Mini-Hatcheries: A viable technology to facilitate supply of Day Old Chicks for rural poultry rearing[1]

Background:
Mini-hatcheries have been successfully established in Bangladesh and have emerged as a viable income earning opportunity for rural women. Mini-hatcheries provide a critical link between parent breeder farms and poultry rearers and enable the supply of Day Old Chicks under a decentralized institutional model. Two models of mini-hatcheries have been promoted – a rice husk based model[2] and a sand-based box type model[3]. Successful implementation of mini-hatcheries requires proximity to parent breeder farms, to secure the backward supply of hatching eggs as also reduce the risk of spoilage of hatching eggs over long distances.

Palli-Karma Sahayak Foundation:
The Palli Karma Sahayak Foundation (PKSF) has led the implementation of the IFAD funded Microfinance and Technical Support Project[4] (MFTSP) across 97 sub-districts in southern and north-eastern Bangladesh, in partnership with other NGOs such as the COAST Trust, the Society for Social Service (SSS) and the Thengamara Mohila Sabuj Sangha (TMSS). The goal of the project, which commenced in 2003, and concluded in 2010, was to improve the livelihoods and food security of 276,000 moderate and ultra poor households and the empowerment of women through support for a range of income generating activities and livestock technology. A key income generating activity initiated under the MFTSP was the design and establishment of mini-hatcheries to facilitate small-holder poultry rearing. Other income generating activities included support for livestock rearing (cows, goats, ducks, and poultry), dairy farming, broiler rearing and beef fattening.

The mini-hatchery intervention was established to hatch the Sonali breed of chicken, a cross between the Rhode Island Red (RIR) male and Fayoumi female hen. The Sonali breed is known for its higher egg production as compared to the *desi* bird, even under semi-scavenging conditions.

Since it was difficult to procure day old chicks from commercial hatcheries located at a distance from remote villages, mini-hatcheries were an appropriate technological option to facilitate supply of DOCs at the village level.

The mini-hatchery technology has been under implementation in Bangladesh for some time now, and was initially used in a number of small-holder livestock projects from the early nineties. It was, however, not very successful in these projects largely on account of poor management of the supply chain of hatching eggs, poor quality of eggs and the high labour inputs required. By addressing management and supply chain constraints, the MFTSP has effectively demonstrated how women from disadvantaged and poor households can earn a regular income through the operation of mini-hatcheries at the village level.

Initial hands-on training and subsequent refresher training for the establishment of mini-hatcheries was provided to beneficiaries at the Narayanganj Duck Farm managed by the Department of Livestock, Government of Bangladesh.

The mini-hatchery units established under the MFTSP varied in size with a capacity of a few hundred to several thousand eggs and establishment costs ranged from about US$ 10 to US$ 425 per hatchery.

Mini-Hatchery Technology and how it works
Mini-hatchery technology is said to have originated in China where it is used to hatch duck eggs. The technology is best suited for the hatching of duck eggs since the duck egg-shell is less brittle than the chicken egg shell.

Mini-hatcheries are successful under the climatic conditions of Bangladesh[5] however their operation may reduce or completely stop during the winter period from mid November till February, when temperatures fall to a low of 20° C.

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[1] The technology can also be used for hatching duck and quail eggs.

[2] The experience with mini-hatcheries technology in Bangladesh, Rota Antonio et al., International Fund for Agricultural Development, IFAD, Rome, Italy and Micro Finance and Technical Support Project, PKSF, Dhaka, Bangladesh available at: http://www.cop-ppld.net/fileadmin/user_upload/cop-ppld/items/Rice%20husk%20Mini-hatcheries.pdf

[3] Building and operating a mini-hatchery: Sand method - A manual by IFAD and PKSF, September 2011. The manual can be accessed at the following link : http://www.cop-ppld.net/fileadmin/user_upload/cop-ppld/items/Poultry%20Manual.pdf and the training video is available at http://www.cop-ppld.net/cop_knowledge_base/detail/?uid=3030

[4] The MFTSP was primarily a microfinance project and provided technical and financial support for the promotion of livestock technology.

