

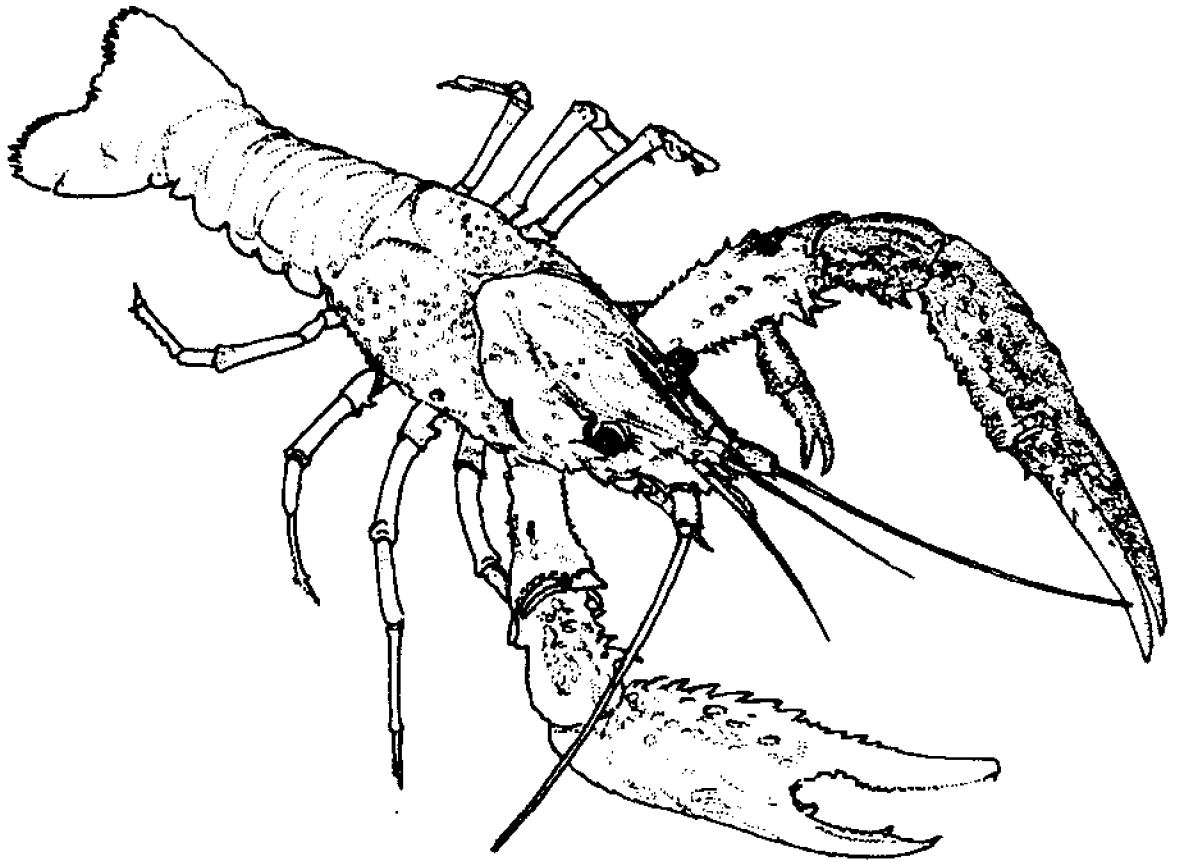
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# Enterprise Budgets for Mississippi Soft Crawfish Production

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## **Enterprise Budgets**

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## Introduction

### Soft Crawfish Industry

Soft crawfish production is an emerging aquacultural industry in Mississippi. There are at least 10 existing producers in Hancock, Harrison, George, Jackson, Pearl River, Wilkinson, and Amite Counties. These producers have invested a total of about \$150,000 on buildings, equipment, and facilities. During the 1989-90 season, they produced at least 20,000 dozen soft crawfish, representing one-fourth of their potential output. The farm-gate value of the 1989-90 total output of soft crawfish was about \$60,000. The total output effect of the industry was about \$150,000.

### Uses of Enterprise Budgets

Existing soft crawfish producers need information to help guide them in making decisions that will help reduce production costs. Because of price ceilings for the product (Shirley et al., 1989), marketing soft crawfish would be less difficult if producers could identify and reduce production costs. Prospective soft crawfish producers also need information to help them decide whether to engage in production. Lending institutions may find this information useful in deciding whether to provide financing to producers who plan to begin or expand soft crawfish production.

## Enterprise Budgeting

Enterprise budgets are financial instruments for business planning. They provide detailed estimates of income, expenses, and resource requirements of a particular enterprise. They specify production inputs and management practices required in an enterprise. Enterprise budgets provide information necessary to project the cash flow of a farm business; to evaluate alternative culture systems, farm sizes, or aquaculture species; to decide whether to expand production facilities and plan for the entire farm.

Producers are cautioned, however, to use these budgetary estimates only as guides in preparing financial projections. These estimates must be modified to suit individual circumstances.

