

Final Report

on

Securing the livelihood through improvement of Kawra/pig-rearing community of southwest Bangladesh'

Period: August 2015 to June 2016



Researchers

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Disclaimer

These are the views and expressions of the author, and do not necessarily represent the view of the Netherlands Embassy in Dhaka or the Blue Gold program.

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Introduction, Acknowledgements and Abbreviations

Introduction

The *Nice Foundation* is one of the NGOs in Bangladesh working for the rights of the minority pig-rearing community, especially the Kawra community. Since 2005, it has focused on the livelihood security and social rights of those who are vulnerable and 'untouchable' in the community.

The pig rearing community is treated as '**Dalit**'. This term comes from the Sanskrit root 'daland' means 'broken, ground-down, downtrodden, or oppressed'. Those previously known as 'untouchable', 'depressed' classes, and Harijans, are today increasingly adopting the term 'Dalit' as a name for themselves.

'Dalit' refers to caste rather than class. It applies to members of those menial castes which have born the stigma of 'untouchability' because of the extreme impurity and pollution connected with their traditional occupations. Dalits are 'outcasts', falling outside the traditional four-fold caste system consisting of the hereditary Brahmin, Kshatriya, Vaishya, and Shudra classes (Kawras are under Shudra). They are considered impure and polluting and are therefore physically and socially excluded and isolated from the rest of society.

'Untouchability' means that the dominant castes could no longer legally force Dalits to perform any 'polluting' occupation. In our research area, polder #30, almost 88% of the residents are from the Hindu community. They are living harmoniously. They know each other and they share the same culture and religion. Most also eat pork.

Our research was concerned with the improvement of the economic and social status of the pig-rearing community by investigating a number of aspects of pig management and rearing: pigs' reproductive performance, their mortality rates, diseases and treatment, feeding practice, and marketing.pig farming as one of the best nutrition for those who eat pork and our experiment was on the hygienic pig production.

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Abbreviations

BWDB	Bangladesh Water Development Board
DLO	District Livestock Officer
DLS	Department of Livestock Services
DOF	Department of Fisheries
EKN	Embassy of the Kingdom of the Netherlands
FFS	Farmer Field School
FF	Field Facilitator
HH	House Hold
HTL	Host Team Leader
LRI	Livestock Research Institute
NGO	Non Government Organization
NF	Nice Foundation
UNS	Upazila Nirbahi Surgeon
UVS	Upazila Veterinary Surgeon
UP	Union Parishad
VS	Veterinary Surgeon
WMG	Water Management Group
WMA	Water Management Association

Executive Summary

This report sets out the findings from the first major research study to be conducted into pig farming in rural Bangladesh.

The study was commissioned and supported by Blue Gold, a joint enterprise founded by the Dutch and Bangladesh governments. It was undertaken by the Nice Foundation, an NGO set up in 2005 to support the country's most deprived communities of Hindu pig farmers in south-west Bangladesh.

This Executive Summary briefly outlines:

- 1. The study's objectives and methodology.
- 2. Its key outcomes, detailed more fully in Chapter 4.
- 3. Our reflections of where the research has taken us and the key challenges which remain.
- 4. Recommendations and next steps.

1. Objectives and methodology

The research took place between August 2015 to June 2016 in a Blue Gold polder¹ in Batiaghata, an area of 32 villages just outside Khulna in south-west Bangladesh, with some 11,500 households, 90% of which are Hindu. Its aim was to improve the economic and social status of the pig-rearing community by investigating a number of aspects of hygienic pig management and rearing: pigs' reproductive performance, their mortality rates, diseases and treatment, feeding practice, and marketing.

