

## Effect of Shrimp Culture on Livestock Production

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**Abstract:** Survey method was used to find the effect of shrimp culture on livestock production. The study area is located in the south-western part of Bangladesh in the tidal flood plain near the large mangrove forest, the sundarbans. The average livestock (cattle, goat, sheep, buffalo) number (per farmer), milk production (kg/day/cow), lactation period (day), birth wt. (kg) are significantly higher before shrimp culture compared to after shrimp culture but mortality percentage are significantly higher after shrimp culture compared to before shrimp culture. Livestock population and its overall conditions were better before shrimp culture compared with after shrimp culture. The study has revealed that the production of livestock have been affected following the shrimp farming practices in the study areas. Shrimp farming interacts with the environment and its expansion destroyed whole ground in coastal region.

**Key words:** Shrimp culture, population, milk production, lactation, birth weight, mortality

### Introduction

In the agrarian and largely subsistence economy of Bangladesh, livestock plays a vital role in respect of nutrient supply, generation of income and employment. Nearly 85% of its population are engaged in agriculture and livestock constitutes an important segment of agriculture sector. Livestock of all types are kept to provide meat, milk, eggs, hides and skins. Cattle and buffaloes provide nearly all draught power for the cultivation of crop lands and post harvest operation. The contribution of livestock sub-sector to GDP is estimated at 3.86% (Anonymous, 1999). The livestock population in Bangladesh is currently estimated at 23.40 million cattle, 0.82 million buffaloes, 33.5 million goats, 1.11 million sheep, 138.20 million chicken and 13.00 million ducks (Reza, 1999). The livestock production and survival capacity mainly depends on natural environment. In Bangladesh, shrimp farming started in some coastal areas at the later part of the sixties called brackish water aquaculture of shrimp in the coastal districts. Marine (marine water) shrimp farming over the coastal areas has been expanded and spread during the decades of seventies and eighties as a result of high demand in international markets and its high prices in the world. However, the fast growing shrimp industry has also been accompanied by concerns over social, economic and environmental impacts (Flaherty *et al.*, 2000, De Silva, 2000). The introduction of marine and brackish water shrimp farming near shore and inland has created ecological and social problems by changing the quality of agricultural land, natural vegetation, poultry and livestock production and daily life of the area. Water use in the shrimp culture affects the surrounding environment through extraction of ground water and discharge of pond water. Heavy water use drives away the fresh water and reduces supply of domestic and agricultural water, aside from causing seawater contamination. All soils and natural sources of water contain more or less amounts of soluble salts which may affect the normal growth and yield of livestock feeds. Salinity may be defined for soils and water which contains sufficient soluble salts that impair its productivity. Feeds and fodder management under saline condition is difficult by the fact that an excessive salt concentration in soil is detrimental to plant growth. Due to the presence of excessive concentration of salts in the soil high osmotic pressure is created which obstructs the absorption of nutrient elements.

Most of the studies so far conducted on the effects of shrimp farming are, however, superficial and fragmentary. Information on the effects of shrimp farming on livestock and their performance is however, scarce. Therefore, this study has been aimed to provide information on the impact of shrimp farming on livestock production in some selected villages of Paikgacha upazila under Khulna district.

### Materials and Methods

For the present field study, survey method was used to collect data. The method was preferred considering the limitation of time. In order to ensure the quality of data, repeated visits were made to collect data. Questions were asked in such a manner that the respondents could answer from their memory. In order to achieve the objectives outlined earlier, a micro level study based on primary and secondary data was designed. The study area is located in the south-western part of Bangladesh in the tidal flood plain near the large mangrove forest, the sundarbans. For the collection of data villages of paikgacha upazila under Khulna district were selected. In this study, a total of 100 respondents (sampling unit) were selected. Classification of respondents was based on landownership. The interview schedule was carefully designed keeping the objective of the study in view. The schedule contained both open and closed form questions. Most easy, simple and direct questions were used to obtain information. The data were collected from both primary and secondary sources. Primary data were collected by researcher himself through personal interviews with the selected responding farmers in the Paikgacha upazila and secondary data were available from, various sources viz, books, journals, reports, thesis, official records and statistical year books of Bangladesh. Data were collected during the period from 1<sup>st</sup> February to 30<sup>th</sup> April of 2001. After data collection, the collected data were edited to summarize them meaningfully and were processed by using tabulation sheets. Data collected from the respondents were coded, compiled, tabulated and analyzed in accordance with objectives of the study. Data were analyzed using paired t-test with the help of computer package SPSS. Information received from the respondent about the condition of variables before and after shrimp culture is described below.