### Computer Simulation Models

In developing soft crawfish budget information, certain qualifying assumptions were made regarding input use, productivity, and prices. These assumptions were based on data collected from producers, suppliers, and processors (Posadas and Homziak, 1991). In estimating these budgets, most of the operational characteristics of production systems were converted

into a "per-square-foot-per-day" basis. This procedure simplified sensitivity analysis of culture systems to fluctuations in critical economic, marketing, technical, and biological factors. Computer simulation models can be created upon request for existing or planned soft crawfish production systems. A producer must be willing, however, to provide basic information regarding an existing or proposed production system before such models can be created.

### Goals of Soft Crawfish Producers

Each soft crawfish producer wants a sustainable yield in order to maintain a viable soft crawfish operation. Decisions regarding location, culture system, farm size, feeding scheme, temperature, handling, stocking, packaging, and others will help determine if goals can be reached. Each producer should also strive to maximize returns to labor, management, capital, and risk. Motivations other than profit may also play a role in these decisions.

During the establishment year, producers may typically produce less than the industry average. Producers are, therefore, cautioned to anticipate cash-flow problems in the establishment year. There are cost-cutting or revenue-raising alternatives, however, that producers can pursue to become competitive in the industry. As the producer gains more experience, average yield should rise to equal or to exceed the industry level. Improvements in yields may be brought about by improved management practices, including accurate record keeping, improved stock handling, and experience.

The production of soft crawfish is a new industry, with rapidly changing production technology. The information used to describe production systems and to establish enterprise budgets may change. To keep up with changes in prices or production techniques, contact your county Extension agent for assistance when considering starting or expanding a soft crawfish operation.

## Production Systems

### Flow-Through Systems

Generally, soft crawfish can be produced by using flow-through/open systems or recirculating/closed systems. Detailed descriptions of both production systems are presented by Culley et al. (1988), Malone and Burden (1988), Homziak (1989), and Culley and Duobinis-Gray (1990).

In the flow-through system, water is flushed through the trays once and discharged. Using recommended flow rates (Homziak, 1989; Culley and Duobinis-Gray, 1990), water passes through the culture system within 5-10 minutes. Large quantities of high-quality water

and an inexpensive heating system or source of heated water must be available to operate an open culture system for the entire production season.

## **Recirculating Systems**

In recirculating systems, water is filtered and reused for 20-30 days (see Malone and Burden, 1988). Under this system, water quality is predictable and little or no discharge occurs. This culture system, however, requires water management expertise, and the producer must install a filtration system suitable for his needs. Prospective producers should consult with established producers or Extension agents before designing their own filter system. Those purchasing ready-made filter systems should be aware that many designs have proven to be ineffective.

A permit may be required to divert or withdraw surface or ground water. Contact the Bureau of Land and Water Resources in the Department of Natural Resources, Jackson, for permit information.

An aquaculture facility that discharges wastes into state waters at least 30 days per year and producing at least 100,000 pounds annually also needs to obtain a National Pollutant Discharge Elimination System (NPDES) permit. The Bureau of Pollution Control in the Department of Natural Resources evaluates the need for a discharge permit. McLaughlin et al. (1988) reviewed permit requirements for aquaculture in Mississippi.

## **Elements of Enterprise Budgets**

### **Gross Receipts from Production**

Gross receipts equal the total sales of soft crawfish produced plus the sales of boiler-sized crawfish that did not molt during the culture period.

### **Variable Costs**

Variable costs are cash expenses directly related to soft crawfish production. Estimates of these costs vary because farm sizes, molting rates, length of culture period, mortality rates, replacement schedule, source of crawfish stocks, and culture systems vary among farms.

The expenditure items under this section include hired labor, crawfish stocks, electricity, gas, hauling cost, crawfish feed, communication, repair and maintenance, interest on operating capital, and miscellaneous.

### **Income Above Variable Costs**

Income above variable costs (often called gross margin) measures the income earned after paying for cash expenses. Some producers might consider this amount

to be profit, but no costs have been assigned for fixed inputs—the replacement cost of buildings, facilities, equipment used in soft crawfish production, and others.

## **Fixed Costs**

Fixed costs are incurred by producers as soon as the building, facilities, and equipment are set aside for soft crawfish production—regardless of whether production occurs. The cost of fixed inputs remains the same during the entire culture period and does not vary with the level of soft crawfish production.

Expenditure items under fixed costs include depreciation for building, equipment, and facilities and interest on investment, taxes, insurance, and rental payments.

## **Total Costs**

Total costs are the sum of variable costs and fixed costs.

## **Returns to Land, Labor, Management, and Risk**

This is the difference between gross receipts and total costs. Due to the part-time and seasonal nature of soft crawfish production, no economic values or opportunity costs were assigned to land, labor, management, and risk provided or assumed by the producer. Before the start of soft crawfish production, the economic value of unemployed resources under these circumstances was practically negligible. When the difference is positive, however, the owner can estimate the value of his contributed labor and management by dividing the difference between gross receipts and total costs by man-hours spent in production.

Those who plan to engage in large-scale, soft-shell production on a full-time basis, however, should assign real values to the resources employed in production.

Owner man-hours devoted to production may be treated as variable labor input or fixed management input, depending on circumstances. The costs of land and buildings used in soft crawfish production may be treated as fixed rental expenses. A financial plan using this approach would, thus, include, but considered separately, personal and business resources.