[5] Bangladesh has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and high humidity. The maximum summer temperatures range between 38 and 41° C and winter temperatures range between 16–20 °C during the day and around 10° C at night. Most parts of the country receive at least 2,300 mm of rainfall annually.

The mini hatchery technology uses heated rice husk or sand as a means of artificial incubation for hatching chicken/duck eggs. Units can vary in size with a capacity of a few hundred eggs to several thousands.

There are broadly two types of mini-hatchery models under implementation in Bangladesh namely the **Rice-husk Model and the Sand Model**.

The rice-husk model is also known as the husk-bamboo cylinder or the quilt-husk model depending on the use of additional features.

1. Rice-husk model:

Incubation cylinder placed inside the rice-husk filled incubation box, along with the thermometer *(Photo: A. Rota/IFAD)*

The basic equipment required for setting up of a rice-husk based mini-hatchery includes a well insulated room, a box for incubation[6] and 2-3 bamboo cylinders[7], kerosene lamp (hurricane), hatching bed[8], thermometer, a tray made from bamboo, a 3x3 feet dark coloured cloth for wrapping the eggs, a candling box[9] and rice husk.

Steps for setting up the rice-husk based incubation box

An incubation box housing three incubation cylinders *(Photo: A. Rota/IFAD)*

Step 1: A polythene sheet measuring 6x4 feet is spread on the floor in the incubation room followed by a tin sheet measuring 5x3 feet. The incubation box made of wood is set over this tin sheet to prevent seepage of moisture into the incubation box. The dimensions (length, breadth and height) of the incubation box are 5, 3 and 1 feet respectively.

Step 2: The incubation box is filled with rice husk, 6 inches deep and covered with jute sheets. An incubation box with the aforesaid dimensions can house two to three incubation cylinders (made of bamboo) with a diameter of 1-1.7 feet and a height of 3 feet each.

A poultry rearer heating the eggs on a bamboo strainer prior to putting them in the incubation cylinders *(Photo: A. Rota/IFAD)*

Step 3: The incubation cylinders made of bamboo are kept in the husk-filled incubation box forcing them into the gunny sheets. The cylinder should have a diameter of 1-1.7 feet and a height of 3 feet. The incubation box and cylinders are further press-filled with rice husk. The cylinders should be 1-2 inches higher than the incubation box.

Step 4: The husk filled incubation boxes are covered with gunny sheets. The sheets are spread in such a manner that the incubation cylinders remain uncovered. A petrol/kerosene lamp (hurricane) is always kept in one of the cylinders alternately during the entire hatching period to maintain heat in the incubation box ranging from 98-100° F or 37-38°C. For a three cylinder type incubation box, for example, the hatching eggs could be kept in the two side cylinders, with the hurricane lamp placed in the central cylinder to maintain uniform heat, and subsequently moved to the side cylinder, and the hatching eggs moved to the central cylinder. For a two cylinder type incubation box, the hurricane lamp could be alternatively placed in one cylinder with the hatching eggs in the second cylinder. On no account should the hatching eggs be placed in the

[6] An incubation box to accommodate 2 cylinders will have the following measurements:
Length – 5 feet, Breadth – 3 feet and height – 2.6 feet. The base of the incubation box comprises a wooden sheet.

[7] A 3 feet tall bamboo cylinder is made by rolling 3x1.3 feet of bamboo sheet.

[8] The hatching bed is made using sheets woven with bamboo fronds covered up to two inches with the pre-heated rice husk and then covered with a gunny sheet, blanket or cotton quilt. The size of the hatching bed varies with the capacity of the mini-hatchery. For example a double bodied hatching bed with a capacity of 1,000 eggs will measure 6x2x4 in length, breadth and height respectively. The height of the lower part of the body from the floor is 1' (feet), followed by two compartments of 1.5 feet each on the top. The eggs are generally placed in the two upper compartments of the hatching bed.