The study's formal objectives were fourfold:

- To conduct participatory action research on pig farming leading to *the establishment of a demonstration model farm* to display good husbandry and hygienic management, together with further research in ten homesteads, to improve pig rearers' practice and, though that, their income and wellbeing.
- To *improve the work practices and hygienic management* of pig rearers.
- To investigate the causes of *social barriers* and limitations of adopting pig laws.
- To promote and *facilitate access of the pig rearing community to government services.*

The Nice Foundation networked widely with local agencies, notably the Water Management Group and the Water Management Association. It built on the experiences of other NGOs and service providers in the region, and it undertook a limited literature on the subject. The research was highly participatory: the team took time and care to build relationships, through both one-to-one and group discussions.

¹ Blue Gold Polder 30.

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Surveys were undertaken at the beginning and end of the research, identifying participants' pig-rearing practices in terms of breeding, rearing, housing, feeding, sanitation, management and marketing, together with their wider public health implications.

2. Key outcomes

The research study has successfully achieved a range of innovative solutions concerned with pig husbandry through the demonstration farm and the training and participation of a large number of the pig-rearing community – relating, in particular, to hygienic management, veterinary practice, feeding and growth development, and reproductive effectiveness, and market development. It has also achieved tangible outcomes relating to the engagement of government and other officialdom in the affairs of the community and its pig rearing activities,

- (i) This research study successfully engaged on a day-to-day basis 200 members of the pig rearing community in exploring good practice in pig husbandry. This should provide a firm base from which the community itself will be able to spread good practice beyond the confines of Batiaghata. The study has shown the pig-farming community that good practice not only provides better outputs for households, but also improves the wider community's attitudes to pig farming through the use of less anti-social, more environmentally friendly, farming practice. By using more hygienic methods, the pig farming community can make itself acceptable to wider markets beyond local households and hotels. The study has introduced the community to officials in various tiers government who can further their aims. Further, the study has facilitated a process of better knowledge and understanding between professional (e.g. veterinary) officials and the pig-farming communities.
- (ii) If pig producers are to succeed in securing wider markets for their products, quality assurance programmes are required to ensure the production of safe, high quality pork. The study sought to establish initial guidelines for pig producers in the hygienic production of piglets and high quality pork. Traditional systems have tended to use unhygienic systems with low profitability. Farmers have tended to be dependent on roughage for pig food and they reared pigs primarily for fattening, rather than for breeding. A demonstration farm was therefore established to select the most appropriate pig breed for Bangladesh and to contribute to the development of economically-profitable, hygienic farming systems for the production of high quality pork and piglets.
- (iii) As part of this study, two hundred farmers were trained in best practice pig farming techniques in order to be able to improve their livestock farming conditions. As a result of their participation in this study, some farmers are showing more interest in rearing pigs for piglet production. They are also using anti-parasitic drugs to prevent external and internal parasites and vaccines for disease prevention. More farmers are using disinfectants and cleaning pig sheds more regularly to improve sanitation and safety for the farmers as well as their pigs. Farmers are also now more sensitive to the need to communicate with, for example, the upazila veterinary office.
- (iv) A number of important linkages have been achieved, involving officialdom as well as within the farming community:

- Ten pig-rearing groups have been formed to share ideas with the ultimate aim of improving pig rearing methods, increasing production, improving marketing, and exchanging ideas.
- ➤ Ten new pig farmers' field schools have been established and a teaching curriculum has been developed.
- Lines of communication have been established with policy makers and various tiers of government on the extension of veterinary services for pig farmers.
- Links have also been established between the pig rearing community and the local upazila livestock officer.
- Learning points and recommendations have been drafted (as summarised here) which, when signed off, will be published and widely disseminated to donors and interested stakeholders.
- 1000 hygienic pig farming, management and treatment leaflets were developed and was distributed among the 200 farmers as well as interested pig farmers

(v) Further major deliverables will, it is hoped, be of lasting benefit to those who have participated in the research and, it is hoped, word will spread to well beyond the research area:

- > Research materials (secondary information, books, journals etc.).
- > Data collection, for example from the surveys and literature reviews.
- Workshops, for example for regional stakeholders and for curriculum development.
- > The formation and development of a polder-based Kawra group.
- > Training for field facilitators.
- > Pig farmers' attendance at the field schools.
- Dissemination and validation of findings through the range of participating stakeholders, including the upazila livestock officer, veterinary officer and Nirhabi officer²; and the union parishad chairman
- An exposure visit to Vietnam with resulting sharing of documentation process, record keeping and improved understanding – by researchers, farmers and Blue Gold representatives – through of the impact of pig farming on public health and food safety.

