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Costs of Producing Seed Potatoes in Michigan
Michigan State University Cooperative Extension Service
Allen Shapley, Anne Williams, Agricultural Economics
Issued February 1988
12 pages

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Costs of Producing Seed Potatoes in Michigan

by

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Michigan ranks 10th in the country in the production of potatoes. About 55,000 acres of potatoes are planted, and approximately 4,000 of these acres (about 7 percent) are raised and sold as seed potatoes. The leading county is Presque Isle, with 613 acres, followed by Otsego with 462 acres. The remainder are in several other northern Michigan counties.

The cost of producing seed potatoes is very high compared with costs of such crops as corn or soybeans. For example, this study indicates that the variable (direct) costs to produce an acre of seed potatoes are approximately \$1,300; for corn grain, these costs are approximately \$150.

Costs vary greatly between farms. It is essential that seed potato producers know their own cost of producing a hundredweight (cwt) of seed potatoes if they are to succeed. The information here can be of value to seed potato growers making decisions about expanding, reducing or holding constant the potato enterprise. They may compare costs given here with their costs for an indication of how efficient they are in producing seed potatoes compared with a "typical" grower. Vegetable growers can compare the costs here with the cost of producing other vegetables to determine their enterprise mix. Growers, sellers, processors and buyers will also find the information useful in marketing decisions.

The Typical Farm

The "typical farm" in this study has the following characteristics:

- 500 total acres, of which 250 are tillable.

- The 250 tillable acres are in vegetable production, and of that, 80 acres (30 percent) are in seed potatoes.
- The farm includes a full complement of general machinery, equipment, buildings and improvements for farm operation, plus the specialized equipment necessary for potato production.
- The 80-acre seed potato enterprise yields 250 cwt per acre. Ninety percent of this is of seed quality; the other 10 percent is sold as tablestock potatoes.
- 225 cwt per acre (90 percent of 250 cwt) are stored as seed potatoes, and 25 cwt (10 percent of 250 cwt) are stored as tablestock. After an 8 percent shrinkage loss during storage, 207 cwt per acre are packed as seed potatoes and 23 cwt as tablestock potatoes.
- 80 percent of the seed potatoes (166 cwt) are packed in bulk, with the remaining 20 percent (41 cwt) packed in bags.
- 100 percent of the tablestock potatoes are packed in bags.

Fixed Costs + Variable Costs = Total Costs

The various costs included in this study are divided into two categories: fixed and variable. Fixed costs include those that vary little, if any, with the crop or the amount produced on the farm, such as property taxes and interest on investment. Variable costs include those that vary more directly with crop production, including hired labor, fuel, fertilizer, seed, pesticides, etc.

Fixed Costs

Table 1A lists the general machinery and equipment complement needed to operate our "typical" 500-acre farm and presents the first fixed cost—depreciation on general machinery and equipment. It also gives the average value of machinery and equipment, which is used to calculate another fixed cost—interest on the machinery and equipment investment (shown in Table 3). Table 1B includes the specialized equipment costs for an 80-acre seed potato enterprise. Table 2A includes the inventory of land, general buildings and improvement costs. Table 2B includes the specialized facilities needed for potato production.

Table 3 brings all the fixed costs together. Depreciation is taken directly from the calculated values in Tables 1A, 1B, 2A and 2B. Interest on investment is determined by charging 10 percent on the average values calculated in Tables 1A, 1B, 2A and 2B. Repairs and maintenance are considered a fixed cost on buildings and improvements but a variable cost for machinery and equipment. Taxes and insurance are the final fixed costs.

The general machinery, equipment, buildings and improvements are used to operate the whole farm, not just to produce potatoes. Because seed potatoes take up 30 percent of the income-producing acreage, 30 percent of the cost of owning these items is charged to the seed potato enterprise. The costs associated with owning the specialized machinery, equipment and improvements are charged entirely to the seed potato enterprise.

Numerous methods may be used to allocate general fixed costs to the various enterprises on the farm. Here, they are allocated on the basis of income-producing acreage. Another common method is to allocate these costs on the basis of gross receipts generated by the various enterprises.

If this method were used on our typical farm and we assumed that the potato enterprise generates 60 percent of the farm's gross receipts (even though it utilizes only 30 percent of the income-producing acres), we would then charge 60 percent of the general fixed costs to the potato enterprise. When allocating

these costs on your farm, use a method that best represents reality for your business.