[9] A candling box or candler is a simple technique used to differentiate fertile eggs from non-fertile eggs. A light bulb or a torch/candle is fixed on one end of a tin, wooden or cardboard box and on the other end a small hole is made to place the broad end of an egg. A fertilised egg shows a narrow blood vein through the yolk.

cylinder holding the hurricane lamp. In certain hatcheries husk pillows are also prepared and pre-heated prior to keeping them next to the hatching eggs.

An incubation cylinder with eggs wrapped in dark-coloured cloth for incubation
Photo: Society for Social Service, Tangail, Bangladesh

Step 5: The eggs are washed in anti-bacterial solution, dried, marked[10] and then heated evenly, by continuously turning them around, either in direct sunlight or over a kerosene stove by keeping the eggs in a bamboo strainer. The temperature of the eggs must reach 98°-100° F after which they are kept in the incubation cylinders by packing them in bundles of 45-50 eggs each in a dark coloured cotton cloth. A cloth measuring 3 feet in length and breadth can hold up to 50-60 eggs. It is a preferred practice to keep a pre-heated husk or feather pillow beneath and above the bundles of these eggs.

Step 6: The temperature of the incubation cylinders should be constantly checked using a thermometer and maintained at 98°-100° F. After keeping the eggs in the incubation cylinder for 24 hours, they should be turned for the first time after which turning of eggs should be repeated every 6-8 hours. Egg candling[11] is done on the sixth day to separate the fertile, non-fertile and spoilt eggs. Incubation is continued for the fertile eggs while the non-fertile eggs are either sold or consumed.

Step 7: The eggs are turned in the incubation cylinder till the 13th day. On the 14th day[12] the eggs are removed from the incubation cylinders and spread on the hatching bed. The eggs once spread over the hatching bed should be covered with a blanket /quilt or gunny sheet to avoid loss of temperature. The temperature of the hatching bed should be maintained using a hurricane lamp and should always be within a range of 101°F-102°F. Similar to the practice in the incubation cylinders, the eggs should be turned in the hatching bed once in 6-8 hours until the 18th day, after which the turning around should stop.

Above: Eggs spread out on the hatching bed on the 14th Day
Below: Hatching bed covered with a quilt to avoid loss of heat
Photo: Society for Social Service, Tangail, Bangladesh

Step 8: A crack is observed on the eggs of the poultry bird on the 18th day and on the duck eggs on the 25th – 26th day, after which the turning around should be stopped and the quilt should be removed. Chicks or ducklings hatch within 24 hours of appearance of the crack on the egg-shell. The newly hatched chicks should be immediately transferred to the brooding area after drying. After hatching from the eggs, the chicks dry naturally within 40-45 minutes.

2. Sand-type model

Wooden incubation box
(Photo: PKSF/IFAD)

The basic equipment required for setting up of a sand-based mini-hatchery, with a capacity to incubate 1200-1500 eggs (also called a mother mini-hatchery unit), includes a well insulated[13] room, a wooden incubation box measuring 135 cm in Height, 105 cm in width and 235 cm in length. A small opening with a door is made at the top of the incubation box to allow the exhaust of over-heat for maintaining the temperature of the incubator; a minimum of five trays/shelves made of wood or iron are fitted into the incubation box; kerosene lamp (hurricane); thermometer; gunny bags and black colour cloth for the trays; sand; candling box and water bowl. Small incubation boxes are also made to hatch 50-100 eggs at one time. Though the mini-hatchery unit can also be placed anywhere inside the house, it is

[10] The eggs are marked for identification using a sign pen. After the 6th day of placing the eggs, candling is carried out and infertile or spoilt eggs are removed from the incubation cylinder. Fresh eggs are placed to compensate for the infertile/ spoilt eggs. Marking helps in distinguishing the new eggs from the old ones and also to track the hatching cycle. Fresh eggs are added to the incubation cylinder due to the following reasons:
-To allow hatching of more eggs
-New eggs get warmth from the eggs placed earlier which reduces the need for providing additional heat for the new eggs.
-It aids in continuous setting of eggs for production of chicks as per demand.
-It decreases the chances of a sudden rise of temperature in the incubation box.

