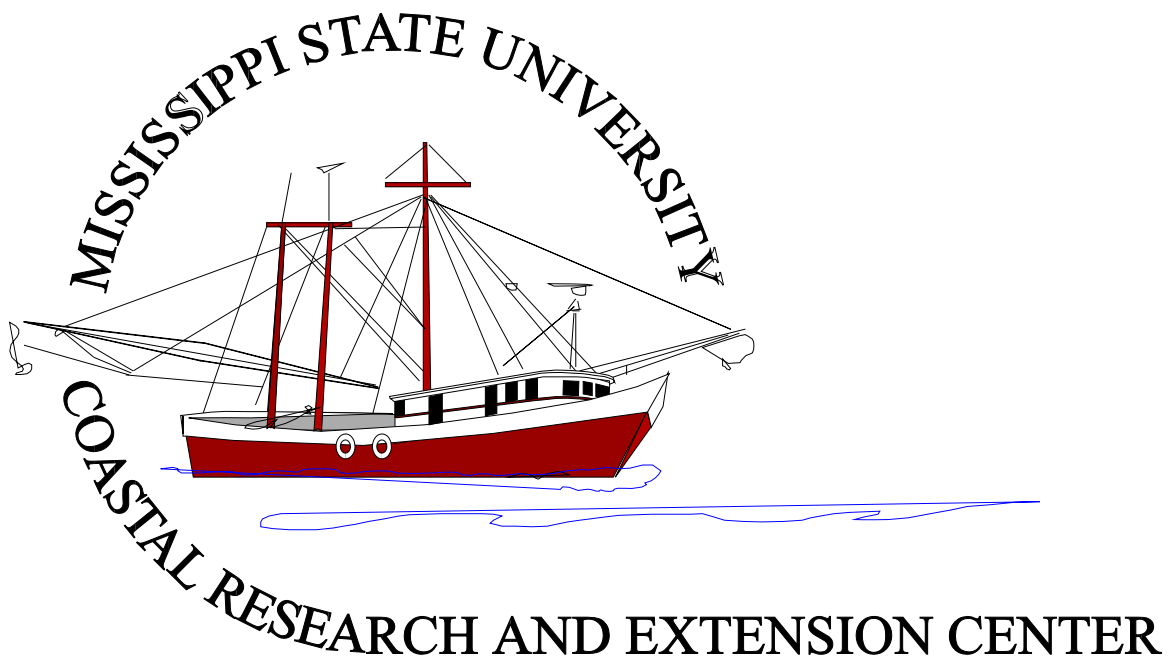


Waste Management Options For Mississippi Shrimp Processors



**Coastal Research and Extension Center
Mississippi State University
Biloxi, Mississippi
October 1998**

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*Compiled by the Mississippi State University
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Information provided by the industry indicates that during the most recent 12-month period (September 1997-August 1998), Mississippi shrimp processors peeled about 38 million pounds of shrimp, primarily through the use of automated peeling machines. In the following table “wet” waste signifies the weight of the material as it exits the processing plant via conveyor belt. “Dry” waste is the weight of the material as it is received at the drying plant after preliminary mechanical de-watering. As can be seen, there is a high seasonal fluctuation with about 40 percent of the annual waste stream produced in the period from mid-May through mid-July each year. Minimal processing and waste production occurs during the first quarter of the calendar year. These figures are depicted graphically in Figure 1.

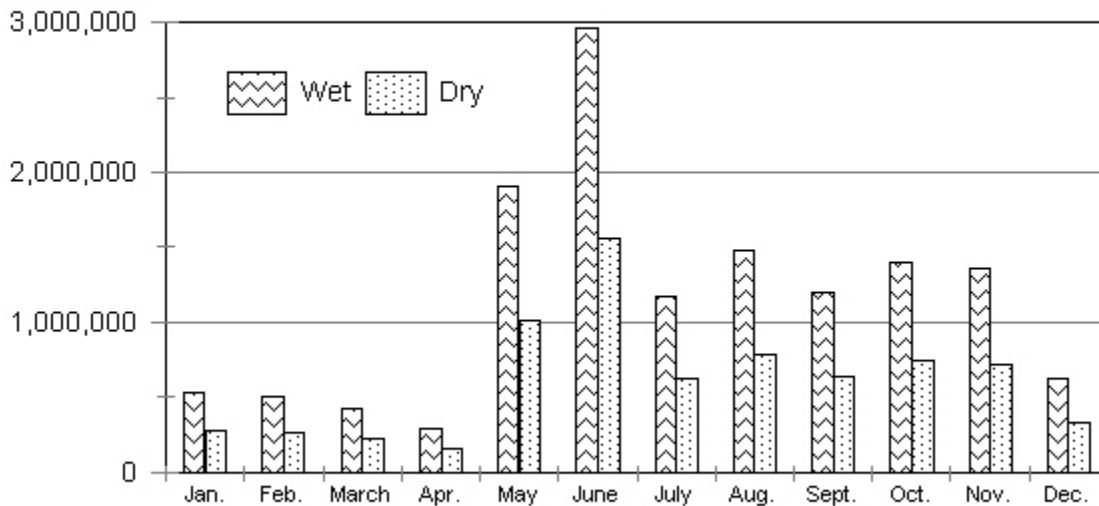
Table 1.

Waste Stream Profile

	<u>Pounds of Product Processed</u>		<u>Waste Generated</u>		
	<u>Heads-on</u>	<u>Headless</u>	<u>Wet</u>	<u>Dry</u>	<u>Percent</u>
Jan.	786,637	992,253	532,950	282,464	3.9%
Feb.	691,806	1,026,771	502,612	266,384	3.6%
March	564,115	942,746	433,050	229,517	3.1%
Apr.	361,955	674,069	293,077	155,331	2.1%
May	4,374,108	693,681	1,902,253	1,008,194	13.7%
June	7,070,335	569,696	2,953,467	1,565,338	21.3%
July	2,682,011	465,223	1,175,154	622,831	8.5%
Aug.	3,252,704	779,878	1,472,655	780,507	10.6%
Sept.	2,817,225	314,599	1,196,102	633,934	8.6%
Oct.	3,236,015	456,590	1,394,856	739,274	10.1%
Nov.	3,233,093	300,565	1,359,362	720,462	9.8%
Dec.	1,314,333	440,553	622,655	330,007	4.5%
Totals	30,384,338	7,656,624	13,838,192	7,334,242	100.0%
Technical assumptions:					
Heads-on wet waste yield	40.00%				
Headless wet waste yield	22.00%				
Wet-dry conversion factor	53.00%				

Figure 1.

Monthly Waste Production Pounds of Shrimp Processing Waste



Currently, Mississippi shrimp processors contract for waste removal by leasing 6 cubic yard dumpsters on an annual basis and paying additional fees based on the cubic yards of waste removed from their facilities. On the average, one cubic yard of mechanically de-watered shrimp processing waste weighs 366 pounds. The industry members using this service (14 plants) incur a total annual cost associated with processing waste disposal of about \$140,000--\$150,000. At present, the waste is transported to Bayou La Batre, Alabama as raw material for a drying plant where it is used to make meal.