(vi) The pig demonstration farm, established as part of the research study, enabled some important conclusions to be drawn in animal rearing and husbandry:

- Growth performance: The comparative study of pig breeds indicated that the greatest weight growth was in local traditional Black breed, with greater growth in most breeds among sows than boars, reflecting higher feed during pregnancy and weaning.
- Feed consumption rate: Pig growth unsurprisingly reflected daily feed and nutrition intake. However, the study also revealed variations between breeds in the consumption of concentrate feed and roughage. For example, Dolkomol and Whitish breeds preferred concentrate feed to roughage.

² Upazila chief executive.

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- Reproductive performances: The highest survival rates were found in the traditional Black breed. Although other breeds gave birth to more piglets.
- Disease occurrence: The local Black breed also proved most disease-resistant. Minor diseases affected other breeds although the management of sanitation and vaccinations minimised these, certainly compared with the experience of pig farmers in the community.
- (vii) To test performance outside the protected environment of the demonstration farm, tests also took place in homesteads. Pig farmers have historically been more inclined to focus on the less-profitable pig fattening, which requires less technical knowledge and support, rather than piglet production. As part of the research study, ten 'trial farms' were therefore established in homesteads to test performance outside the sheltered environment of the best-practice demonstration farm. Ten households were selected, each given one boar and one sow of the same pig breed: eight homesteads were provided with Black pigs and two with Dolkomol pigs:
 - Growth performance: As was found in the demonstration farm, the Black breed gained more average body weight than the Dolkomol breed. In addition, as with the demonstration farm, body weight increase was higher in sows in both breeds
 - Feed consumption rate: Traditional pig farmers have not focused on good quality pig feed, instead mostly using rice polish, boiled rice, kitchen waste or arum. In this study, the ten trial homestead farmers were provided with a formulated concentrate feed to complement roughage. Black pigs were better feeders that Dolkomol. However, where farmers over-used the concentrate, at the expense of the roughage, pigs showed lower growth and, in particular, poorer reproductive performances.
 - Reproductive performances: Six of the eight farms with Black pigs successfully bred from them. Out of the two farms with Dolkomol pigs one succeeded. Average piglet production rate was 5.6 per pregnancy (Highest 7 and lowest 3 piglets by one sow). Feed consumption rate is closely related with reproductive performances. As above, the correct balance of concentrate and roughage was essential to maximize piglet production.
 - Disease occurrence: Most of trial farms were affected with minor diseases/symptoms. Farmers who took proper care with their animal husbandry benefited with superior breeding outcomes, compared with those who did not maintain adequate bio-security
- (viii) Pig manures can be used for the purpose of bio-gas and organic fertilizer in agricultural field. Pig droppings provide a good alternative to chemical fertilizer. In our benchmark survey, respondents commented on the odour caused by unhygienic farm management. At the endline survey, it was found that 80% of respondents said that this odour reduced after the installation of ring slabs for managing pig wastes and by regular sweeping of floors.

