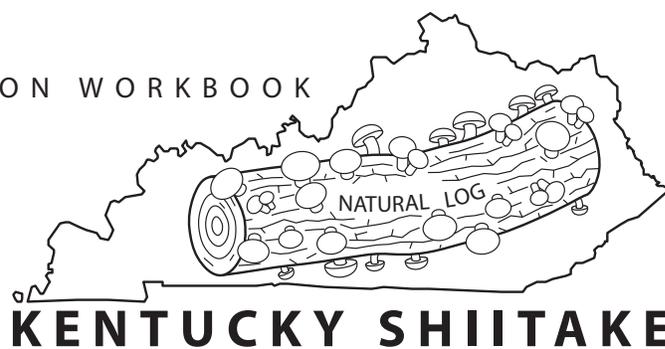


## KENTUCKY SHIITAKE PRODUCTION WORKBOOK

# Potential Profits from a Small-Scale Shiitake Enterprise



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Rich hardwood forests cover 50 percent of the land area of Kentucky and offer an excellent resource for growing shiitake mushrooms. Small 3-inch to 8-inch diameter logs cut during a timber stand improvement provide a good source of logs for starting a small-scale shiitake enterprise. Log-grown shiitake mushrooms are a higher quality and therefore a more valuable product than shiitakes grown on an artificial substrate. Artificially produced shiitakes currently dominate more than 90 percent of the U.S. shiitake market.

Producers interested in starting a shiitake enterprise should survey potential markets to determine possible financial returns and associated risks before entering the business. Market type will determine the price you receive for your mushrooms with prices ranging from \$4.50 to \$10.50 per pound (2000 prices).

Although marketing is beyond the scope of this publication, you should determine where your markets are located before inoculating logs. Consider who your customers will be and what type of product you want to market: fresh mushrooms, dried mushrooms, or another type of mushroom product. Start small! Talk to people already growing shiitakes (growers' associations, spawn suppliers, Cooperative Extension resource people, etc.), and begin by selling close to home. Identify your markets. The shiitake mushroom has a number of uses as an ingredient with its unique, garlicky flavor and meaty texture. Chefs have indicated they would use shiitake as the mushroom of choice in all their dishes that use mushrooms. Talk to locally owned supermarkets, restaurants, cooperatives, and farmers' markets and ask if they will be willing to buy mushrooms and, if so, at what volume, price, and frequency. The Marketing Division of the Kentucky Department of Agriculture can provide you with some information on marketing, but the major responsibility for identifying and developing markets lies with you, the producer.



**Shiitake mushrooms packaged for shipping.**

This publication contains costs and potential returns for a 500-log operation. Costs and revenues presented are estimates to be used as a guide in decision-making and the timing and risk involved in a shiitake business enterprise. Costs can vary greatly depending on raw materials, equipment used, equipment already available, ability of the producer to build equipment, efficiency and costs of labor, and production methods used.

## A 500-Log Operation

The following is an example of a small-scale outdoor log operation for fresh mushroom production. Assumptions for the analysis are as follows:

- 130 logs were inoculated each year (see FOR-81, *Inoculation*).
- logs were carried over a four-year rotation with a maximum number of 503 logs (373 logs actually fruit-

ing) in the fourth year and continuing for the life of the operation (Table 1).

- with proper management, each log should average 2 pounds of mushrooms a year (three fruiting cycles) for a total of 6 pounds over the life of the log.
- proper management in this workbook refers to the forced production cycle described in FOR-85, *Harvesting*, in this workbook series.

Over a five-year period, some logs may be lost annually due to damage caused by contaminating fungi, weather, and handling. Contamination can be reduced by:

- using freshly cut logs.
- sealing inoculation sites and all cuts and wounds with wax.
- using viable shiitake spawn.
- handling spawn with rubber gloves during inoculation.
- keeping logs reasonably clean (not dragging your logs in the mud!).
- storing logs (during both incubation and production) on base logs, pallets, or other supports off the ground surface.

For our 500-log operation, we assumed 2 percent of the logs would be lost every year for the four-year period (Table 2).