The investment costs and projected revenues/savings associated with waste management infrastructure are broken down into two components—transportation and meal production. For the transportation element, costs are compared among typical 20 and 30 cubic yard capacity trucks under three scenarios: 1) status quo—delivering the material to the existing plant in Bayou La Batre, Alabama; 2) delivering the material to a plant located in Gulfport, Mississippi, and 3) delivering the material to a plant located in Moss Point, Mississippi. The latter two sites were chosen because private investors had indicated their suitability for this purpose. The theoretical drying plant is sized to be able to handle 10 million pounds of raw material annually with

allowances for the seasonal nature of shrimp waste production. Linear programming is used to determine optimum investment strategies. Finally, various management/ownership regimes are examined to determine the most cost-effective and equitable arrangement for Mississippi shrimp processors.

Transportation Component:

Table 2.

Transportation Requirements

<u>Mileage Estimates to Various Sites</u>									
	<u>Cubic Yards</u>	<u>Trips20</u>	<u>Trips30</u>	<u>Gulfport20</u>	<u>Gulfport30</u>	<u>Moss Point20</u>	<u>Moss Point30</u>	<u>BLB20</u>	<u>BLB30</u>
Jan.	772	39	26	2,470	1,646	3,473	2,315	6,174	4,116
Feb.	728	36	24	2,329	1,553	3,275	2,183	5,823	3,882
March	627	31	21	2,007	1,338	2,822	1,881	5,017	3,345
Apr.	424	21	14	1,358	905	1,910	1,273	3,395	2,263
May	2,755	138	92	8,815	5,877	12,396	8,264	22,037	14,691
June	4,277	214	143	13,686	9,124	19,246	12,831	34,215	22,810
July	1,702	85	57	5,446	3,630	7,658	5,105	13,614	9,076
Aug.	2,133	107	71	6,824	4,549	9,596	6,398	17,060	11,374
Sept.	1,732	87	58	5,543	3,695	7,794	5,196	13,856	9,238
Oct.	2,020	101	67	6,464	4,309	9,089	6,060	16,159	10,773
Nov.	1,968	98	66	6,299	4,199	8,858	5,905	15,748	10,499
Dec.	902	45	30	2,885	1,924	4,057	2,705	7,213	4,809
Totals	20,039	1,002	668	64,125	42,750	90,175	60,117	160,311	106,874

Note: Comparison For 20 & 30 Cubic Yard Capacity Trucks

Cubic Yard = 366 Pounds (75% Moisture Content)

Tables 3-5 outline the annual ownership and operating costs for typical rear loading compactor trucks with 20 cubic yard and 30 cubic yard capacities. Costs in these tables are based on the following assumptions: 1) 1,800 hours per year of vehicle operation; 2) 8 years service life; 3) 10 years economic life (for depreciation); 4) \$24 per hour shop rate; 5) One full-time employee working one shift per hauling day; 6) 10 percent interest rate on investment capital; 7) Unit costs for 20 cubic yard and 30 cubic yard trucks of \$120,000 and \$140,000 respectively. Comparisons are also given based on hauling the material to Gulfport, Bayou La Batre, and Moss Point drying plant locations. At the present time, the waste transportation requires the use of two full-time trucks and three full-time employees.

Table 3.

Total Costs of Hauling Shrimp Processing Wastes to Gulfport Drying Plant

	RLCT (18-20 cu yd)			RLCT (31-32 cu yd)		
	\$/year	\$/mile	\$/trip	\$/year	\$/mile	\$/trip
Operating Costs:						
Preventive maintenance	2,080	0.05	2.89	3,368	0.07	4.68
Tire cost	2,860	0.06	3.97	6,240	0.14	8.67
Shop repairs	5,200	0.11	7.22	10,140	0.22	14.08
Fuel cost	3,072	0.07	4.27	4,608	0.10	6.40
Sub-total	13,212	0.29	18.35	24,356	0.53	33.83
Ownership Costs:						
Depreciation*	15,000	0.33	20.83	17,500	0.38	24.31
Investment interest	6,000	0.13	8.33	7,000	0.15	9.72
Dumpster lease	14,000	0.30	19.44	14,000	0.30	19.44
Permits and licenses	2,000	0.04	2.78	2,000	0.04	2.78
Liability insurance	6,800	0.15	9.44	7,933	0.17	11.02
Management	25,000	0.54	34.72	25,000	0.54	34.72
Sub-total	68,800	1.49	95.56	73,433	1.59	101.99
Total cost	82,012	1.78	113.91	97,789	2.12	135.82

Technical and economic assumptions:

Total annual mileage	46,080.00	46,080.00
Fuel cost per mile	0.067	0.10
Maximum trips per year	720.00	720.00
Hauling miles per trip	24.00	24.00
Collection miles per trip	40.00	40.00
Max. truck hours per year	1,800.00	1,800.00
Hours per trip	2.50	2.50
*Salvage value	0.00	0.00
*Economic life	8.00	8.00

Table 4.

Total Costs of Hauling Shrimp Processing Wastes to Bayou La Batre Drying Plant

Item	RLCT (18-20 cu yd)			RLCT (31-32 cu yd)		
	\$/year	\$/mile	\$/trip	\$/year	\$/mile	\$/trip
Operating Costs:						
Preventive maintenance	2,080	0.03	4.62	3,368	0.05	7.48
Tire cost	2,860	0.04	6.36	6,240	0.09	13.87
Shop repairs	5,200	0.07	11.56	10,140	0.14	22.53
Fuel cost	4,800	0.07	10.67	7,200	0.10	16.00
Sub-total	14,940	0.21	33.20	26,948	0.37	59.88
Ownership Costs:						
Depreciation*	15,000	0.21	33.33	17,500	0.24	38.89
Investment interest	6,000	0.08	13.33	7,000	0.10	15.56
Dumpster lease	14,000	0.19	31.11	14,000	0.19	31.11
Permits and licenses	2,000	0.03	4.44	2,000	0.03	4.44
Liability insurance	6,800	0.09	15.11	7,933	0.11	17.63
Management	25,000	0.35	55.56	25,000	0.35	55.56
Sub-total	68,800	0.96	152.89	73,433	1.02	163.19
Total cost	83,740	1.16	186.09	100,381	1.39	223.07
Technical and economic assumptions:						
Total annual mileage	72,000.00			72,000.00		
Fuel cost per mile	0.067			0.10		
Maximum trips per year	450.00			450.00		
Hauling miles per trip	120.00			120.00		
Collection miles per trip	40.00			40.00		
Max. truck hours per year	1,800.00			1,800.00		
Hours per trip	4.00			4.00		
*Salvage value	0.00			0.00		
*Economic life	8.00			8.00		

Table 5.