3. Reflections and remaining key challenges

- (i) Pig farming can be accepted by the majority Muslim population, if sensitively managed. This study took place in a polder area with a 90% Hindu population, most of whom were already involved with pig farming. This was of course deliberate in order to maximize the benefits of the research for those who are most affected. However, it also included a small area was populated by the Muslim community, who were also interviewed as part of the research. To them, the sight of pigs in an open field might be (at least) surprising. However, they were likely to be accepting of pig rearing if it is less publically obvious and is undertaken hygienically. An imam interviewed for the research commented: '[Pigs] must not be visible before and after prayers but, if the pig rearers [farm] in their own place without showing us, we do not have objections'. So, to the Muslim community, pig management.
- (ii) The mortality rates of young pigs are still high and this needs further study. Marketing is fully dependent on local demand which can be linked with national market. The feed formulation can be more cost effective for feed availability, the scarcity of clean water, a lack of skilled veterinarians with knowledge of pig diseases, and poor preventive health care.
- (iii) There is much to do to change behaviour. Despite the work of the Nice Foundation to encourage the government to facilitate behavioural change of the wider community towards the pig farming community, more remains to be done, which needs to be focus of the Foundation in the future. The government needs to be encouraged to formulate an appropriate policy regarding pig production in the livestock production strategy. A national level workshop should be arranged involving civil society members, human rights activists, government officials, supporters, journalists, lawyers and NGOs.
- (*iv*) *The indigious Black pig has many advantages.* The most-frequently bred pig was the indigenous local Black pig, which as above proved to have significant advantages over other breeds tested. But a comparative study with other geographical areas like Rangamati (in the Chittagong Hill Tracts) would be valuable.
- (v) Perhaps the most critical finding of the study is that pig farming, even within the improbable environment of a predominantly Muslim country, can be undertaken successfully and profitably. This is partly because the study focused only on a polder area where 90% of the population is Hindu, most of whom are involved with pigs, so an adverse attitude from the Muslim community would not be so expected. However, the key point is that participants in the study are now aware of the factors such as management, food, hygiene and medical good practice and the fact that piglet production is more profitable which will enhance this profitability and provide more returns than traditional practices. This should at least contribute to the future well-being of, and recognition given to, their community.
- 4. Recommendations and next steps

Notwithstanding this progress, there remains much to do. Further research and action-based study is required to investigate a number of issues which arise from this report.

- (*i*) *Fatterning:* Beside FFS fattening trial can be studied to see the profit and loss because the fattening is for pork. In order to catch the market hygienic pig fattening is important and these has traditionally popularities among the pig farmers.
- (*ii*) A scaled-up version of the present study to include other polders could include the areas of piglet production, fattening trial and extension of hygienic pig farming system. Due to high demand of pig farming, the poor household can be supported with piglets and training technology and support for hygienic pig farming shed. Piglet to piglet production and pig fattening was not compared due to time and resource constraints. A comprehensive fattening and piglet production can be piloted in the scale up study
- (*iii*) *Market development*: Most farmers find that there are inadequate markets for their produce. Market promotion would be a valuable focus of future research. Of particularly need for more work is the scope for marketing of live pigs and pork to be undertaken by producers rather than through middleman. A national market profile/buyers profile or an inventory would help identify marketing opportunities.
- (*iv*) *Training*: There remain many farmers who did not receive training on pig farming. We hope that trained farmers will be able to transfer pig rearing techniques to other farmers in their village. Monitoring is required to see whether this in fact happens. A further survey after one year would facilitate some evaluation of the longer-term impact of the study.
- (v) **Pig farmers professional rights:** These were not studied in the research reported here, and is certainly something which requires further research and action.
- (vi) Gender implications: Women in the study area virtually all worked only at home, but some three in five were involved in some kind of incomegenerating activity, mostly livestock production, including pig farming. However, the affirmative action for empowering women who are involved in pig rearing is quite low and further study is required into the scope for facilitating participation across the range of social, heath-related, financial and political areas.
- (vii) Pig-farming communities who have been deprived of their livelihood and social rights need to be studied further so that the reasons and lessons can better understood and disseminated.
- (viii) The WMA and WMG played an active role during the research period that can be supported for pig farming institutionally for exploring it as income earning venture which will help them sustaining the WMA/WMG even after completion of BG activities in the area. In further work, the WMG can initiate pig farming collectively from where they will get profit and will ensure the

marketing. Through the rearing process the WMG fund will be increased which will help sustaining them and the dependency on other sources will be reduced.