## **Estimation Procedures**

Farm characteristics, production technology, and cost of production estimates were developed from Mississippi data (Posadas and Homziak, 1991) and from production manuals (Culley et al., 1988; Malone and Burden, 1988; Homziak, 1989; Culley and Duobinis-Gray, 1990).

## Initial Fixed Investment and Annual Fixed Costs

**Farm Structure.** The cost of farm structures includes a barn or greenhouse, concrete slab, wiring, plumbing, and a gas line. Farm structures and their construction costs are shown in the enterprise budgets. The current costs of farm structures are based on the costs of new buildings used by some Mississippi producers and on estimates made by Caffey (1988) for 40 tray flow-through and recirculating systems.

**Farm Facilities.** Farm facilities include a water well and pump, a water heater or boiler, a recycling or filtration system, a sump, reservoir, sinks, trays, and stands.

The cost of trays and stands varies with the type of materials used and their dimensions. Almost all soft crawfish producers used fiberglass on construction plywood trays 8 feet long, 2-4 feet wide, and 6 inches deep. The cost of construction ranged from \$26 to \$33 per tray and from \$5 to \$20 per stand.

The description and construction costs of other farm facilities are shown in the enterprise budgets.

**Farm Equipment and Furniture.** Farm equipment includes a freezer, a refrigerator, test kits, scales, an oxygen meter, counters, tools, and a back-up emergency generator. Furniture includes a desk, tables, shelves, and storage.

**Production Capacity.** Culture capacity is equal to the number of culture trays multiplied by the size of culture trays. Molting (or acclimation capacity) is equal to the number of molting or acclimation trays multiplied by the size of each tray. The suggested ratio of molting to culture capacity is 1:10. Some producers maintain the same ratio between acclimation and culture trays (Culley and Duobinis-Gray, 1990). The average rate of culture tray capacity use is about 85 percent due to the variability of the supply of crawfish stocks during the production season.

**Fixed Costs.** Annual fixed costs are the sum of interest on investment, insurance, taxes, rental payments, and depreciation. Insurance, interest on investment, and taxes are estimated from average investment, which is equal to one-half the replacement or new cost of each farm asset. Depreciation is computed by using the straight-line method and zero-salvage value. Standard business textbooks available at most libraries will provide information on calculating these values.

## Output and Prices

**Molting.** The molting process is a natural biological phenomenon among crawfish. Generally, the molting rate of crawfish depends on feeding, temperature, stocking density, conditions of the crawfish stocks, length of culture period, and possibly other factors.

When crawfish stocks are acclimated properly in acclimation tanks, they undergo physiological adjustments

to the new culture system after the stress of harvest, handling, and transport. Complete acclimation of crawfish stocks may occur in 12 to 24 hours (Culley and Duobinis-Gray, 1990).

Molting, on the average, may occur as early as 28 days or as late as 42 days after stocking (Culley et al., 1988; and Culley and Duobinis-Gray, 1990). Daily molting rates fluctuate during the culture period. With ample experience, producers can sustain an average daily molting rate of two percent during production years (Culley and Duobinis-Gray, 1990). New producers, however, may achieve an average daily molting rate of about one percent during the establishment year. In making projections for annual production, use the average molting rate for the entire season.

**Output.** In calculations, it was assumed the output of soft crawfish begins on the fifth week after initial stocking. This daily output is equal to available stock multiplied by daily molting rate. The weekly or monthly output is the total of daily soft crawfish outputs.

Soft crawfish molts can be regular-sized, irregular-sized, or have one/no claws. Each of these molt categories is sold at a different farm-gate price. Boiler crawfish are stockers that did not molt during the season. Boilers are sold to the hard-shell crawfish market at half or less the stockers' buying prices. Losses (mortality) account for the difference between total output and stocking density.

**Prices.** Farm-gate, producer, or ex-farm prices may fluctuate during the season and over the years, and producers must anticipate these changes and incorporate them into the financial analysis for each culture period. Price variations occur due to differences in product quality (packaging, sizes, etc.) and changes in demand and supply conditions (Shirley et al., 1989).

## Variable Costs of Production

**Labor.** The amount of hired labor depends on the experience of the operator and man-hours the operator devotes to the production system. Our estimates (Posadas and Homziak, 1991) suggest that a total of about one man-hour of experienced labor is required to handle a fully stocked, 24-square-foot culture tray each week. During the establishment year, producers may need to employ as much as four times this amount of labor. Less labor is required when the system is operated at less than full capacity (during shortages of crawfish stocks) or toward the end of the production season.

**Stocks.** Crawfish stock purchases depend upon stocking rate, molting rate, mortality rate, hauling mortality, and quality of stocks. Experimental and commercial results showed a stocking rate of about 1 pound per square foot of culture tray capacity produced the best survival and molting rates (Culley and Duobinis-Gray, 1987a; Culley et al., 1988). A daily mortality-rate estimate of one percent of the total stock is based

on records for existing production systems (Homziak, 1989; Posadas and Homziak, 1991).