Total Costs of Hauling Shrimp Processing Wastes to Moss Point Drying Plant

Item	RLCT (18-20 cu yd)			RLCT (31-32 cu yd)		
	\$/year	\$/mile	\$/trip	\$/year	\$/mile	\$/trip
Operating Costs:						
Preventive maintenance	2,080	0.03	2.89	3,368	0.05	4.68
Tire cost	2,860	0.04	3.97	6,240	0.10	8.67
Shop repairs	5,200	0.08	7.22	10,140	0.16	14.08
Fuel cost	4,320	0.07	6.00	6,480	0.10	9.00
Sub-total	14,460	0.22	20.08	26,228	0.40	36.43
Ownership Costs:						
Depreciation*	15,000	0.23	20.83	17,500	0.27	24.31
Investment interest	6,000	0.09	8.33	7,000	0.11	9.72
Dumpster lease	14,000	0.22	19.44	14,000	0.22	19.44
Permits and licenses	2,000	0.03	2.78	2,000	0.03	2.78
Liability insurance	6,800	0.10	9.44	7,933	0.12	11.02
Management	25,000	0.39	34.72	25,000	0.39	34.72
Sub-total	68,800	1.06	95.56	73,433	1.13	101.99
Total cost	83,260	1.28	115.64	99,661	1.54	138.42
Technical and economic assumptions:						
Total annual mileage	64,800.00			64,800.00		
Fuel cost per mile	0.067			0.10		
Maximum trips per year	720.00			720.00		
Hauling miles per trip	50.00			50.00		
Collection miles per trip	40.00			40.00		
Max. truck hours per year	1,800.00			1,800.00		
Hours per trip	2.50			2.50		
*Salvage value	0.00			0.00		
*Economic life	8.00			8.00		

_____ Due to the highly seasonal nature of the processing waste stream, it is instructive to compare equipment requirements associated with peak periods with the overall annual average needs (excluding peak months). Is the ability to handle peak loads and have the peace of mind associated with a back-up piece of equipment worth the extra investment if this equipment will be underused the remainder of the year? Or would it be better to plan for the average annual load (again excluding peak months) and either lease equipment or subcontract for the peak period? The monthly equipment requirements based on 20 working days a month and 8-hour shifts can be determined for the three plant locations by examining Tables 6-8 and Figures 2-5.

Table 6.

Monthly hauling trips to Bayou La Batre using 20 cubic yard truck

Month	Total volume	Total trips required	Number of trips/month		
			one shift	two shifts	three shifts
Jan	772	39	40	80	120
Feb	728	36	40	80	120
Mar	627	31	40	80	120
Apr	424	21	40	80	120
May	2,755	138	40	80	120
Jun	4,277	214	40	80	120
Jul	1,702	85	40	80	120
Aug	2,133	107	40	80	120
Sep	1,732	87	40	80	120
Oct	2,020	101	40	80	120
Nov	1,968	98	40	80	120
Dec	902	45	40	80	120

Technical and economic assumptions:

Trucks	units	1
Truck load	yd3/trip	20
Haul days	days/mo	20
Haul hours	hrs/trip	4

Table 7.

Monthly hauling trips to Bayou LaBatre using 30 cubic yard truck

Month	Total volume	Total trips required	Number of trips/month		
			one shift	two shifts	three shifts
Jan	772	26	40	80	120
Feb	728	24	40	80	120
Mar	627	21	40	80	120
Apr	424	14	40	80	120
May	2,755	92	40	80	120
Jun	4,277	143	40	80	120
Jul	1,702	57	40	80	120
Aug	2,133	71	40	80	120
Sep	1,732	58	40	80	120
Oct	2,020	67	40	80	120
Nov	1,968	66	40	80	120
Dec	902	30	40	80	120

Technical and economic assumptions:

Trucks	units	1
Truck load	yd3/trip	30
Haul days	days/mo	20
Haul hours	hrs/trip	4

Table 8.

Monthly hauling trips to Moss Point or Gulfport using 20 cubic yard truck

Month	Total volume	Total trips required	Number of trips/month		
			one shift	two shifts	three shifts
Jan	772	39	64	128	192
Feb	728	36	64	128	192
Mar	627	31	64	128	192
Apr	424	21	64	128	192
May	2,755	138	64	128	192
Jun	4,277	214	64	128	192
Jul	1,702	85	64	128	192
Aug	2,133	107	64	128	192
Sep	1,732	87	64	128	192
Oct	2,020	101	64	128	192
Nov	1,968	98	64	128	192
Dec	902	45	64	128	192

Technical and economic assumptions:

Trucks	units	1
Truck load	yd ³ /trip	20
Haul days	days/mo	20
Haul hours	hrs/trip	2.5

Table 9.

Monthly hauling trips to Moss Point or Gulfport using 30 cubic yard truck

Month	Total volume	Total trips required	Number of trips/month		
			one shift	two shifts	three shifts
Jan	772	26	64	128	192
Feb	728	24	64	128	192
Mar	627	21	64	128	192
Apr	424	14	64	128	192
May	2,755	92	64	128	192
Jun	4,277	143	64	128	192
Jul	1,702	57	64	128	192
Aug	2,133	71	64	128	192
Sep	1,732	58	64	128	192
Oct	2,020	67	64	128	192
Nov	1,968	66	64	128	192
Dec	902	30	64	128	192

Technical and economic assumptions:

Trucks	units	1
Truck load	yd ³ /trip	30
Haul days	days/mo	20
Haul hours	hrs/trip	2.5