Table 3 indicates that the portion of the total fixed costs charged to the seed potato enterprise is \$66,011, which breaks down to \$825 per acre.

Variable Costs

The variable costs (sometimes called direct or operating costs) to produce an acre of seed potatoes are listed in Table 4. The values reflect per acre costs based on an 80-acre enterprise with a total production of 20,000 cwt. Ninety percent of this field yield is of seed quality; the other 10 percent is sold as tablestock potatoes.

The variable costs have been divided into three categories: growing, harvesting and storage, and packing and marketing. Note that the last two categories account for approximately one-third of all variable costs. The quantities of inputs listed in Table 4 do not necessarily reflect university recommendations, but rather represent grower practices.

Most items in Table 4 are self-explanatory, but two items need explanation: labor costs for storage and packing, and interest on operator capital.

First, we assumed that six people can store 250 cwt potatoes in 20 minutes (for a labor total of 2 hrs). This results in an hourly rate of 125 cwt/hr (250 cwt divided by 2 hrs) or 2 hrs/A (250 cwt/A divided by 125 cwt/hr). Ninety percent of this time (1.8 hr) is allotted to seed potato storage and .2 hr to tablestock.

Packing labor costs are based on the assumption that seven people can pack 900 cwt of potatoes in 8 hours (56 hrs total labor). This results in an hourly rate of 16 cwt/hr (900 cwt divided by 56 hrs).

The pack-out rate on our typical farm is 207 cwt/A (see basic assumptions). Eighty percent of the 207 cwt of seed potatoes (166 cwt) are packed in bulk. The labor cost for packing in bulk is 34 cents/cwt (\$5.50/hr wage rate divided by 16 cwt/hr). The total cost for packing the 166 cwt/A of seed potatoes is \$56.44/A (166 cwt/A x 34 cents/cwt).

Twenty percent of the 207 cwt of seed potatoes (41 cwt/A) are packed in bags. We know from farmer es-

estimates that packing in bags costs an extra 65 cents/cwt, bringing the unit cost for packing in bags to 99 cents/cwt (65 cents/cwt + 34 cents/cwt). The total cost of packing in bags is \$40.59/A (41 cwt/A x 99 cents/cwt).

The same calculations are repeated to obtain tablestock costs but with 100 percent of the tablestock potatoes packed in bags. With a unit cost of 99 cents/cwt, the total cost for packing tablestock potatoes is \$22.77/A (23 cwt/A x 99 cents/cwt).

Second, interest on operator capital requires some explanation. Regardless of whether a grower borrows operating money to plant and grow the crop or takes it out of savings, a charge must be made for its use. Interest is charged only on the growing costs and not on the harvesting and marketing costs because it is assumed that the latter will be paid from receipts as they occur. On many farms, this is not the case because receipts come in long after harvest. On such farms, interest should be charged on the total variable costs rather than on the growing costs alone.

As Table 4 shows, the variable costs for an 80-acre typical seed potato enterprise total \$1,293 per acre.

Total Costs and Returns

Table 5 brings together the variable and fixed costs for producing seed potatoes and compares these costs with typical gross receipts. These costs are calculated on a per acre and a per cwt basis.

The figures in Table 5 indicate that this typical seed potato enterprise was not profitable. The price per cwt did cover the variable costs but contributed only \$2.04 toward the fixed costs of \$3.59. In fact, the harvest and postharvest costs per cwt (\$1.83) equaled 24 percent of the price received. Of course, your yield or prices may be higher or costs lower than those on the typical farm. If any of these situations were to exist, the crop could show a profitable return. On the other hand, your costs could be higher, the yield lower or the price lower, resulting in an even greater loss than that shown in Table 5.

These Figures vs. Your Figures

The figures in Tables 1A-5 are estimates based on consensus of several Michigan seed potato growers. To calculate the costs on your farm, use your own farm records as much as possible to fill in the "your farm" columns. For those items where no records exist, use the figures in the tables or other relevant estimates. The "Worksheet for Summarizing" helps to bring together your costs per acre and per cwt and guides you through the calculation of net return.