[11] Candling is done using a bright light or torch light in a dark room. When seen through the candler/ torch or bulb, fertilized eggs show a narrow blood vein through the yolk. Un-fertilised eggs look transparent with only a shade of yolk, whereas spoilt eggs have floating spots often black or hazy in color throughout the egg.

[12] The eggs of ducks are placed on the hatching tray on the 18th day as they hatch in 28 days unlike those of poultry birds which hatch in 21 days.

[13] The incubation room is prepared in such a way that there is minimal passage of air across the room. This is achieved by keeping only one window open in the north or southern side of the room. The windows are further covered with clean polythene so as to restrict the passage of air into the room. Additionally the entrance of the room is kept on the western side to prevent direct sunlight.

advisable to keep it in a separate room which does not get direct sunlight and rain.

Steps for preparing the eggs for hatching


Four-shelved incubation box for the sand-type mini hatchery
(Photo: PKSF/IFAD)

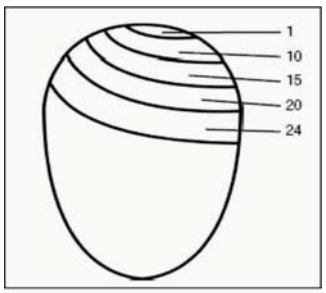
Step 1: The first four shelves in the incubation box are placed at a distance of 15-20 cm from each other while the lower most shelf of the wooden incubation box is fitted 50 cms away from the fourth shelf. The eggs for hatching are placed on the first three shelves and sand is placed on the fourth shelf to a depth of 1.5 to 3 cm. The kerosene lamps for heating the incubation box are placed on the fifth and last shelf. The front door of the incubation box is made of two panels and is covered with gunny bags from inside to help in maintaining the warmth of the box. The width of each tray may vary from 55-60 cm and all the trays are kept at a distance of 8 cms from the wall of the incubation box. A well-maintained incubation box can last for almost 8-10 years. The room where the incubation box is placed must be regularly cleaned using a disinfectant to ensure bio-security.


Front doors of the incubation box are covered with rice-husk filled gunny bags
(Photo: PKSF/IFAD)

Step 2: A gunny bag followed by a black coloured cotton cloth is spread over the first three trays on which the eggs for hatching are to be placed. A disinfectant like Dettol or Savlon is also sprayed inside the incubation box prior to placing the hatching eggs.


Selecting eggs for incubation
(Photo: PKSF/IFAD)

Step 3: Selection of eggs: This forms an integral step in the set-up of any type of mini-hatchery. Good selection not only contributes to higher hatchability rates and production of good quality chicks but also helps with hatching chicks of uniform size and prevents losses. Egg selection is done carefully and only eggs with normal shells and medium size are chosen for hatching. The eggs which are abnormally large or small in size are generally discarded at this step. Some of the other parameters which are maintained while selecting the eggs include disregarding dirty eggs; eggs with bigger or smaller air sacs[14]; eggs that have got wet in the rain; blood stained eggs; rough shelled eggs and eggs received immediately after the lay. The eggs for hatching are collected from mother breeder farms in the vicinity where both male and female poultry are kept together. These mother breeder farms usually maintain a male to female ratio of 1:10. Since a large number of eggs may not be available at a particular time for setting up the mini-hatchery, the eggs collected daily from the breeder farms are preserved for 6-7 days. Additionally it is observed that eggs kept for at least seven days prior to placing them in the incubator have a higher hatchability percentage. The eggs are stored at room temperature in a room that allows free passage of air and light. A few methods used for preserving the eggs for 6-7 days after the laying include keeping them in big earthen pots; or wide mouthed baskets made of bamboo. Eggs are also kept under the cot by making a litter bed with sand and ash.



