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Machine Rates for Selected Harvesting Machines

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MACHINE RATES FOR SELECTED FOREST HARVESTING MACHINES

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INTRODUCTION

Very little new literature has been published on the subject of machine rates and machine cost analysis since 1989 when the Alabama Agricultural Experiment Station Circular 296, *Machine Rates for Selected Forest Harvesting Machines,* was originally published. Many machines discussed in the original publication have undergone substantial changes in various aspects, not the least of which is increased costs. Many machines are no longer manufactured, and several new machines have been developed and are discussed in this updated publication.

The objective of this publication is to provide a survey of up-to-date cost estimates for forest harvesting machines. These estimates may be used to compare machines or combinations of machines to estimate owning and operating costs for harvesting systems. This comparison is in real dollars adjusted based on the Consumer Price Index (CPI). The CPI is an index of the increasing cost of goods or services over time *(6)*. During the thirteen year time period from 1988 to 2000 the CPI was found to be 0.0302, or about 3 percent *(3)*. This rate was used to adjust the 1988 purchase price into the equivalent year 2000 dollars.

Despite the growing complexity of the machines and systems and their rising owning and operating costs, the degree of mechanization in harvesting operations continues to increase. Rapidly changing machine technologies and operating methods require that the manager continually evaluate ongoing costs in order to minimize overall production costs as well as to compare prospective

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machines and systems at replacement time. These evaluations require detailed records and reasonable estimates of costs to determine expected costs and to compare alternatives.

It would be impossible in this report to list every machine and attachment combination available today. Machines representative of the many classes of logging equipment were selected and are are listed by manufacturer. Machines on this list represent those currently available and easily accessible for needed data.[1] Machines were selected in 12 categories, including feller bunchers, harvesters, skidders, forwarders, loaders, and delimbers.

METHODS

Overview of Machine Rates

Matthews *(7)* in his classic 1942 textbook, *Cost Control in the Logging Industry,* described a cost analysis method called the "machine rate." With some modification, this method of calculating machine costs is still widely used today. In general, this method calculates a machine's lifetime average hourly cost. Both the fixed costs of ownership and the variable costs of operation are included in the calculation.

Like any cost estimation method, the quality of the results depends on the quality of the information used to obtain them. A system to classify the accuracy of cost estimates was proposed by Jarck *(5)*. The three categories of estimates, in order of preference, are calculations based on (1) empirical data (ie: long-term costs records), (2) best estimates made by knowledgeable sources, and (3) unknown or questionable sources or by use of rule-of-thumb values. In this paper, calculations were based on empirical data and published estimates as much as possible. Some data were based on conservative estimates such as working hours per year and fuel prices.

The use of the machine rate requires caution on the part of the manager. Since the result of the machine rate calculation is an average cost, actual cash expenditures for ownership costs will be greater than estimated costs early in the machine's life, and will be less than estimated in later years. Actual operating costs have the opposite characteristic over time when compared to the estimated cost *(2)*. It also follows that complete system costs determined by the machine rate must also be interpreted carefully, since it is most likely that the machines in the system will not all be the same age. Additionally the machine rate does not consider after-tax cash flow, which may estimate a greater cost than is actually realized *(12)*. Machine rate costs are also affected by several

[1] The use of brand or trade names is for the reader's convenience and is not an endorsement by the authors or their respective organizations.

other basic assumptions, such as the total hours of machine life; lack of consideration of the time value of money; no discounting of future dollar values; the cost of interest, insurance, and taxes, which are calculated as a percentage of average fixed value rather than actual costs; and maintenance and repair, which may be calculated as a percentage of depreciation rather than a predicted maintenance cost if accurate maintenance records are not maintained.

Time Standards

Costs may be expressed over any unit of time (seconds, hours, years) as long as the results have meaning to the user. Machine rates are usually expressed per productive machine hour (PMH) or scheduled machine hour (SMH). Scheduled time is the time during which equipment is scheduled to do productive work. Productive time is the part of the scheduled time during which a machine is performing its scheduled function *(1)*. The sum of productive time and non-productive delay time equals the scheduled operating time. The ratio of the productive time to the scheduled time for a machine is known as the utilization rate of the machine.

For the costs presented in this paper, 2,000 scheduled machine hours per year were assumed for all machines. Utilization rates (Table 1) were determined from a review of the literature and were standardized by machine category or sub-category. Total machine costs were expressed in both dollars per SMH and dollars per PMH.

Calculation of Machine Rates: Ownership Costs

The actual machine rate calculation procedure, machine rate worksheet, is shown in Table 2. Costs were determined for owning the machine and for operating the machine.

Ownership costs, also known as fixed or overhead costs, are those costs which can be predicted and accumulate with the length of ownership *(7)*. These machine costs are not dependent on operating conditions or technique. Instead, they occur constantly, even if the machine is stored for a season. While ownership costs may be predicted, they can only be partially controlled by the logging manager once a machine is purchased. The components of ownership costs are traditionally defined as depreciation, interest, insurance, and taxes.

Depreciation – The fixed cost known as depreciation is an attempt to quantify the "decline in value of a machine due to wear, obsolescence, and weathering" *(13)*. This decline in value is not an "out-of-pocket" cost in the sense that a cash payment is made. Rather, it is the loss in value "associated with the production of a unit of output" *(10)*. Depreciation cost may be expressed per unit of time or unit of product produced. Unit product based depreciation is used to determine the price of a product. In forest machine rate calculations, depreciation is usually calculated per SMH or PMH units of time.

Table 1. Machine Life, Salvage Value, Utilization, and Repair and Maintenance Estimators

Machine description	Life (years)	Salvage value[1]	Utilization[2]	Repair and maintenance[3]
Tree shear, without carrier	5	50	60	100
Fellerbuncher, sm., rubber tired	3	20	65	100
Fellerbuncher, med-lg., rubber tired	4	20	65	100
Fellerbuncher, lg., tracked, boom	5	15	60	75
Cable skidder, sm., <=80 hp	4	20	65	75
Cable skidder, med., 81-100 hp	4	20	65	90
Cable skidder, med., 101-120 hp	5	15	60	90
Cable skidder, lg., >=120 hp	5	10	60	90
Grapple skidder, 70-90 hp	4	20	65	90
Grapple skidder, >=91 hp	5	25	60	90
Grapple skidder, lg., tracked	5	15	65	100
Forwarder, shortwood	4	20	65	100
Slasher/loader, multi-stem	4	0	65	35
Delimber, iron gate	5	20	90	65
Harvester, combine	4	20	65	110
Loader, bigstick	5	10	65	90
Loader, sm., hydraulic	5	30	65	90
Loader, med., hydraulic	5	30	65	90
Chipper, sm.-med., 12"-18"	5	20	75	100
Chipper, lg., >=22"	5	20	75	100
Crawler tractor, <=100 hp	5	20	25	100
Crawler tractor, 101-200 hp	5	20	60	100
Crawler tractor, >=201	5	20	60	100

[1] Percent of purchase price.
[2] Percent of scheduled machine hours.
[3] Percent of annual depreciation.
Sources: Cubbage *(2),* Hypes and Stuart *(4),* Miyata (8), Warren *(13),* and authors.

The method used to calculate machine depreciation costs should reflect the firm's view of a machine's performance (ie: its ability to produce a product) over its useful life rather than an accelerated depreciation method to provide early tax benefits. If a machine is expected to perform at the same level every year, straight-line depreciation should be used to reflect a uniform usage of machine productivity. In this publication, it was assumed the straight-line method was appropriate since all machines would be highly maintained, and yearly productivity would be fairly constant.

Information required for calculation of depreciation cost is purchase price, useful life, and salvage value. Purchase prices of the machines listed in this publication were obtained from dealers and manufacturers during the summer of 2000. These prices were the list prices (F.O.B.) for the machines equipped with either the standard level or most common level of features and options. Tire and track values were included in the depreciated amounts. Table 1 con-

Table 2. Machine Rate Worksheet

Machine description:_____

1. Input Data		
Purchase price (P)	$ _____	
Machine horsepower rating (hp)	_____	hp
Machine life (n)	_____	yrs
Salvage value, percent of purchase price (rv%)	_____	%
Utilization rate (ut%)	_____	%
Repair and maintenance, percent of depreciation (rm%)	_____	%
Interest rate (in%)	_____	%
Insurance and tax rate (it%)	_____	%
Fuel consumption rate (fcr)	_____	gal/hp-hr
Fuel cost (fcg)	$ _____	per gal
Lube and oil, percent of fuel cost (lo%)	_____	%
Operator wage and benefit rate (WB)	$ _____	hr
Scheduled machine hours (SMH)	_____	hrs/yr
2. Calculations		
Salvage value (S) = (P*rv%)	$ _____	
Annual depreciation (AD) = ((P-S)/n)	$ _____	
Average yearly investment (AYI) = ((((P-S)*(n+1))/(2*n))+S)	$ _____	
Productive machine hours (PMH) = (SMH*ut%)	_____	hrs/yr
3. Ownership costs		
Interest cost (IN) = (in%*AYI)	$ _____	yr
Insurance and tax cost (IT) = (it%*AYI)	$ _____	yr
Yearly ownership cost (YF$) = (AD+IN+IT)	$ _____	yr
Ownership cost per SMH (F$SMH) = (YF$/SMH)	$ _____	hr
Ownership cost per PMH (F$PMH) = (YF$/PMH)	$ _____	hr
4. Operating costs		
Fuel cost (F) = (hp*fcr*fcg)	$ _____	hr
Lube cost (L) = (F*lo%)	$ _____	hr
Repair and Maintenance cost (RM) = (AD*rm%/PMH)	$ _____	hr
Operator labor and benefit cost (WB/ut%)	$ _____	hr
Operating cost per PMH (V$PMH) = (F+L+RM+(WB/ut%))	$ _____	hr
Operating cost per SMH (V$SMH) = (V$PMH*ut%)	$ _____	hr
5. Total Machine Costs		
Total cost per SMH (T$SMH) = (F$SMH+V$SMH)	$ _____	hr
Total cost per PMH (T$PMH) = (F$PMH + V$PMH)	$ _____	hr

tains useful life estimates by machine type as found in Cubbage *(2),* Hypes and Stuart *(4),* and Miyata *(8).* Examples of salvage values after useful life, expressed as a percent of purchase price, can be also be found in Table 1. However, for the purpose of simplicity in this publication, salvage value was assigned as 20 percent of the purchase price for all machines in making the calculation in Appendix B.