Figure 3.
Monthly Hauling Trips
 Bayou LaBatre

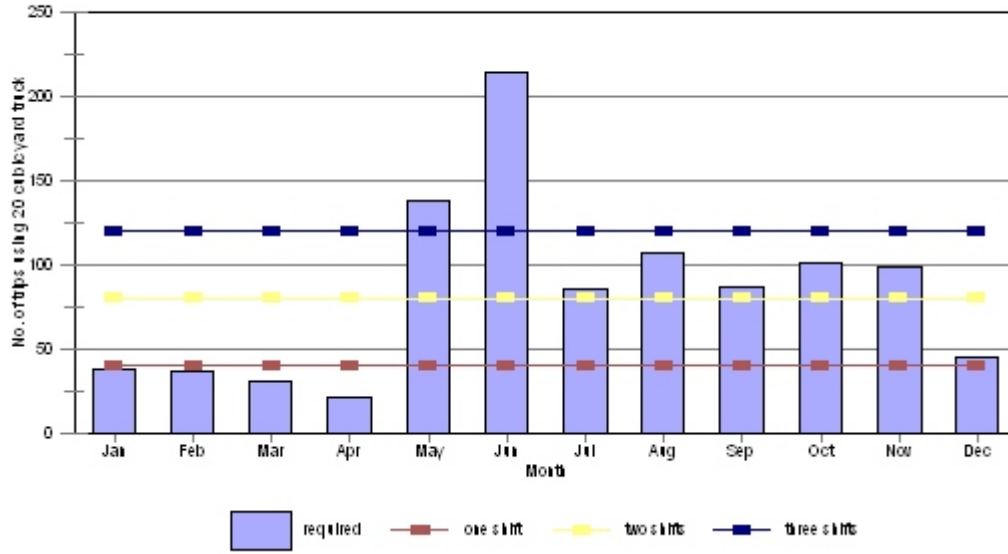


Figure 4.
Monthly Hauling Trips
 Bayou LaBatre

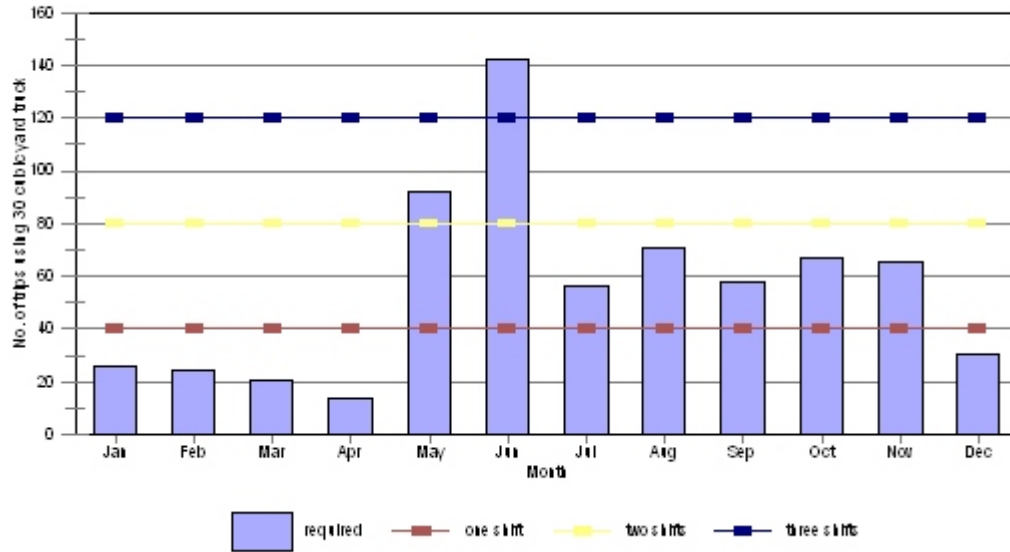


Figure 5.
Monthly Hauling Trips
 Gulfport or MossPoint

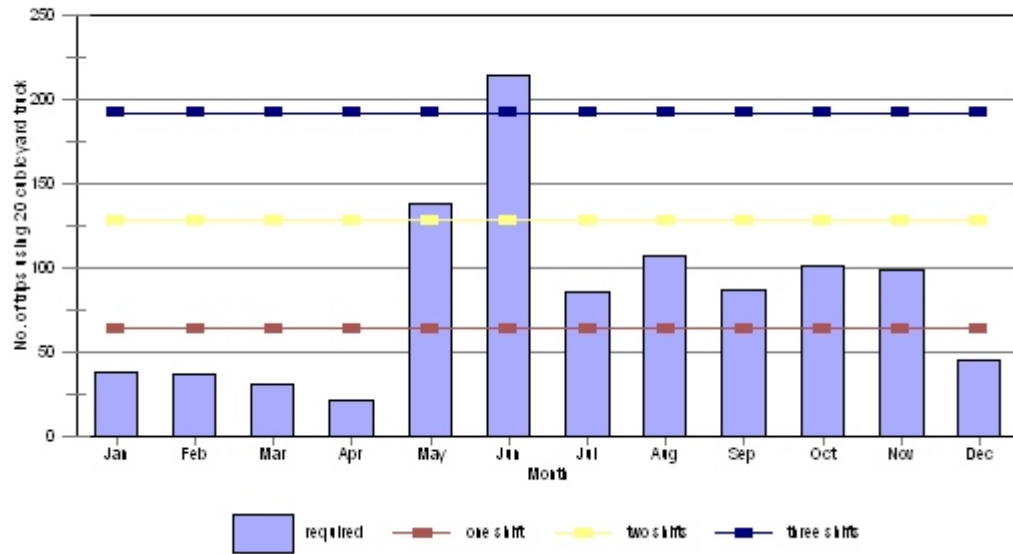
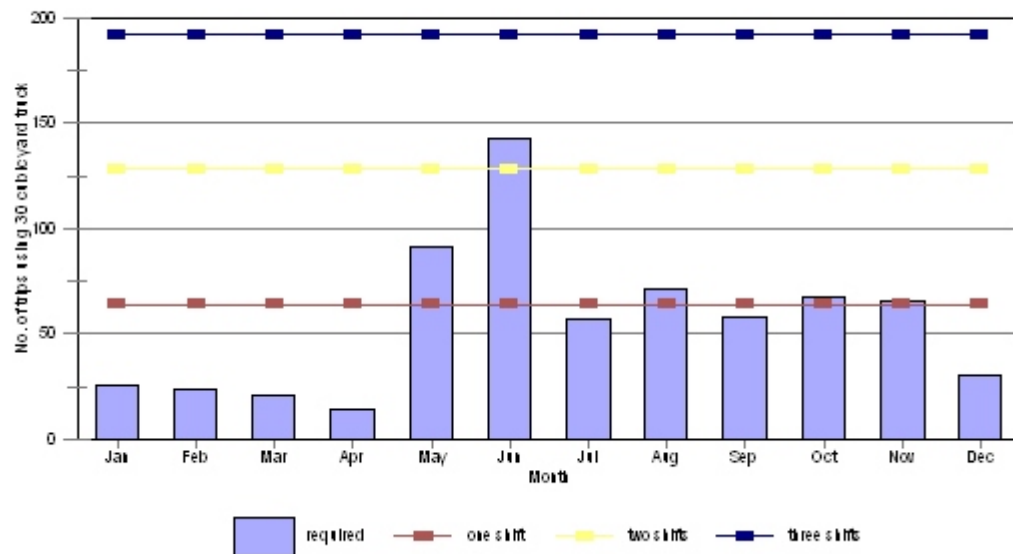


Figure 6
Monthly Hauling Trips
 Gulfport or MossPoint



For example, one 30-cubic-yard truck going to Bayou La Batre would have to work three shifts during May and June (June would require working 7 days a week), two shifts from July through November, and one shift the remainder of the year. Remember that the costs given in Tables 3-5 are based on 1,800 hours of use a year which translates to one 8-hour shift per day for 20 working days per month. The figures given for items such as fuel and maintenance costs (as well as additional labor) would have to be increased proportionately to the increase in use. Even working 24-hours a day, 7 days per week, one 20-cubic-yard truck going to Bayou La Batre would be insufficient to handle the load required. For two trucks working one 8-hour shift per day, the costs given in Tables 3-5 can essentially be doubled.

At the other end of the spectrum, one 30-cubic yard truck going to Gulfport or Moss Point would be almost fully utilized working one 8-hour shift for all months except May and June and be able to handle those months by working two shifts. Alternatively, two 20-cubic-yard capacity trucks would be fully utilized working 8-hour shifts from May through November (an extra shift would be required for one truck during June), but one truck would essentially be idle from January through April.

Meal Production Component:

The costs associated with shrimp meal production are given in Tables 10-11. The average total costs at various levels of production are shown in Figure 6. The break-even selling price per ton at a production level of 1,000 tons is \$198/ton. The market price of shrimp meal varies with the cost and availability of substitutes. The current price is about \$225/ton. Production beyond 1,200 tons/year would require the purchase of an additional dryer with a concomitant increase in production costs.

Table 10.