Logs will produce mushrooms seasonally on their own, based on local temperature and rainfall. For commercial production, logs can be forced to fruit on a schedule by immersing logs under water for 8 to 24 hours. There is a trade-off between the life of a log and forced fruitings. Logs forced to produce mushrooms will produce over a shorter period than logs not forced. The advantage of forced fruiting is the control you have on the timing of your harvest.

**Table 1.** Logs fruiting and mushrooms produced from a 500-log outdoor operation.

Year	Logs at Start Of Year	Logs Fruiting	Pounds of Mushrooms
1	130	0	0
2	257	127	254
3	381	251	564
4	503	373	746

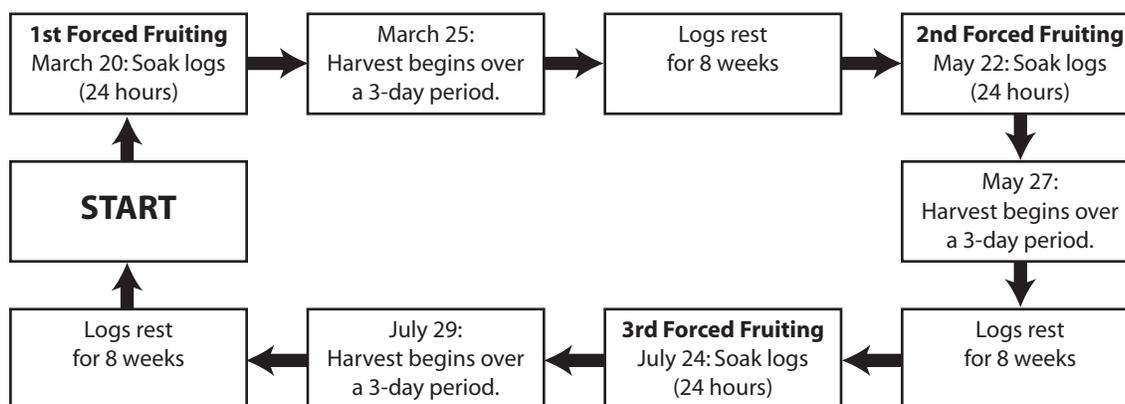
**Table 2.** Log losses and mushroom yields for each 130 logs on a five-year cycle.

Year	Percent Loss	Logs at Start of Year	Pounds per Log	Mushrooms (Pounds per Year)
1	2	130	0	0
2	2	127	2.0	254
3	2	124	2.5	310
4	2	122	1.5	183
Total	8	-	6.0	747

In this example, logs are forced to fruit three times a year with fruiting starting a year after inoculation and then allowed to rest eight weeks between forced productions (Figure 1). There are numerous types of shiitake strains that produce best in different temperatures. The production process as described in FOR-85 takes five to seven days from soaking to harvest. Once harvested, those logs must rest for eight weeks, so the whole cycle per log is a nine-week cycle—one week in production and eight weeks at rest. For consistent production on a weekly basis, divide the total number of incubated logs by nine (Table 3).

You may want to consider using some cold-tolerant strains to lengthen your production cycle by force fruiting these logs in late October or November. In this analysis, we are assuming an average initial fresh log weight of 30 pounds, with each log producing a total of about 6 pounds of mushrooms per log over the four-year period (Table 2). Logs are expected to produce more during the early part of the production cycle and decrease after the third year.

**Figure 1.** An example of shiitake production with three forced fruitings a year.



**Table 3.** Number of logs needed to soak on a weekly basis for consistent production.

Size of Log Operation	Number of Logs in Rotation Soaked Weekly	Approx. Pounds of Mushrooms Expected <sup>1</sup>
100 logs (1 person)	11	7
500 logs (family)	55-56	37
1,000 logs (must start hiring labor)	111	74

<sup>1</sup> Assumes 0.67 lb /flush. This type of yield is possible only if using the crib stack and covering system recommended in publication FOR-85, *Harvesting*.

## What You Will Need to Start Your Shiitake Enterprise

The following is a detailed description of the costs you will need to consider when starting a small-scale log operation. Many of the basic items may already be in your tool shed or available from neighbors.

### Items you will need to start production:

#### Start-up cost

Items vary with the number of logs in production.