Interest cost – Interest is defined as the rental amount charged by a lender for the use of money *(11)*. Interest expenses, as explained by Matthews *(7),* are included in machine rates to avoid unrealistic comparisons between machines with greatly different initial costs. For financed machine purchases, interest cost takes the form of finance charges. Outright machine purchases are charged the amount which the funds would have earned had they been invested elsewhere, such as in bonds or a savings account.

An interest rate is used to determine the interest cost in machine rate calculations. This rate should equal the rate charged by the lending institution for borrowed purchases, or a firm's alternative investment rate for cash purchases. For the calculations in this publication, an interest rate of 10 percent, Annual Percentage Rate (APR) was used. This value was determined by surveying current rates charged by equipment dealers and lending institutions. Once the interest rate has been determined, it is charged to the average yearly investment (AYI) amount for the machine. This AYI is also referred to in the literature as "average value of yearly investment" (AVI) *(8)* and "average annual investment" (AAI) *(13)*. The AYI is a value which represents the lifetime average of the investment cost of a machine. The formula for calculating AYI may be found in the machine rate worksheet, Table 2.

Insurance cost – The costs of liability and comprehensive insurance coverage vary depending on the location and size of a woods operation. Generally, the more equipment that is insured, the lower the premium cost per machine. In this paper, a yearly insurance cost was based on a percentage of the purchase price (Table 3) as taken from Werblow and Cubbage *(14)*. Rates obtained from agents in the east Alabama area range from 1.5 to 5 percent of the replacement cost for a piece of machinery, thus reflecting no significant change in the rate basis since the initial 1988 publication.

Tax costs – Taxes are costs paid to the local government based on the assessed value of the machine. License and highway use fees are included in this cost category. Since in-woods equipment is not usually subject to tax collection, no tax costs were used in this analysis.

Calculation of Machine Rates: Operating Costs

Operating costs, also known as variable costs, occur solely due to the operation of a machine. The magnitude of these costs is directly proportional to the time the machine operates. Operating costs are subject to more management control than are ownership costs. Operating cost items consist of fuel, lubrication, repair and maintenance, and labor and benefits. Generally, labor costs are paid during scheduled machine hours, while the remaining operating costs are paid over productive machine hours.

Fuel costs – The fuel consumption rate for a machine is mainly a function of the machine's horsepower rating; however, transmission type, machine type,

Table 3. Insurance Rates

Equipment	Percent of purchase price
Skidder/Clambunk	5.0
Rubber-tired feller-buncher	4.5
Forwarder/Harvester	4.0
Tracked feller-buncher	3.5
Tracked delimber/Shovel	2.0
Knuckleboom loader	1.5

and machine use also influence fuel consumption. To obtain fuel cost per productive hour, the gallon-per-hour fuel consumption rate is multiplied by the fuel price per gallon. Fuel consumption was determined using consumption rates (Table 4) from Plummer and Stokes *(9)*.

Lubrication costs – Lube costs include the cost of engine oil, hydraulic oil, and lubricants. This cost is usually determined as a percentage of fuel costs, since the factors which determine fuel consumption (horsepower, transmission type, machine type, machine use) also determine the amount of oils used. A rate of 36.8 percent of hourly fuel cost is used to determine lube costs. This rate was calculated from Plummer and Stokes *(9)* and a local oil price survey was made in 2000 to determine current fuel costs which were $1.45 per gallon of off-road fuel.

Repair and maintenance – Repair and maintenance are the most unpredictable of all machine costs. Operating conditions, operator skill, repair and

Table 4. Fuel Consumption by Machine Type and Transmission Type

	Fuel consumption (gal/hp-hr)		
	Transmission		
Machine category/description	Standard	All	Powershift
Tree shear, without carrier		0.00000	
Fellerbuncher, sm., rubber tired		0.02633	
Fellerbuncher, med-lg., rubber tired		0.02633	
Fellerbuncher, lg., tracked, boom		0.02633	
Cable skidder, sm., <=80 hp	0.02917		0.02800
Cable skidder, med., 81-100 hp	0.02917		0.02800
Cable skidder, med., 101-120 hp	0.02917		0.02800
Cable skidder, lg., >=120 hp	0.02917		0.02800
Grapple skidder, 70-90 hp	0.02917		0.02800
Grapple skidder, >=91 hp	0.02917		0.02800
Grapple skidder, lg., tracked	0.02917		0.02800
Forwarder, shortwood		0.02488	
Slasher/loader, multi-stem		0.03104	
Harvester, combine		0.02917	
Loader, sm., hydraulic		0.02166	
Loader, med., hydraulic		0.02166	
Crawler tractor, <=100 hp		0.03932	
Crawler tractor, 101-200 hp		0.03932	
Crawler tractor, >=201		0.03932	

Sources: Plummer and Stokes *(9),* and Stokes.

maintenance strategy, and machine quality influence this cost. This component includes the cost of preventive maintenance parts and labor, repair parts and labor, and in our case, tire (or track) replacement costs.

The machine rate method calculates repair and maintenance hourly costs as a percentage of average yearly depreciation. This calculation results in an average cost across the useful life of a machine. Percentage rates used in this publication were obtained from Cubbage *(2)* and Warren *(13)*. Table 1 lists these values by machine type.

Labor and benefit cost – Wages and benefits are not included in this study due to the wide range of rates paid by different companies and locations. Labor costs generally occur during scheduled machine hours and may be directly added to the total machine cost per SMH value for each machine listed. Labor is often paid on a piece rate, which can be added directly to the costs per unit of production, or converted to an approximate hourly rate for machine rate calculations. Dividing the labor cost per SMH by the utilization rate will give the equivalent labor cost per PMH, which may be added to the total machine cost per productive hour.

Personal Computer Spreadsheet Analysis

To reduce the work required to keep updated machine rates for the 104 machines being studied, a personal computer spreadsheet program was used. This spreadsheet is available on the world wide web at www.aces.edu/sfws/publications.htm. This electronic worksheet has a recalculation capability which makes computing current machine costs a simple matter of entering updated parameter values. The new results will be automatically computed and displayed in the appropriate formula blocks.

To calculate and store the machine rate information for this paper, a personal computer was used with a Microsoft Excel [2] spreadsheet software package. Machine cost input variables and formulas were entered across the worksheet columns in the order in which they are listed in the machine rate worksheet (Table 2). Each individual machine's description and cost data were entered in the appropriate column on a worksheet row. The software package calculated each formula and displayed the cost analysis results on the worksheet.

RESULTS

The appendices of this report contain the machine rate results for the forest harvesting machines selected for analysis. The machines are organized in

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alphabetical order by manufacturer and category. Appendix A reflects the basic input data for each machine. Other information includes descriptive features such as mobility type, attachment type, attachment size, engine horsepower, transmission type, and tire or track size. The transmission type and horsepower ratings determined the machine fuel consumption.

Appendix B lists the machine parameters as obtained from Tables 1, 3, and 4 in this report. Appendix C provides additional parameters and annual costs for each machine. Operating costs for these machines are shown in Appendix D. Calculations are performed using the formulas found in Table 2. Ownership cost, operating cost, and total machine cost are expressed in both dollars per SMH and PMH.

When using the machine rate figures presented, the reader must realize that machine life and purchase price are the most influential factors affecting machine costs. A one-year change in machine life estimation may result in a 10 to 15 percent change in AYI and the owning and operating cost per productive machine hour. Purchase price, while less influential than useful life, also changes the values of the AYI and annual depreciation. If an individual manager experiences different machine life durations, or pays significantly different prices for a machine listed here, appropriate corrections should be made to obtain an hourly cost which reflects the exceptional local conditions. Also, these costs are based on standardized assumptions and may not reflect actual costs of a particular machine in a particular operation. There are many factors such as down payments and different financing plans, local fuel costs, and a range of maintenance procedures that may affect these costs. However, using these standard methods, relative comparisons can be made between harvesting machines.

As stated in the operating costs portion of this paper, labor rates have not been included in the calculation of the machine rates presented in the Appendices. Labor and benefit costs are locally variable and are easily added by the reader in the appropriate units to the machine cost.

Many changes occurred in harvesting machines in the 12 years since the 1988 survey, thus making a direct comparison possible for only 22 of the machines. These comparisons are found in Appendix E. Actual costs for harvesting equipment have increased substantially for many of the machines listed in both the 1988 and current publication. However, the real purchase price (adjusted for inflation based on CPI) percentage variation ranged from -63 to 30 percent. Similarly, the real cost per SMH and PMH ranged from -65 to 38 percent. These increases should be viewed with the understanding that no assumptions are made for engineering and technology advances and ergonomic and safety improvements. Also, there are no substantial differences in current technology with reference to machine make, model, and service.

SUMMARY

Machine rate calculations provide a method of comparing the economics of specified machines using generalized cost data. The machine rate method considered both the fixed costs of ownership and the variable costs of operation in determining the average hourly machine cost. Labor costs were not included because of their high variability. Estimates for each cost component were made from the best available sources.

Personal computers and worksheet programs provide managers and researchers with an efficient means of frequently updating equipment cost estimates. Hourly cost estimates, coupled with hourly production estimates, allow managers make economic comparisons between equipment alternatives.