Daily replacements of crawfish that have been removed because of molting or mortality produced the highest yields. Since crawfish ponds are not usually located near shedding facilities in Mississippi, a weekly or biweekly replacement is more practical.

In purchasing crawfish stocks, producers should allow for losses due to hauling mortalities and to inclusion of mature stock unsuitable for molting. Hauling mortality of about five percent has been reported by Mississippi producers (Posadas and Homziak, 1991).

Upon arrival at the production system, the crawfish are sorted, and live, immature crawfish are acclimated and stocked in trays. About five percent of stock purchases have not been suitable for molting.

Ideally, over 300 pounds of replacement crawfish stocks are required weekly to fully utilize production capacity for the system described here. In practice, however, full capacity is rarely utilized. Biweekly deliveries keep the system below capacity. The supply of crawfish suitable for molting is limited (and price is high) at the beginning of each season. Likewise, toward the end of each season, fewer suitable replacements are available.

The variability in the supply and demand for crawfish stocks during the seven-month production season results in an underutilization of available culture capacity.

**Heating.** Temperature influences the molting of crawfish (Culley and Duobinis-Gray, 1987b). The recommended culture tray temperature is 80-82 degrees Fahrenheit, especially from December to February when most of the catch is composed of old, immature crawfish (Culley et al., 1988; Culley and Duobinis-Gray, 1990).

Old, immature crawfish showed acceptable molting rates at 80-82 °F, but young-of-the-year, immature crawfish will molt well at 70-72 °F. The amount of heating depends on the quality of immature crawfish (old versus young-of-the-year) and difference between ambient water temperature and the desired holding temperature.

Most heating costs are incurred in December to February, when ambient water temperatures are lowest and stocks are largely old crawfish. Producers operating during this period need to heat their systems to induce the available old immature crawfish to molt. Heating costs are reduced or negligible when ambient water temperature reaches at least 70 °F and young immature crawfish become abundant.

**Hauling.** Transport cost is the cost of hauling crawfish stocks from production ponds to the shedding facility. Hauling distance refers to the mileage travelled to and from crawfish ponds. Hauling time includes man-hours employed in hauling crawfish stocks.

Mississippi soft crawfish producers bought crawfish stocks from sources located in Louisiana (450 miles round trip) and Alabama (150 miles round trip), (Posadas and Homziak, 1991).

**Feeding.** Crawfish stocks are fed once or twice a day. Maintaining a proper feeding scheme is important to avoid loss of feed and overfeeding. Excess feed also exerts undue pressure on the biological filtration system used in recirculating culture systems. Feed pellets with 28-30 percent protein are adequate (Culley and Duobinis-Gray, 1990).

**Interest.** Interest on operating capital is equal to interest rate for the duration of the culture period multiplied by half the total operating costs, excluding own and family labor. Most Mississippi soft crawfish producers received loans at 12 percent annual interest rate (Posadas and Homziak, 1991).

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## Enterprise Budgets

### Description and construction costs of farm structures

Item	Unit	Open system	Closed system
Building			
Space	sq ft	1,512	1,512.00
Cost	\$/sq ft	5.20	5.20
Concrete slab			
Space	cu ft	514.80	514.80
Cost	\$/cu ft	0.97	0.97
Plumbing			
Cost	\$/system	498.96	498.96
Wiring			
Cost	\$/system	166.32	166.32
Gas line			
Cost	\$/system	0.00	241.92

### Description and construction costs of farm facilities

Item	Unit	Open system	Closed system
Water well			
Diameter	inch	4	4
Depth	ft	143	347
Flow rate	gal/min	45	43
Water temperature	degree Fahrenheit	70	70
Cost	\$/well	1,825	2,353
Water pump			
Horsepower	HP	3	2
Capacity	gal/min	50	54
Cost	\$/pump	1,775	1,315
Recycling/filter system			
Filters	number	0	3
Filter capacity	gal/min	0	74
Water temperature	degree Fahrenheit	70	80
Cost	\$/system	0	3,061
Sump and reservoir			
Sump capacity	gal	0	420
Reservoir capacity	gal	0	6,231
Total cost	\$/system	0	1,506
Trays			
Culture	number	60	60
Molting	number	6	6
Acclimation	number	6	6
Stands	number	36	36

## Initial fixed investment and annual fixed costs of open culture system

Number of culture trays	60.00
Culture capacity (sq ft)	1,440.00
Average tray size (sq ft)	24.00
Molting trays (sq ft)	144.00
Acclimation trays (sq ft)	144.00
Building space (sq ft)	1,512.00

### Initial fixed investment

Item	Replacement cost	Average investment (in dollars)	Annual depreciation
Building	7,862.40	3,931.20	786.24
Concrete slab	499.36	249.68	24.97
Plumbing	498.96	249.48	49.90
Wiring	166.32	83.16	8.32
Gas line	.00	.00	.00
Water well/pump	3,600.00	1,800.00	360.00
Water heater/boiler	.00	.00	.00
Recycling/filter system	.00	.00	.00
Sump/reservoir	.00	.00	.00
Trays	2,376.00	1,188.00	594.00
Stands	720.00	360.00	240.00
Freezer	550.00	275.00	78.57
Refrigerator	.00	.00	.00
Test kits	160.00	80.00	32.00
Scales	55.00	27.50	11.00
Oxygen meter	.00	.00	.00
Counters	50.00	25.00	10.00
Tools	50.00	25.00	5.00
Sinks	55.00	27.50	3.67
Furniture	50.00	25.00	10.00
Generator	.00	.00	.00
Miscellaneous	.00	.00	.00
Total*	16,693.04	8,346.52	2,213.66
Average**	11.59	5.80	1.54

### Annual fixed costs

	Rate	Dollars
Interest on investment	12.00%	1,001.58
Taxes and insurance	.60%	50.08
Rent		0.00
Depreciation		2,213.66
Total*		3,265.32
Average**		2.27

\*Per farm.