- Logs: Hardwood (beech, hickory, maple, oak) logs if purchased @\$1.00 each, 3" to 8" diameter by 36" to 48" length; 40" recommended. If you own your own forestland, you can use logs from your forest from timber stand improvement (TSI) operations.
- Spawn: These costs vary depending on the diameter of the log and amount of spawn purchased at a time. Spawn prices decrease with the amount bought.
  - Sawdust spawn: 20 to 25 logs/bag @ \$20-25/bag.
  - Dowel spawn: 10 logs/unit @\$28/unit (750 plugs).
- Wax: cheese wax (10 lb/100 logs @\$20/10 lb or \$0.20/log). Can substitute paraffin mixed with mineral oil: 2 quart pot with 3 pints of melted wax + 3 tablespoons of mineral oil or 1 pint of wax + 1 tablespoon of mineral oil.
- Drill bit: two needed per 50 logs @ \$9 each + collar (\$2) = \$11.
- Utilities: For filling soak tanks with running water and for running the drill. May be negligible in a small operation.

**Table 4.** How costs will vary with size of operation.

Start-Up Item	100 Logs (1 person)	500 Logs (family)	1,000 Logs (must start hiring labor)
Logs <sup>1</sup>	\$100	\$500	\$1,000
Spawn			
Sawdust	110	375	625
Dowel	280	800	1300
Wax	20	100	200
Drill bit	22	110	440

<sup>1</sup> You can save money by using small-diameter logs from timber stand improvement on your farm.

### Equipment—short-term use (five years)

Items with a \$ indicate inexpensive alternatives may be found within your home or farm.

- \$ Log drilling stand: 1 at \$20. *Recycled alternative:* use vise grips, or work with a partner.
- \$ Inoculation tool: 1 at \$30/each, Or pack by hand.
- \$ Wax melting pot: 1 at \$40. *Recycled alternative:* an old fryer or hot plate you may have on hand.
- \$ Glass baster to apply the wax: \$30, or a wax dauber (\$1 each/4 minimum per order). *Recycled alternative:* a tin cup and paint brush.
- \$ Spring scale (55-lb capacity) to weigh logs: \$15. *Recycled alternative:* a bathroom scale.
- \$ Extension cord: \$18. *Recycled alternative:* may already have one in your home or farm.
- \$ Drill: 1 high-speed drill (8,000 to 10,000 RPM) at \$250 to \$300. *Recycled alternative:* may already have one in your home or farm.
- \$ Water hose and sprinkler: \$35. *Recycled alternative:* may already have one in your home or farm.
- \$ Scale (to weigh mushrooms): \$15. *Recycled alternative:* any scale that can weigh pounds/ounces.
- \$ Brackets and bag covers to maintain the correct temperature and conditions for the log: \$50. (See FOR-85 for details on construction.) *Recycled alternative:* small diameter crooked branches that will keep cover off top logs.
- \$ Soak tank: cattle trough/250 gal. tank @ \$125 each. *Recycled alternative:* small kid's pool or stock trough that you may already have on your farm.

### Equipment—long-term use (10 years)

- \$ Refrigerator: 0.41cu. ft./lb of mushrooms; holds all mushrooms fruited in one week: \$650 for 19 cu. ft. refrigerator. *Recycled alternative:* used refrigerator \$150 to \$300. **This is a very important item.**

### Harvesting and labor considerations for your shiitake enterprise:

The following is a description of harvesting and labor considerations you will need to consider when starting a small-scale log operation.

#### Harvesting costs

Items with a \$ indicate inexpensive alternatives may be found within your home or farm.

- \$ Packaging and labels: \$0.15 to \$0.21/lb of mushrooms (depends on market choice). *Alternative:* make your own labels on a home computer.
- Stamps: Kentucky Fresh labels \$4 to \$6/1,000.
- Bulk mushroom boxes (standard sizes are 3, 5, and 10 lb): \$1.05 each.

- \$ Advertising or marketing charge: will vary. An example may be a one-page flyer or pamphlet showing your product and prices (500 copies @ \$.15/each). *Alternative*: produce and print flyer on home computer for cost of ink and paper.
- Transportation: A rough estimate is 0.31 cents/mile + your time. For example, if you live 100 miles from your market, the cost will be 0.31 x 100 miles, or \$31/ trip. You may also incorporate many errands (advertising, gathering additional market information, or a trip to the bank, etc.) into these trips to lower your overall costs.
- \$ Picking and storage baskets: basket or bucket for weighing: handheld supermarket baskets work great; hold 20 pounds; ~\$5. *Recycled alternative*: any baskets with good airflow.