Description, Number, Costs and Economic Life of Equipment for Drying Solid Shrimp Wastes

Item	Description	Qty.	Unit cost (\$)	Total cost (\$)	Econ. life (yr)	Average invest. (\$)	Annual deprec. (\$)	Annual interest (\$)
Building and Grounds:								
Land	acre	4	25,000	100,000		50,000		5,000
Building and Grounds:	8000 sq ft, w/ office, bath & office equipment			130,000	10	65,000	13,000	6,500
Driveway	yard	35	70	2,450	10	1,225	245	123
Storage bin	silo type, 25 tons each	4	2,200	8,800	10	4,400	880	440
Utility construction	parts & labor			25,000	10	12,500	2,500	1,250
Subtotal				266,250		133,125	16,625	13,313
Processing Equipment for Shrimp Waste								
Dryer	drum type	1	120,000	120,000	10	60,000	12,000	6,000
Screw conveyor & holding bin	unit	1	14,700	14,700	10	7,350	1,470	735
Storage bin loader/unloader	unit	1	2,000	2,000	10	1,000	200	100
Hammer mill equipment	unit	1	13,000	13,000	10	6,500	1,300	650
Fork lift/20 collection tubs	unit	1	75,000	75,000	10	37,500	7,500	3,750
Scrubber/Fan	unit	1	50,000	50,000	10	25,000	5,000	2,500
Well	60 gpm	1	10,000	10,000	10	5,000	1,000	500
Miscellaneous	dollar			10,000	10	5,000	1,000	500
Subtotal				294,700		147,350	29,470	14,735
Total				560,950		280,475	46,095	28,048

Technical and economic assumptions:

Annual interest rate percent 10%

Table 11.

Total Costs of Drying Solid Shrimp Processing Wastes into Shrimp Meal

Item	Description	Quantity	Unit cost	Total cost \$/year	\$/ton
Operating Costs:					
Hired labor	hour, part-time	700	7	4,900	4.90
Fringe benefits	percent of hired labor's wages	4,900	25%	1,225	1.23
Diesel fuel (#2 fuel oil)	dollar			26,000	26.00
Electricity	dollar			8,000	8.00
Water	\$/month	12	350	4,200	4.20
Repair & maintenance	percent of equipment costs	294,700	5%	14,735	14.74
Telephone	\$/month	12	200	2,400	2.40
Supplies	\$/month	12	210	2,520	2.52
Interest on operating capital	percent of 1/2 of operating capital	31,990	10%	3,199	3.20
Subtotal				67,179	67.18
Ownership Costs:					
Depreciation	dollar			46,095	46.10
Investment interest	dollar			28,048	28.05
Permits and licenses	dollar			2,000	2.00
Liability insurance	percent	448,760	2.62%	11,758	11.76
Plant manager	20 days/mo, 12 mo/yr	1.00	35,000.00	35,000	35.00
Fringe benefits	percent of plant manager's salary	25%	35,000.00	8,750	8.75
Subtotal				131,650	131.65
Total				198,829	198.83
Technical and economic assumptions:					
Permits and licenses	\$/year			2,000	
Liability insurance	\$2.62 per \$100 of 80% of init.			2.62%	

Annual interest rate	inv.	10%
Shrimp meal production	percent ton/year	1,000

Average Total Costs Drying Shrimp Processing Waste

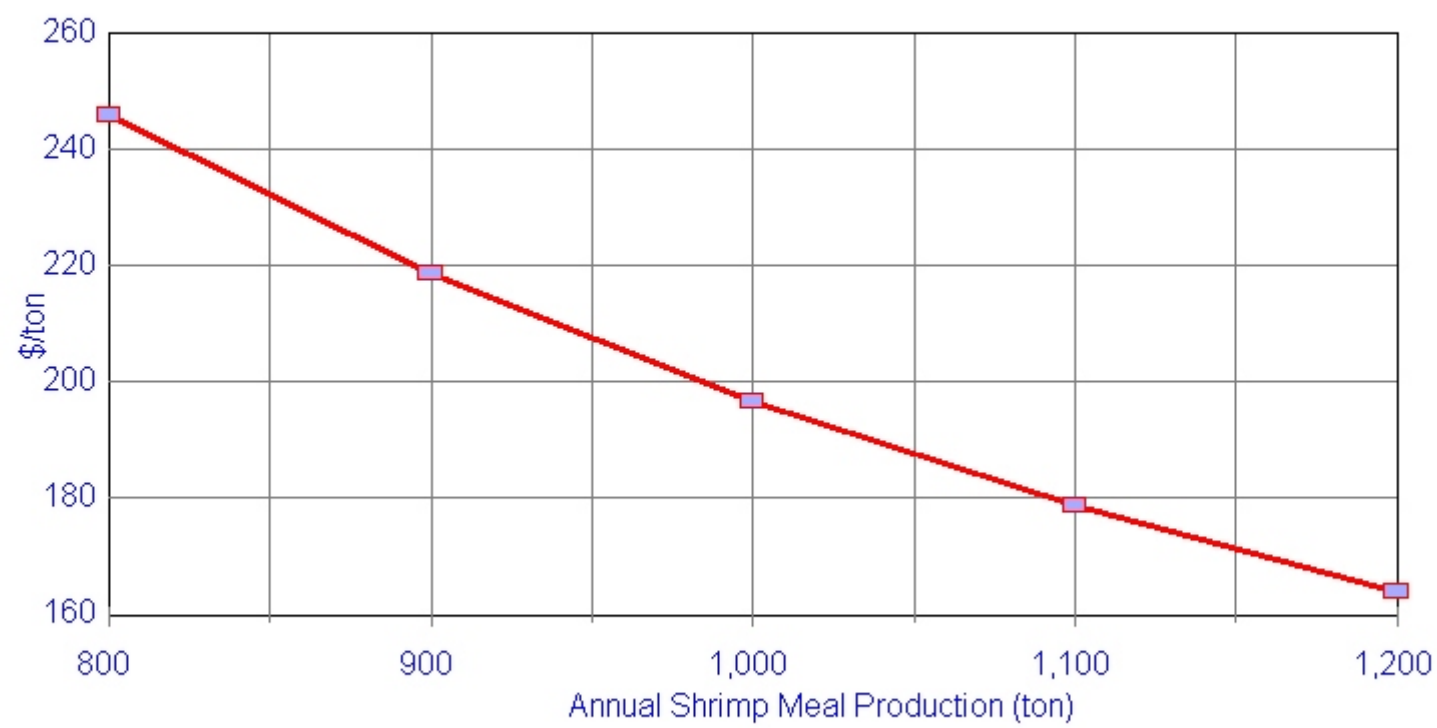


Figure 6.

Cash Flow Analyses:

Initial capital requirements are given in Table 12. Cash flow comparisons using borrowed capital and capital provided by owners are shown in Tables 13 and 14 respectively. Note that no expense category is listed for financing of operating costs. Transportation costs of \$140,000 are already currently incurred by shrimp processors. Sources of operating capital for shrimp meal production should be considered. As an example, interest expense on \$125,000 of operating capital financed on monthly installment basis at 9% would be approximately \$6,177, or on a 12-month note, approximately \$11,250. Longer-term financing, self-financing and lower-interest financing might be considered for more favorable cash flow results. Consideration should also be given to the purchase of used vehicles for additional cost savings.