- (ix) The work undertaken in the current study with government and other agencies needs to be built on to remove current barriers so that the pig rearers can get support nationally. A national level workshop can be arranged by involving civil society members, human rights activists, government officials, supporters, journalist, lawyers and NGOs. also formulate an appropriate policy regarding pig production in the livestock production strategy.
- (x) The pig farmers adolescent girl and boys can be motivated through some courtyard sessions on future modern pig farming and marketing system.

We would welcome the opportunity to take discuss with Blue Gold how this further work can be undertaken.

Chapter 1 Research Concept, Hypothesis and Methodology Analysis

1: Context

As has been shared by pig farmers and traders of the pig farming take places in 59 districts out of 64 by tribal, Hindu and sweeper community. Batiaghata Upazila has been established in 1892 and Upazila has been started functioning from 1983. There are 7 union parishads and 172 villages where 171,752, (Male = 86,685; Female = 85,067) 40,779 housholds. In polder number 30 there are 11,562 households living in 32 villages where 90% are Hindu community.

This is one of the Upazila Parishad in Bangladesh where majority populations are Hindu community whom are used to rear pigs and eat pork. The natural problem makes the area vulnerable because of coastal salinity, water logging, flash flood, river erosion, canal siltation and top dying of trees. The water Development Board declared polders to utilize the lands and protect the habitats. The area is dependent on natural resources like water, fisheries and agriculture.



Fig 1: Map of Batiaghata

Due to salinity livestock is seasonal. However, a section of Hindu community is traditionally rearing pigs as one of their major livelihood. Considering the population, cuture and potentiality *Nice Foundation* has selected polder no. 30 for conducting a pilot based participatory action research on hygienic pig farming with the support of Blue Gold Programme for scaling up in other areas and polders in future.

2: Research concept

The *Nice Foundation* focuses on the Kawra and pig rearing communities whom are treated as untouchable among the minority Hindu community. They are neglected because of their

profession. They are used to rear/cultivate pigs, eat pork and trade those in and outside of the country. This community took- up pig-rearing as a profession, as pork has a large market among Hindus, Christians, foreigners in Dhaka and international hotels. Their major livelihood is pig-rearing which is not accepted by the majority Muslim community. Moreover, many pigs and piglets are dying of unknown diseases, as the Government has limited treatment facilities. In addition, there are limited diagnostic facilities in the regional and local livestock offices and even this community is not calling Veterinary Officers for

treatment. Furthermore, there is no permission and recognized shops to sell pork in local market.

Class and status gaps create discrimination, resulting in a loss of self-confidence. Majority communities possess their lands illegally and control their resources. They have no opportunity to participate even in the lowest local government structure. The traditional pig rearing is unhygienic and not socially supportive.



Pig open grazing scene

Considering the above situation a participatory action research has been taken up to identify the root causes, their socioeconomic livelihood pattern, access to government resources, marketing facilities of pork, treatment facilities of pigs, blending of indigenous knowledge with modern pig rearing technology and behavioral pattern of neighbors with special emphasis on the gender to ensure their livelihood security. The action research focuses onidentifying the hygienic farming, social barriers of pig rearing community that hinder their development, confidences of these communities and livelihood patterns with their coping mechanism to develop their livelihoods.