**Table 5.** How harvesting costs will vary with size of operation.

Harvesting Cost	100 logs (1 person)	500 logs (family)	1,000 logs (must start hiring labor)
Packaging/labels	\$36	\$180	\$420
Advertising	90	90	180
Transportation	same	same	same or slightly more
Baskets	10	20	60

### Labor

In small operations, you and your family members can do the labor.

**Table 6:** Labor considerations for a shiitake enterprise.

Item	Time Consideration
Market research	Where to sell your mushrooms. Start <b>before</b> you inoculate logs! For help, contact the Kentucky Department of Agriculture Marketing Division.
Transport of logs to site	Time will depend on distance from your site.
Drill and inoculate logs	8 minutes per log; approximately 14 hours/100 logs. Depends on how many people on team.
Soak logs	Logs must be physically moved into and out of soak tanks.
Harvest mushrooms	2 hours each day for 3 days. If weekly harvest with three forced fruitings, 3 days/week for a 6-month period.
Packing	Will depend on market(s) chosen: i.e., boxes or baskets or packaged product.
Transport to markets	Depends on distance to market (see "Market research" above).

## Economics

The budgets shown in this publication are flexible guidelines, not rigid amounts for dollar and cents. No two shiitake growers have the same resources or will manage and make decisions alike. The examples illustrated in this publication can be used as a rough guide to what costs will occur in which years and determine when your enterprise might start to earn a profit. You should put in your own costs for your shiitake enterprise in the column labeled "Your Operation." These budget sheets will help you determine your costs and what you need to start your operation, allocate the use of resources on your farm, and decide whether a shiitake enterprise is something you want to do. To reflect your resources accurately, it is important to add any costs you believe are missing or eliminate costs you do not have.

Two budget sheets are presented in this guide: (1) a detailed budget sheet reflecting what costs will occur in which years (Table 7) and (2) a budget sheet (Shiitake Mushroom Outdoor Production Worksheet) illustrating costs on a yearly basis once full production is reached with space to depreciate equipment costs. Labor was not included in this analysis, on the assumption that shiitake producers would perform all labor requirements. The Shiitake Mushroom Outdoor Budget Worksheet will help you determine returns for your labor by subtracting your total profit *with labor* from your total profit *without labor*. The difference between the two will help you determine how much you can afford to pay yourself for your labor (see "Total Labor"). The total cost of producing a 500-log operation over a four-year period, excluding labor costs, is \$3,308.30.

The following example is designed to be representative of a *well-managed* shiitake enterprise. Costs are based on assumptions given in the section on "What you will need to start your shiitake enterprise." The budgeted annual costs were determined with the assumption that 130 logs are added each year. At year 5, old logs are taken out of production so that you have a steady amount of 503 logs in production and 373 logs fruiting at any given time.

