnesota, Illinois, Utah, and Maryland (8). Retail prices ranged from $1.75 to $2.75 per 60-pound bale at local distributors, including lumber yards, feedlots, and hatcheries. Nebraska retailers purchased baled shavings in carload lots from other states from $1.10 to $1.25 per bale.

In Arizona, Edmond estimated the 1965 price in the Phoenix area at 60-75 cents per bale.[5] Near Salt Lake City, Utah baled shavings were selling for around 80 cents per bale, or $20 per ton. Assuming the $15 per ton price for Arizona shavings resulted in the 60-75 cents per bale estimate.

In New Mexico and Colorado, prices quoted in 1968 were 75 cents to $1.30 per bale for shavings and 35 cents per sack for sawdust.[6] Sowles concluded that prices of $1.10 - $1.25 per bale of shavings were not uncommon in the central Rockies.

Prices used in this report were 80 cents per 80-pound bale for shavings and 40 cents per 30-pound sack of sawdust. This represented an average 6.7 percent increase in prices per year from 1965 to 1970.

ENTERPRISE BUDGETS

The enterprise budgets are based almost entirely on results of the study by McArthur and Warnick (6). The 1970 costs and returns were based on indexes of changes in costs of various items used in the budgets. The investments were also adjusted to changes in machinery and building prices. Although it was assumed that the raw materials used were sawmill and planer mill residues, one section was included that represents the 1966 investment necessary for a shavings plant using cordwood (small diameter timber).

Budgets are presented for a shavings plant using a converted hay baler, a plant using a manufactured shavings baler at full capacity and average output (in Utah), a sawdust sacking plant at full capacity and average output, and a combination shavings and sawdust plant at full capacity and average capacity.

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[5]Edmond, Clarence D., "Economic Potentials for Commercial Use of Wood Shavings and Sawdust in Arizona", University of Arizona manuscript, June 1967, 8 pp.

[6]Sowles, Kenneth M. and T. J. Loring, "The Potential Market for Wood Shavings and Sawdust in New Mexico", New Mexico Department of State Forestry manuscript, 1968, 16 pp.

Investments

The maximum investment in a building and equipment for a combination shavings and sawdust plant is estimated to be $22,560 (table 11), provided the owner-operator has suitable land. A shavings plant investment would be from $15,500 to $16,200, depending on whether a converted or specialized shavings baler is included. A sawdust sacking enterprise investment would be $12,360. The building investment includes the bin, hopper, and a storage area. A more complete listing of investments indicated that the major machinery for a shavings mill using cottonwood cordwood were a fork lift, a dryer-driven dehydrator, and the baler (8) (table 12). Operating investment needed for a month's "start-up" time would be $3,264 for a wood inventory, utilities, and wages. A comparable plant in the Four Corners Economic Development Region would substitute aspen for cottonwood.

Table 11. Estimated investments in equipment and buildings of shavings and sawdust plants in the Four Corners Economic Development Region, 1970

Type of Plant	Item	Investment	Life	Annual Production
		dollars	years	
Shaving plant	Converted hay baler	3,500	10	38,400 bales
	Building	12,000	25	
Shaving plant	Specialized shavings baler	4,200	25	67,200 bales
	Building	12,000	25	
Sawdust plant	Sewing machine	360	10	192,000 sacks
	Building	12,000	25	
Combination plant	Specialized shavings baler	4,200	25	
	Sewing machine	360	10	
	Building	18,000	25	

Table 12. Estimated fixed and operating investment in wood shaving plant using small diameter timber, Four Corners Economic Development Region, 1970

Item	Units	Useful Life	Installed Value
	number	years	dollars
Fixed Investment			
Building	1	10	6,000
Shavings mill (Jackson)	1	5	8,400
Motor for shaver (50 hp)	1	5	1,500
Knife sharpener	1	5	720
Blower and tubing	2	5	540
Motor for blowers (25 hp)	2	5	1,500
Forklift	1	5	6,000
Dryer-drum dehydrator	1	5	6,000
Baler	1	5	6,600
Land (3 acres)	-	--	2,160
Electric services and miscellaneous	-	--	3,000
Total			42,420
Operating Investment (one month)			
Wood inventory (196 cords @ $9.00)			1,764
Utilities			600
Wages (3 men @ $1.80 per hour)			900
Total			3,264
Total Capital			45,684

Major Source: Ralph T. Monahan, "The Potential in Manufacturing and Marketing Wood Shavings in Nebraska," College of Agriculture mimeograph, University of Nebraska, January 1967.