3: Objectives of the research

Considering the qualitative achievement following 4 broad objectives were set in the business case to implement the research study within the timeframe:

- 1. To conduct a participatory action research on pig farming in order to establish a demo model farm in a hygienic manner and to improve the livelihood status of the Kawra /pig rearing community.
- 2. To improve pig treatment and personal hygiene of pig rearers.
- 3. To investigate the causes of social barriers and limitations of adopting pig laws.
- 4. To promote and linking the Kawra /pig rearing community with government services

4: Outcomes of the research

- 1. One demo pig farms and 10 household pig farming systems established at Batiaghata Upazila of Khulna District under BWDB polder number 30 that produce healthy pigs and provide a decent income to the farmers.
- 2. Ten Kawra/pig rearing groups formed to increase the production, marketing, and exchange of ideas for pig rearing.
- 3. Pig Farmers Field School curriculum developed and 10 FFS was implemented in the villages of Fultala, Kismotfultala, Debitala, Boyervangha, Maitvangha,

Vennabunia, Basurabad Uttarpara, Basurabad Madgapara, Mailmara and Chalk Soilmari

- 4. Discussions on going with policy makers / government department of Livestock on extension and veterinary services regarding pig rearing
- 5. Kawra/pig rearing Community are linked with ULO of BG 30 polder in BatiaghataUpazila
- 6. A research report published with recommendations and 200 copies disseminated to the donors and interested stakeholders

5: Major deliverables/activities

- 1. Research Materials (secondary information, books, journal etc):
- 2. Data Collection
- 3. Regional Stakeholders workshop- inception
- 4. Polder based Kawra group formation and nurturing
- 5. Pig farmers field school curriculum development workshop
- 6. Training for Field Facilitators
- 7. Pig Farmers Field School Session
- 8. Pig Demonstration farm 1 demo centre in polder no. 30
- 9. Pig farming Household model (FFS trial) by women
- 10. Vaccination and treatment
- 11. Process documentation and books/ records keeping
- 12. Knowledge sharing by the Researchers, Kawra farmers and Blue Gold Representatives through exposure visit to Vietnam
- 13. Public health impact and food safety

6: Progress at a glance against the target – numerical

Planned Activities	Target	Achie	evement	Deviation	Updated status		
Outcome 1.1 One demo nig	farms and	1 10 h	ousehold	nig farming s	systems established in		
one blue Gold working polde	one blue Gold working polder that produce healthy pigs and provide a decent income to						
the farmers							
1.1.1 Selection of pig	8	9		+1	Plan was for 8		
farming villages in					villages but achieved		
Batiaghata					9		
1.1.2 Selection of pig	1 shed	1 shee	d	0	Shed completed		
farmers who will provide					1		
land for Establish pig farms							
1.1.3 Engage 1 Kawra	01	01		0	Selected and engaged		
women care taker							
1.1.4 Demo Shed	01	01		0	Shed completed		
Making/construction							
1.1.5 Procure piglets and	08	08		0	Procured four		
supply feeds for demo pigs					varieties of pigs		
1.1.6 Selection of 10 HHs for	10	10		0	10 pig farmers		
trial homestead farm research					Selected &		
					constructed trial shed		
117 Construct trial nig shed	10	10		0	Construction		
for 10 homestead pig rearing					completed and has		
					continued FFS		
1.1.8 Use those HHs pig shed	10	10		0	10 groups have		
for FFS session					completed 15 FFS		
	• •	•		-	sessions & field day		
1.1.9 Procure piglets and	20	20		0	Procured 20 piglets in		
supply local/concentrated					10 sheds		
teeds	••		C				
marketing and exchange of i	pig reari doos for r	ng gro Ng roon	oups tori ring	ned to incre	ease the production,		
1.2.1 Organize Kawra/pig	10	ng ital	10	0	10 groups formed		
rearing community in groups	10		10	0	with 200 Households		
On an average 20 farmers in							
one group such 10 groups							
who is also FFS group							
	200	pig	200 pig	0	200 farmers		
1.2.2 Continue Polder based	farmers	r-0	farmers	-	continued nurturing		
Kawra/pig rearing group					through regula		
formation and nurturing					meeting		
1.2.3 Link the Kawra/pig	8 WMG		8 WMG	0	Linked with 8 WMG		
rearing groups with Water					and 1 WMA		
Management Group							
1.2.4 Maintain Process	By 3 FF	Fand	complet	0	Format are using by 3		
documentation and	sr. resear	chers	ed		FF and accounts		
records/book keeping					record updated		
Outcome 2. Pig Farmers Field School curriculum developed and 10 FFS implemented							