**Table 7.** Shiitake enterprise growing and harvesting costs for a 500-log operation, years 1 through 4.<sup>1</sup>

<b>Item</b>	<b>Quantity</b>	<b>Price</b>	<b>Unit</b>	<b>Value</b>	<b>Your Operation</b>
<b>First Year</b>					
<i>Pre-harvest variable costs</i>					
Logs	130	\$1.00	<i>logs</i>	\$130.00	_____
Spawn	5	22.00	<i>unit</i>	110.00	_____
Wax	15	2.00	<i>pounds</i>	30.00	_____
Drill bits	3	9.00	<i>bit</i>	27.00	_____
Stop collar	1	2.00	<i>collar</i>	2.00	_____
<i>Equipment costs</i>					
\$ <sup>2</sup> Log drilling stand	1	20.00	<i>stand</i>	20.00	_____
Inoculation tool	1	30.00	<i>tool</i>	30.00	_____
\$ Wax melting pot	1	40.00	<i>pot</i>	40.00	_____
\$ Glass baster	1	30.00	<i>baster</i>	30.00	_____
\$ Extension cord	1	18.00	<i>cord</i>	18.00	_____
Drill	1	250.00	<i>drill</i>	250.00	_____
\$ Hose	1	35.00	<i>hose</i>	35.00	_____
Brackets, bag covers	1	50.00	<i>cover</i>	50.00	_____
Total First Year Expenses				\$772.00	_____
<b>Second Year</b>					
<i>Pre-harvest variable costs</i>					
Logs	130	1.00	<i>logs</i>	\$130.00	_____
Spawn	5	22.00	<i>unit</i>	110.00	_____
Wax	15	2.00	<i>pounds</i>	30.00	_____
Drill bits	3	9.00	<i>bit</i>	27.00	_____
Stop collar	1	2.00	<i>collar</i>	2.00	_____
<i>Harvesting costs</i>					
Packaging	51	1.05	<i>boxes</i>	53.55	_____
Advertising <sup>3</sup>	200	0.15	<i>sheets</i>	30.00	_____
Transportation <sup>4</sup>	100	0.31	<i>mile</i>	31.00	_____
\$ Bucket/baskets	4	5.00	<i>bucket</i>	20.00	_____
<i>Equipment costs<sup>2</sup></i>					
\$ Scales	1	15.00	<i>scale</i>	15.00	_____
Brackets, bag cover	1	50.00	<i>cover</i>	50.00	_____
\$ Soak tank	2	125.00	<i>tank</i>	250.00	_____
\$ Refrigerator	1	450.00	<i>unit</i>	450.00	_____
				\$1,198.55	

**Table 7.** Shiitake enterprise growing and harvesting costs for a 500-log operation, years 1 through 4.<sup>1</sup>

<b>Item</b>	<b>Quantity</b>	<b>Price</b>	<b>Unit</b>	<b>Value</b>	<b>Your Operation</b>
<b>Third Year</b>					
<i>Pre-harvest variable costs</i>					
Logs	130	1.00	logs	\$130.00	_____
Spawn	5	22.00	unit	110.00	_____
Wax	15	2.00	pounds	30.00	_____
Drill bits	3	9.00	bit	27.00	_____
Stop collar	1	2.00	collar	2.00	_____
<i>Harvesting costs</i>					
Packaging	102	1.05	boxes	107.10	_____
Advertising <sup>3</sup>	200	0.15	sheets	30.00	_____
Transportation <sup>4</sup>	100	0.31	mile	31.00	_____
<i>Equipment costs<sup>2</sup></i>					
Brackets, bag cover	1	50.00	cover	50.00	_____
\$ Soak tank	2	125.00	tank	250.00	_____
Total Third Year Expenses				\$767.10	_____
<b>Fourth Year</b>					
<i>Pre-harvest variable costs</i>					
Logs	130	1.00	logs	\$130.00	_____
Spawn	5	22.00	unit	110.00	_____
Wax	15	2.00	pounds	30.00	_____
Drill bits	3	9.00	bit	27.00	_____
Stop collar	1	2.00	collar	2.00	_____
<i>Harvesting costs</i>					
Packaging	153	1.05	boxes	160.65	_____
Advertising <sup>3</sup>	200	0.15	sheets	30.00	_____
Transportation <sup>4</sup>	100	0.31	mile	31.00	_____
<i>Equipment costs<sup>2</sup></i>					
Brackets, bag cover	1	50.00	cover	50.00	_____
Total Fourth Year Expenses				570.65	_____
Total Start-up and Growing Costs for 4-Year Production Cycle				\$3,308.30	_____

<sup>1</sup> All costs and revenues are presented on a before-tax basis.

<sup>2</sup> Costs that can be lowered by using recycled or alternative materials. See "What you will need to start your shiitake enterprise," pages 4 and 5.

<sup>3</sup> Advertising: 200 copies of a flyer @ 15 cents per copy.

<sup>4</sup> Transportation: cost of one 100-mile trip @ 31 cents/mile. Estimate your total mileage and number of trips to market your mushrooms.

## Shiitake Mushroom Outdoor Production Worksheet

**Enterprise budget sheet**—Assumes life of log as four years for mushroom production. This budget sheet is an example of full production. Your costs and revenue might be much different. Use this blank worksheet as a guide for each budget year. Enter zero if you will not need to purchase an item.