If your total cost per cwt is greater than your expected price per cwt (over the long run), then seed potato production is a questionable enterprise. If your projected total variable cost per cwt is greater than your expected price in any year, you definitely should not grow seed potatoes. In such a situation, you would be better off to leave the land fallow.

List of Tables

Table 1A	General machinery and equipment costs for a typical farm producing seed potatoes, Michigan, 1987	<i>Page 4</i>
Table 1B	Specialized equipment costs for an 80-acre seed potato enterprise, Michigan, 1987	<i>Page 5</i>
Table 2A	Land, general building and improvement costs for a typical farm producing seed potatoes, Michigan, 1987	<i>Page 6</i>
Table 2B	Specialized building and improvement costs for an 80-acre seed potato enterprise, Michigan, 1987	<i>Page 6</i>
Table 3	Fixed costs charged to the seed potato enterprise, typical farm, Michigan, 1987	<i>Page 7</i>
Table 4	Variable costs per acre for seed potato production, Michigan, 1987	<i>Page 8</i>
Table 5	Per acre and per hundredweight costs and returns for seed potato production, typical farm, Michigan, 1987	<i>Page 10</i>
	Worksheet for summarizing your costs and returns per acre and per hundredweight	<i>Page 12</i>

Table 1A. General Machinery and Equipment Costs for a Typical Farm Producing Seed Potatoes, Michigan, 1987¹

Item	New Price	Salvage Value ²	Average Value ³	Annual Depreciation ⁴
TRACTORS				
100 hp diesel (F.W. assist)	\$ 40,000	\$20,000	\$ 30,000	\$ 2,000
75 hp diesel (2) @ \$28,000	56,000	30,000	43,000	2,600
40 hp (2) @ \$18,000	36,000	18,000	27,000	1,800
I.H. Model BN (forklift)	7,000	4,000	5,500	300
TILLAGE				
4-18 in rollover plow	9,000	1,000	5,000	800
Stone picker (used)	—	—	5,000	—
14 ft disk	6,000	1,000	3,500	500
Subsoiler	4,000	600	2,300	340
Springtooth drag	3,000	1,000	2,000	200
Cultipacker (used)	—	—	2,500	—
CROP PLANTING AND MAINTENANCE				
Fertilizer spreader	4,000	800	2,400	320
Corn planter	20,000	8,000	14,000	1,200
Loader for a 75 hp tractor	3,500	1,000	2,250	250
Brush hog	600	200	400	40
Drill	10,000	4,000	7,000	600
MISCELLANEOUS				
Pickup truck (4-wheel drive)	12,000	2,000	7,000	1,000
Dump truck (used)	—	—	5,000	—
Elevator	6,000	500	3,250	550
Shop tools	10,000	6,000	8,000	400
TOTALS	\$227,100		\$175,100	\$12,900

¹The typical seed potato farm in this study consists of 500 acres total, with 250 tillable.

²A 10-year life is assigned to all machinery and equipment.

³Average value is calculated to create a basis for determining interest on machinery and equipment investment (see Table 3). When determining this value for your farm, use an estimated market value of the machinery and equipment.

⁴Annual depreciation = (new price - salvage value) ÷ 10 years.

Table 1B. Specialized Equipment Costs for an 80-acre Seed Potato Enterprise, Michigan, 1987

Item	New price	Salvage value ¹	Average value ²	Annual depreciation ³
PRODUCTION AND HARVEST				
Seed cutter	\$ 2,500	\$ 500	\$ 1,500	200
4-row potato planter	19,000	6,500	12,750	1,250
Seed elevator (20 ft w/power)	3,500	500	2,000	300
Cultivator/hiller	1,500	500	1,000	100
500-gal T sprayer, 60-ft boom	20,000	9,000	14,500	1,100
Weed sprayer	3,500	500	2,000	300
Traveler irrigation unit	18,000	6,000	12,000	1,200
1,000 ft 6-in aluminum pipe	2,100	900	1,500	120
Irrigation pumps (2) @ \$14,000	28,000	10,000	19,000	1,800
2-row windrower	15,000	5,000	10,000	1,000
2-row harvester w/air separator	50,000	12,500	31,250	3,750
Tandem trucks (2) @ \$12,000	24,000	10,000	17,000	1,400
Wagons (4) w/box (10 T run. gear) @ \$3,000	12,000	3,000	7,500	900
PACKING FACILITY				
Elevator	5,000	1,000	3,000	400
Grading line, 24-in portable dry grader, input elevator/screen, sizer	6,000	1,000	3,500	500
Bagger	3,000	1,000	2,000	200
10-bag holding tub	3,500	1,500	2,500	200
Conveyor belt to pack-off table	1,000	0	500	100
Pack-off table holding section	1,200	200	700	100
Sewing machine (semi-automatic)	8,000	1,000	4,500	700
STORAGE EQUIPMENT				
Mertec applicator	2,700	500	1,600	220
Bin piler	23,000	5,000	14,000	1,800
Skid loader	14,000	6,000	10,000	800
TOTALS	\$266,500		\$174,300	\$18,440