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Appendix A. Basic Input Data for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Model number	Machine type	Class	Mobility	Attach. type
1	Barko	685	FB	Articulated	Rtire	Saw
2	Barko	785	FB	Articulated	Rtire	Saw
3	Barko	885	FB	Articulated	Rtire	Saw
4	Franklin-TF	C3600 HTFB	FB	Articulated	Rtire	Saw
5	Franklin-TF	C4500 HTFB	FB	Articulated	Rtire	Saw
6	Franklin-TF	C4800 HTFB	FB	Articulated	Rtire	Saw
7	Franklin-TF	C5000 HTFB	FB	Articulated	Rtire	Saw
8	Franklin-TF	C5500 HTFB	FB	Articulated	Rtire	Saw
9	JD	643G	FB	Articulated	Rtire	Saw
10	JD	843G	FB	Articulated	Rtire	Saw
11	Tigercat	720B	FB	Articulated	Rtire	Saw
12	Tigercat	720C	FB	Articulated	Rtire	Saw
13	Tigercat	726B	FB	Articulated	Rtire	Saw
14	Timbco	TB820-D	FB	Articulated	Rtire	Knucboom
15	Timbco	TB820-D	FB	Articulated	Rtire	Knucboom
16	Tigercat	845B	FB	Tracked	Tracked	Saw
17	Tigercat	845B	FB	Tracked	Tracked	Saw
18	Tigercat	H845B	FB	Tracked	Tracked	HarvHead
19	Tigercat	860	FB	Tracked	Tracked	Saw
20	Timbco	T415-D	FB	Tracked	Tracked	Saw
21	Timbco	T425-D	FB	Tracked	Tracked	Saw
22	Timbco	T445-D	FB	Tracked	Tracked	Saw
23	Timbco	T450-D	FB	Tracked	Tracked	Saw
24	Timbco	T455-D	FB	Tracked	Tracked	Saw
25	Tjack	608L	FB	Tracked	Tracked	Saw
26	Tjack	950	FB	Tracked	Tracked	Saw
27	CAT	550	Harvester	Articulated	Rtire	HarvHead
28	CAT	570	Harvester	Articulated	Rtire	HarvHead
29	Ponsse	HS10	Harvester	Articulated	Rtire	HarvHead
30	Ponsse	HS16	Harvester	Articulated	Rtire	HarvHead
31	Rottne	2004	Harvester	Articulated	Rtire	HarvHead
32	Rottne	5000	Harvester	Articulated	Rtire	HarvHead
33	Rottne	SMV Rapid EGS	Harvester	Articulated	Rtire	HarvHead
34	Rottne	SMV Rapid TGS	Harvester	Articulated	Rtire	Two Grip
35	Tjack	1270B	Harvester	Articulated	Rtire	HarvHead
36	CAT	515	Skidder	Articulated	Rtire	Grapple
37	CAT	525	Skidder	Articulated	Rtire	Grapple
38	CAT	545	Skidder	Articulated	Rtire	Grapple
39	Franklin-TF	170 S2	Skidder	Articulated	Rtire	Grapple
40	Franklin-TF	405 S2	Skidder	Articulated	Rtire	Grapple
41	Franklin-TF	Q 70	Skidder	Articulated	Rtire	Grapple
42	Franklin-TF	Q 80	Skidder	Articulated	Rtire	Grapple
43	Franklin-TF	Q 90	Skidder	Articulated	Rtire	Grapple
44	JD	548G-II	Skidder	Articulated	Rtire	Grapple
45	JD	648G-II	Skidder	Articulated	Rtire	Grapple
46	JD	748G-II	Skidder	Articulated	Rtire	Grapple
47	Ranger	F65G	Skidder	Articulated	Rtire	Grapple
48	Ranger	H66DS	Skidder	Articulated	Rtire	Grapple
49	Ranger	H67H	Skidder	Articulated	Rtire	Grapple
50	Ranger	F68G	Skidder	Articulated	Rtire	Grapple
51	Tigercat	620	Skidder	Articulated	Rtire	Grapple
52	Tigercat	630B	Skidder	Articulated	Rtire	Grapple
53	Tigercat	635	Skidder	Articulated	Rtire	Grapple
54	Tjack	360C	Skidder	Articulated	Rtire	Cable

continued

Appendix A. Basic Input Data for Specific Harvesting Machines (Part 2)

Machine number	Attach. size	Rated HP	Trans type	Tire/Trk size (front)	Tire size (rear)	Purchase price
1	20	140	Hydro	28Lx26		$184,145
2	20	174	Hydro	28Lx26		$198,920
3	20	215	Hydro	28Lx26		$205,275
4	20	152	Hydro	24.5x32	21.5L-16.1	$151,600
5	20	152	Hydro	23.1x26		$174,100
6	20	174	Hydro	28Lx26		$192,900
7	20	174	Hydro	28Lx26		$203,700
8	20	210	Hydro	30.5x32		$221,800
9	20	170	Hydro	28Lx26		$215,000
10	20	200	Hydro	28Lx26		$217,000
11	20	165	Hydro	23.1x26		$181,685
12	20	174	Hydro	23.1x26		$184,100
13	23	215	Hydro	28Lx26		$203,020
14	na	260	Hydro	28Lx26		$274,996
15	na	260	Hydro	28Lx26		$287,133
16	23	205	•	24"		$300,185
17	23	205	•	24"		$336,185
18	23	230	•	24"		$354,195
19	23	250	•	24"		$351,255
20	•	200	•	24"		$193,016
21	•	215	•	24"		$223,015
22	•	260	•	24"		$248,836
23	•	260	•	28"		$258,327
24	•	260	•	28"		$277,232
25	•	230				$343,553
26	24	230				$432,944
27	45cm	163	Hydro	600/65x34		$435,290
28	55cm	221	Hydro	600/65x34		$481,745
29	•	210	Hydro	600x22.5		$412,000
30	•	210	Hydro	600x34	600x26.5	$445,000
31	18	120	Hydro	500/50x26.5		$320,000
32	18	170	Hydro	600/65x35		$410,000
33	24	185	Hydro	23.1x34	600/55x26.5	$440,000
34	•	170	Hydro	600/55x26.5		$440,000
35	25.6	204	Hydro	700mmx26.5	700mmx34	$405,829
36	na	153	PS	23.1Lx26		$154,380
37	na	175	PS	28Lx26		$182,415
38	na	225	PS	30.5Lx32		$275,400
39	na	174	PS	23.1x26		$138,000
40	na	152	PS	23.1x27		$134,500
41	na	185	PS	24.5x32		$169,100
42	na	185	PS	30.5x32		$182,000
43	na	230	PS	30.5x32		$228,200
44	na	119	PS	28Lx26		$155,000
45	na	153	PS	28Lx26		$173,475
46	na	169	PS	30.5x32		$227,000
47	na	116	PS	23.1x26		$145,550
48	na	174	PS	28Lx26		$162,800
49	na	185	PS	24.5x32		$174,700
50	na	230	PS	30.5x32		$178,500
51	na	174	Hydro	28Lx26		$172,530
52	na	240	Hydro	30.5Lx32		$201,220
53	na	240	Hydro	30.5x32	28Lx26	$269,280
54	na	148	PS	23.1x26		$143,424

continued

Appendix A, continued.
Basic Input Data for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Model number	Machine type	Class	Mobility	Attach. type
55	Tjack	360C	Skidder	Articulated	Rtire	Grapple
56	Tjack	460C	Skidder	Articulated	Rtire	Cable
57	Tjack	460C	Skidder	Articulated	Rtire	Grapple
58	Tjack	560	Skidder	Articulated	Rtire	Grapple
59	Tjack	660C	Skidder	Articulated	Rtire	Cable
60	Tjack	660C	Skidder	Articulated	Rtire	Grapple
61	CAT	517	Skidder	Tracked	Tracked	Grapple
62	CAT	527	Skidder	Tracked	Tracked	Grapple
63	Tigercat	C640	Clambunk	Articulated	Rtire	Grapple
64	Tigercat	S640	Site Prep	Articulated	Rtire	Plow
65	Timbco	TF820-D	Clambunk	Articulated	Rtire	Knucboom
66	Timbco	TS820-D	Clambunk	Articulated	Rtire	Knucboom
67	Timbco	TS820-D	Dual Arch	Articulated	Rtire	Knucboom
68	CAT	574	Forwarder	Articulated	Rtire	Knucboom
69	Franklin-TF	632	Forwarder	Articulated	Rtire	Knucboom
70	Franklin-TF	670	Forwarder	Articulated	Rtire	Knucboom
71	Ponsse	S10	Forwarder	Articulated	Rtire	Knucboom
72	Ponsse	S15	Forwarder	Articulated	Rtire	Knucboom
73	Ponsse	S16	Forwarder	Articulated	Rtire	Knucboom
74	Rottne	Rapid (6)	Forwarder	Articulated	Rtire	Knucboom
75	Rottne	Rapid (8)	Forwarder	Articulated	Rtire	Knucboom
76	Rottne	SMV Rapid (6)	Forwarder	Articulated	Rtire	Knucboom
77	Rottne	SMV Rapid (8)	Forwarder	Articulated	Rtire	Knucboom
78	Timbco	TF820-D	Forwarder	Articulated	Rtire	Knucboom
79	Tjack	1010B	Forwarder	Articulated	Rtire	Knucboom
80	Tjack	1410	Forwarder	Articulated	Rtire	Knucboom
81	Tjack	1710	Forwarder	Articulated	Rtire	Knucboom
82	Barko	160D	Loader	Trailer	Truck	Knucboom
83	Barko	225	Loader	Trailer	Truck	Knucboom
84	Barko	295	Loader	Trailer	Truck	Knucboom
85	Franklin-TF	KBL-28	Loader	Trailer	Truck	Knucboom
86	Franklin-TF	KBL-35	Loader	Trailer	Truck	Knucboom
87	Husky	XL-175	Loader	Trailer	Truck	Knucboom
88	Husky	XL-175	Loader	Tracked	Tracked	Knucboom
89	Husky	XL-275	Loader	Trailer	Truck	Knucboom
90	Husky	XL-275	Loader	Tracked	Tracked	Knucboom
91	Husky	XL-375	Loader	Trailer	Truck	Knucboom
92	Husky	XL-375	Loader	Tracked	Tracked	Knucboom
93	Tigercat	230B	Loader	Trailer	Truck	Knucboom
94	Tigercat	240B	Loader	Trailer	Truck	Knucboom
95	Tigercat	T240B	Loader	Tracked	Tracked	Knucboom
96	Tigercat	T245B	Loader	Tracked	Tracked	Knucboom
97	Tigercat	T248	Loader	Tracked	Tracked	Knucboom
98	Tjack	230	Loader	Trailer	Truck	Knucboom
99	Tjack	330	Loader	Trailer	Truck	Knucboom
100	Tjack	430	Loader	Trailer	Truck	Knucboom
101	Tjack	530	Loader	Trailer	Truck	Knucboom
102	Tigercat	S860	Shovel	Tracked	Tracked	Knucboom
103	Tigercat	D860	Delimber	Tracked	Tracked	Delimber
104	Tigercat	D860	Delimber	Tracked	Tracked	Delimber

[1] CAT=Caterpillar, Franklin-TF=Franklin-TreeFarmer, JD=John Deere, Tjack=Timberjack.