Table 12.

INITIAL CAPITAL REQUIREMENTS (based on purchase of new equipment and facilities)

	Scenario #1	Scenario # 2	Scenario # 3	Scenario # 4
Transportation				
Vehicles	\$240,000.00	\$157,000.00	\$240,000.00	\$157,000.00
Shrimp Waste Drying Facilities				
Land			\$100,000.00	\$100,000.00
Building (8,000 sq. ft.)			\$130,000.00	\$130,000.00
Support facilities			\$36,250.00	\$36,250.00
Capital equipment			\$294,700.00	\$294,700.00
Total drying facilities			\$560,950.00	\$560,950.00
Total Capital Investment	\$240,000.00	\$157,000.00	\$800,950.00	\$717,950.00

Scenario # 1--transportation only, to Bayou LaBatre, 2 20-yd vehicles

Scenario # 2--transportation only, to Bayou LaBatre, 1 30-yd. vehicle

For this option to be viable, it is advisable that a smaller capacity, used vehicle be purchased. This vehicle would be used during peak periods and provide down time for primary truck.

Scenario # 3--transportation, drying and meal production facility located in Gulfport or Moss Point, MS, transport using 2 20-yd trucks

Scenario # 4 --transportation using 1 30-yd truck, meal production and drying facility located in Gulfport or Moss Point, MS

Table 13.**CASH FLOW COMPARISON WITH BORROWED CAPITAL**

	Scenario # 1	Scenario # 2	Scenario # 3	Scenario # 4
Revenue				
Gross sales			\$225,000.00	\$225,000.00
Expenses				
Direct expenses-transportation unit				
Vehicle maintenance	\$4,160.00	\$5,052.00	\$2,704.00	\$3,368.00
Tires	\$5,720.00	\$9,360.00	\$3,718.00	\$6,240.00
Vehicle repair	\$10,400.00	\$15,210.00	\$6,760.00	\$10,140.00
Fuel	\$11,221.77	\$7,481.18	\$5,390.00	\$3,500.00
Salary and Labor expense	<u>\$50,000.00</u>	<u>\$40,000.00</u>	<u>\$32,000.00</u>	<u>\$25,000.00</u>
Direct transportation expenses	<u>\$81,501.77</u>	<u>\$77,103.18</u>	<u>\$50,572.00</u>	<u>\$48,248.00</u>
Direct expenses-meal production unit				
Labor			\$6,125.00	\$6,125.00
Fuel			\$26,000.00	\$26,000.00
Supplies			<u>\$2,520.00</u>	<u>\$2,520.00</u>
Direct meal production expense	\$0.00	\$0.00	<u>\$34,645.00</u>	<u>\$34,645.00</u>
Total direct expenses	<u>\$81,501.77</u>	<u>\$77,103.18</u>	<u>\$85,217.00</u>	<u>\$82,893.00</u>
Indirect expenses-transportation unit				
Dumpster lease	\$14,000.00	\$14,000.00	\$14,000.00	\$14,000.00
Debt service on vehicles *	\$59,784.00	\$39,108.74	\$59,784.00	\$39,108.74
Permits and licenses	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
Insurance	<u>\$6,800.00</u>	<u>\$7,933.00</u>	<u>\$6,800.00</u>	<u>\$7,933.00</u>
Indirect transportation expenses	<u>\$82,584.00</u>	<u>\$63,041.74</u>	<u>\$82,584.00</u>	<u>\$63,041.74</u>
Indirect Expenses-meal production unit				
Utilities			\$14,600.00	\$14,600.00
Salary expense			\$43,750.00	\$43,750.00
Debt service on plant and equipment **			\$68,274.34	\$68,274.34
Equipment service, maintenance			\$14,735.00	\$14,735.00
Permits and licenses			\$2,000.00	\$2,000.00
Insurance			\$11,758.00	\$11,758.00
Indirect meal production expenses	\$0.00	\$0.00	<u>\$155,117.34</u>	<u>\$155,117.34</u>
Total Indirect Expenses	<u>\$82,584.00</u>	<u>\$63,041.74</u>	<u>\$237,701.34</u>	<u>\$218,159.08</u>
Total Expenses	<u>\$246,669.77</u>	<u>\$140,144.92</u>	<u>\$405,502.34</u>	<u>\$364,093.82</u>
Net Profit (Loss) before tax	<u>(\$246,669.77)</u>	<u>(\$140,144.92)</u>	<u>(\$180,502.34)</u>	<u>(\$139,093.82)</u>
Reduction in current waste disposal costs	\$140,000.00	\$140,000.00	\$140,000.00	\$140,000.00
Net savings before taxes	(\$106,669.77)	(\$144.92)	(\$40,502.34)	\$906.18

Assumes meal sales of 1,000 tons at a price of \$225 per ton.

* Includes interest and principal payments on various capacity RLCT vehicles .

Assumes financing of vehicles at 9% over 5 years (payments of \$59,784 or \$39,109).

** Financing of real property and capital equipment at 9% over 15 years (payments of \$68,274).

Labor costs in transportation unit reflect average employment of two full-time shifts with 20-yd vehicle and 1 full-time plus one part-time shift with 32-yd vehicle.

Table 14.**CASH FLOW COMPARISON WITH CAPITAL PROVIDED BY OWNERS**

	Scenario # 1	Scenario # 2	Scenario # 3	Scenario # 4
Revenue				
Gross sales			\$225,000.00	\$225,000.00
Expenses				
Direct expenses-transportation unit				
Vehicle maintenance	\$4,160.00	\$5,052.00	\$2,704.00	\$3,368.00
Tires	\$5,720.00	\$9,360.00	\$3,718.00	\$6,240.00
Vehicle repair	\$10,400.00	\$15,210.00	\$6,760.00	\$10,140.00
Fuel	\$11,221.77	\$7,481.18	\$5,390.00	\$3,500.00
Salary and Labor expense	<u>\$50,000.00</u>	<u>\$40,000.00</u>	<u>\$32,000.00</u>	<u>\$25,000.00</u>
Direct transportation expenses	<u>\$81,501.77</u>	<u>\$77,103.18</u>	<u>\$50,572.00</u>	<u>\$48,248.00</u>
Direct expenses-meal production unit				
Labor			\$6,125.00	\$6,125.00
Fuel			\$26,000.00	\$26,000.00
Supplies			\$2,520.00	\$2,520.00
Direct meal production expense			<u>\$34,645.00</u>	<u>\$34,645.00</u>
Total direct expenses	<u>\$81,501.77</u>	<u>\$77,103.18</u>	<u>\$85,217.00</u>	<u>\$82,893.00</u>
Indirect expenses-transportation unit				
Dumpster lease	\$14,000.00	\$14,000.00	\$14,000.00	\$14,000.00
Permits and licenses	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
Insurance	<u>\$6,800.00</u>	<u>\$7,933.00</u>	<u>\$6,800.00</u>	<u>\$7,933.00</u>
Indirect transportation expenses	<u>\$22,800.00</u>	<u>\$23,933.00</u>	<u>\$22,800.00</u>	<u>\$23,933.00</u>
Indirect Expenses-meal production unit				
Utilities			\$14,600.00	\$14,600.00
Salary expense			\$43,750.00	\$43,750.00
Equipment service, maintenance			\$14,735.00	\$14,735.00
Permits and licenses			\$2,000.00	\$2,000.00
Insurance			\$11,758.00	\$11,758.00
Indirect meal production expenses			<u>\$86,843.00</u>	<u>\$86,843.00</u>
Total Indirect Expenses	<u>\$22,800.00</u>	<u>\$23,933.00</u>	<u>\$109,643.00</u>	<u>\$110,776.00</u>
Total Expenses	<u>\$127,101.77</u>	<u>\$101,036.18</u>	<u>\$217,660.00</u>	<u>\$217,602.00</u>
Net Profit (Loss) before taxes	<u>(\$127,101.77)</u>	<u>(\$101,036.18)</u>	<u>\$7,340.00</u>	<u>\$7,398.00</u>
Reduction in current waste disposal costs	\$140,000.00	\$140,000.00	\$140,000.00	\$140,000.00
Net savings before taxes	\$12,898.23	\$38,963.82	\$147,340.00	\$147,398.00
Optional capital financing Costs (using new equipment and facilities)				
Vehicles*	\$59,784.00	\$39,108.74	\$59,784.00	\$39,108.74
Meal production facility**			<u>\$68,274.34</u>	<u>\$68,274.34</u>
Total Capital Expenses	<u>\$59,784.00</u>	<u>\$39,108.74</u>	<u>\$128,058.34</u>	<u>\$107,383.08</u>