¹A 10-year life is assigned to all machinery and equipment.

²Average value is calculated to create a basis for determining interest on machinery and equipment investment (see Table 3). When determining this value for your farm, use an estimated market value of machinery and equipment

³Annual depreciation = (new price – salvage value) ÷ 10 years.

Table 2A. Land, General Building and Improvement Costs for a Typical Farm Producing Seed Potatoes, Michigan, 1987¹

Item	New price	Salvage value ²	Average value	Annual Depreciation
Land - 500 acres x \$450/A ³	\$225,000	—	\$225,000	—
Machinery shop (40x80x16 ft)	20,000	5,000	12,500	600
Water well (2) 150 ft 6 in @ \$8,000	16,000	—	8,000	640
TOTALS (gen. bldgs. and improvements only)	\$36,000	—	\$20,500	\$1,240

¹A "typical farm" consists of 500 acres total, with 250 tillable acres of which 80 acres are in seed potato production.

²A 25-year life is assigned to all buildings and improvements.

³The land price includes tiling.

Table 2B. Specialized Building and Improvement Costs for an 80-acre Seed Potato Enterprise, Michigan, 1987

Item	New price	Salvage value ¹	Average value	Annual depreciation
Packing shed/tool storage (50x100x12 ft)	\$20,000	\$ 5,000	\$12,500	\$ 600
Potato storage (40x100x14 ft) ²	67,200	17,000	42,100	2,008
TOTALS	\$87,200	—	\$54,600	\$2,608

¹ A 25-year life is assigned to all buildings and improvements.

² The volume of this building is 56,000 ft³ with a 22,400 cwt capacity (56,000 ft³ ÷ 2.5 ft³/cwt), which is adequate for our typical farm (250 cwt/A x 80 A = 20,000 cwt). The cost for such a building equipped with an air system is \$3/cwt, or \$67,200.

Table 3. Fixed Costs Charged to the Seed Potato Enterprise, Typical Farm, Michigan, 1987

Item	Cost	Percent charged to seed potatoes ¹	Cost charged to seed potatoes	Your farm cost charged to seed potatoes
DEPRECIATION				
General machinery and equipment (Table 1A)	\$12,900	30	\$3,870	
Specialized equipment (Table 1B)	18,440	100	18,440	
General buildings and improvements (Table 2A)	1,240	30	372	
Specialized buildings and improvements (Table 2B)	2,608	100	2,608	
Total depreciation			\$25,290	
INTEREST²				
General machinery and equipment (\$175,100 x 10%)	\$17,510	30	\$5,253	
Specialized equipment (\$174,300 x 10%)	17,430	100	17,430	
Land (225,000 x 5%)	11,250	30	3,375	
General buildings and equipment (\$20,500 x 10%)	2,050	30	615	
Specialized buildings and improvements (\$54,600 x 10%)	5,460	100	5,460	
Total interest			\$32,133	
REPAIRS AND MAINTENANCE³				
General buildings and improvements (\$20,500 x 3%)	\$615	30	\$185	
Specialized buildings and improvements (\$54,600 x 3%)	1,638	100	1,638	
Total repairs and maintenance			\$1,823	
TAXES				
Real estate (\$32/acre x 500 acres)	\$16,000	30	\$4,800	
INSURANCE				
Property, machinery and equipment (\$12/acre x 500 acres)	\$6,000	30	\$1,800	
Vehicles (including licenses)	550	30	165	
Total insurance			\$1,965	
TOTAL FIXED COSTS (Potato enterprise share)			\$66,011	
TOTAL FIXED COSTS PER ACRE OF POTATOES (\$66,011 ÷ 80 acres)			\$825	

¹The 80-acre seed potato enterprise uses 30 percent of the income-producing acreage, so 30 percent of all generalized fixed costs for operating the farm are charged to potatoes. Of those costs associated with facilities and equipment used exclusively in the production of potatoes, 100 percent is charged to the potato enterprise.