**Cattle and buffalo population:** Cattle/buffalo population was determined on the basis of total number of cattle/buffalo with any sex, which was above three month of age in same species.

**Milk production:** Milk production was measured on the basis of total amount of milk produced by the animal in a day. It was expressed as, milk production = amount of milk kg/day/animal.

**Lactation period:** Lactation period was measured in terms of days.

**Health condition:** A score of one (1) was assigned for good health condition and score of two (2) was assigned for bad health condition.

**Birth wt. of animal:** Birth weight was measured in terms of Kg.

**Mortality:** Mortality was determined in term of %

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Respondents told a number, which was converted into percentage.

**Goat and sheep population:** It was measured on the basis of total number of animal with any sex, which was above 3 months of age in same species.

### Results and Discussion

**Performance of cattle:** Results indicate that after shrimp culture cattle number (2.72 per farmer), milk production (1.05 kg/day/cow), lactation period (238.79 day), birth weight (11.63 kg), decreased significantly ( $P < 0.01$ ) compared with cattle number (6.29 per farmer), milk production (2.27 kg/day/cow), lactation period (262.75 days), birth weight (17.65 kg) respectively before shrimp culture (Table 1). Mortality percentage (5.32) was significantly ( $P < 0.01$ ) higher after shrimp culture compared to before shrimp culture. All of the respondents told that health condition of cattle became very bad to worse after shrimp culture than before shrimp culture. There were available fresh water and different types of livestock feeds such as durba, bajra, nal, roadside grasses, straws etc., before shrimp culture. Farmers could easily rear their livestock by feeding those feeds and fodder. Overall condition of livestock was sound before shrimp culture. But after introduction of shrimp culture higher salinity reduced land area available for grazing and declines quantity of fodder and other cattle feeds. Guimaraes (1989) reported that reduction of cattle population is due to lacking of grazing land in the shrimp culture area. As livestock did not get sufficient feed and normal water, their health condition became very poor. Milk production, lactation period and birth weight decreased due to lack of sufficient feed and fresh water. Hossain and Hoque (1990) stated that production of cattle have been decreased due to indiscriminate expansion of shrimp culture. Similarly, Jaster *et al.* (1978) reported that daily milk production has been reduced and declined lactation period with the consumption of saline water. A malnourished mother could not produce healthy calves. So birth weight of calves was very poor in the shrimp farming areas. Animals suffer from different types of diseases (mainly diarrhoea) and mortality percentage increased after shrimp culture. Deb (1998) supported this result and reported that salinization increased mortality percentage in the shrimp farming area. He also stated that total production of cows and buffaloes have declined by 47% in very high salinity areas from 1986-1989. These reports are in agreement with the present findings.

**Performance of goat:** The results indicate that after shrimp culture goat number (2.37 per farmer), milk production (0.30 kg/day/doe), lactation period (95.77 day), birth weight (1.21 kg) decreased significantly ( $P < 0.01$ ) compared to goat number (6.08 per farmer), milk production (0.50 kg/day/doe), lactation period (120 day), birth weight (1.95 kg) respectively before shrimp culture (Table 2). Ninety-eight % of the respondent told that health condition of goat became worse after shrimp culture compared with before shrimp culture.

Goat prefers to eat grasses, shrubs, plants or tree leaves like mango, jack fruit. Browse is usually the preferred feed of goats. But there was no scope of browsing in shrimp farming area. About 70% trees were destroyed and scarcity of grasses or grazing land due to salinization in whole area exists after shrimp culture. It was not possible for raising goat after shrimp culture. Hence, goat number decreased after shrimp culture. Hossain and Hoque (1990) also reported that goat number decreased due to indiscriminate expansion of shrimp culture. Due to insufficient feed nutrients there were decreased milk production, lactation period and birth weight of goat after shrimp culture. These results are similar to the previous reports of Mahmood (1986). Mortality percentage (5.22) was significantly ( $P < 0.01$ ) higher after shrimp culture compared with that before shrimp culture. Deb (1998) supported this result and reported that diseases increased due to salinization in the grazing land and mortality percentage increased in coastal area.