\*\*Per square foot of culture capacity.

## Monthly variable inputs and outputs of open culture system

Item	Culture month							Season
	Dec	Jan	Feb	Mar	Apr	May	Jun	
Variable inputs								
Labor (man-hour)	123	236	222	250	243	252	131	1,456
Owner	91	174	163	184	179	185	97	1,073
Family	0	0	0	0	0	0	0	0
Hired	32	62	58	66	64	66	34	383
Crawfish stocks (lb)	1,406	1,406	1,270	1,406	1,361	1,406	0	8,256
Electricity (kwh)	1,860	1,829	1,652	1,829	1,770	1,829	1,829	12,597
Gas (cu ft)	0	0	0	0	0	0	0	0
Repair/maintenance (\$)	32	32	29	32	31	32	32	218
Hauling distance (mi)	1,993	1,993	1,800	1,993	1,929	1,993	0	11,700
Hauling time (hr)	43	43	38	43	41	43	0	250
Loading/unloading	9	9	8	9	9	9	0	55
Travel time	33	33	30	33	32	33	0	195
Crawfish feed (lb)	218	417	392	441	430	445	232	2,575
Communication (\$)	116	116	105	116	112	116	116	797
Soft-shell crawfish (lb)	0	834	785	883	859	890	464	4,714
Regular	0	818	769	865	842	872	454	4,620
Irregular	0	8	8	9	9	9	5	47
One/no claws	0	8	8	9	9	9	5	47
Crawfish boilers (lb)	70	70	64	70	68	70	309	722

## Seven-month costs and returns of open culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	7.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	4,619.65	27,717.91	6.00	19.25	_____
Irregular	lb	4.00000	47.14	188.56	4.00	.13	_____
No claws	lb	2.00000	47.14	94.28	2.00	.07	_____
Boiler	lb	.50000	721.80	360.90	.50	.25	_____
Total gross receipts	\$	-	5,435.73	28,361.65	5.22	19.70	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	1,072.98	.00	.00	.00	_____
Hired labor	hr	4.30000	383.15	1,647.55	.30	1.14	_____
Stocks	lb	1.00000	8,255.52	8,255.52	1.52	5.73	_____
Electricity	kwh	.08363	12,596.84	1,053.47	.19	.73	_____
Gas	cu ft	.00500	.00	.00	.00	.00	_____
Repair/maintenance	\$	1.00000	217.77	217.77	.04	.15	_____
Haul distance	mi	.20000	11,700.00	2,340.00	.43	1.63	_____
Haul time	hr	4.30000	250.04	1,075.16	.20	.75	_____
Feed	lb	.28000	2,574.94	720.98	.13	.50	_____
Communication	\$	1.00000	796.86	796.86	.15	.55	_____
Interest	%	.07000	8,053.66	563.76	.10	.39	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	16,671.07	3.07	11.58	_____
Income above variable costs	\$	-	-	11,690.58	2.15	8.12	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,265.32	.60	2.27	_____
Total fixed costs	\$	-	-	3,265.32	.60	2.27	_____
Total costs	\$	-	-	19,936.39	3.67	13.84	_____
Returns to land, labor, management, and risk	\$	-	-	8,425.26	1.55	5.85	_____

## Six-month costs and returns of open culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	6.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost value/ sq ft	Your estimate
Gross receipts							
Regular	lb	6.00000	3,794.27	22,765.65	6.00	15.81	_____
Irregular	lb	4.00000	38.72	154.87	4.00	.11	_____
No claws	lb	2.00000	38.72	77.43	2.00	.05	_____
Boiler	lb	.50000	654.52	327.26	.50	.23	_____
Total gross receipts	\$	-	4,526.23	23,325.21	5.15	16.20	_____
Variable costs							
Own/family labor	hr	.00000	897.50	.00	.00	.00	_____
Hired labor	hr	4.30000	320.49	1,378.11	.30	.96	_____
Stocks	lb	1.00000	6,909.84	6,909.84	1.53	4.80	_____
Electricity	kwh	.08363	10,846.76	907.11	.20	.63	_____
Gas	cu ft	.00500	.00	.00	.00	.00	_____
Repair/maintenance	\$	1.00000	187.44	187.44	.04	.13	_____
Haul distance	mi	.20000	9,792.86	1,958.57	.43	1.36	_____
Haul time	hr	4.30000	209.28	899.90	.20	.62	_____
Feed	lb	.28000	2,153.83	603.07	.13	.42	_____
Communication	\$	1.00000	685.87	685.87	.15	.48	_____
Interest	%	.06000	6,764.96	405.90	.09	.28	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	13,935.82	3.08	9.68	_____
Income above variable costs	\$	-	-	9,389.39	2.07	6.52	_____
Fixed costs							
Building, facilities, and equipment	\$	-	-	3,265.32	.72	2.27	_____
Total fixed costs	\$	-	-	3,265.32	.72	2.27	_____
Total costs	\$	-	-	17,201.14	3.80	11.95	_____
Returns to land, labor, management, and risk	\$	-	-	6,124.07	1.35	4.25	_____