Costs and Returns

Hay Baler Shavings Plant. Costs were divided into fixed and variable. Fixed costs are those that occur whether or not anything is produced and do not depend on the quantities produced. Variable costs are those which vary directly with the amounts produced.

Fixed costs for a shavings plant using a converted hay baler were 7.1 cents per bale. The three larger fixed costs were interest on investment, administration and overhead, and building depreciation (table 13). Among the variable costs, the largest was raw material at 32 cents per bale. The $8 per ton cost was based on a 50-mile haul by trucks other than common carrier and a price of $1.60 per ton to be paid to the sawmill or planing mill.

Comparative costs of transporting the raw materials 50 miles by the three major transportation facilities are (4):

Rail	$3.75 per ton
Truck	$6.40 per ton
Truck, common carrier	$8.00 per ton

Definite advantages exist if the shavings plant has access to the raw material supply by rail. However, most sawmills are located near forest areas, and only a few are near rail facilities.

Labor costs of 18 cents per bale is the next largest variable cost, followed by other materials at 12 cents per bale.

Table 13. Budgeted costs and returns for baling wood shavings, converted hay baler at capacity, 1970 prices[1]

Item	Annual	Per Bale
	dollars	cents
Total Revenue	30,720	80.0
Fixed Costs:		
Depreciation		
Machine	300	.8
Building	480	1.2
Insurance	133	.3
Property tax	194	.5
Interest on investment	1,050	2.8
Administration and overhead	564	1.5
Total Fixed Costs	2,721	7.1
Variable Costs:		
Raw materials ($8.00 per ton)	12,288	32.0
Labor (2 men @ $1.80 per hour)	6,912	18.0
Electricity	796	2.1
Maintenance	443	1.1
Other materials (wire, wood ends, etc.)	4,608	12.0
Total Variable Costs	25,047	65.2
Total Production Cost	27,768	72.3
Net Return	2,952	7.7

[1] 20 bales per hour capacity, 38,400 bales per year (1,536 tons)

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March 1967.

The revenue in this budget is based on a plant producing 20 bales per hour, or 38,400 bales per year. The raw material required would be 1,536 tons. If the operator received 80 cents per bale, f.o.b. plant, the total revenue would be $30,720. With a total production cost of $27,768, net returns to pay for the operator's management would be $2,952, or 7.7 cents per bale.

Manufactured Baler Shavings Plant. Fixed costs per year of a shavings plant using a manufactured shavings baler and operating at full capacity would be much the same as that of the shavings plant with a converted hay baler (table 14). However, with a capacity of 35 bales per hour, the plant would produce 67,200 bales per year at fixed costs of 4.2 cents per bale.

Variable costs were $37,503, or 55.8 cents per bale. When the 4.2 cent fixed costs were included with variable costs, total costs were 60 cents per bale. Net returns to the operator were 20 cents per bale, or $13,417 per plant operated at capacity.

Most plants do not operate at capacity, but at about one-third capacity. McArthur and Warnick indicated plants with manufactured shaving balers in Utah produced an average of about 20,000 bales per year. A small savings in variable costs occurred when plants operated at less than capacity (table 15). The cost of nine cents per bale in a plant operating at less than capacity was less than the 10.3 cents per bale of a full-capacity plant. With two men, a plant with one baling machine has an excess of labor. However, fixed costs were substantially more per bale when the plant was operated at less than capacity. The net return of $2,271 more per bale when the plant was operated at less than capacity. The net return of $2,271 was less than that of the plant with a converted hay baler, although the return per bale was higher.

