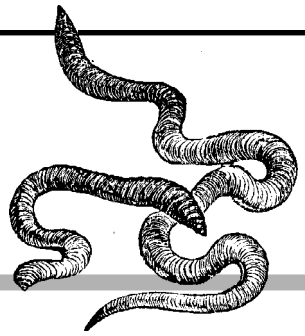
AGRICULTURAL ALTERNATIVES

Earthworm Production



Earthworm production is an enterprise that could be suitable for many small farms. An operation with one or two worm beds requires only minimal set-up costs, maintenance, and labor. A small enterprise can be handled with family labor, and much of the material required for constructing the worm beds and feeding the worms may already be available on the farm.

The most important issue that a potential earthworm grower faces is sufficient market demand. While small quantities of worms might be marketed for use in animal feeds, home gardens, or organic waste disposal systems, earthworms are sold mainly for fishing bait. Demand is seasonal and location is critical for marketing success. You must provide what customers want at the time they want it. This may mean offering various sizes of high-quality earthworms and containers at attractive prices, opening early in the morning, and maintaining personal contact with customers or retailers.

Growing Earthworms

The primary bait worm raised in the United States is the red worm (*Lumbricus rubellus)*. It is the most popular variety because of its hardiness and ability to tolerate large concentrations of decaying organic matter. Other worm species grown for bait include the African night crawler *(Eudrilus eugeniae)* and the brandling worm *(Eisenia foetida)*. The night crawler native to North America *(Lumbricus terrestris)*, although prized for fishing bait, is extremely difficult to raise commercially because it requires cool temperatures, reproduces slowly, and tends to migrate.

Earthworms can be grown in any container with adequate organic matter and drainage. Bedding materials must be deep enough to keep the earthworms cool and moist. During dry periods, you may have to periodically sprinkle the bed with small amounts of water. In high rainfall areas, some protection from heavy rains may be necessary because too much water can cause worms to escape from the bed or die. Use of gravel, sand, and a perforated septic tank drainage line in the base of the bed will help prevent flooding.

A variety of materials can be used to construct a worm bed. Two options are a permanent wooden structure or an expandable cinder block bed. For easy access during harvest, the bed should be around 48 inches wide. In the northern United States, the structure should be set 16 to 24 inches into the ground and covered in the winter to prevent freezing. Tables 1 and 2 show the cost of constructing these structures.

The bedding material should be approximately two-thirds topsoil and one-third decayed organic matter. The stocking rate for red worms is 100 to 500 worms per square foot of bed area. The initial stocking rate, along with the amount and frequency of feeding, will greatly influence the size of the mature worms. Overstocking and underfeeding will result in few worms of sufficient market size. Worms hatch from eggs after a three- to five-week incubation period.

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Young worms grow rapidly and are ready to reproduce in about one month. Depending on growing conditions, worms may take up to six months to attain full size. An actively growing worm bed will yield 4 to 5 pounds of worms per square foot of bed space per year.

Worms may be fed a variety of organic matter, including fresh manure, kitchen waste, and ground livestock feeds. Feeds containing 10- to 12-percent protein (on a dry-matter basis) are best for good growth and reproduction. Manure should be mixed with water and poured on the bed. Dry feeds should be sprinkled on the bed and watered in. Feeding is required every three to five days in vigorously growing worm beds. Overfeeding must be avoided as it can lead to excessive fermentation in the bed and an acid environment that can cause worms to shrink. Worms also may escape from the bed or die because of excessive fermentation. In addition, overfeeding can attract mites, which compete with worms for food.

Harvesting

During the growing season, worms feed at night near the bed surface. The best time for harvesting is in the early morning before the worms move deeper into the bed. Remove the top 2 or 3 inches of bedding material, separate the marketable worms, and return the bedding material to the bed. You can separate worms by hand using a sorting screen or with a commercial earthworm separator. A sorting table and bright lights are helpful. Harvest only enough worms for a few days supply and store worms for sale in moist bedding material or peat moss.

Marketing

Worms can be sold directly to anglers and gardeners or wholesale to bait shops. Various types of containers can be used, including paper sacks, paperboard cartons, and cups made of paper, plastic, or Styrofoam. Do not crowd worms in the container. About 500 red worms will weigh a pound and fit into a gallon container. A quart container holds about 250 and a half-pint container about 50 red worms.

The sample budget provides an estimate of the costs and returns for earthworm production. This budget shows what costs and receipts to include in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, you should think of this budget as a first approximation and use the “Your Estimate” column to reflect your specific situation.

Table 1. Cost of constructing and stocking a wooden-box worm bed.