Appendix A, continued.
Basic Input Data for Specific Harvesting Machines (Part 2)

Machine number	Attach. size	Rated HP	Trans type	Tire/Trk size (front)	Tire size (rear)	Purchase price
55	na	148	PS	23.1x27		$160,931
56	na	174	PS	28Lx26		$154,579
57	na	174	PS	28Lx27		$172,847
58	na	185	PS	30.5Lx32		$222,929
59	na	215	PS	30.5Lx32		$199,003
60	na	215	PS	30.5Lx32		$243,158
61	na	136	PS	22"		$238,870
62	na	166	PS	22"		$280,851
63	na	240	Hydro	30.5x32	28Lx26	$261,200
64	na	240	Hydro	30.5x32		$171,120
65	na	260	Hydro	28Lx26		$294,360
66	na	260	Hydro	28Lx26		$299,237
67	na	260	Hydro	28Lx26		$283,418
68	na	163	PS	700/50x26.5		$361,160
69	na	116	PS	28Lx26	600/55x26.5	$189,600
70	na	152	PS	28Lx26	600/55x26.5	$211,100
71	na	122	Hydro	700/45x22.5		$246,500
72	na	159	Hydro	600/55x34	600/50x26.5	$262,000
73	na	210	Hydro	70/50x26.5		$310,000
74	na	125	Hydro	600/65x34	600/55x26.5	$220,000
75	na	125	Hydro	600/55x26.5		$235,000
76	na	185	Hydro	23.1x34	20.5x25	$265,000
77	na	185	Hydro	600mmx26.5		$280,000
78	na	260	Hydro	28Lx26		$277,290
79	na	110	Hydro	28Lx26	700mmx26.5	$268,155
80	na	168	Hydro	700mmx26.6		$346,152
81	na	210	Hydro	650mmx26.5		$419,354
82	na	140	na	na		$100,505
83	na	140	na	na		$118,940
84	na	166	na	na		$153,290
85	na	174	na	na		$102,500
86	na	174	na	na		$127,700
87	na	115	na	na		$74,298
88	na	115				$147,624
89	na	115	na	na		$85,792
90	na	115				$158,686
91	na	152	na	na		$110,819
92	na	152				$178,582
93	na	174	na	na		$112,675
94	na	174	na	na		$121,070
95	na	174	•	30"		$181,030
96	na	174	•	30"		$191,670
97	na	174	•	30"		$205,225
98	na	148	na	na		$102,190
99	na	148	na	na		$120,601
100	na	148	na	na		$138,639
101	na	240	na	na		$161,074
102	na	225	•	24"		$305,275
103	na	225	•	24"		$355,510
104	na	225	•	24"		$354,900

Appendix B. Operating Parameters for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Life (year)	Salvage value	Util.
1	Barko	685	FB	5	0.20	0.65
2	Barko	785	FB	5	0.20	0.65
3	Barko	885	FB	5	0.20	0.65
4	Franklin-TF	C3600 HTFB	FB	5	0.20	0.65
5	Franklin-TF	C4500 HTFB	FB	5	0.20	0.65
6	Franklin-TF	C4800 HTFB	FB	5	0.20	0.65
7	Franklin-TF	C5000 HTFB	FB	5	0.20	0.65
8	Franklin-TF	C5500 HTFB	FB	5	0.20	0.65
9	JD	643G	FB	5	0.20	0.65
10	JD	843G	FB	5	0.20	0.65
11	Tigercat	720B	FB	5	0.20	0.65
12	Tigercat	720C	FB	5	0.20	0.65
13	Tigercat	726B	FB	5	0.20	0.65
14	Timbco	TB820-D	FB	5	0.20	0.60
15	Timbco	TB820-D	FB	5	0.20	0.60
16	Tigercat	845B	FB	5	0.20	0.60
17	Tigercat	845B	FB	5	0.20	0.60
18	Tigercat	H845B	FB	5	0.20	0.60
19	Tigercat	860	FB	5	0.20	0.60
20	Timbco	T415-D	FB	5	0.20	0.60
21	Timbco	T425-D	FB	5	0.20	0.60
22	Timbco	T445-D	FB	5	0.20	0.60
23	Timbco	T450-D	FB	5	0.20	0.60
24	Timbco	T455-D	FB	5	0.20	0.60
25	Tjack	608L	FB	5	0.20	0.60
26	Tjack	950	FB	5	0.20	0.60
27	CAT	550	Harvester	6	0.20	0.80
28	CAT	570	Harvester	6	0.20	0.80
29	Ponsse	HS10	Harvester	6	0.20	0.80
30	Ponsse	HS16	Harvester	6	0.20	0.80
31	Rottne	2004	Harvester	6	0.20	0.80
32	Rottne	5000	Harvester	6	0.20	0.80
33	Rottne	SMV Rapid EGS	Harvester	6	0.20	0.80
34	Rottne	SMV Rapid TGS	Harvester	6	0.20	0.80
35	Tjack	1270B	Harvester	6	0.20	0.80
36	CAT	515	Skidder	5	0.20	0.60
37	CAT	525	Skidder	5	0.20	0.60
38	CAT	545	Skidder	5	0.20	0.60
39	Franklin-TF	170 S2	Skidder	5	0.20	0.60
40	Franklin-TF	405 S2	Skidder	5	0.20	0.60
41	Franklin-TF	Q 70	Skidder	5	0.20	0.60
42	Franklin-TF	Q 80	Skidder	5	0.20	0.60
43	Franklin-TF	Q 90	Skidder	5	0.20	0.60
44	JD	548G-II	Skidder	5	0.20	0.60
45	JD	648G-II	Skidder	5	0.20	0.60
46	JD	748G-II	Skidder	5	0.20	0.60
47	Ranger	F65G	Skidder	5	0.20	0.60
48	Ranger	H66DS	Skidder	5	0.20	0.60
49	Ranger	H67H	Skidder	5	0.20	0.60
50	Ranger	F68G	Skidder	5	0.20	0.60
51	Tigercat	620	Skidder	5	0.20	0.60
52	Tigercat	630B	Skidder	5	0.20	0.60
53	Tigercat	635	Skidder	5	0.20	0.60
54	Tjack	360C	Skidder	5	0.20	0.60

continued

Appendix B. Operating Parameters for Specific Harvesting Machines (Part 2)

Machine number	R&M rate	Interest rate	I&T rate	Fuel use rate	Fuel $/gal.	Lube and oil rate
1	1.00	0.10	0.045	0.02633	1.45	0.3677
2	1.00	0.10	0.045	0.02633	1.45	0.3677
3	1.00	0.10	0.045	0.02633	1.45	0.3677
4	1.00	0.10	0.045	0.02633	1.45	0.3677
5	1.00	0.10	0.045	0.02633	1.45	0.3677
6	1.00	0.10	0.045	0.02633	1.45	0.3677
7	1.00	0.10	0.045	0.02633	1.45	0.3677
8	1.00	0.10	0.045	0.02633	1.45	0.3677
9	1.00	0.10	0.045	0.02633	1.45	0.3677
10	1.00	0.10	0.045	0.02633	1.45	0.3677
11	1.00	0.10	0.045	0.02633	1.45	0.3677
12	1.00	0.10	0.045	0.02633	1.45	0.3677
13	1.00	0.10	0.045	0.02633	1.45	0.3677
14	1.00	0.10	0.045	0.02633	1.45	0.3677
15	1.00	0.10	0.045	0.02633	1.45	0.3677
16	0.75	0.10	0.035	0.02633	1.45	0.3677
17	0.75	0.10	0.035	0.02633	1.45	0.3677
18	0.75	0.10	0.035	0.02633	1.45	0.3677
19	0.75	0.10	0.035	0.02633	1.45	0.3677
20	0.75	0.10	0.035	0.02633	1.45	0.3677
21	0.75	0.10	0.035	0.02633	1.45	0.3677
22	0.75	0.10	0.035	0.02633	1.45	0.3677
23	0.75	0.10	0.035	0.02633	1.45	0.3677
24	0.75	0.10	0.035	0.02633	1.45	0.3677
25	0.75	0.10	0.035	0.02633	1.45	0.3677
26	0.75	0.10	0.035	0.02633	1.45	0.3677
27	0.30	0.10	0.040	0.02633	1.45	0.3677
28	0.30	0.10	0.040	0.02633	1.45	0.3677
29	0.30	0.10	0.040	0.02633	1.45	0.3677
30	0.30	0.10	0.040	0.02633	1.45	0.3677
31	0.30	0.10	0.040	0.02633	1.45	0.3677
32	0.30	0.10	0.040	0.02633	1.45	0.3677
33	0.30	0.10	0.040	0.02633	1.45	0.3677
34	0.30	0.10	0.040	0.02633	1.45	0.3677
35	0.30	0.10	0.040	0.02633	1.45	0.3677
36	0.90	0.10	0.050	0.02800	1.45	0.3677
37	0.90	0.10	0.050	0.02800	1.45	0.3677
38	0.90	0.10	0.050	0.02800	1.45	0.3677
39	0.90	0.10	0.050	0.02800	1.45	0.3677
40	0.90	0.10	0.050	0.02800	1.45	0.3677
41	0.90	0.10	0.050	0.02800	1.45	0.3677
42	0.90	0.10	0.050	0.02800	1.45	0.3677
43	0.90	0.10	0.050	0.02800	1.45	0.3677
44	0.90	0.10	0.050	0.02800	1.45	0.3677
45	0.90	0.10	0.050	0.02800	1.45	0.3677
46	0.90	0.10	0.050	0.02800	1.45	0.3677
47	0.90	0.10	0.050	0.02800	1.45	0.3677
48	0.90	0.10	0.050	0.02800	1.45	0.3677
49	0.90	0.10	0.050	0.02800	1.45	0.3677
50	0.90	0.10	0.050	0.02800	1.45	0.3677
51	0.90	0.10	0.050	0.02800	1.45	0.3677
52	0.90	0.10	0.050	0.02800	1.45	0.3677
53	0.90	0.10	0.050	0.02800	1.45	0.3677
54	0.90	0.10	0.050	0.02800	1.45	0.3677

