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Intelligence

Projected cost comparison of semi-intensive, zero-exchange culture systems in Nicaragua

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Gross profit generated by new technology on a per-hectare basis was significantly higher

In addition to establishing a successful demonstration site for zero-exchange shrimp production, the Nicaragua Small Shrimp Producer Assistance Program recently projected budgets for a typical Nicaragua semi-intensive shrimp farm and zero-exchange farm. The program was designed to help the country's shrimp farmers recover from disease problems and the devastation caused by Hurricane Mitch.

Financial information for 1994-1999 was considered as the baseline production period for the comparison. Consideration of the Taura Syndrome Virus, El Niño drought, Hurricane Mitch, and outbreak of White Spot Syndrome Virus that took place in those years was deemed necessary to objectively evaluate shrimp farm viability in Nicaragua.



Aerated zero-exchange ponds can be more cost-efficient to run than semi-intensive systems. Photo by Liz Light.

Semi-intensive farm

For the baseline farm, the following characteristics were noted: an average grow-out phase of 134 days, stocking density of 18.16 PL per square meter, survival rate of 32 percent, and average shrimp harvest size of 12.96 g (head-on). An average of 2.04 production cycles per year and FCR of 1.81:1 were assumed. The typical semi-intensive farm using current technology had a cost per pound (head-on) of U.S. \$2.00, resulting in a net return of \$0.17 per pound at a market price of \$2.17 (Table 1).

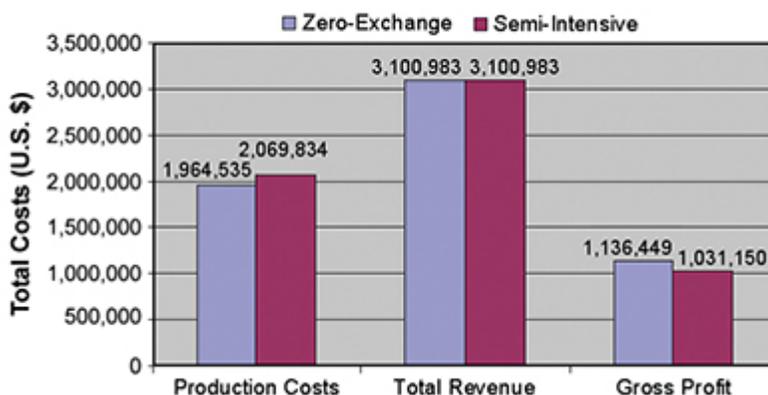


Fig. 1: Total costs and profits by system.

Zero-exchange system

A hypothetical zero water-exchange system using production rates from the demonstration project was designed to achieve a production level of 470 metric tons (MT), an average production for current farms. A 26-ha zero-exchange system with 52 0.5-ha ponds would be required to generate this production, compared to 324 ha for a semi-intensive farm. Total investment requirements for feeding, permanent equipment, and other construction costs were U.S. \$2,815,622 or \$108,957 per hectare. Total annual depreciation was U.S. \$386,152 or \$14,943 per hectare.

Lopez, Cost and return budget for typical semi-intensive shrimp farm, Table 1

	Actual Cost 2 Cycles	Annual/Harvested lb	/Seeded ha
Pounds harvested	1,033,661		
Price/lb	2.17		
Total revenue	2,247,386	2.17	3,339
Operating expenses			
Postlarvae	484,639	0.47	720
Feed (incl. shipping)	479,523	0.46	713
Chemicals/fertilizer	61,195	0.06	91
Direct labor	64,731	0.06	96
Indirect costs	979,746	0.95	1,456
Total expenses	2,069,834	2.00	3,076
Gross profit	177,552	0.17	264

Table 1. Cost and return budget for typical semi-intensive shrimp farm in Nicaragua (U.S. \$).

Production parameters

The assumptions used for estimating production costs and revenues for the two farms are shown in Table 2. It was estimated a production of 9.1 MT per hectare per cycle could be achieved by applying optimum production practices of the zero-exchange intensive technology. In the 26-ha system, average survival rate of 55 percent and average harvest size of 13.50 g would be required to meet the annual production objective. In contrast, a 324-ha farm using semi-intensive technology would be required for this production.

Stocking density varied between the two systems: 122 PL per square meter for the zero water-exchange system and 18 PL per square meter for the semi-intensive system. The two systems were assumed to operate two cycles per year. The market price for shrimp was assumed to be U.S. \$3.00 per pound.

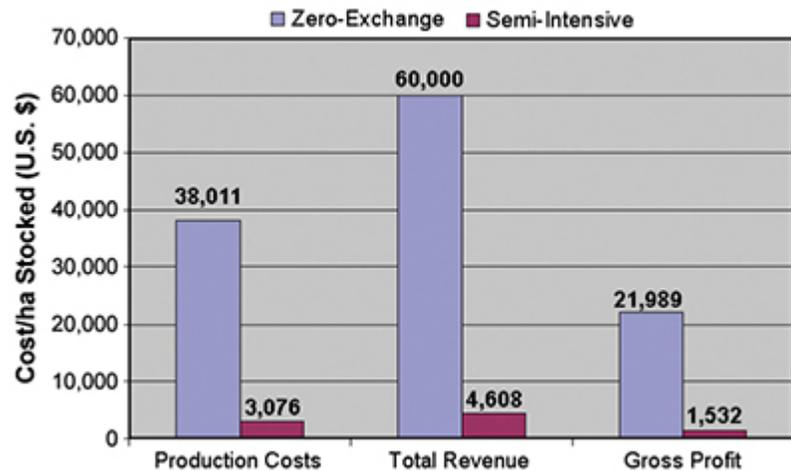


Fig. 2: Costs and profits/lb harvested.

Lopez, Performance comparison of a typical semi-intensive farm, Table 2

	Semi-Intensive	Zero-Exchange
Annual production	1,033,661	1,033,661
Yield/cycle (lb/ha)	1,567	20,000
Production area (ha)	324	26
Number 0.5-ha ponds	–	52
Cycles	2	2
Stocking density	18	122
Survival rate (%)	32	55
Harvest size (g, head-on)	12.98	13.50
Price/lb (head-on)	3.00	3.00

Table 2. Performance comparison of a typical semi-intensive farm versus a hypothetical zero water-exchange farm.

Economic comparison

Both systems yielded the same level of production and received the same market price, so they generated the same total revenues. However, the zero water-exchange system resulted in lower total operating costs, thereby generating a higher gross profit than the semi-intensive system (Fig. 1). The lower production costs indicated the zero-exchange

system can be more cost-efficient than typical semi-intensive systems.

On a per-harvested lb basis, the zero water-exchange technology provided a small (\$0.10) profit difference when compared to the semi-intensive system (Fig. 2). However, the gross profit generated by the zero water-exchange technology on a per-hectare basis (Fig. 3) was significantly higher. Annual profit per seeded hectare for the zero-exchange system was U.S. \$21,989, whereas the same value for the traditional system was \$1,552.

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Fig. 3. Costs and profits/ha stocked.

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