## Five-month costs and returns of open culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	5.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	2,968.90	17,813.39	6.00	12.37	_____
Irregular	lb	4.00000	30.29	121.18	4.00	.08	_____
No claws	lb	2.00000	30.29	60.59	2.00	.04	_____
Boiler	lb	.50000	587.23	293.62	.50	.20	_____
Total gross receipts	\$	-	3,616.72	18,288.77	5.06	12.70	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	722.02	.00	.00	.00	_____
Hired labor	hr	4.30000	257.83	1,108.66	.31	.77	_____
Stocks	lb	1.00000	5,564.16	5,564.16	1.54	3.86	_____
Electricity	kwh	.08363	9,096.69	760.76	.21	.53	_____
Gas	cu ft	.00500	.00	.00	.00	.00	_____
Repair/maintenance	\$	1.00000	157.11	157.11	.04	.11	_____
Haul distance	mi	.20000	7,885.71	1,577.14	.44	1.10	_____
Haul time	hr	4.30000	168.52	724.65	.20	.50	_____
Feed	lb	.28000	1,732.72	485.16	.13	.34	_____
Communication	\$	1.00000	574.89	574.89	.16	.40	_____
Interest	%	.05000	5,476.26	273.81	.08	.19	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	11,226.34	3.10	7.80	_____
Income above variable costs	\$	-	-	7,062.43	1.95	4.90	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,265.32	.90	2.27	_____
Total fixed costs	\$	-	-	3,265.32	.90	2.27	_____
Total costs	\$	-	-	14,491.66	4.01	10.06	_____
Returns to land, labor, management, and risk	\$	-	-	3,797.11	1.05	2.64	_____

## Four-month costs and returns of open culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	4.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	2,143.52	12,861.12	6.00	8.93	_____
Irregular	lb	4.00000	21.87	87.49	4.00	.06	_____
No claws	lb	2.00000	21.87	43.75	2.00	.03	_____
Boiler	lb	.50000	519.95	259.97	.50	.18	_____
Total gross receipts	\$	-	2,707.21	13,252.33	4.90	9.20	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	546.55	.00	.00	.00	_____
Hired labor	hr	4.30000	195.17	839.22	.31	.58	_____
Stocks	lb	1.00000	4,218.48	4,218.48	1.56	2.93	_____
Electricity	kwh	.08363	7,346.61	614.40	.23	.43	_____
Gas	cu ft	.00500	.00	.00	.00	.00	_____
Repair/maintenance	\$	1.00000	126.78	126.78	.05	.09	_____
Haul distance	mi	.20000	5,978.57	1,195.71	.44	.83	_____
Haul time	hr	4.30000	127.77	549.39	.20	.38	_____
Feed	lb	.28000	1,311.61	367.25	.14	.26	_____
Communication	\$	1.00000	463.90	463.90	.17	.32	_____
Interest	%	.04000	4,187.57	167.50	.06	.12	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	8,542.63	3.16	5.93	_____
Income above variable costs	\$	-	-	4,709.70	1.74	3.27	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,265.32	1.21	2.27	_____
Total fixed costs	\$	-	-	3,265.32	1.21	2.27	_____
Total costs	\$	-	-	11,807.95	4.36	8.20	_____
Returns to land, labor, management, and risk	\$	-	-	1,444.38	.53	1.00	_____

## Initial fixed investment and annual fixed costs of closed culture system

Number of culture trays	60.00
Culture capacity (sq ft)	1,440.00
Average tray size (sq ft)	24.00
Molting trays (sq ft)	144.00
Acclimation trays (sq ft)	144.00
Building space (sq ft)	1,512.00

### Initial fixed investment

Item	Replacement cost	Average investment (in dollars)	Annual depreciation
Building	7,862.40	3,931.20	786.24
Concrete slab	499.36	249.68	24.97
Plumbing	498.96	249.48	49.90
Wiring	166.32	83.16	8.32
Gas line	241.92	120.96	12.10
Water well/pump	3,667.90	1,833.95	288.36
Water heater/boiler	536.00	268.00	53.60
Recycling/filter system	3,061.20	1,530.60	306.12
Sump/reservoir	1,506.00	753.00	75.30
Trays	2,376.00	1,188.00	594.00
Stands	720.00	360.00	240.00
Freezer	550.00	275.00	78.57
Refrigerator	.00	.00	.00
Test kits	160.00	80.00	32.00
Scales	55.00	27.50	11.00
Oxygen meter	.00	.00	.00
Counters	50.00	25.00	10.00
Tools	50.00	25.00	5.00
Sinks	55.00	27.50	3.67
Furniture	50.00	25.00	10.00
Generator	.00	.00	.00
Miscellaneous	.00	.00	.00
Total*	22,106.05	11,053.03	2,589.13
Average**	15.35	7.68	1.80

### Annual fixed costs

	Rate	Dollars
Interest and investment	12.00%	1,326.36
Taxes and insurance	.60%	66.32
Rent		0.00
Depreciation		2,589.13
Total*		3,981.81
Average**		2.77

\*Per farm.