		Your Operation			Your Operation
Number of logs at beginning of production	130		Number of fruitings per year	3	
Number of logs added per year	130		Total (lbs) mushrooms Yield/log/yr:	2	
Number of logs lost per year (2%)	3		Sale price (\$/lb)	\$4.50 - 10.50	
Number of logs fruiting in year 2	127		Other considerations		
Number of logs fruiting in year 3	251				
Number of logs fruiting in year 4	373				

**BUDGET YEAR** Year 4

### Estimated Enterprise Costs and Returns

Description	Quantity	Unit	Price	Total (\$)	
<b>Gross returns/year</b>					
Mushrooms (373 logs @ 2 lbs/log)	746	pounds	\$5.00	\$3,730.00	
<b>Yearly costs vary with amount in production</b>					
Logs	130	logs	\$1.00	\$130.00	
Spawn	5	unit	\$22.00	\$110.00	
Wax	15	pounds	\$2.00	\$30.00	
Drill bit (7/16 spade bit)	3	bit	\$9.00	\$27.00	
Drill bit stop collar	1	collar	\$2.00	\$2.00	
Other costs				\$0.00	
<b>Total pre-harvest costs</b>				<b>\$299.00</b>	
<b>Harvesting costs</b>					
Packaging/labels	153	boxes	\$1.05	\$160.65	
Marketing charge	200	copies	\$0.15	\$30.00	
Transportation	100	miles	\$0.31	\$31.00	
Baskets for weighing, picking, and storage	4	baskets	\$5.00	\$20.00	
<b>Total harvesting costs</b>				<b>\$241.65</b>	
<b>Total cost varying with amounts produced</b>				<b>\$540.65</b>	

**Equipment cost: Costs do not vary with amount produced**

<b>Equipment Cost</b>	<b>Quantity</b>	<b>Useful Life (years)</b>	<b>Annual Cost</b>	<b>Purchase Price</b>	<b>Annual Fixed Cost</b>	
Log drilling stand/table	1	5	\$4.00	\$20.00	\$4.00	
Inoculation tool	1	5	\$5.20	\$30.00	\$5.20	
Pot for melting wax	1	5	\$8.00	\$40.00	\$8.00	
Glass baster	1	5	\$6.00	\$30.00	\$6.00	
Scales	1	5	\$3.00	\$15.00	\$3.00	
Extension cord	1	5	\$3.60	\$18.00	\$3.60	
Drill	1	5	\$50.00	\$250.00	\$50.00	
Hose	1	5	\$7.00	\$35.00	\$7.00	
Brackets, bag covers	4	5	\$10.00	\$50.00	\$40.00	
Soak tank	4	5	\$125.00	\$500.00	\$125.00	
Refrigerator (used- \$200; new-\$650)	1	10	\$45.00	\$450.00	\$45.00	
<b>Total fixed costs</b>					<b>\$296.80</b>	
<b>Total costs</b>					<b>\$837.45</b>	
<b>Profit with no hired labor</b> With a family-run business, these costs may be zero.					<b>\$2,892.55</b>	
<b>Cost of Operator Labor</b>			<b>Wage Rate</b>	<b>Hours Labor</b>		
Pre-harvest labor			\$8.00	42	\$336.00	
Harvest			\$8.00	18	\$144.00	
<b>Total labor</b>					<b>\$480.00</b>	
<b>Profit for the year with hired labor</b>					<b>\$2,412.55</b>	

To determine your profitability, you will need to look at your cash flows for costs and receipts from mushroom sales over the life of your operation. Cash flow (net annual return) over four years for a 500-log operation is presented in Table 8 for price ranges of \$4.50 to \$9.00 per pound representing three different market opportunities (wholesale, grocery/restaurant, and direct market to individuals). Net annual return or cash flow is the difference between revenue received and total expenses paid within a 12-month period. In our example, net revenues in the first one or two years are negative, and it is not until the second or third year that the operation begins to bring positive returns. This is due to the larger fixed start-up costs occurring during the first few years with revenues from mushroom sales not occurring until the beginning of the second year. What you can expect from your investment depends on how much of your initial investment cost you can recapture early in the enterprise. The more you can do to lower your costs early in the enterprise, the more profitable your operation will be. Notice costs can be dramatically reduced in the first two years by using recycled or alternative materials (noted by the \$ on page 3). Ideas for recycled or alternative materials are listed in “What you need to start your shiitake enterprise.”

