

An integrated livestock-fish farming system

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Batu Kumbang, a little village on Lombok Island, is situated in one of the most important fish producing areas of Indonesia. Rice, the main crop, is planted twice a year followed by a secondary crop such as maize or soybean. Many farmers practice traditional rice-freshwater fish farming. In this system farmers keep fish in selected, small rice plots. The fish are fed on a daily basis with leftover rice from the household. Before the rice harvest the fields are left to dry, the fish are collected and consumed by the household, donated to family members or neighbours, or sold at the local market. At the onset of the next rice growing season, the farmers usually obtain new fish seed stock for free, from well-off farmers in the area that have their own hatcheries.

In 1980 Erman Abdul Wahab, the oldest son in the Wahab family, inherited 1.2 hectares of farm land that had been managed under the traditional rice-freshwater fish system by his father. Soon after starting his farming activities, he found out that the traditional rice-fish system had a big disadvantage – the misfit between the growth cycle of rice and the fish maturity. As the rice harvest period approaches less water is needed, so the farmers gradually let the fields dry up and harvest the fish. Erman discovered that the fish were not able to reach full maturity in the limited time span of a single rice crop. As a consequence, he was forced to sell small, underage fish that have a lower value than fully developed mature fish. Another aspect that bothered Erman was that the income from the fish sale was totally dependent on the rice crop cycle.

Integrating livestock

Aware of the disadvantages of rice-fish farming, he started to think about a way to sustain fish production through the year and thereby provide continuous income for the family. At the end of 1980 he obtained a handbook on integrated livestock-fish farming systems. These systems achieve optimal utilization of waste, because the waste produced in one subsystem (livestock) is an input for a second subsystem (fish).

Not wanting to waste his time, he started digging a pond near his house, measuring 7 x 15 metres with a depth of 2 metres. Above the pond, standing on concrete piles, he constructed a 2 x 2 metre chicken house in the traditional style, with a platform made of bamboo and a roof of corrugated iron. The bamboo platform was ideal because it allowed chicken manure to drop directly into the pond. The chicken house was large enough for chickens to roost and nest. It was designed in such way that it was well ventilated but would protect the chickens from the weather, predators and injury. Plastic drinkers and feeders were placed inside the house.

After finishing the pond and the chicken house he transferred hundreds of fish from his field to the pond, including gouramy, carp and a species of tilapia called *mujair*, this being a common combination of species in Indonesia. He introduced 25 chickens into the pen, taking good care of them and making sure that the house was kept clean and dry. Chicken feed had to be bought in town, but feeding the fish incurred no cost at all, since they fed on the chicken manure that dropped into the pond.

The results were positive and five years later he decided to increase the size of the chicken house to its present dimensions (7 x 2 metres) and increase the number of chicken to four hundred. The number of fish has also increased.

Now, after 25 years of integrated livestock-fish farming, Erman is convinced that the system offers significant profits. Income from fish sales is continuous and not dependent on the rice crop cycle. The fish in the pond grow much bigger than those from the rice fields because the chicken manure provides more nutrients than the leftovers of rice that fish receive in the traditional system. Bigger fish sell at a higher price: the big healthy fish from the pond fetch up to US\$ 1/kg, compared to US\$0.20/kg for immature fish from the rice fields. Erman estimates the monthly net income from fish to be around US\$150, while the income from fish in the traditional system is about US\$50 per rice production cycle. The additional income from the chicken is also significant. Although it is necessary to purchase feed and medicine, the chickens offer a very attractive monthly net income of US\$120. The total net income from integrated livestock-fish farming is almost twice the average monthly salary of a government officer (US\$150). The family not only enjoys a proper standard of living, but also have easy access to good, protein-rich food, such as fish, meat and eggs.

Challenges and opportunities

Erman and his family have shown that integrated livestock-fish farming is a viable and profitable business, and their experience has become an inspiration for his neighbours and governmental staff. Even so, adoption of the system has been low. The major problem to the successful adoption of this integrated farming system appears to be the high cost involved in pond construction. Other reasons for low levels of adoption are related to developments outside the farm sphere. Rapid population growth is leading to urbanization of rural areas, and growing industrial development and tourism encourage people to become active in off-farm income-generating activities. These socio-economic changes pose a real challenge to sustainable rural development, but may also create new opportunities as food production also needs to increase. The government is becoming more aware of this and is now re-promoting small-scale livestock-fish farming that may serve the future needs of the rural population as well as other sectors of society. ■

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