continued

Appendix B, continued.
Operating Parameters for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Life (year)	Salvage value	Util.
55	Tjack	360C	Skidder	5	0.20	0.60
56	Tjack	460C	Skidder	5	0.20	0.60
57	Tjack	460C	Skidder	5	0.20	0.60
58	Tjack	560	Skidder	5	0.20	0.60
59	Tjack	660C	Skidder	5	0.20	0.60
60	Tjack	660C	Skidder	5	0.20	0.60
61	CAT	517	Skidder	5	0.20	0.60
62	CAT	527	Skidder	5	0.20	0.60
63	Tigercat	C640	Clambunk	5	0.20	0.65
64	Tigercat	S640	Site Prep	5	0.20	0.60
65	Timbco	TF820-D	Clambunk	5	0.20	0.65
66	Timbco	TS820-D	Clambunk	5	0.20	0.65
67	Timbco	TS820-D	Dual Arch	5	0.20	0.60
68	CAT	574	Forwarder	6	0.20	0.80
69	Franklin-TF	632	Forwarder	6	0.20	0.80
70	Franklin-TF	670	Forwarder	6	0.20	0.80
71	Ponsse	S10	Forwarder	6	0.20	0.80
72	Ponsse	S15	Forwarder	6	0.20	0.80
73	Ponsse	S16	Forwarder	6	0.20	0.80
74	Rottne	Rapid (6)	Forwarder	6	0.20	0.80
75	Rottne	Rapid (8)	Forwarder	6	0.20	0.80
76	Rottne	SMV Rapid (6)	Forwarder	6	0.20	0.80
77	Rottne	SMV Rapid (8)	Forwarder	6	0.20	0.80
78	Timbco	TF820-D	Forwarder	6	0.20	0.80
79	Tjack	1010B	Forwarder	6	0.20	0.80
80	Tjack	1410	Forwarder	6	0.20	0.80
81	Tjack	1710	Forwarder	6	0.20	0.80
82	Barko	160D	Loader	5	0.20	0.65
83	Barko	225	Loader	5	0.20	0.65
84	Barko	295	Loader	5	0.20	0.65
85	Franklin-TF	KBL-28	Loader	5	0.20	0.65
86	Franklin-TF	KBL-35	Loader	5	0.20	0.65
87	Husky	XL-175	Loader	5	0.20	0.65
88	Husky	XL-175	Loader	5	0.20	0.65
89	Husky	XL-235	Loader	5	0.20	0.65
90	Husky	XL-235	Loader	5	0.20	0.65
91	Husky	XL-335	Loader	5	0.20	0.65
92	Husky	XL-335	Loader	5	0.20	0.65
93	Tigercat	230B	Loader	5	0.20	0.65
94	Tigercat	240B	Loader	5	0.20	0.65
95	Tigercat	T240B	Loader	5	0.20	0.65
96	Tigercat	T245B	Loader	5	0.20	0.65
97	Tigercat	T248	Loader	5	0.20	0.65
98	Tjack	230	Loader	5	0.20	0.65
99	Tjack	330	Loader	5	0.20	0.65
100	Tjack	430	Loader	5	0.20	0.65
101	Tjack	530	Loader	5	0.20	0.65
102	Tigercat	S860	Shovel	5	0.20	0.65
103	Tigercat	D860	Delimber	5	0.20	0.65
104	Tigercat	D860	Delimber	5	0.20	0.65

[1] CAT=Caterpillar, Franklin-TF=Franklin-TreeFarmer, JD=John Deere, Tjack=Timberjack.

Appendix B, continued.
Operating Parameters for Specific Harvesting Machines (Part 2)

Machine number	R&M rate	Interest rate	I&T rate	Fuel use rate	Fuel $/gal.	Lube and oil rate
55	0.90	0.10	0.050	0.02800	1.45	0.3677
56	0.90	0.10	0.050	0.02800	1.45	0.3677
57	0.90	0.10	0.050	0.02800	1.45	0.3677
58	0.90	0.10	0.050	0.02800	1.45	0.3677
59	0.90	0.10	0.050	0.02800	1.45	0.3677
60	0.90	0.10	0.050	0.02800	1.45	0.3677
61	0.90	0.10	0.020	0.02800	1.45	0.3677
62	0.90	0.10	0.020	0.02800	1.45	0.3677
63	1.00	0.10	0.050	0.02800	1.45	0.3677
64	0.90	0.10	0.050	0.02800	1.45	0.3677
65	1.00	0.10	0.050	0.02800	1.45	0.3677
66	1.00	0.10	0.050	0.02800	1.45	0.3677
67	0.90	0.10	0.050	0.02800	1.45	0.3677
68	0.30	0.10	0.040	0.02488	1.45	0.3677
69	0.30	0.10	0.040	0.02488	1.45	0.3677
70	0.30	0.10	0.040	0.02488	1.45	0.3677
71	0.30	0.10	0.040	0.02488	1.45	0.3677
72	0.30	0.10	0.040	0.02488	1.45	0.3677
73	0.30	0.10	0.040	0.02488	1.45	0.3677
74	0.30	0.10	0.040	0.02488	1.45	0.3677
75	0.30	0.10	0.040	0.02488	1.45	0.3677
76	0.30	0.10	0.040	0.02488	1.45	0.3677
77	0.30	0.10	0.040	0.02488	1.45	0.3677
78	0.30	0.10	0.040	0.02488	1.45	0.3677
79	0.30	0.10	0.040	0.02488	1.45	0.3677
80	0.30	0.10	0.040	0.02488	1.45	0.3677
81	0.30	0.10	0.040	0.02488	1.45	0.3677
82	0.90	0.10	0.015	0.02166	1.45	0.3677
83	0.90	0.10	0.015	0.02166	1.45	0.3677
84	0.90	0.10	0.015	0.02166	1.45	0.3677
85	0.90	0.10	0.015	0.02166	1.45	0.3677
86	0.90	0.10	0.015	0.02166	1.45	0.3677
87	0.90	0.10	0.015	0.02166	1.45	0.3677
88	0.90	0.10	0.015	0.02166	1.45	0.3677
89	0.90	0.10	0.015	0.02166	1.45	0.3677
90	0.90	0.10	0.015	0.02166	1.45	0.3677
91	0.90	0.10	0.015	0.02166	1.45	0.3677
92	0.90	0.10	0.015	0.02166	1.45	0.3677
93	0.90	0.10	0.015	0.02166	1.45	0.3677
94	0.90	0.10	0.015	0.02166	1.45	0.3677
95	0.90	0.10	0.015	0.02166	1.45	0.3677
96	0.90	0.10	0.015	0.02166	1.45	0.3677
97	0.90	0.10	0.015	0.02166	1.45	0.3677
98	0.90	0.10	0.015	0.02166	1.45	0.3677
99	0.90	0.10	0.015	0.02166	1.45	0.3677
100	0.90	0.10	0.015	0.02166	1.45	0.3677
101	0.90	0.10	0.015	0.02166	1.45	0.3677
102	0.90	0.10	0.020	0.03932	1.45	0.3677
103	0.90	0.10	0.020	0.03932	1.45	0.3677
104	0.90	0.10	0.020	0.03932	1.45	0.3677

Appendix C.
Parameters and Annual Costs for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Scheduled hr./yr.	Production hr./yr.
1	Barko	685	FB	2000	1300
2	Barko	785	FB	2000	1300
3	Barko	885	FB	2000	1300
4	Franklin-TF	C3600 HTFB	FB	2000	1300
5	Franklin-TF	C4500 HTFB	FB	2000	1300
6	Franklin-TF	C4800 HTFB	FB	2000	1300
7	Franklin-TF	C5000 HTFB	FB	2000	1300
8	Franklin-TF	C5500 HTFB	FB	2000	1300
9	JD	643G	FB	2000	1300
10	JD	843G	FB	2000	1300
11	Tigercat	720B	FB	2000	1300
12	Tigercat	720C	FB	2000	1300
13	Tigercat	726B	FB	2000	1300
14	Timbco	TB820-D	FB	2000	1200
15	Timbco	TB820-D	FB	2000	1200
16	Tigercat	845B	FB	2000	1200
17	Tigercat	845B	FB	2000	1200
18	Tigercat	H845B	FB	2000	1200
19	Tigercat	860	FB	2000	1200
20	Timbco	T415-D	FB	2000	1200
21	Timbco	T425-D	FB	2000	1200
22	Timbco	T445-D	FB	2000	1200
23	Timbco	T450-D	FB	2000	1200
24	Timbco	T455-D	FB	2000	1200
25	Tjack	608L	FB	2000	1200
26	Tjack	950	FB	2000	1200
27	CAT	550	Harvester	2000	1600
28	CAT	570	Harvester	2000	1600
29	Ponsse	HS10	Harvester	2000	1600
30	Ponsse	HS16	Harvester	2000	1600
31	Rottne	2004	Harvester	2000	1600
32	Rottne	5000	Harvester	2000	1600
33	Rottne	SMV Rapid EGS	Harvester	2000	1600
34	Rottne	SMV Rapid TGS	Harvester	2000	1600
35	Tjack	1270B	Harvester	2000	1600
36	CAT	515	Skidder	2000	1200
37	CAT	525	Skidder	2000	1200
38	CAT	545	Skidder	2000	1200
39	Franklin-TF	170 S2	Skidder	2000	1200
40	Franklin-TF	405 S2	Skidder	2000	1200
41	Franklin-TF	Q 70	Skidder	2000	1200
42	Franklin-TF	Q 80	Skidder	2000	1200
43	Franklin-TF	Q 90	Skidder	2000	1200
44	JD	548G-II	Skidder	2000	1200
45	JD	648G-II	Skidder	2000	1200
46	JD	748G-II	Skidder	2000	1200
47	Ranger	F65G	Skidder	2000	1200
48	Ranger	H66DS	Skidder	2000	1200
49	Ranger	H67H	Skidder	2000	1200
50	Ranger	F68G	Skidder	2000	1200
51	Tigercat	620	Skidder	2000	1200
52	Tigercat	630B	Skidder	2000	1200

continued

Appendix C.
Parameters and Annual Costs for Specific Harvesting Machines (Part 2)