	UNIT	PRICE	QUANTITY	AMOUNT
Lumber (2"x 4")	foot	$0.30	48	$14.40
Lumber (2"x 8")	foot	$0.65	46	$29.90
Nails (8d)	pound	$1.00	1	$1.00
Drain pipe (4")	foot	$0.40	12	$4.80
Gravel (3")	cu ft	$0.45	10.5	$4.73
Sand (3")	cu ft	$0.70	10.5	$7.35
Top soil/compost mix (8")	cu ft	$0.50	28	$14.00
Labor	hour	$5.00	6	$30.00
Worms	pound	$5.00	42	$210.00
Total investment cost				$316.18
Cost per sq ft bed area				$7.53

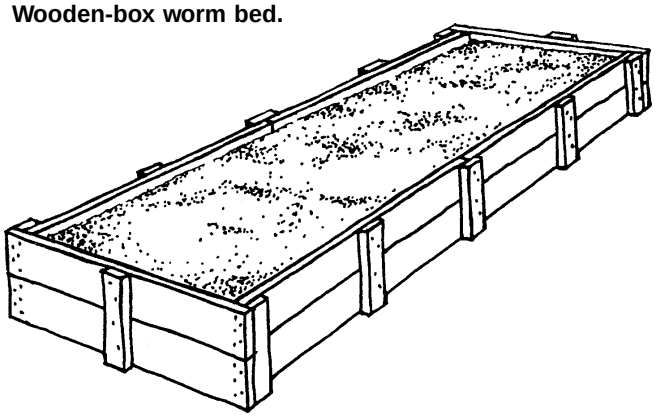
Note: outside dimensions are 12.25 by 4 feet; effective bed area is 12 by 3.5 feet.

Table 2. Cost of constructing and stocking a cinder-block worm bed.

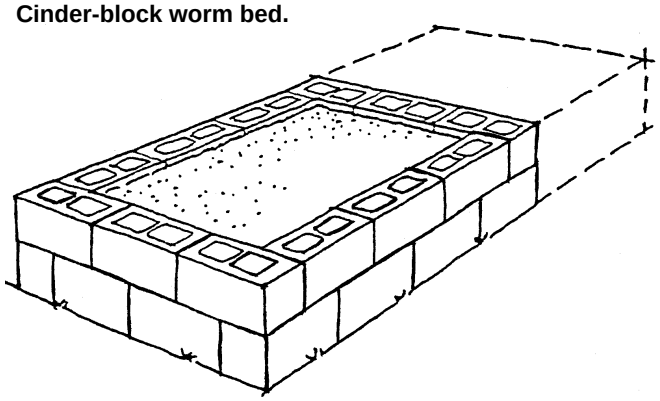
	UNIT	PRICE	QUANTITY	AMOUNT
Cinder blocks (8"x 8"x 16")	each	$0.90	44	$39.60
Rebar (3/8")	foot	$0.35	20	$7.00
Drain pipe (4")	foot	$0.40	12	$4.80
Gravel (3")	cu ft	$0.45	7	$3.15
Sand (3")	cu ft	$0.70	7	$4.90
Top soil/compost mix (8")	cu ft	$0.50	19	$9.50
Labor	hour	$5.00	4	$20.00
Worms	pound	$5.00	28.5	$142.50
Total investment cost				$231.45
Cost per sq ft bed area				$8.12

Note: outside dimensions are 12 by 4 feet; effective bed area is 10.67 by 2.67 feet.

Wooden-box worm bed.



Cinder-block worm bed.



For More Information

Abe, Ronald K., William L. Braman, and Ocleris Simpson. *You Can Start Producing Earthworms in a Washtub.* 1978 Yearbook of Agriculture, U.S. Department of Agriculture.

Minnich, Jerry. *The Earthworm Book: How to Raise and Use Earthworms in Your Farm and Garden.* Rodale Press, Emmaus, PA.

Detailed up-to-date information on the production and marketing of earthworms can be obtained from Shields Publications, P.O. Box 669, Eagle River, WI 54521.

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Sample Budget for Earthworm Production

This budget assumes bait sales of 168 pounds of earthworms per year from a wooden worm bed with a 42-square-foot surface area and a yield of 4 pounds of worms per square foot. The expected lifetime of the investment is five years.

	Unit	Price	Quantity	Amount	Your estimate
Receipts					
Bait sales	100/pint	$1.00	840	$840.00	_____
Other sales	_____	_____	_____	_____	_____
Total receipts	_____	_____	_____	_____	_____
Variable costs					
Feeding labor	hour	$5.00	52	$260.00	_____
Feed[a]	_____	_____	_____	$0.00	_____
Harvest labor	hour	$5.00	60	$300.00	_____
Packaging cartons	pint	$0.10	840	$84.00	_____
Advertising	_____	_____	_____	$0.00	_____
Other variable costs	_____	_____	_____	_____	_____
Total variable costs				$644.00	_____
Fixed costs					
Initial investment	bed	$63.24	1	$63.24	_____
Other fixed costs	_____	_____	_____	_____	_____
Total fixed costs	_____	_____	_____	_____	_____
Total costs				$707.24	_____
Returns					
Returns over variable cost				$196.00	_____
Net returns				$132.76	_____

[a]Feed is available at no cost on-farm.

Initial resource requirements

- Wooden worm bed (42 sq ft surface area): $316
- Feeding labor: 1 hour/bed/week, 52 weeks/year
- Harvest labor: 3 hours/bed/week, 20 weeks/year

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