Table 1: Performance of cattle before and after shrimp culture

Parameters	Mean $\pm$ SE	
	Before shrimp culture	After shrimp culture
Cattle population (No./farmer)	6.29 $\pm$ 0.609	2.72 $\pm$ 0.32
Milk production (kg/day/cow)	2.27 $\pm$ 0.07	1.05 $\pm$ 0.06
Lactation period (day)	262.75 $\pm$ 2.25	238.79 $\pm$ 2.97
Birth wt. (kg)	17.65 $\pm$ 2.43	11.63 $\pm$ 0.29
Mortality (%)	2.46 $\pm$ 0.10	5.32 $\pm$ 0.28

Table 2: Performance of goat before and after shrimp culture

Parameters	Mean $\pm$ SE	
	Before shrimp culture	After shrimp culture
Goat population (No./farmer)	6.08 $\pm$ 0.42	2.37 $\pm$ 0.37
Milk production (kg/day/doe)	0.50 $\pm$ 0.00	0.30 $\pm$ 0.02
Lactation period (day)	120.00 $\pm$ 2.33	95.77 $\pm$ 2.09
Birth wt. (kg)	1.95 $\pm$ 0.05	1.21 $\pm$ 0.04
Mortality (%)	2.26 $\pm$ 0.09	5.22 $\pm$ 0.12

Table 3: Performance of sheep before and after shrimp culture

Parameters	Mean $\pm$ SE	
	Before shrimp culture	After shrimp culture
Sheep population (No./farmer)	5.50 $\pm$ 0.57	1.14 $\pm$ 0.49
Milk production (kg/day/doe)	0.50 $\pm$ 0.00	0.28 $\pm$ 0.02
Lactation period (day)	124.28 $\pm$ 3.75	98.57 $\pm$ 3.25
Birth wt. (kg)	1.69 $\pm$ 0.08	1.26 $\pm$ 0.07
Mortality (%)	2.72 $\pm$ 0.11	5.20 $\pm$ 0.24

Table 4: Performance of buffalo before and after shrimp culture

Parameters	Mean $\pm$ SE	
	Before shrimp culture	After shrimp culture
Buffalo population (No./farmer)	4.62 $\pm$ 0.52	1.21 $\pm$ 0.20
Milk production (kg/day/buffalo)	3.40 $\pm$ 0.13	1.70 $\pm$ 0.16
Lactation period (day)	258.00 $\pm$ 3.37	228.00 $\pm$ 3.37
Birth wt. (kg)	20.50 $\pm$ 0.52	14.90 $\pm$ 0.65
Mortality (%)	1.90 $\pm$ 0.01	4.75 $\pm$ 0.28

Significant at 1% levels Each parameter represents mean of 100 respondents

**Performance of sheep:** After shrimp culture sheep number (1.14 per farmer), milk production (0.28 kg/day/doe), lactation period (98.57 day), birth wt. (1.26 kg) decreased significantly ( $P < 0.01$ ) compared to sheep number (5.50 per farmer), milk production (0.50 kg/day/doe), lactation period (124.28 day), birth wt. (1.69 kg) respectively before shrimp culture (Table 3). Hundred% respondents told that health condition of sheep became worse after shrimp culture compared to before shrimp culture. The grazing grounds have also been taken over by the shrimp farmers. Even the roads are no safer for grazing and so sheep number and their performance declined. This opinion was supported by previous reports of Hossain and Hoque (1990), Mahmood (1986), Deb (1998), Guimaraes (1989).

**Performance of buffalo:** Significant ( $P < 0.01$ ) difference between after shrimp culture and before shrimp culture were recorded for buffalo number (1.21 and 4.62 per farmer), milk production (1.70 and 3.40 kg/day/buffalo), lactation period (228 and 258 day), birth weight (14.9 and 20.5 kg), mortality percentage (4.75 and 1.90) respectively (Table 4). Ninety-eight% respondents told that health condition of buffalo affected after shrimp culture than before shrimp culture.

After shrimp culture saline water was introduced in the field and homestead area. This saline water decreased crop production and other livestock feeds, fodder and grasses. So, that area was no more suitable for rearing buffaloes. Hence buffalo number decreased after shrimp culture. Guimaraes (1989) reports are in well agreement with the present result and he stated that salinization declined the quantity of fodder availability, which lead to consequential reduction in buffalo number. Milk production of existing buffaloes decreased due to the scarcity of feeds in shrimp farming areas. Deb (1998) showed that total production of cows and buffaloes have declined by 47% and milk yield by 25% in high salinity areas from 1986-1989. Not only decreases milk production but also reduce lactation period and decreased birth weights were found. There were shortages of fresh water. So different types of diseases increased and mortality percentage also increased.

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