Machine number	Salvage value	Annual deprec.	Average yearly inv.	Interest cost/yr.	Ins. cost/yr.	Fixed cost/yr.
			$			
1	36,829	29,463	125,219	12,522	5,635	47,620
2	39,784	31,827	135,266	13,527	6,087	51,441
3	41,055	32,844	139,587	13,959	6,281	53,084
4	30,320	24,256	103,088	10,309	4,639	39,204
5	34,820	27,856	118,388	11,839	5,327	45,022
6	38,580	30,864	131,172	13,117	5,903	49,884
7	40,740	32,592	138,516	13,852	6,233	52,677
8	44,360	35,488	150,824	15,082	6,787	57,357
9	43,000	34,400	146,200	14,620	6,579	55,599
10	43,400	34,720	147,560	14,756	6,640	56,116
11	36,337	29,070	123,546	12,355	5,560	46,984
12	36,820	29,456	125,188	12,519	5,633	47,608
13	40,604	32,483	138,054	13,805	6,212	52,501
14	54,999	43,999	186,997	18,700	8,415	71,114
15	57,427	45,941	195,250	19,525	8,786	74,253
16	60,037	48,030	204,126	20,413	7,144	75,587
17	67,237	53,790	228,606	22,861	8,001	84,651
18	70,839	56,671	240,853	24,085	8,430	89,186
19	70,251	56,201	238,853	23,885	8,360	88,446
20	38,603	30,883	131,251	13,125	4,594	48,601
21	44,603	35,682	151,650	15,165	5,308	56,155
22	49,767	39,814	169,208	16,921	5,922	62,657
23	51,665	41,332	175,662	17,566	6,148	65,047
24	55,446	44,357	188,518	18,852	6,598	69,807
25	68,711	54,968	233,616	23,362	8,177	86,507
26	86,589	69,271	294,402	29,440	10,304	109,015
27	87,058	58,039	290,193	29,019	11,608	98,666
28	96,349	64,233	321,163	32,116	12,847	109,196
29	82,400	54,933	274,667	27,467	10,987	93,387
30	89,000	59,333	296,667	29,667	11,867	100,867
31	64,000	42,667	213,333	21,333	8,533	72,533
32	82,000	54,667	273,333	27,333	10,933	92,933
33	88,000	58,667	293,333	29,333	11,733	99,733
34	88,000	58,667	293,333	29,333	11,733	99,733
35	81,166	54,111	270,553	27,055	10,822	91,988
36	30,876	24,701	104,978	10,498	5,249	40,448
37	36,483	29,186	124,042	12,404	6,202	47,793
38	55,080	44,064	187,272	18,727	9,364	72,155
39	27,600	22,080	93,840	9,384	4,692	36,156
40	26,900	21,520	91,460	9,146	4,573	35,239
41	33,820	27,056	114,988	11,499	5,749	44,304
42	36,400	29,120	123,760	12,376	6,188	47,684
43	45,640	36,512	155,176	15,518	7,759	59,788
44	31,000	24,800	105,400	10,540	5,270	40,610
45	34,695	27,756	117,963	11,796	5,898	45,450
46	45,400	36,320	154,360	15,436	7,718	59,474
47	29,110	23,288	98,974	9,897	4,949	38,134
48	32,560	26,048	110,704	11,070	5,535	42,654
49	34,940	27,952	118,796	11,880	5,940	45,771
50	35,700	28,560	121,380	12,138	6,069	46,767
51	34,506	27,605	117,320	11,732	5,866	45,203
52	40,244	32,195	136,830	13,683	6,841	52,720

continued

Appendix C, continued.
Parameters and Annual Costs for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Scheduled hr./yr.	Production hr./yr.
53	Tigercat	635	Skidder	2000	1200
54	Tjack	360C	Skidder	2000	1200
55	Tjack	360C	Skidder	2000	1200
56	Tjack	460C	Skidder	2000	1200
57	Tjack	460C	Skidder	2000	1200
58	Tjack	560	Skidder	2000	1200
59	Tjack	660C	Skidder	2000	1200
60	Tjack	660C	Skidder	2000	1200
61	CAT	517	Skidder	2000	1200
62	CAT	527	Skidder	2000	1200
63	Tigercat	C640	Clambunk	2000	1300
64	Tigercat	S640	Site Prep	2000	1200
65	Timbco	TF820-D	Clambunk	2000	1300
66	Timbco	TS820-D	Clambunk	2000	1300
67	Timbco	TS820-D	Dual Arch	2000	1200
68	CAT	574	Forwarder	2000	1600
69	Franklin-TF	632	Forwarder	2000	1600
70	Franklin-TF	670	Forwarder	2000	1600
71	Ponsse	S10	Forwarder	2000	1600
72	Ponsse	S15	Forwarder	2000	1600
73	Ponsse	S16	Forwarder	2000	1600
74	Rottne	Rapid (6)	Forwarder	2000	1600
75	Rottne	Rapid (8)	Forwarder	2000	1600
76	Rottne	SMV Rapid (6)	Forwarder	2000	1600
77	Rottne	SMV Rapid (8)	Forwarder	2000	1600
78	Timbco	TF820-D	Forwarder	2000	1600
79	Tjack	1010B	Forwarder	2000	1600
80	Tjack	1410	Forwarder	2000	1600
81	Tjack	1710	Forwarder	2000	1600
82	Barko	160D	Loader	2000	1300
83	Barko	225	Loader	2000	1300
84	Barko	295	Loader	2000	1300
85	Franklin-TF	KBL-28	Loader	2000	1300
86	Franklin-TF	KBL-35	Loader	2000	1300
87	Husky	XL-175	Loader	2000	1300
88	Husky	XL-175	Loader	2000	1300
89	Husky	XL-275	Loader	2000	1300
90	Husky	XL-275	Loader	2000	1300
91	Husky	XL-375	Loader	2000	1300
92	Husky	XL-375	Loader	2000	1300
93	Tigercat	230B	Loader	2000	1300
94	Tigercat	240B	Loader	2000	1300
95	Tigercat	T240B	Loader	2000	1300
96	Tigercat	T245B	Loader	2000	1300
97	Tigercat	T248	Loader	2000	1300
98	Tjack	230	Loader	2000	1300
99	Tjack	330	Loader	2000	1300
100	Tjack	430	Loader	2000	1300
101	Tjack	530	Loader	2000	1300
102	Tigercat	S860	Shovel	2000	1300
103	Tigercat	D860	Delimber	2000	1300
104	Tigercat	D860	Delimber	2000	1300

[1] CAT=Caterpillar, Franklin-TF=Franklin-TreeFarmer, JD=John Deere, Tjack=Timberjack.

Appendix C, continued.

Parameters and Annual Costs for Specific Harvesting Machines (Part 2)

Machine number	Salvage value	Annual deprec.	Average yearly inv.	Interest cost/yr.	Ins. cost/yr.	Fixed cost/yr.
			$			
53	53,856	43,085	183,110	18,311	9,156	70,551
54	28,685	22,948	97,528	9,753	4,876	37,577
55	32,186	25,749	109,433	10,943	5,472	42,164
56	30,916	24,733	105,114	10,511	5,256	40,500
57	34,569	27,656	117,536	11,754	5,877	45,286
58	44,586	35,669	151,592	15,159	7,580	58,407
59	39,801	31,840	135,322	13,532	6,766	52,139
60	48,632	38,905	165,347	16,535	8,267	63,707
61	47,774	38,219	162,432	16,243	3,249	57,711
62	56,170	44,936	190,979	19,098	3,820	67,854
63	52,240	41,792	177,616	17,762	8,881	68,434
64	34,224	27,379	116,362	11,636	5,818	44,833
65	58,872	47,098	200,165	20,016	10,008	77,122
66	59,847	47,878	203,481	20,348	10,174	78,400
67	56,684	45,347	192,724	19,272	9,636	74,256
68	72,232	48,155	240,773	24,077	9,631	81,863
69	37,920	25,280	126,400	12,640	5,056	42,976
70	42,220	28,147	140,733	14,073	5,629	47,849
71	49,300	32,867	164,333	16,433	6,573	55,873
72	52,400	34,933	174,667	17,467	6,987	59,387
73	62,000	41,333	206,667	20,667	8,267	70,267
74	44,000	29,333	146,667	14,667	5,867	49,867
75	47,000	31,333	156,667	15,667	6,267	53,267
76	53,000	35,333	176,667	17,667	7,067	60,067
77	56,000	37,333	186,667	18,667	7,467	63,467
78	55,458	36,972	184,860	18,486	7,394	62,852
79	53,631	35,754	178,770	17,877	7,151	60,782
80	69,230	46,154	230,768	23,077	9,231	78,461
81	83,871	55,914	279,569	27,957	11,183	95,054
82	20,101	16,081	68,343	6,834	1,025	23,940
83	23,788	19,030	80,879	8,088	1,213	28,332
84	30,658	24,526	104,237	10,424	1,564	36,514
85	20,500	16,400	69,700	6,970	1,046	24,416
86	25,540	20,432	86,836	8,684	1,303	30,418
87	14,860	11,888	50,523	5,052	758	17,698
88	29,525	23,620	100,384	10,038	1,506	35,164
89	17,158	13,727	58,339	5,834	875	20,436
90	31,737	25,390	107,906	10,791	1,619	37,799
91	22,164	17,731	75,357	7,536	1,130	26,397
92	35,716	28,573	121,436	12,144	1,822	42,538
93	22,535	18,028	76,619	7,662	1,149	26,839
94	24,214	19,371	82,328	8,233	1,235	28,839
95	36,206	28,965	123,100	12,310	1,847	43,121
96	38,334	30,667	130,336	13,034	1,955	45,656
97	41,045	32,836	139,553	13,955	2,093	48,885
98	20,438	16,350	69,489	6,949	1,042	24,342
99	24,120	19,296	82,009	8,201	1,230	28,727
100	27,728	22,182	94,275	9,427	1,414	33,024
101	32,215	25,772	109,530	10,953	1,643	38,368
102	61,055	48,844	207,587	20,759	4,152	73,754
103	71,102	56,882	241,747	24,175	4,835	85,891
104	70,980	56,784	241,332	24,133	4,827	85,744