The size of air-sacs on various days of incubation

Step 4: Cleaning and warming of eggs: Eggs are cleaned with warm water and an antiseptic solution such as Dettol or Savlon prior to placing them in the hatching tray. The cleaned eggs are kept in the sun so that they get heated to 98-100° F or 37-38°C evenly.


Poultry rearer adjusting the flame of the hurricane lamps to control temperature inside the incubator
(Photo: PKSF/IFAD)

Step 5: Meanwhile the kerosene lamps are placed inside the incubating box so that the sand gets heated up to a temperature of 98-100°F or 36.5-37.5°C. Generally the lamps are placed 3-4 hours prior to placing the pre-heated eggs in the incubating box. A bowl full of water should be kept next to the kerosene lamps and be re-filled constantly to avoid loss of complete moisture and maintain the required humidity of 70-80%.

[14] The air sac is located at the blunt end of the egg. It is formed when the inner and outer membranes separate shortly after the egg is laid. The air sac helps the egg save water so that the egg will not dry out. The air inside the air sac is the first breath the chick will take before hatching out of the shell. During incubation the size of the air sac increases due to evaporation of moisture from the egg.

Though it is not a common practice to measure the humidity in the incubating box, some beneficiaries prefer using Hydrometers to measure the humidity of the incubating box.

Step 6: First day: The eggs are carefully placed in the top three trays of the incubating box. A thermometer should be placed in each of the trays to keep a constant watch on the temperature of the eggs.

Step 7: 2nd - 6th day: After keeping the eggs in the incubating box for 24 hours, the eggs should be first turned and thereafter turned once every six hours to ensure uniform heating of all the eggs. At night the eggs are turned before going to sleep and immediately on waking up early the next morning. This turning is done until the 18th day. In case of excessive temperature the top lid or even the front door of the incubating box is kept open for some time to allow the escape of the over-heat. The light of the kerosene lamp may also be dimmed to allow the temperature to be maintained at a constant level of 98-100° F or 36.5 – 37.5°C.

The top lid of the incubation box is kept open for some time to allow the excess heat to escape
(Photo: PKSF/IFAD)

Egg-candling in process on the 7th day of incubation
(Photo: PKSF/IFAD)

Step 8: 7th day: Candling is done on the 7th day to weed out the non-fertile or spoilt eggs, both of which are removed instantly from the incubating box. Candling is also done on the 14th day to further discard the non-fertile or spoilt eggs.

Step 9: 18th day: Turning of the eggs must be stopped on the 18th day in case of chicken eggs and on the 24th day in case of duck eggs.

Step10: 19th day: Cracks on the chicken eggs can be observed on this day. In case the cracks do not appear on the eggs, they should be softly sponged using a wet cloth. In case of duck eggs, sponging should be done only after the 24th day.

Cracks appearing on the chicken eggs
(Photo: PKSF/IFAD)

Chicks hatching out of eggs
(Photo: PKSF/IFAD)

Step11: 20th-21st day: Chicks can be observed coming out from the eggs. They should not be touched until they are completely dry. The chicks normally dry within 40-45 minutes after hatching and should then be removed to a separate basket.

Step12: The egg shells, spoilt eggs and dead chicks should be removed from the incubating box and disposed off by burying under the ground. Ducklings hatch on the 27th day. The gunny bags and black cloth must be removed from the incubating box, washed and disinfected prior to hatching the next batch of eggs. It is observed that the success rate of hatching eggs increases with experience. Normally 65 to 70 percent of eggs hatch in the sand type mini-hatchery.

Stake-holders in the Mini-Hatchery Supply Chain

Parent or Model Breeders

Model breeders supply fertile eggs to mini-hatchery owners. Model breeders run small parent farms under confined production systems[15] to ensure the pureness of the parent lines which comprise Fayoumi females and Rhode Island Red males. In the MFTSP model, parent breeders were beneficiaries under the programme. They received referral and technical support from PKSF and were linked to government or private farms for purchasing parent stock.