Table 14. Budgeted costs and returns for baling wood shavings in a typical operation with a manufactured shavings baler, 1970 prices[1]

Item	Annual	Per Bale
	dollars	cents
Total Revenue	53,760	80.0
Fixed Costs:		
Depreciation		
Machine	168	.2
Building	480	.7
Insurance	143	.2
Property tax	210	.3
Interest on investment	1,134	1.8
Administration and overhead	705	1.0
Total Fixed Costs	2,840	4.2
Variable Costs:		
Raw materials ($8.00 per ton)	21,504	32.0
Labor (2 men @ $1.80 per hour)	6,912	10.3
Electricity (7-1/2 hp motor)	610	.9
Maintenance	413	.6
Other materials (wire, wood ends, etc.)	8,064	12.0
Total Variable Costs	37,503	55.8
Total Production Cost	40,343	60.0
Net Return	13,417	20.0

[1] 35 bales per hour capacity, 67,200 bales per year (2,688 tons)

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March 1967.

Table 15. Budgeted costs and returns for baling wood shavings for a typical operation using a manufactured shavings baler operating at less than capacity, 1970 prices[1]

Item	Annual	Per Bale
	dollars	cents
Total Revenue	16,000	80.0
Fixed Costs:		
Depreciation		
Machine	168	.8
Building	480	2.4
Insurance	143	.7
Property tax	210	1.1
Interest on investment	1,134	5.7
Administration and overhead	705	3.5
Total Fixed Costs	2,840	14.2
Variable Costs:		
Raw materials ($8.00 per ton)	6,400	32.0
Labor (1 man @ $1.80 per hour)	1,800	9.0
Electricity (7-1/2 hp motor)	171	.8
Maintenance	118	.6
Other materials (wire, wood ends, etc.)	2,400	12.0
Total Variable Costs	10,889	54.4
Total Production Cost	13,729	68.6
Net Return	2,271	11.4

[1] 20 bales per hour, 20,000 bales per year (800 tons)

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March 1967.

Sawdust Sacking Plant. Two budgets are given for sawdust-sacking plants--one at full capacity and the other at less-than-full capacity--both of which are representative of plant operations in 1965 in Utah (6). Fixed costs of a full-capacity plant were estimated to be 1.11 cents per sack, with interest in investment and administrative costs as 64 percent of total fixed costs (table 16). Raw material costs of 12 cents per sack were 50 percent of total costs, and labor costs were 15 percent.

Net returns for a sawdust-sacking plant operated at capacity of 100 sacks per hour was estimated at $28,356. With an investment of $12,360, this is a very favorable return. However, because of problems in marketing sawdust, particularly because of the seasonal demand for agricultural or garden uses during the growing season, few plants can operate at capacity. Instead, they operate at about one-third capacity.

Typically, plants in Utah operated at a rate of 35 sacks per hour, producing 67,200 30-pound sacks per year (table 17). The distribution of costs were similar for the less-than-capacity plant as for the capacity plant. Net returns of $7,386, or 10.99 cents per sack, were favorable based on the investment of $12,360.

Combined Shavings and Sawdust Plant. Often the sawdust sacking enterprise is combined with the shavings baling enterprise. A very large difference in net returns was budgeted based on whether the combination plant was operated at one-third or full capacity (table 18). When operated at one-third capacity, the plant produced 20,000 bales of shavings and 67,200 sacks of sawdust. The net return was $9,109 or 40 percent of investment in building and

equipment. When the combined plant was operated at capacity, net returns were $42,842. This was a very favorable rate of return on investment in building and equipment.

Table 16. Budgeted costs and returns for a sawdust sacking operation, 1970 prices[1]

Item	Annual	Per Sack
	dollars	cents
Total Revenue	76,800	40.00
Fixed Costs:		
Depreciation		
Machine	36	.02
Building	480	.25
Insurance	109	.06
Property tax	160	.08
Interest on investment	721	.37
Administration and overhead	705	.37
Total Fixed Costs	2,211	1.15
Variable Costs:		
Raw materials ($8.00 per ton)	23,040	12.00
Labor (2 men @ $1.80 per hour)	6,912	3.60
Maintenance	153	.08
Other materials (sack, string, etc.)	16,128	8.40
Total Variable Costs	46,233	24.08
Total Production Cost	48,444	25.23
Net Return	28,356	14.77

[1] 100 sacks per hour capacity, 192,000 sacks per year (2,880 tons)

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March 1967.