Table 9 shows the dollar amount invested in producing a pound of mushrooms, returns from three markets, and the pounds of mushrooms you would need to produce just to make enough money to cover your costs. You will need to produce at least 2 pounds of mushrooms over the life of each log (four years) to break even and cover your costs of production in lower-priced markets. However, in a higher-priced market, like a farmers’ market, you need to produce only 0.84 pounds over the life of each log to cover all your costs of production. In a small production operation, such as a 500-log enterprise, this means unless you can produce at least 2 pounds over the life of each log, you will need to find markets with higher revenues (restaurant, grocery, or direct individual markets) or find alternative ways to increase production while holding down costs.

**Table 8.** Shiitake mushrooms: estimated revenue and returns to land and management, with 130 new logs placed into production every year with peak production at 503 logs, 1 through 4 years.<sup>1</sup>

	Year			
	1	2	3	4
	<b>Dollars/ Year</b>			
Receipts for mushroom sales				
@ \$4.50/ lb	0	1143	2259	3357
@ \$6.50/ lb	0	1651	3263	4849
@ \$9.00/ lb	0	2286	4518	6714
Costs <sup>2</sup>	772	1199	767	571
Net annual return to mushroom sales				
@ \$4.50/ lb	-772	-56	1492	2786
@ \$6.50/ lb	-772	452	2496	4278
@ \$9.00/ lb	-772	1087	3751	6143

<sup>1</sup> All cost and receipts are presented on a before-tax basis.

<sup>2</sup> Packaging and labels were not included for the wholesale market.

## Ways to Increase the Profitability of Your Enterprise

For the shiitake mushroom enterprise outlined in this example, mushrooms must be sold at \$3.51 to \$4.44 (depending on use of recycled materials) per pound or above to be profitable. A break-even mushroom price of \$3.51 to \$4.44 means that you can afford to sell your mushrooms at \$3.51 to \$4.44 and just cover all your expenses. Any price above will be a profit, and any price below will result in a loss. By looking at the effects of a particular cost at the break-even price, we can determine which costs will have the most effect on profitability. Obtaining a better price for your mushrooms, finding ways to increase the number of pounds of mushrooms produced, and of course finding ways to lower start-up costs will have the most impact on the profitability of your shiitake enterprise. By being innovative and finding ways to lower your initial costs, you can decrease the amount of time you have to wait for a positive return on your investment. A list of the effects of eliminating various start-up costs can be seen in Table 10.

**Table 9.** For each market, the production costs in dollars per pound invested, the dollars received per pound of mushrooms, and the pounds of mushrooms per life of each log (four years) you would need to recover all expenses.

Market	Production Costs per Pound of Mushrooms <sup>1</sup>	Market Price per Pound of Mushrooms	Break-Even Mushroom Pounds/Log Lifetime <sup>2</sup>
Wholesale	\$3.51-\$4.44	\$4.50	2.0 lbs
Restaurant/Grocery/Mark-up Retail	4.32	6.50-8.00	1.4-1.1
User end or direct market to individual	4.32	9.00-10.50	1.0-0.8

<sup>1</sup> Marketing costs and packaging were not included for wholesale markets.

<sup>2</sup> The average pounds of mushrooms you need to produce per log just to cover costs at the end of the four-year operation. Assumes an even production of mushrooms for the life of the log beginning in the second year.

**Table 10.** The effect of eliminating a particular cost on the amount you can sell your mushrooms for and still cover costs for the four-year operation.

Item Removed as a Cost	Mushroom Price per Pound <sup>1</sup>
Logs	\$3.73
Soak tank	\$3.76
Refrigerator	\$3.82

<sup>1</sup> Break-even price is \$4.44/lb with all the above fixed and variable costs included. Assumes a production of 6 lbs per life of the log (to obtain this type of production, use methods outlined in FOR-85).