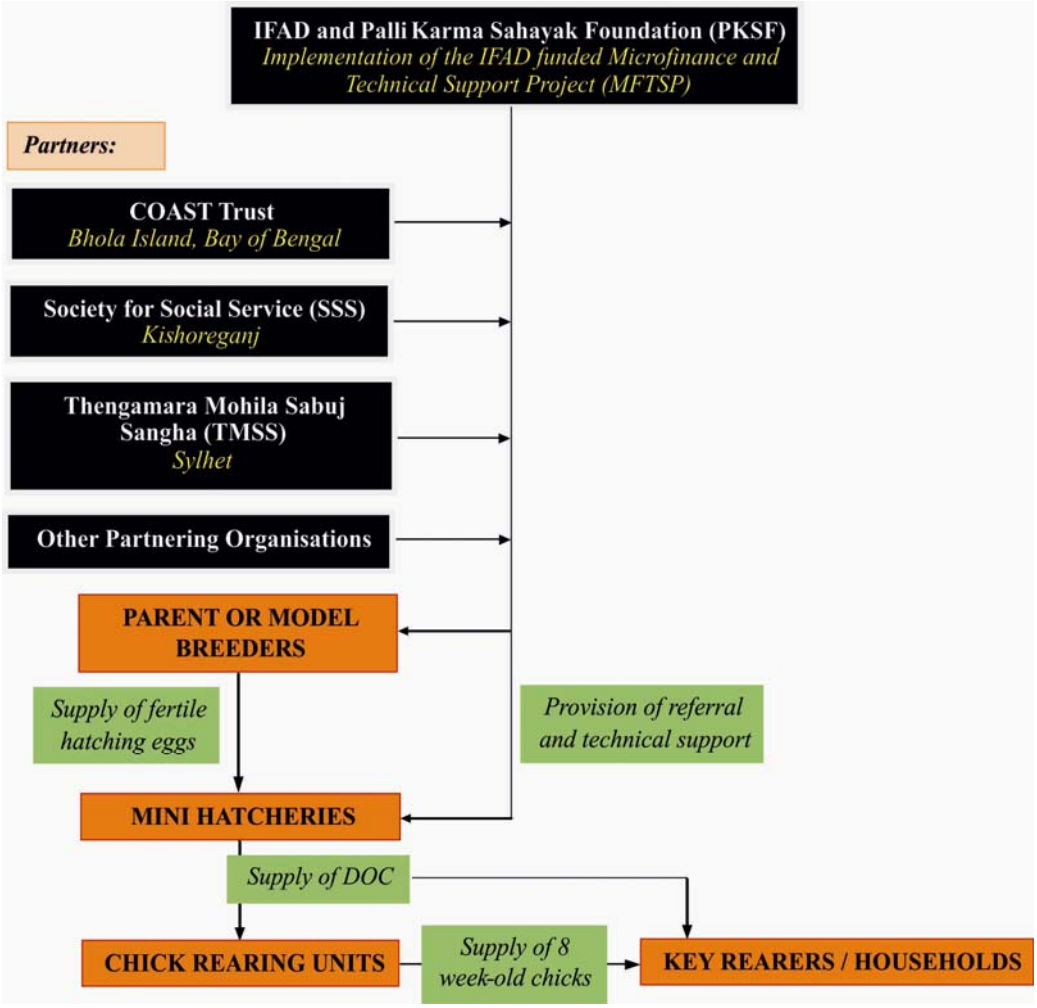
[15] Confined Production System refers to rearing conditions maintained for parent stock. This comprises hygienic housing, use of healthy parent stock with higher genetic potential, provision of balanced feed and regular vaccination. In case of ducks and poultry the male to female ratio is maintained at 6:1 and 10:1 respectively. The ducks and poultry for laying are raised for a minimum of one year prior to the onset of egg-laying.