Table 17. Budgeted costs and returns for a sawdust sacking operation with an annual output less than capacity, 1970 prices[1]

Item	Annual	Per Sack
	dollars	cents
Total Revenue	26,880	40.00
Fixed Costs:		
Depreciation		
Machine	36	.05
Building	480	.72
Insurance	109	.16
Property tax	160	.24
Interest on investment	721	1.07
Administration and overhead	705	1.05
Total Fixed Costs	2,211	3.29
Variable Costs:		
Raw materials ($8.00 per ton)	8,064	12.00
Labor (1 man @ $1.80 per hour)	3,456	5.14
Maintenance	118	.18
Other materials (sack, string, etc.)	5,645	8.40
Total Variable Costs	17,283	25.72
Total Production Cost	19,494	29.01
Net Return	7,386	10.99

[1] 35 sacks per hour, 67,200 sacks per year (1,008 tons)

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March, 1967.

Table 18. Budgeted costs and returns for a combined shavings-baling sawdust-sacking operation for mills with two levels of annual output, 1970 prices

Item	Annual Production	
	One-third of capacity [1]	Full capacity [2]
	dollars	dollars
Total Revenue	42,880	130,560
Fixed Costs:		
Depreciation		
Machine	204	204
Building	720	720
Insurance	200	200
Property tax	292	292
Interest on investment	1,579	1,579
Administration and overhead	987	987
Total Fixed Costs	3,982	3,982
Variable Costs:		
Raw materials	14,464	44,544
Labor	6,912 [3]	13,824 [4]
Electricity	171	610
Maintenance	197	566
Other materials [5]	8,045	24,192
Total Variable Costs	29,789	83,736
Total Production Cost	33,771	87,718
Net Return	9,109	42,842

[1] 20,000 bales, 67,200 sacks

[2] 67,200 bales, 192,000 sacks

[3] Two men employed full-time

[4] Four men employed full-time

[5] Included wood ends, wire, sacks, etc.

Major Source: J'Wayne McArthur, and Glenn Warnick, "Economic Potential for Baling Wood Shavings and Sacking Sawdust," Economic Research Service Publication ERS-335, U.S. Department of Agriculture, March 1967.

Shavings Plant Utilizing Aspen Cordwood. Aspen occurs throughout the Four Corners Economic Development Region in scattered stands at higher elevations. Although relatively pure, the stands are often small. Raw material procurement is a major problem for plants producing shavings from this species. However, excelsior, a very high quality product is produced. It is widely used as packing material and in filters for air conditioners.

No attempt was made to adjust costs and returns of the budget prepared by Monahan (8). Fixed costs per bale were 11.6 cents (table 19). Variable costs were 75 cents, and the price received per bale was $1.05. The gross profit before taxes other than property taxes was 18.4 cents per bale. On an annual basis, 70,716 bales were budgeted.

ANALYSIS OF FEASIBILITY

Using the investments, costs, and prices as presented in this report, it appears that baling wood shavings, and sacking sawdust are feasible ventures. Supply of raw materials and the potential area demand must be considered before investing in a baling or sacking firm. As indicated previously in this report, if all shavings and sawdust residues were used, from

Table 19. Estimated costs and returns of a shavings plant in Nebraska, 1966

Item	Annual	Per Bale
	dollars	cents
Gross Returns, 70,716 bales @ $1.05 each	74,252	105.0
Fixed Costs:		
Depreciation	5,712	8.1
Interest	1,440	2.0
Taxes and insurance	1,056	1.5
Total	8,280	11.6
Variable Costs:		
Wood inventory (2,352 cords)	18,816	26.6
Utilities	6,000	8.5
Baling supplies	4,248	6.0
Wages (3 men @ $1.75 per hour)	10,488	14.8
Operation of front end loader (4 hours per day)	2,640	3.7
Office supplies	1,200	1.7
Machinery and building maintenance	6,000	8.5
Sales and advertising	3,708	5.2
Total Variable Costs	53,100	75.0
Total Costs	61,308	86.6
Gross Profits Before Taxes	12,944	18.4

Source: Ralph T. Monahan, "The Potential in Manufacturing and Marketing Wood Shavings in Nebraska," College of Agriculture mimeograph, University of Nebraska, January 1967.