Another way to increase the profitability of your shiitake enterprise is to increase the number of mushroom rooms produced. Larger production in lower-priced markets would allow smaller-scale production to increase profitability. In our scenario, markets in the lower price range (\$4.50 per pound) would not be profitable unless each log produced more than 2 pounds over the life of the log. This would be possible with lower-priced markets if each log were to produce at least 0.16 pounds for the three forced fruitings per year or at least 0.25 pounds with two forced fruitings a year. Other markets would still be profitable with a lower volume of mushrooms produced per log (Table 9). You might want to think about working with a variety of different markets in your area to decrease your overall risks by allowing you to test markets as you gain skill in production. Remember: a larger-scale operation will reduce per pound costs, increase opportunities to sell at wholesale markets, and, while higher direct market prices can be obtained, they will require greater marketing efforts and expertise.

## Marketing Considerations

Shiitake mushrooms can be marketed through a number of different channels. Smaller-scale producers will typically sell either directly to consumers through a farmers' market or to restaurants, small independent groceries, and specialty/natural/health food stores. Many marketing innovations are well suited for this product. Working with Community Supported Agriculture organizations (CSAs) that have a produce subscription distribution system may be a possibility. Promoting availability

to restaurant buyers on a regularly maintained Web site also works in certain market areas. Larger-scale marketing is carried out through a number of cooperatives and larger grower-packers, selling primarily into wholesale markets

Wholesale distribution of shiitakes generally involves boxes holding 3, 5, or 10 pounds of product, which fit well into walk-in coolers. Because of their specialty nature, shiitakes are mixed with a variety of other products in a delivery. They can be mixed with many other specialty vegetables that require similar temperatures and relative humidity. Keep these mushrooms at 32° to 36° with a relative humidity of 90 to 100 percent.

Repacking lots into smaller shipments of mixed produce is common among wholesalers and foodservice distributors who have their own distribution network to supply. A specific product look-up code is designated for shiitakes (4651) that should be included on retail packages sold through retail groceries.

The best strategy for packaging for direct sale in smaller volumes depends partly on the market. Restaurants, farm markets, and certain specialty food stores can accommodate bulk deliveries. There may be some value to more expensive retail packaging, however, if the product is to be distributed in a grocery store. Packaging and promotion for wholesale distribution has been estimated to be about one-third of the total start-up expense in other budgets. Since shiitakes are unknown to many consumers, and considering that it will require some effort and resources to establish a reliable supplier presence with institutional customers, you should plan on committing some funds early in the enterprise development toward promotion.

Promotional strategies targeted directly to consumers can include product information, recipes and product care inserts, samples, and cooking demonstrations. Promotional strategies targeted to larger buyers can involve help with cross merchandising, in-store point-of-purchase printed material, and logo development. There may be additional opportunities to promote a product as locally produced on a menu or with a display.



## Super Tuna Casserole

1 8 oz bag of noodles  
1 packet of fresh-pack albacore tuna  
1 can cream of mushroom soup  
1 3" diameter Vidalia onion  
1/2 dozen 2" fresh shiitake mushroom caps  
1/2 cup half and half  
1 cup frozen peas  
1 tablespoon olive oil  
1 tablespoon Spike® seasoning  
1 tablespoon dried parsley flakes  
salt and pepper to taste  
1/2 cup shredded cheese (e.g., cheddar, jack)  
bread crumbs for topping  
paprika for garnish

1. Put water on to boil for pasta.
2. Dice onion and sauté in olive oil over medium heat in skillet until clear (3 to 5 minutes).
3. Dice mushrooms and add to sauté while cooking the onions.
4. Season onion-mushroom mix with parsley, Spike, salt, and pepper.
5. Remove mix from heat and add half and half, soup, and tuna.
6. Cook pasta until al dente (chewy) according to package directions.
7. Drain pasta and mix with tuna mixture. Add frozen peas and mix in.
8. Place in rectangular casserole dish and sprinkle with bread crumbs and shredded cheese. Garnish with paprika.
9. Bake in 350°F oven for 20 minutes or until bubbly and top is browned.

Serves 8

— Deborah B. Hill

*Mention or display of a trademark, proprietary product, or firm in text or figures does not constitute an endorsement and does not imply approval to the exclusion of other suitable products or firms.*