The 2009 IFAD report observes that model breeders sold the eggs at a premium price of Taka 1 to 2 per egg on account of a high demand for hatching eggs of both chicken and ducks from the mini-hatcheries. Model breeders therefore also benefited from this link with mini-hatcheries.

Mini-Hatcheries:
They comprise the second rung in the supply chain, facilitating supply of DOCs to poultry rearing households.

Chick Rearers and Key Rearers
The mini-hatcheries sell their day-old chicks to Chick Rearing Units (CRU). These units rear batches of 200-300 day-old-chicks (DOCs) up to eight weeks, in sheds made of local material. The chick-rearers supply birds to the key rearers, another category of project participants in the MFTS project. Any surplus of chicken is sold in local markets.

The key rearers are smallholders who rear 5-10 birds each and comprise 90% of the poultry farmers involved. These birds primarily scavenge for food, supplemented with a handful of grains. The mature birds are kept by key rearers and the targeted ultra-poor[16] beneficiaries to produce eggs for the market as also for household consumption.



[16] The Ultra Poor are defined as those households who spend almost 80% of their income on food and yet are unable to meet their daily calorie requirement. Means of livelihood comprise highly seasonal and unreliable work and primarily work that receives relatively lower wages.

Key Observations from an IFAD Supervision Mission to MFTSP (October 2009)
Three Partnering Organizations were visited to assess the implementation of various income generating activities. These were the COAST Trust at Bhola Island in the Bay of Bengal, Society for Social Service (SSS) in Kishoreganj and the Thengamara Mohila Sabuj Sangha (TMSS) in Sylhet.

The report highlights that Livestock Technical Assistants (LTA) employed under the programme were instrumental in providing back-stopping even after the completion of training for the establishment of mini-hatcheries. For example COAST alone employed 14 Livestock Technical Assistants under the MFTS project. It also employed an animal husbandry graduate, whose task was to back-stop the LTAs.

In the COAST Trust programme area – Bhola Island - 22 mini-hatcheries were set up out of which 14 were in operation at the time of the Mission. Major reasons for closure of the mini-hatcheries included a lack of family support and the highly labour intensive activity. This area had a total of 30 parent breeder farms. The ratio of infertile to fertile eggs in the mini-hatchery was 22% and 78% respectively. The hatching rate of fertile eggs was almost 83%.

In the area of operation (Kishoreganj district) of the partnering organisation, Society for Social Service (SSS), a total of 13 mini-hatcheries were reported with 12 parent breeder farms in the vicinity. The report further mentions that of all the mini-hatcheries operating in the area, hatching eggs from the 10-12 parent breeder farms were obtained by just one large mini-hatchery. An under-reporting of parent breeder farms was observed, and following this observation a study was recommended to understand the supply channel of hatching eggs with respect to parent breeder farms.

As per recent statistics shared by the Society for Social Service, the number of mini-hatcheries in five villages of the Tarail Upazila of Kishoreganj district is 30 while the number of parent breeder farms has remained constant at 12.

In TMSS, Sylhet, the total number of mini-hatcheries established was 17 with 27 parent breeder farms. An interesting trend observed in this area was that the experienced mini-hatchery owner was the master-trainer providing training to other interested villagers. This area also housed 400 quail farms and quail eggs were also incubated in the mini-hatcheries. It was observed that the quail parent stock came from TMSS's own farm.

Success of Mini-hatcheries in the MFTS project and its benefits over larger hatcheries

From the commencement of the project in 2003 until June 2007, MFTSP supported mini-hatchery owners had raised 2,027 batches of DOCs. The average chick production per batch was 223 and the average hatchability rate was 70% (ranging from a minimum of 23 per cent to a maximum rate of 94 per cent). Considering that most mini-hatcheries were operated with kerosene, an average hatchability rate of 70% is very satisfactory.