28 to 98 shavings plants and 145 to 417 sawdust plants could be established in the region, the number depending upon whether plants are operated at full or part capacity. Based on raw material supplies, shavings plants are in operation or would be feasible in central Utah, south-central Arizona, northeastern New Mexico, southeastern New Mexico, northwestern New Mexico, and generally throughout the western two-thirds of Colorado.

A potential demand analysis indicates that a large quantity of shavings and sawdust could be used in the four states. A further analysis should be made to determine effective demand.

The investment required for shavings baling, or sawdust sacking is slight compared to most small businesses. The maximum investment in a building and equipment for a combination shavings and sawdust plant is estimated to be $22,560. This level of investment assumed that the owner-operator has suitable land. A shavings plant investment would be from $15,500 to $16,200. A sawdust sacking enterprise investment would be $12,360.

A converted hay baler may be used to bale shavings, an operation which was budgeted at a capacity net return of $2,952 or 7.7 cents per bale. Balers specifically manufactured to bale wood shavings were budgeted to give a net return of $13,417 or 20 cents per bale when operated at capacity. The same plant operating at approximately one-third capacity would net $2,271 or 11.4 cents per bale.

A sawdust sacking operation at capacity would provide a net return of $28,356 or 14.77 cents per sack. Functioning at one-third capacity, a sawdust-sacking operation would net $7,386 or 10.99 cents per sack.

The functions of baling shavings and sacking sawdust can be incorporated into the operation of one firm to use all fine wood residue. Both operations producing at capacity would yield a net return of $42,842 annually. Functioning at one-third capacity, the firm would have a net return of $9,109.

Baling shavings and sacking sawdust in areas where lumber by-products and residues have not been used may add significantly to the returns from the lumber industry and benefit the local economy. Several barriers, however, must be overcome prior to the establishment of shavings-baling and sawdust-sacking operations in the Four Corners Economic Development Region.

BARRIERS IN ESTABLISHING ENTERPRISES

Two major barriers must be overcome before shavings-baling and sawdust-sacking enterprises can be successful. These are establishing a market for the products and locating the plant with ready and assured supplies of raw materials. The capital requirement is not considered as a major barrier because of the low amount needed compared to other kinds of business enterprises. The technology requirement for operating either kind of enterprise also is modest. Many individuals in agricultural production can operate a hay baler and with a few hours of instruction can learn to operate a bag-sewing machine.

IMPLEMENTATION PLAN

The implementation plan deals with what needs to be done, how to do it, and who will do it. Here are the six steps needed to determine what needs to be done:

1) Form a local group to interest individuals in the economic potential of establishing a plant in a local community.

2) Involve investigation by individuals who may be interested in establishing a plant. The investigation should include a survey of nurseries within a 100- to 200-mile radius to determine the amount of shavings or sawdust that might be demanded, sources of present supplies, pricing of the product, quality of product, seasonality, etc. Other potential markets should also be investigated.

3) Conduct a survey of nearby sawmills and planing mills to determine the quantity and quality of raw materials available, how long the sawmill or planing mill has been and plans to continue in operation, price of raw materials, and arrangements for access to materials, etc.

4) Arrange for transportation of both raw materials and the finished product. Transportation agencies and local truckers should be contacted to determine the cost per ton of moving shavings and sawdust to the local community, and costs per bale or per sack of moving the finished product to the markets determined as feasible in the second step.

5) Determine a feasible site for the plant, with ready access to the transportation system chosen, utilities, labor, etc. Zoning regulations should be examined.

6) Arrange financing.