²Interest on investment is determined by charging 10 percent on the average values. The investments cited in this section are the average values calculated in Tables 1A, 1B, 2A and 2B.

³Farm records suggest that repairs and maintenance of buildings and improvements equal approximately 3 percent of average value annually. Repairs and maintenance costs on machinery and equipment are included in variable costs (see Table 4).

Table 4. Variable Costs Per Acre for Seed Potato Production, Michigan, 1987

Item	Amount/acre	Price	Cost/acre	Your farm cost/acre
GROWING				
Seed ¹	22 cwt	\$10.00		\$220.00
Fertilizer:				
• Nitrogen	160 lb	0.22		35.20
• Phosphorus	122 lb	0.21		25.62
• Potassium	243 lb	0.10		24.30
Lime	0.5 ton	17.60		8.80
Fungicides				
• Tops 2.5D (seed treatment)	10 lb	1.20		12.00
• Copper	9 lb	0.60		5.40
• Manzate (8x)	0.31 gal	10.00		24.80
• Ridomil (2x)	2 lb	3.50		14.00
• Kocide (3x)	1.5 lb	1.75		7.90
• Spreaders/stickers, etc.				1.00
Insecticides				
• Temik (1x)	18 lb	2.60		46.80
• Monitor (3x)	0.25 gal	55.45		41.60
• Ambush (2x)	0.047 gal	81.52		7.66
Herbicides				
• Sencor/Lexone	0.5 lb	18.00		9.00
• Dual	0.125 gal	49.75		6.22
Vine killers				
• Diquat	0.25 gal	67.10		16.78
• Ortho X-77	0.06 gal	12.70		0.76
Cultural labor				
• Preparation ²	7.5 hr	5.50		41.25
• Seed cutting ³	2.2 hr	5.50		12.00
• Planting	0.5 hr	5.50		2.75
• Cleaning and sanitation ⁴	0.3 hr	5.50		1.65
• Irrigation (3x)	0.171 hr	5.50		2.82
• Cultivation (1x)	0.3 hr	5.50		1.65
• Spraying (ground) (12x)	0.1 hr	5.50		6.60
• Hilling	0.25 hr	5.50		1.38
• Side-dressing	0.05 hr	5.50		0.28
• Rogueing (\$5 per acre) ⁵				
• Fringe benefits (20% of payroll: \$70.38)				14.08
Fuel, oil ⁶				70.00
Machinery repair (including all field equipment)				75.00

Table 4, continued

Item	Price	Cost/Acre	Your farm cost/acre
Machine hire		0.00	
Utilities		20.00	
Miscellaneous (travel, etc.)		11.00	
Field inspection		26.50	
Interest on operating capital (\$795 x 10% x 1 yr)		79.50	
Total growing and interest		\$874.30	
HARVESTING AND STORAGE⁷			
Labor			
• Harvest (1.4 hrs x 8 people = 11.2 hrs per acre)	5.50	61.60	
• Cleaning and sanitation (.1 hr per acre)	5.50	0.55	
• Storage and grading (225 cwt ÷ 125 cwt/hr = 1.8 hrs/A)	5.50	9.90	
• Fringe benefits (20% of payroll: \$72.05)		14.40	
Utilities		25.00	
Total harvesting and storage		\$111.45	
PACKING AND MARKETING⁸			
Labor			
• Packing (bulk) (166 cwt/A x \$.34/cwt)		\$56.44	
• Packing (bags) (41 cwt/A x \$.99/cwt)		40.59	
• Fringe benefits (20% of payroll=\$97.03)		19.41	
Packages, pallets, supplies		40.00	
Repairs and maintenance		21.00	
Utilities		2.00	
Promotion: \$.04/cwt		9.60	
Brokerage fee: \$.40/cwt		96.00	
Lab inspection		0.00	
Winter testing		7.30	
Shipping inspection		15.00	
Total packing and marketing		\$307.34	
TOTAL VARIABLE COSTS PER ACRE		\$1,293.00	
<p>¹The price /cwt includes \$1 for transportation to farm site.</p> <p>²Includes plowing (.5 hrs), disking (.5 hrs) and rock picking (6.5 hrs).</p> <p>³This is based on 10 cwt/hr/person.</p> <p>⁴It takes two people 1/2 day each (8 hrs total) to clean equipment between planting of four varieties. It takes two people one full day each (16 hrs total) to clean equipment between cutting of four varieties. The grand total time spent on sanitizing equipment is 24 hrs. This equals a per acre average of .3 hr (24 hrs divided by 80 acres).</p> <p>⁵Rogueing should be included as a cost if that activity is required.</p> <p>⁶Includes irrigation fuel.</p> <p>⁷Our "typical farm" has a field yield of 250 cwt. Ninety percent of this per acre field yield of 250 cwt is of seed quality; the other 10 percent is sold as tablestock potatoes.</p> <p>⁸Based on 207 cwt/A (250 cwt/A yield less 8 percent shrinkage and 10% sold as tablestock).</p>			