\*\*Per square foot of culture capacity.



## Monthly variable inputs and outputs of closed culture system

Item	Culture month							Season
	Dec	Jan	Feb	Mar	Apr	May	Jun	
Variable inputs								
Labor (man-hour)	123	236	222	250	243	252	131	1,456
Owner	91	174	163	184	179	185	97	1,073
Family	0	0	0	0	0	0	0	0
Hired	32	62	58	66	64	66	34	383
Crawfish stocks (lb)	1,406	1,406	1,270	1,406	1,361	1,406	0	8,256
Electricity (kwh)	2,860	2,860	2,583	2,860	2,768	2,860	2,860	19,651
Gas (cu ft)	42,944	42,944	38,788	0	0	0	0	124,675
Repair/maintenance (\$)	32	32	29	32	31	32	32	218
Hauling distance (mi)	1,993	1,993	1,800	1,993	1,929	1,993	0	11,700
Hauling time (hr)	43	43	38	43	41	43	0	250
Loading/unloading	9	9	8	9	9	9	0	55
Travel time	33	33	30	33	32	33	0	195
Crawfish feeds (lb)	218	417	392	441	430	445	232	2,575
Communication (\$)	116	116	105	116	112	116	116	797
Soft-shell crawfish (lb)	0	834	785	883	859	890	464	4,714
Regular	0	818	769	865	842	872	454	4,620
Irregular	0	8	8	9	9	9	5	47
No claws	0	8	8	9	9	9	5	47
Crawfish boilers (lb)	70	70	64	70	68	70	309	722

## Seven-month costs and returns of closed culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	7.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	4,619.65	27,717.91	6.00	19.25	_____
Irregular	lb	4.00000	47.14	188.56	4.00	.13	_____
No claws	lb	2.00000	47.14	94.28	2.00	.07	_____
Boiler	lb	.50000	721.80	360.90	.50	.25	_____
Total gross receipts	\$	-	5,435.73	28,361.65	5.22	19.70	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	1,072.98	.00	.00	.00	_____
Hired labor	hr	4.30000	383.15	1,647.55	.30	1.14	_____
Stocks	lb	1.00000	8,255.52	8,255.52	1.52	5.73	_____
Electricity	kwh	.08363	19,650.91	1,643.41	.30	1.14	_____
Gas	cu ft	.00500	124,675.20	623.38	.11	.43	_____
Repair/maintenance	\$	1.00000	217.77	217.77	.04	.15	_____
Haul distance	mi	.20000	11,700.00	2,340.00	.43	1.63	_____
Haul time	hr	4.30000	250.04	1,075.16	.20	.75	_____
Feed	lb	.28000	2,574.94	720.98	.13	.50	_____
Communication	\$	1.00000	796.86	796.86	.15	.55	_____
Interest	%	.07000	8,660.31	606.22	.11	.42	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	17,926.84	3.30	12.45	_____
Income above variable costs	\$	-	-	10,434.80	1.92	7.25	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,981.81	.73	2.77	_____
Total fixed costs	\$	-	-	3,981.81	.73	2.77	_____
Total costs	\$	-	-	21,908.66	4.03	15.21	_____
Returns to land, labor, management, and risk	\$	-	-	6,452.99	1.19	4.48	_____

## Six-month costs and returns of closed system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	6.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	3,794.27	22,765.65	6.00	15.81	_____
Irregular	lb	4.00000	38.72	154.87	4.00	.11	_____
No claws	lb	2.00000	38.72	77.43	2.00	.05	_____
Boiler	lb	.50000	654.52	327.26	.50	.23	_____
Total gross receipts	\$	-	4,526.23	23,325.21	5.15	16.20	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	897.50	.00	.00	.00	_____
Hired labor	hr	4.30000	320.49	1,378.11	.30	.96	_____
Stocks	lb	1.00000	6,909.84	6,909.84	1.53	4.80	_____
Electricity	kwh	.08363	16,913.93	1,414.51	.31	.98	_____
Gas	cu ft	.00500	111,745.92	558.73	.12	.39	_____
Repair/maintenance	\$	1.00000	187.44	187.44	.04	.13	_____
Haul distance	mi	.20000	9,792.86	1,958.57	.43	1.36	_____
Haul time	hr	4.30000	209.28	899.90	.20	.62	_____
Feed	lb	.28000	2,153.83	603.07	.13	.42	_____
Communication	\$	1.00000	685.87	685.87	.15	.48	_____
Interest	%	.06000	7,298.02	437.88	.10	.30	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	15,033.93	3.32	10.44	_____
Income above variable costs	\$	-	-	8,291.28	1.83	5.76	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,981.81	.88	2.77	_____
Total fixed costs	\$	-	-	3,981.81	.88	2.77	_____
Total costs	\$	-	-	19,015.74	4.20	13.21	_____
Returns to land, labor, management, and risk	\$	-	-	4,309.47	.95	2.99	_____