MFTSP reports show that the average net income earned per batch (in three weeks) by each woman mini-hatchery owner was Tk. 1,709 equivalent to USD 24.77. A key element that contributed to the success of mini-hatcheries was the practical hands-on training and technical follow-up provided by the Livestock Technical Assistants (LTAs).

Growth in the rural economy contributed to increasing market opportunities and improving the economics of mini hatcheries, and led to a demand for day-old-chicks at the village level which was met by the mini-hatcheries.

Table 1: Summary of the results of the rice-husk hatchery model in MFTSP up to July 2007	
Women trained by the project	**113**
Operating units	**188**
Batches hatched	**2,027**
Average number of eggs placed in each batch	**317**
Chicks hatched per batch	**223**
Hatchability	**70%**
Purchasing cost of one fertile egg	**Taka 5 (USD 0.073)**
Production cost per batch	**Taka 2,146 (USD 31)**
Selling price of day-old chick	**Taka 15 (USD 0.217)**
Average gross income per batch	**Taka 3,855 (USD 55.9)**
Net income per batch	**Taka 1,709 (USD 24.77)**
Data: A Rota, IFAD and PKSF	

Other factors that contributed to the success of the mini-hatchery model were the reduced labour requirement since eggs needed to be turned only once in six to eight hours, an intensive practical hands-on training on the complete hatching cycle (28 days for ducks and 21 days for poultry) and regular technical support by the Livestock Technical Assistants.

Economics of the Rice-husk and Sand type Mini-hatchery model

	Rice-husk type mini-hatchery		Sand-type mini-hatchery	
	Material and Equipment	Cost (Taka)	Material and Equipment	Cost (Taka)
One-Time Expenditure	Room	9,000	Room	-
	Incubation box (Height 1feet, Length 5feet, width 3feet)	5,000	Incubation box (Height 4.3feet, Length 7.3feet, width 3.3feet)	8,580
	Incubation Cylinder made of bamboo (2 numbers)	2,000	Kerosene lamp, bulb	500
	Kerosene lamp	500	Thermometer (3 pcs)	90
	Thermometer	500	Black cloth (5 meter)	300
	Coloured Cloth/Pillow	500	Jute sac	120
	Candler (1 piece)	150	Candler (1 pc)	150
	Rice-Husk (25 kg@Taka10)	500	sand	-
	Hatching bed	3,000	Chick Box (5 pc)	700
	Chick Box (5 pc)	700	Water pot(1 pc)	100
	Total cost	**21,850**	**Total cost**	**10,540**
Recurring Expenditure (Operational cost)	Purchase of eggs	Chicken = 5,100 Duck = 4,500	Purchase of eggs	Chicken = 5,100 Duck =4,500
	Kerosene, disinfectant antiseptic solution etc	600	Kerosene, disinfectant antiseptic solution etc	600
	Total cost	**Chicken = 5,700 Duck = 5,100**	**Total cost**	**Chicken = 5,700 Duck = 5,100**

Data Source: Information collected from Training Video (Reference No. 10), Mr. Santosh Chandra Paul, Deputy Director, Society for Social Service, Tangail, Bangladesh and Ms Sarah Jasmin, Assistant General Manager (PKSF) and Project Coordinator MFTS Project

Sustainability of the mini-hatchery model

There is currently not enough data on model breeders to develop an accurate understanding of the supply channels of hatching eggs across the mini-hatcheries.

Preliminary data indicates that the hatchability rate is largely influenced by the quality, handling and conservation of fertile eggs before incubation. There is also little information on viability of DOCs after hatching and sale to Chick Rearing Units and key rearers. There is therefore need to further study mini-hatcheries, particularly after the conclusion of project support[17].

Despite the success of this technology in Bangladesh, replication to other geographical regions and climatic conditions should be undertaken after detailed research, including a thorough assessment of the backward and forward linkages, particularly the supply of hatching eggs and demand for DOCs. Regular hands-on training and technical follow-up played a pivotal role in the successful operation of mini-hatcheries in the MFTSP, and should be included in the design and implementation of similar programmes.

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