Assumes meal sales of 1,000 tons at price of \$225 per ton.

Assumes financing of vehicles at 9% over 5 years (payments of \$59,784 or \$39,109), financing of real property and capital equipment at 9% over 15 years (payments of \$68,274).

Labor costs in transportation unit reflect average employment of two full-time shifts with 20-yd vehicle and 1 full-time plus one part-time shift with 32-yd vehicle.

Discussion:

On initial review of cash flow projections, profitability is unlikely. However, a number of variables on both the income and expense side affect the cash flow and profit potential of this business venture. The volume of the waste stream will dramatically affect gross revenues and economies of scale in production. The gross receipts projected in this report are based upon current reports of waste generated by plants involved in the reporting process. Any additional waste generated would increase profits. In addition, there is some evidence that the meal or finished product may draw a higher than projected per unit price thereby increasing gross receipts. A higher-end-use product could be produced if waste were disposed of and processed more expediently. Some shrimp waste is used to produce chitin which could potentially increase the per unit sales price by \$100/ton. On the expense side, the sizable initial capital requirement of the venture is the obstacle which must be dealt with. With the possible exception of industrial parks, acquisition of land should be outside of any developed area due to both cost and the nature of the business. Savings should be explored in purchase of land, facilities, equipment, and vehicles. Projections were based upon purchase of new vehicles due to reliability and access of information. However, the purchase of 3 or 4 used vehicles in the \$10,000 to \$40,000 price range would produce significant cost savings. Financing of equipment and facilities also increases cost. Lower financing costs and/or outright purchase of some capital equipment would produce additional savings.

Business Structure:

The need for a mechanism and entity to handle the Mississippi Coast shrimp waste transport and disposal was reviewed in light of the various business structures available in Mississippi. A comparison of the advantages and disadvantages of available business structures is given in Table 15. The most preferential treatment of the Shrimp Waste Transport and Disposal Entity would be realized by using either the Cooperative Association or the Limited Liability Company. These entities afford their members both limited liability and favorable tax treatment.

Other entities outlined include the S-corporation, the General Partnership, and the C-corporation. The S-corporation is not a viable entity due to ownership restrictions prohibiting ownership by corporations and non-residents. The unlimited liability of the General Partnership is unattractive in light of potential liability arising from the transport and/or handling of shrimp waste. In addition, a more formal structure than partnership is advisable for an operation of this magnitude. Though a viable alternative, the complexity and double taxation of a C-corporation makes this a less attractive option than the two options cited above.

In order to select between the LLC and the cooperative, further cash flow analysis should be conducted in order to examine the profit potential of the entity to be created. The cooperative is the appropriate entity if the sole purpose is a cost-sharing arrangement to maximize efficiency and economies of scale of shrimp waste disposal. In the event of an eventual profit, the cooperative can be converted to a corporate form of business. If the venture will be undertaken for profit, the LLC would provide limited liability, a pass-through mechanism for throwing off losses in the initial stages of business development, and avoid double taxation of potential future profits.

Table 15.

COMPARISON OF OWNERSHIP OPTIONS

CHARACTERISTICS	COOPERATIVE ASSOCIATION	C-CORPORATION	S-CORPORATION	LIMITED LIABILITY COMPANY	GENERAL PARTNERSHIP
FORMATION Process and Documents	Execute Articles of Association and Incorporation naming organization, specifying life and operation under Agricultural Association Law; May or may not be organized with capital stock; May have more than one class of stock;	Execute Articles of Incorporation with required provisions; Election must be filed within 75 days of when status effective	Execute Articles of Incorporation with required provisions; May issue only one class of stock, membership restrictions below	Execute Certificate of Formation containing name of LLC and agent, address, date of dissolution, how management powers vested; To receive most favorable tax status must lack 2 of the 4 defining corporate characteristics: 1) limited liability 2) free transferability of interests 3) centralized management 4) continuity of life; Name must include Limited Liability Company or LLC	Agreement or contract between the parties involved
Filing Requirements	File with the Ms Secretary of State	File with the Ms Secretary of State	File with the Ms Secretary of State	File with the Ms Secretary of State	No filing with the state required
Cost to Create	\$25 recording fee, amendments \$20, legal fees related to document preparation/advice, e.g. \$1,000	\$50 filing fee with state, legal fees related to document preparation/advice, e.g. \$1,000	\$50 filing fee with state, legal fees related to document preparation/advice, e.g. \$1,000	\$50 filing fee with state, legal fees related to document preparation/advice, e.g. \$1,000	No filing fee, legal expenses if attorney used to execute partnership agreement

CHARACTERISTICS	COOPERATIVE ASSOCIATION	C-CORPORATION	S-CORPORATION	LIMITED LIABILITY COMPANY	GENERAL PARTNERSHIP
Duration	Specific period of time not to exceed 99 years	Perpetual or indefinite	Perpetual or indefinite	Typically limited to a fixed amount of time	Dissolved by death of a partner or bankruptcy
Changing Form (entity type)	May amend articles of association to the corporate form with a vote of 2/3 or greater of the board of directors and a majority of each class of stock ; If eligible for the LLC form would likely involve dissolution, liquidation and possible tax consequences	Can be converted to a LLC but usually involves dissolution and liquidation, taxable if corporation holds appreciated assets	Can be converted to a LLC but usually involves dissolution and liquidation, taxable if corporation holds appreciated assets	Can sell stock to C or S corporation, usually no tax incurred	Can easily be converted to a LLC, usually no tax incurred
Ownership (# of members, who can own)	10 or more members needed; Voting members must be producers of agricultural or fisheries products who make use of facilities and services	Any number of shareholders, few restrictions on the type of entities which can be owners	No more than 75 shareholders; Limited to U.S. residents, certain trusts and estates. S-Corp; Can't be a member of affiliated group of corporations	Usually more than 2 members; corporation can be a member, LLC can own a corporation	2 or more members to be recognized as partnership for tax purposes
OPERATING STRUCTURE Management, Control, Business Action, Organizational Structure, Flexibility	Governed with by-laws and Board of Directors elected by organizing members	Operations governed with by-laws of corporation and elected Board of Directors	Operations governed with by-laws of corporation and elected Board of Directors	Operating agreement controls how profits, losses, distributions, and management powers are shared by members; Management generally vested to LLC members, process set forth in operating agreement, every member an agent and action of any member binding unless certificate of formation vests management with hired managers; Maximum flexibility	Partnership agreement sets forth operating procedures of partnership

Table 15 (Cont.)