Appendix D. Operating Costs for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Fixed $/SMH	Fixed $/PMH	Fuel $/PMH
				—————$—————		
1	Barko	685	FB	23.81	36.63	5.34
2	Barko	785	FB	25.72	39.57	6.64
3	Barko	885	FB	26.54	40.83	8.21
4	Franklin-TF	C3600 HTFB	FB	19.60	30.16	5.80
5	Franklin-TF	C4500 HTFB	FB	22.51	34.63	5.80
6	Franklin-TF	C4800 HTFB	FB	24.94	38.37	6.64
7	Franklin-TF	C5000 HTFB	FB	26.34	40.52	6.64
8	Franklin-TF	C5500 HTFB	FB	28.68	44.12	8.02
9	JD	643G	FB	27.80	42.77	6.49
10	JD	843G	FB	28.06	43.17	7.64
11	Tigercat	720B	FB	23.49	36.14	6.30
12	Tigercat	720C	FB	23.80	36.62	6.64
13	Tigercat	726B	FB	26.25	40.39	8.21
14	Timbco	TB820-D	FB	35.56	59.26	9.93
15	Timbco	TB820-D	FB	37.13	61.88	9.93
16	Tigercat	845B	FB	37.79	62.99	7.83
17	Tigercat	845B	FB	42.33	70.54	7.83
18	Tigercat	H845B	FB	44.59	74.32	8.78
19	Tigercat	860	FB	44.22	73.71	9.54
20	Timbco	T415-D	FB	24.30	40.50	7.64
21	Timbco	T425-D	FB	28.08	46.80	8.21
22	Timbco	T445-D	FB	31.33	52.21	9.93
23	Timbco	T450-D	FB	32.52	54.21	9.93
24	Timbco	T455-D	FB	34.90	58.17	9.93
25	Tjack	608L	FB	43.25	72.09	8.78
26	Tjack	950	FB	54.51	90.85	8.78
27	CAT	550	Harvester	49.33	61.67	6.22
28	CAT	570	Harvester	54.60	68.25	8.44
29	Ponsse	HS10	Harvester	46.69	58.37	8.02
30	Ponsse	HS16	Harvester	50.43	63.04	8.02
31	Rottne	2004	Harvester	36.27	45.33	4.58
32	Rottne	5000	Harvester	46.47	58.08	6.49
33	Rottne	SMV Rapid EGS	Harvester	49.87	62.33	7.06
34	Rottne	SMV Rapid TGS	Harvester	49.87	62.33	6.49
35	Tjack	1270B	Harvester	45.99	57.49	7.79
36	CAT	515	Skidder	20.22	33.71	6.21
37	CAT	525	Skidder	23.90	39.83	7.11
38	CAT	545	Skidder	36.08	60.13	9.14
39	Franklin-TF	170 S2	Skidder	18.08	30.13	7.06
40	Franklin-TF	405 S2	Skidder	17.62	29.37	6.17
41	Franklin-TF	Q 70	Skidder	22.15	36.92	7.51
42	Franklin-TF	Q 80	Skidder	23.84	39.74	7.51
43	Franklin-TF	Q 90	Skidder	29.89	49.82	9.34
44	JD	548G-II	Skidder	20.31	33.84	4.83
45	JD	648G-II	Skidder	22.73	37.88	6.21
46	JD	748G-II	Skidder	29.74	49.56	6.86
47	Ranger	F65G	Skidder	19.07	31.78	4.71
48	Ranger	H66DS	Skidder	21.33	35.54	7.06
49	Ranger	H67H	Skidder	22.89	38.14	7.51
50	Ranger	F68G	Skidder	23.38	38.97	9.34
51	Tigercat	620	Skidder	22.60	37.67	7.06
52	Tigercat	630B	Skidder	26.36	43.93	9.74

continued

Appendix D. Operating Costs for Specific Harvesting Machines (Part 2)

Machine number	Lube&oil $/PMH	R&M $/PMH	Oper. $/PMH	Oper. $/SMH	Total $/PMH	Total $/SMH
			$			
1	1.97	22.66	29.97	19.48	66.61	43.29
2	2.44	24.48	33.57	21.82	73.14	47.54
3	3.02	25.26	36.49	23.72	77.33	50.26
4	2.13	18.66	26.60	17.29	56.75	36.89
5	2.13	21.43	29.36	19.09	64.00	41.60
6	2.44	23.74	32.83	21.34	71.20	46.28
7	2.44	25.07	34.16	22.20	74.68	48.54
8	2.95	27.30	38.26	24.87	82.39	53.55
9	2.39	26.46	35.34	22.97	78.11	50.77
10	2.81	26.71	37.15	24.15	80.32	52.21
11	2.32	22.36	30.98	20.14	67.12	43.63
12	2.44	22.66	31.74	20.63	68.37	44.44
13	3.02	24.99	36.21	23.54	76.60	49.79
14	3.65	36.67	50.24	30.15	109.50	65.70
15	3.65	38.28	51.86	31.12	113.74	68.24
16	2.88	30.02	40.72	24.43	103.71	62.23
17	2.88	33.62	44.32	26.59	114.87	68.92
18	3.23	35.42	47.43	28.46	121.75	73.05
19	3.51	35.13	48.18	28.91	121.88	73.13
20	2.81	19.30	29.74	17.85	70.25	42.15
21	3.02	22.30	33.53	20.12	80.32	48.19
22	3.65	24.88	38.46	23.08	90.67	54.40
23	3.65	25.83	39.41	23.65	93.61	56.17
24	3.65	27.72	41.30	24.78	99.47	59.68
25	3.23	34.36	46.37	27.82	118.45	71.07
26	3.23	43.29	55.30	33.18	146.15	87.69
27	2.29	10.88	19.39	15.51	81.06	64.85
28	3.10	12.04	23.58	18.87	91.83	73.46
29	2.95	10.30	21.27	17.01	79.63	63.71
30	2.95	11.13	22.09	17.67	85.13	68.11
31	1.68	8.00	14.27	11.41	59.60	47.68
32	2.39	10.25	19.13	15.30	77.21	61.77
33	2.60	11.00	20.66	16.53	82.99	66.39
34	2.39	11.00	19.88	15.90	82.21	65.77
35	2.86	10.15	20.80	16.64	78.29	62.63
36	2.28	18.53	27.02	16.21	60.73	36.44
37	2.61	21.89	31.61	18.96	71.43	42.86
38	3.36	33.05	45.54	27.33	105.67	63.40
39	2.60	16.56	26.22	15.73	56.35	33.81
40	2.27	16.14	24.58	14.75	53.95	32.37
41	2.76	20.29	30.56	18.34	67.48	40.49
42	2.76	21.84	32.11	19.27	71.85	43.11
43	3.43	27.38	40.16	24.09	89.98	53.99
44	1.78	18.60	25.21	15.12	59.05	35.43
45	2.28	20.82	29.31	17.59	67.19	40.31
46	2.52	27.24	36.62	21.97	86.19	51.71
47	1.73	17.47	23.91	14.34	55.69	33.41
48	2.60	19.54	29.20	17.52	64.74	38.85
49	2.76	20.96	31.24	18.74	69.38	41.63
50	3.43	21.42	34.19	20.51	73.16	43.90
51	2.60	20.70	30.37	18.22	68.03	40.82
52	3.58	24.15	37.47	22.48	81.41	48.84

continued

Appendix D, continued.
Operating Costs for Specific Harvesting Machines (Part 1)