The implementation plan to deal with how it should be done will be restricted to the two major barriers. Because of the small sizes of the plants needed in terms of capital and employment, the enterprises will probably be single entrepreneurships, or partnerships between two individuals. Material taken from a Small Business Administration publication, reproduced in the appendix, deals with pricing of the product and demonstrates how the operator should plan his business (13).

Several agencies and individuals should be involved in the local group whose function is to interest individuals in the enterprise and help them to get started. The local state forest representative may help to arrange for visits to sawmills and planing mills. The Chamber of Commerce committee dealing with small business opportunities should be represented in the local groups and perhaps should lead in the program of the group. The county agricultural agent has access to agricultural finance, transportation, and marketing associations. He may also help the potential plant owner in finding markets for shavings and sawdust. Federal agencies such as the Farmers Home Administration and the Small Business Administration should be contacted by the local group so that their programs can be explained by the agency representative to prospective plant operators. State agencies such as departments of development or their equivalent should be contacted for help in making contacts for raw material, credit, and markets. These departments in turn can contact nurseries, farm supply stores, and producer organizations to aid in establishing a market.

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APPENDIX

A PRICING CHECKLIST FOR MANAGERS OF POINTS TO CHECK AND REMEMBER

Pricing is a basic factor in insuring the profitable operations of small businessmen. Pricing plans, objectives, and policies are important phases of management, and to set effective prices the owner-manager must: (1) know his costs and (2) understand buyer motivation, timing, and competitors.

The questions in this checklist are intended to help small businessmen in evaluating their policies and practices, as well as to show them some of the things that should be done and considered.

EXAMINING COSTS, SALES VOLUME, AND PROFITS

The questions in this part can be helpful when prices are looked at from the viewpoint of costs, sales volume and profits.

Costs and Prices

As the small businessman, you may set the price for a product by applying a standard mark-up and thereby overlook certain cost factors which are connected with that product. This group of questions may help you gather information which should be helpful when you are determining prices on specific types of products.

	Yes	No
1. Do you know which of your operating costs remain the same regardless of sales volume?	____	____
2. Do you know which of your operating costs decrease percentage-wise as your sales volume increases?	____	____
3. Do you look for ways to produce more units per hour, each machine producing more than 75 percent of each hour?	____	____
4. Do you observe how efficient each of your workers are? Sometimes shifting a worker to duties he can do better or faster will increase production.	____	____

Material taken from Small Business Administration SMALL MARKETERS AIDS No. 105, Washington D. C., August 1964

	Yes	No
5. Using the same machinery and labor, do you try to produce a higher-valued product, or a product that can be made faster?	____	____
6. Are the annual sales volumes you plan to achieve reasonable when compared to your labor force, type, capacity and condition of your equipment?	____	____
7. Do you know what the gross profit will be on the annual volume of business you plan?	____	____
8. Do you have a list of business expenses which you can forecast as being necessary?	____	____
9. Is your own salary included in these expenses?	____	____
10. Is the net profit and salary adequate for you to continue in business?	____	____

Pricing and Sales Volume

An effective pricing program should also consider sales volume. For example, high prices can limit your sales volume while low prices might result in a large, but unprofitable volume. The following questions should be helpful in determining what is right for your situation.

	Yes	No
1. Have you set a sales volume goal and then studied it to see if your prices will help reach it?	____	____
2. Have you set a target of a certain number of new customers for next year? (If so, how can pricing help you to get them?)	____	____
3. Should you limit the quantities of producing low-grade and low-margin items?	____	____
4. Do you sell low-grade products at distress prices to move them out and recover at least some of the costs, or do you seek a market that will buy at a price that will give you a profit, small though it may be?	____	____

Pricing and Profits

Prices should bring in sales which are profitable over a long period of time. The following questions may help you think about pricing policies and their effect on your annual profits.