CHARACTERISTICS	COOPERATIVE ASSOCIATION	C-CORPORATION	S-CORPORATION	LIMITED LIABILITY COMPANY	GENERAL PARTNERSHIP
Complexity of Operation	Must hold annual meetings of directors and shareholders; Maintain minutes in corporate books; Elect at least 5 directors; Requirements for changes to articles of association specified in statute	Must hold annual meetings of directors and shareholders; maintain minutes in corporate books	Must hold annual meetings of directors and shareholders; maintain minutes in corporate books	No requirement to file annual report	No requirement to file annual report
Transfer of Ownership	Membership non-transferable	Transferable; Shareholders may sell shares	Transferable; Shareholders may sell shares	Depends upon the Limited Liability Company Agreement; Assignable except where limited by agreement	Depends upon the Partnership Agreement
Dissolution	File revocation with the state; On dissolution, assets remaining after payment of debts and retiring of stock are distributed according to by-laws	File revocation with the state; Disposition of assets is taxable to the corporation then to shareholders on receipt of property liquidated	Can terminate with vote of 50% of stock; File revocation with the state; Action resulting in disqualification as a S-corp. such as selling to corporation terminates the S-corp. election--in such case would file 2 partial-year tax returns	File certificate of dissolution with Ms Secretary of State; Any appreciated assets sold are taxable to the individual owners to the extent there is unrealized gain	No filing necessary; Any appreciated assets sold are taxable to the individual owners to the extent there is unrealized gain
Regulation	Organized under Title 79, chapter 17, 19, 21 Mississippi Code of 1972	Organized under Mississippi Business Corporation Law; sections 79-3-1 to 79-3-293; Annual report filed with Secretary of State	Substantial regulations and ownership restrictions under federal and state statutes; See Title 79 Ms Code	Organized under the Mississippi Limited Liability Company Act; Unrecognized as entity by IRS	Very few regulations or formal requirements with regard to business structure, must file partnership tax return, Form 1065.
Continuity of Life	No	Yes	Yes	Typically no	No

Table 15 (Cont.)

CHARACTERISTICS	COOPERATIVE ASSOCIATION	C-CORPORATION	S-CORPORATION	LIMITED LIABILITY COMPANY	GENERAL PARTNERSHIP
LIABILITY	Members of the Corporation are generally not personally liable	Limited to corporate assets and shareholder capital contributions	Limited to corporate assets and shareholder capital contributions	Limited to LLC assets, owners not personally liable	Unlimited
Responsibility for Debts	Members not personally liable for association debt except to the extent of their debt or obligations to the association	Shareholders not personally liable for corporate debt	Shareholders not personally liable for corporate debt	Owners not personally liable for LLC debt	Each partner individually liable for all partnership debts
TAXATION	Classified as non-profit entity and tax-exempt to the extent it follows guidelines for cooperatives; Intended for the purpose of cost-sharing; Dividends on capital stock in excess of 8% are prohibited by Agriculture Association Law; Dividends declared and paid taxable to recipient	Taxed at corporate level, distributions also taxed to the individual taxpayer	Taxed once at the individual level; Income to owners may be combination of salary and profit; No accumulation of earnings allowed; Net Operating Losses from S-corp. are passed to individual returns on a ratio of shares owned; losses can be carried back 2 yrs. and forward 20 yrs. (Chgs. per the Taxpayer Relief Act of 1997)	Taxed as a partnership at the individual level if properly formed; Lose favorable tax status if fail to meet the requirements; Income allocated to owners according to LLC agreement; Income to owners considered self-employment income and subject to FICA tax; Net operating losses from S-corp. are passed to individual returns on a ratio of shares owned; Losses can be carried back 2 yrs. and forward 20 yrs. (Chgs. in # of years per the Taxpayer Relief Act of 1997)	Taxed once at the individual level; Income considered self-employment income and subject to FICA tax; Net Operating Losses are passed to individual returns on a ratio of shares owned; Losses can be carried back 2 yrs. and forward 20 yrs. (Chgs. in # of years per the Taxpayer Relief Act of 1997)
Tax Rates	NA	15% to 39%	Taxed to individual owners; pass-through entity not a taxable entity in itself	Taxed to individual owners; pass-through entity not a taxable entity in itself; If loses favorable tax status corporate rates apply	Taxed to the individual at each owner's personal tax rate

Table 15 (Cont.)

CHARACTERISTICS	COOPERATIVE ASSOCIATION	C-CORPORATION	S-CORPORATION	LIMITED LIABILITY COMPANY	GENERAL PARTNERSHIP
Double Taxation	No	Yes	No	Only if fails to meet the requirements for a LLC	No
Advantages	Liability protection and cost-sharing arrangements; Relatively easily converted to corporate form	Liability protection	Not feasible for this organization	Combines best features of a corporation and partnership if properly formed; Legal advice recommended	Flexibility and pass-through tax status
Disadvantages	Losses in excess of cost-sharing expenses not allowable	Extensive infrastructure for unprofitable venture; double taxation	Ownership limitations and regulation make this form prohibitive	If organization strictly a cost-sharing venture, may not be appropriate to use for-profit business entity	Liability of all partners and lack of formal structure to direct the affairs of the organization

Table 15(Cont.)

Summary:

Based upon the information obtained from Mississippi shrimp processors and the alternatives presented herein, the current costs associated with shrimp processing waste disposal appear reasonable. However, waste disposal contracts are currently being negotiated on an annual basis so that no long-term costs are available for planning purposes. The small number of businesses available to provide waste hauling services could be of concern in the future if there should be a sudden large increase in disposal fees charged by currently available contractors. There is also a potential problem inherent in the fact that only one meal plant is in operation in a reasonable geographic distance from Mississippi processing businesses. If this plant should close due to environmental regulations or lack of profitability, there are no alternative processing sites which operate on a year-round basis.

It has been shown that a shrimp waste hauling and processing business using new equipment which must be financed or purchased with existing capital would probably not be viable if it relied solely on the amount of raw material available from Mississippi shrimp processors. This situation could be improved by purchasing used equipment and/or fabricating needed equipment such as driers, storage bins, etc. Another approach to consider is to have Mississippi processors invest in a larger-scale operation run by an independent contractor using raw materials obtained from other areas and businesses with a provision that the investment funds would guarantee a long-term contract price and/or profit sharing, applied towards waste management costs.