Machine number	Machine make[1]	Machine model	Machine type	Fixed $/SMH	Fixed $/PMH	Fuel $/PMH
				$		
53	Tigercat	635	Skidder	35.28	58.79	9.74
54	Tjack	360C	Skidder	18.79	31.31	6.01
55	Tjack	360C	Skidder	21.08	35.14	6.01
56	Tjack	460C	Skidder	20.25	33.75	7.06
57	Tjack	460C	Skidder	22.64	37.74	7.06
58	Tjack	560	Skidder	29.20	48.67	7.51
59	Tjack	660C	Skidder	26.07	43.45	8.73
60	Tjack	660C	Skidder	31.85	53.09	8.73
61	CAT	517	Skidder	28.86	48.09	5.52
62	CAT	527	Skidder	33.93	56.54	6.74
63	Tigercat	C640	Clambunk	34.22	52.64	9.74
64	Tigercat	S640	Site Prep	22.42	37.36	9.74
65	Timbco	TF820-D	Clambunk	38.56	59.32	10.56
66	Timbco	TS820-D	Clambunk	39.20	60.31	10.56
67	Timbco	TS820-D	Dual Arch	37.13	61.88	10.56
68	CAT	574	Forwarder	40.93	51.16	5.88
69	Franklin-TF	632	Forwarder	21.49	26.86	4.18
70	Franklin-TF	670	Forwarder	23.92	29.91	5.48
71	Ponsse	S10	Forwarder	27.94	34.92	4.40
72	Ponsse	S15	Forwarder	29.69	37.12	5.74
73	Ponsse	S16	Forwarder	35.13	43.92	7.58
74	Rottne	Rapid (6)	Forwarder	24.93	31.17	4.51
75	Rottne	Rapid (8)	Forwarder	26.63	33.29	4.51
76	Rottne	SMV Rapid (6)	Forwarder	30.03	37.54	6.67
77	Rottne	SMV Rapid (8)	Forwarder	31.73	39.67	6.67
78	Timbco	TF820-D	Forwarder	31.43	39.28	9.38
79	Tjack	1010B	Forwarder	30.39	37.99	3.97
80	Tjack	1410	Forwarder	39.23	49.04	6.06
81	Tjack	1710	Forwarder	47.53	59.41	7.58
82	Barko	160D	Loader	11.97	18.42	4.40
83	Barko	225	Loader	14.17	21.79	4.40
84	Barko	295	Loader	18.26	28.09	5.21
85	Franklin-TF	KBL-28	Loader	12.21	18.78	5.46
86	Franklin-TF	KBL-35	Loader	15.21	23.40	5.46
87	Husky	XL-175	Loader	8.85	13.61	3.61
88	Husky	XL-175	Loader	17.58	27.05	3.61
89	Husky	XL-275	Loader	10.22	15.72	3.61
90	Husky	XL-275	Loader	18.90	29.08	3.61
91	Husky	XL-375	Loader	13.20	20.31	4.77
92	Husky	XL-375	Loader	21.27	32.72	4.77
93	Tigercat	230B	Loader	13.42	20.65	5.46
94	Tigercat	240B	Loader	14.42	22.18	5.46
95	Tigercat	T240B	Loader	21.56	33.17	5.46
96	Tigercat	T245B	Loader	22.83	35.12	5.46
97	Tigercat	T248	Loader	24.44	37.60	5.46
98	Tjack	230	Loader	12.17	18.72	4.65
99	Tjack	330	Loader	14.36	22.10	4.65
100	Tjack	430	Loader	16.51	25.40	4.65
101	Tjack	530	Loader	19.18	29.51	7.54
102	Tigercat	S860	Shovel	36.88	56.73	12.83
103	Tigercat	D860	Delimber	42.95	66.07	12.83
104	Tigercat	D860	Delimber	42.87	65.96	12.83

[1] CAT=Caterpillar, Franklin-TF=Franklin-TreeFarmer, JD=John Deere, Tjack=Timberjack.

Appendix D, continued.
Operating Costs for Specific Harvesting Machines (Part 2)

Machine number	Lube&oil $/PMH	R&M $/PMH	Oper. $/PMH	Oper. $/SMH	Total $/PMH	Total $/SMH
			$			
53	3.58	32.31	45.64	27.38	104.43	62.66
54	2.21	17.21	25.43	15.26	56.74	34.05
55	2.21	19.31	27.53	16.52	62.67	37.60
56	2.60	18.55	28.21	16.93	61.96	37.18
57	2.60	20.74	30.40	18.24	68.14	40.89
58	2.76	26.75	37.02	22.21	85.70	51.42
59	3.21	23.88	35.82	21.49	79.27	47.56
60	3.21	29.18	41.12	24.67	94.21	56.52
61	2.03	28.66	36.22	21.73	84.31	50.59
62	2.48	33.70	42.92	25.75	99.46	59.68
63	3.58	32.15	45.47	29.56	98.12	63.78
64	3.58	20.53	33.86	20.32	71.22	42.73
65	3.88	36.23	50.67	32.93	109.99	71.49
66	3.88	36.83	51.27	33.32	111.57	72.52
67	3.88	34.01	48.45	29.07	110.33	66.20
68	2.16	9.03	17.07	13.66	68.24	54.59
69	1.54	4.74	10.46	8.37	37.32	29.86
70	2.02	5.28	12.78	10.22	42.68	34.15
71	1.62	6.16	12.18	9.75	47.10	37.68
72	2.11	6.55	14.40	11.52	51.51	41.21
73	2.79	7.75	18.11	14.49	62.03	49.62
74	1.66	5.50	11.67	9.33	42.83	34.27
75	1.66	5.88	12.04	9.63	45.33	36.27
76	2.45	6.63	15.75	12.60	53.29	42.64
77	2.45	7.00	16.13	12.90	55.79	44.64
78	3.45	6.93	19.76	15.81	59.04	47.23
79	1.46	6.70	12.13	9.71	50.12	40.10
80	2.23	8.65	16.94	13.55	65.98	52.79
81	2.79	10.48	20.85	16.68	80.25	64.20
82	1.62	11.13	17.15	11.15	35.56	23.12
83	1.62	13.17	19.19	12.47	40.98	26.64
84	1.92	16.98	24.11	15.67	52.20	33.93
85	2.01	11.35	18.83	12.24	37.61	24.45
86	2.01	14.15	21.62	14.05	45.02	29.26
87	1.33	8.23	13.17	8.56	26.78	17.41
88	1.33	16.35	21.29	13.84	48.34	31.42
89	1.33	9.50	14.44	9.39	30.16	19.61
90	1.33	17.58	22.52	14.64	51.59	33.54
91	1.76	12.28	18.80	12.22	39.11	25.42
92	1.76	19.78	26.31	17.10	59.03	38.37
93	2.01	12.48	19.96	12.97	40.60	26.39
94	2.01	13.41	20.89	13.58	43.07	27.99
95	2.01	20.05	27.53	17.89	60.70	39.45
96	2.01	21.23	28.71	18.66	63.83	41.49
97	2.01	22.73	30.21	19.63	67.81	44.08
98	1.71	11.32	17.68	11.49	36.40	23.66
99	1.71	13.36	19.72	12.82	41.81	27.18
100	1.71	15.36	21.71	14.11	47.12	30.63
101	2.77	17.84	28.15	18.30	57.67	37.48
102	4.72	33.82	51.36	33.38	108.09	70.26
103	4.72	39.38	56.92	37.00	122.99	79.95
104	4.72	39.31	56.86	36.96	122.81	79.83

Appendix E. Comparision Chart for Operating Costs for Specific Harvesting Machines (Part 1)

Machine make	Model number	Model number	Purchase price($)	Purchase price($)	Purchase inc.($)	Purchase —inc.(%)— (actual)	(real)
	2000	1988	2000	1988			
Feller Buncher							
Barko	785	775	198,920.00	128,000.00	70,920.00	36	3
Fklin-TF	C3600 HTFB	105	151,600.00	73,500.00	78,100.00	52	27
Fklin-TF	C4500 HTFB	405	174,100.00	81,200.00	92,900.00	53	30
Fklin-TF	C4800 HTFB	170	192,900.00	100,000.00	92,900.00	48	22
Timbco	T415-D	2515	193,016.00	157,069.00	35,947.00	19	-23
Timbco	T425-D	2518	223,015.00	169,306.00	53,709.00	24	-15
Timbco	T445-D	2520	248,836.00	197,533.00	51,303.00	21	-20
Skidder							
CAT	515	518	154,380.00	106,760.00	47,620.00	31	-4
CAT	525	528	182,415.00	151,000.00	31,415.00	17	-25
CAT	517	D4HCS	238,870.00	145,145.00	93,725.00	39	8
CAT	527	D5HCSr	280,851.00	190,096.00	90,755.00	32	-2
Fklin-TF	170 S2	170	138,000.00	84,000.00	54,000.00	39	8
JD	548G-II	548D	155,000.00	74,090.00	80,910.00	52	28
JD	648G-II	648D	173,475.00	85,046.00	88,429.00	51	26
Tjack	360C	380A	160,931.00	97,000.00	63,931.00	40	9
Tjack	460C	450A	172,847.00	103,000.00	69,847.00	40	10
Loader							
Barko	160D	160A	100,505.00	62,000.00	38,505.00	38	7
Barko	225	275	118,940.00	85,000.00	33,940.00	29	-8
Barko	295	350	153,290.00	165,000.00	(11,710.00)	-8	-63
Husky	XL-175	XL-175	74,298.00	43,024.00	31,274.00	42	13
Husky	XL-275	XL-235	85,792.00	53,174.00	32,618.00	38	6
Husky	XL-375	XL-335	110,819.00	74,610.00	36,209.00	33	-2

Appendix E. Comparision Chart for Operating Costs for Specific Harvesting Machines (Part 2)

Total $/SMH	Total $/SMH	$/SMH inc.	$/SMH inc.(%)	Total $/PMH	Total $/PMH	$/PMH inc.	$/PMH —inc.(%)— (actual)	$/PMH —inc.(%)— (real)
2000	1988			2000	1988			
				Feller Buncher				
47.88	32.91	14.97	31	73.66	50.64	23.02	31	2
36.89	18.21	18.68	51	56.75	28.02	28.73	51	30
41.60	20.57	21.03	51	64.00	31.64	32.36	51	30
46.28	25.17	21.11	46	71.20	38.72	32.48	46	23
42.15	40.66	1.49	4	70.25	67.76	2.49	4	-22
48.19	43.53	4.66	10	80.32	72.54	7.78	10	-14
54.40	50.15	4.25	8	90.67	83.58	7.09	8	-16
				Skidder				
36.70	28.24	8.46	23	61.17	43.73	17.44	29	4
43.17	36.91	6.26	15	71.95	61.51	10.44	15	-15
50.99	33.50	17.49	34	84.99	55.83	29.16	34	11
60.16	43.94	16.22	27	100.26	73.24	27.02	27	2
34.05	21.19	12.86	38	56.74	35.32	21.42	38	17
35.69	18.43	17.26	48	59.49	30.72	28.77	48	31
40.61	21.28	19.33	48	67.68	35.47	32.21	48	25
37.87	24.53	13.34	35	63.12	40.88	22.24	35	7
41.81	26.50	15.31	37	68.63	44.17	24.46	36	16
				Loader				
23.29	13.84	9.45	41	35.83	21.30	14.53	41	8
26.64	18.95	7.69	29	40.98	29.16	11.82	29	-10
33.93	36.27	-2.34	-7	52.20	55.79	-3.59	-7	-65
17.41	9.87	7.54	43	26.78	15.18	11.60	43	12
19.61	11.90	7.71	39	30.16	18.31	11.85	39	6
38.37	16.68	21.69	57	59.03	25.66	33.37	57	33

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