Table 5. Per Acre and Per Hundredweight Costs and Returns for Seed Potato Production, Typical Farm, Michigan, 1987

Item	Per acre	Per cwt	Your farm
Gross receipts per acre (207 cwt pack-out x \$8.00 + 23 cwt pack-out x \$4.75)	\$1,765.00	\$7.67	
VARIABLE COSTS			
Growing			
Seed	\$220.00	\$0.95	
Fertilizer	85.12	0.37	
Lime	8.80	0.04	
Fungicide	65.10	0.28	
Insecticides	96.06	0.42	
Herbicides	15.22	0.07	
Vine killers	17.54	0.08	
Cultural labor	84.46	0.37	
Fuel, oil	70.00	0.30	
Machinery repair	75.00	0.33	
Machine hire	—	—	
Utilities	20.00	0.09	
Miscellaneous (travel, etc.)	11.00	0.05	
Field inspection	26.50	0.12	
Interest on oper. capital	79.48	0.34	
Total growing + interest	\$874.28	\$3.80	
Harvesting and Storage			
Labor	\$86.45	\$0.38	
Utilities	25.00	0.11	
Total harvesting and storage	\$111.45	\$0.49	
Packing and Marketing			
Labor	\$116.44	\$0.51	
Packages, pallets, supplies	40.00	0.17	
Repairs and maintenance	21.00	0.09	
Utilities	2.00	0.01	
Promotion	9.60	0.04	

Table 5, continued

Item	Per acre	Per cwt.	Your farm
Brokerage fee	96.00	0.42	
Lab inspection	—	—	
Winter testing	7.30	0.03	
Shipping inspection	15.00	0.07	
Total packing and marketing	\$307.34	\$1.34	
TOTAL VARIABLE COSTS	\$1,293.00	\$5.63	
FIXED COSTS			
Depreciation	\$316.13	\$1.37	
Interest on investment	401.66	1.75	
Repairs and maintenance	22.78	0.10	
Taxes	60.00	0.26	
Insurance	24.56	0.11	
TOTAL FIXED COSTS	\$825	\$3.59	
TOTAL COSTS (variable + fixed)	\$2118	\$9.22	
Net return (loss)	(\$353)	(\$1.55)	

Worksheet

for summarizing your costs and returns per acre and per cwt

Item	Per acre		Cwt sold per acre	Per cwt
1. Total growing & interest (Table 4)	\$			
2. Total harvest, marketing (Table 4)	\$			
3. Total variable costs/acre (line 1 + line 2)	\$	÷	=	\$
4. Total fixed costs/acre (Table 5)	\$	÷	=	\$
5. Total cost (line 3 + line 4)	\$	÷	=	\$
6. Price per cwt. sold				\$
7. Less: total variable costs/cwt (line 3)				\$
8. Net return (loss) over variable costs (line 6 – line 7)				\$
9. Price per cwt sold (line 6)				\$
10. Less: total costs (variable + fixed)/cwt (line 5)				\$
11. Net return (loss) (line 9 – line 10)				\$

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