## Five-month costs and returns of closed culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	5.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

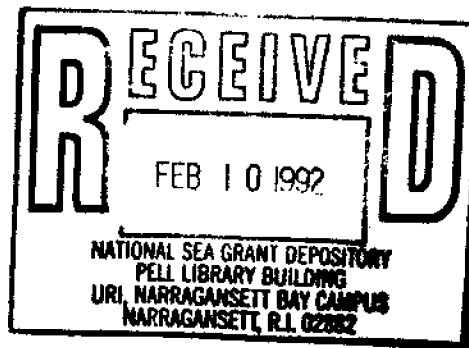
Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	4.00000	2,968.90	17,813.39	6.00	12.37	_____
Irregular	lb	4.00000	30.29	121.18	4.00	.08	_____
No claws	lb	2.00000	30.29	60.59	2.00	.04	_____
Boiler	lb	.50000	587.23	293.62	.50	.20	_____
Total gross receipts	\$	-	3,616.72	18,288.77	5.06	12.70	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	722.02	.00	.00	.00	_____
Hired labor	hr	4.30000	257.83	1,108.66	.31	.77	_____
Stocks	lb	1.00000	5,564.16	5,564.16	1.54	3.86	_____
Electricity	kwh	.08363	14,176.95	1,185.62	.33	.82	_____
Gas	cu ft	.00500	98,816.64	494.08	.14	.34	_____
Repair/maintenance	\$	1.00000	157.11	157.11	.04	.11	_____
Haul distance	mi	.20000	7,885.71	1,577.14	.44	1.10	_____
Haul time	hr	4.30000	168.52	724.65	.20	.50	_____
Feed	lb	.28000	1,732.72	485.16	.13	.34	_____
Communication	\$	1.00000	574.89	574.89	.16	.40	_____
Interest	%	.05000	5,935.74	296.79	.08	.21	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	12,168.26	3.36	8.45	_____
<b>Income above variable costs</b>							
	\$	-	-	6,120.51	1.69	4.25	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,981.81	1.10	2.77	_____
Total fixed costs	\$	-	-	3,981.81	1.10	2.77	_____
Total costs	\$	-	-	16,150.07	4.47	11.22	_____
Returns to land, labor, management, and risk	\$	-	-	2,138.70	.59	1.49	_____

## Four-month costs and returns of closed culture system

Culture capacity (sq ft)	1,440.00
Tray size (sq ft)	24.00
Culture period (month)	4.00
Average capacity use (%)	84.21
Daily molting rate (%)	2.00
Daily mortality rate (%)	1.00
Haul distance (mi/trip)	450.00
Number of trips/week	1.00

### Annual costs and returns

Item	Unit	Unit cost, price	Quantity	Total cost, value	Cost, value/ pound	Cost, value/ sq ft	Your estimate
<b>Gross receipts</b>							
Regular	lb	6.00000	2,143.52	12,861.12	6.00	8.93	_____
Irregular	lb	4.00000	21.87	87.49	4.00	.06	_____
No claws	lb	2.00000	21.87	43.75	2.00	.03	_____
Boiler	lb	.50000	519.95	259.97	.50	.18	_____
Total gross receipts	\$	-	2,707.21	13,252.33	4.90	9.20	_____
<b>Variable costs</b>							
Own/family labor	hr	.00000	546.55	.00	.00	.00	_____
Hired labor	hr	4.30000	195.17	839.22	.31	.58	_____
Stocks	lb	1.00000	4,218.48	4,218.48	1.56	2.93	_____
Electricity	kwh	.08363	11,439.97	956.72	.35	.66	_____
Gas	cu ft	.00500	85,887.36	429.44	.16	.30	_____
Repair/maintenance	\$	1.00000	126.78	126.78	.05	.09	_____
Haul distance	mi	.20000	5,978.57	1,195.71	.44	.83	_____
Haul time	hr	4.30000	127.77	549.39	.20	.38	_____
Feed	lb	.28000	1,311.61	367.25	.14	.26	_____
Communication	\$	1.00000	463.90	463.90	.17	.32	_____
Interest	%	.04000	4,573.45	182.94	.07	.13	_____
Miscellaneous	\$	.00000	.00	.00	.00	.00	_____
Total variable costs	\$	-	-	9,329.83	3.45	6.48	_____
Income above variable costs	\$	-	-	3,922.50	1.45	2.72	_____
<b>Fixed costs</b>							
Building, facilities, and equipment	\$	-	-	3,981.81	1.47	2.77	_____
Total fixed costs	\$	-	-	3,981.81	1.47	2.77	_____
Total costs	\$	-	-	13,311.64	4.92	9.24	_____
Returns to land, labor, management, and risk	\$	-	-	(59.31)	(.02)	(.04)	_____



### **Acknowledgment**

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