	Yes	No
1. Do you have all the facts on costs, sales, and competitive behavior?	____	____
2. Have you set a given level of profits in dollars and in percent of sale?	____	____
3. Do you keep records which will give you the needed facts on profits, losses, and prices?	____	____
4. Do you review your pricing practices periodically to make sure that they are helping to achieve your profit goals?	____	____

JUDGING YOUR CUSTOMERS, TIMING, AND COMPETITORS

The questions in this part are designed to help you check your practices for judging your customers, your timing, and your competitors.

The Customer and Pricing Strategy

After you have your facts on costs, the next point must be the customer--whether you are changing a price, putting in a new product, or checking out your present price practices. Knowledge of your customers helps you to determine how to vary prices in order to get the average gross margin you need for making a profit. The following questions should be helpful in checking your knowledge about your customers.

	Yes	No
1. Do you know whether your customers shop around and for what products?	____	____
2. Do you know how your customers make their comparisons? By reading advertisements? By contacting other producers? By hearsay?	____	____
3. Are you trying to appeal to customers who buy on price alone? To those who buy on quality alone? To those who combine the two?	____	____
4. Do any of your customers tell you that your prices are in line with those of your competitors? Higher? Lower?	____	____

	Yes	No
5. Do you know which products your customers ask for even though you raise the price?	____	____
6. Do you know which products your customers cease to buy when you raise the price?	____	____
7. Do certain products seem to appeal to customers more when you lower the price?	____	____
8. Have you maintained individual sales records to classify your present customers according to the volume of their purchases?	____	____
9. If you are trying to build a quality price image, do your individual customer records show that you are selling a larger volume of higher priced products than you were 12 months ago?	____	____
10. Do your records of individual customer accounts and your observations of customer behavior show price as the important factor in their buying? Service? Quality? Some other consideration?	____	____

Time and Pricing

Effective merchandising means that you have the right product, at the right place, at the right price, and at the right time. All are important, but timing is the critical element for the small producer. The following questions should be helpful in determining what is the right time for you to adjust prices.

	Yes	No
1. Are you a "leader" or a "follower" in announcing your price changes? The follower, even though he matches his competitors, creates a negative impression on his customers.	____	____
2. Have you studied your competitors to see whether they follow any sort of pattern when making price changes?	____	____
3. When you change a price, do you make sure that all customers know about it, by word, by letter, and so on?	____	____
4. Do you try to time price reductions so they can be promoted in your advertising?	____	____

Competition and Pricing

When you set prices, you have to consider how your competitors will react to your prices. The starting place is learning as much as you can about their price structures. The following questions can help you check out this phase of pricing.

	Yes	No
1. Do you use all the available channels of information to keep you informed of your competitor's price policies? Some useful sources of information are: (1) things your customers tell you; (2) the competitor's price list, his advertising, and reports from your suppliers; (3) trade paper studies; (4) and public agencies pricing reports.	____	____
2. Should your policy be to try to always sell above or below competition? Only to meet it?	____	____
3. Have you lost certain customers because competitors match your price cuts?	____	____
4. Is the leader pricing of your competitors affecting your sales volume to such an extent that you must alter your prices on individual products?	____	____
5. Do you realize that no two competitors have identical cost curves? This difference in costs means that certain price levels may or may not be profitable for you or your competitor.	____	____

PRACTICES WHICH CAN HELP OFFSET PRICE

Some small producers take advantage of the fact that price is not always the determining factor in making a sale. They supply customer services, better made products, and offer other inducements to offset the effect of a competitor's lower prices. The following questions are designed to help you take a look at some of these practices.

	Yes	No
1. Are your products made under quality control to insure uniform, well-made products?	____	____
2. Are your products sorted by standard quality rules?	____	____
3. Are your products made to fit the specific needs of your customers? For example, packaging of certain specified sizes, species, and/or grades.	____	____
4. Do your products have other advantages for which customers are willing to pay a little more?	____	____

	Yes	No
5. Should you change your services so as to create an advantage for which your customers are willing to pay?	____	____
6. Do you emphasize benefits rather than price to your customers?	____	____
7. Have you tried to change your product or services to stimulate sales or to attract new business?	____	____
8. Do you rectify by any price or product change errors in sales?	____	____
9. Should you change policy on returned goods so as to impress your customers better?	____	____