 Table 1: Progress at a glance against the target

Planned Activities	Ta	rget	Achie	vement	De	eviation	Updated status
2.1 Selection of 200 farmers	for	200		200		0	200 selected,
FFS and each FFS con	tain	farme	ers	farmers			finalized and started
average 20 participants				selected			FFS
2.2 Arrange workshop on Pig I	FFS	1		1		0	25 participants
curriculum development with	the	work	shop-	worksho	р		participated
assistance of BG, Govt. pig fa	ırm,	15		-	25		
UNDP and other rela	ated	partic	ripant	participa	nt		
organization		S		S			
2.3 Farmers Field School /trai	ning	01		01		0	FFS module used in
module developed							sessions
2.4 Arrange training for F	ield	02 FI	F	03 FF		+1	3 FF were engaged
facilitators on FFS sessions	by						instead of 2 with
Blue Gold. The FFs are from N	Vice						same allocated
Foundation who has alre	ady						budget
working with Kawra Commu	inity						
since inception.							
2.5 Organize pig FFS trai	ning	15		15		complete	Including field day
session for pig farmers on pro	per	sessio	ons	sessions		d	and inputs delivery
housing, rearing, treatm	ent,			organized	ł		
hygienic management, bala	nce						
feeding and marketing							
2.6 Provide support for	pig	As	per	Provided	l	0	Provided vaccines,
vaccination and treatment	by	need					de-working and
using Veterinary Field Assis	tant						other medicines as
(VFA) from ULO office or C	LW						per need
developed by Blue Gold.							
Outcome 3. Discussions or	n go	ing w	ith po	olicy mak	ers	/ govern	ment department of
Livestock on extension and v	veter	inary	servic	es regard	ing	pig rearing	
3.1 Inception workshop	with	30	. 52			+22	52 participants
different Stakeholders at Khuln	a	partic	n pa	rticipants			participated
		pants	~				
		Cont.	. Co	ont			Need based
							discussions were
							held with
3.2 Sharing meeting with po	olicy						Divissional
makers	•						Commissioner,
							Official Nirbani
							Chairman
							Datiochata
		4	1		-+	0	Dallagnala
3.3 Knowledge sharing thro	ugh	4	. 4			U	Visited and detail
exposure visit to Vietnam		partic	1				report submitted
		pants					-

Outcome 4. Kawra /pig rearing	Commu	nity are linked	l with ULO	of Batiaghata
4.1 10 FFS groups regularly	10	10	0	Continued nurturing
monitor by the Field				
Facilitators				
4.2 200 pig farmers of 10 FFS	200	200	0	Continued linking
groups of Batiaghata of 30				with ULO, UVO and
polders are linked with Upazila				Village vet service
Livestock office and getting				providers
services regularly				
Outcome 5. A research rep	o rt publ	ished with re	commendat	ions and 200 copies
disseminated to the donors, con	cern min	istries and inte	erested stal	keholders
5 Engage researchers staff and	06	07	+1	One additional FF
care taker				engaged with same
				allocated budget
5.2 Research Material	Collecte	d		
Collections			1	
5.3Researchers and staff	11	13	+2	Based on need 2
monthly meeting				meetings held extra
	30	33	+3	In Polder area with
5.4 Focus Group Discussions				general people,
				WMA and WMG
			-	members
5.5. Data Collection from	10	10 villages	complete	
kawra/namasudra/minority	villag		d	
Hindu living villages in 30	es			
polder where the minority				
living				
6. Other actions	r		1	
6.1 Monthly research progress	11	11	0	
and planning report preparation				
6.2 Procurements (furniture,	As per	procured	0	Used for project
Motor byke, laptop)	plan			purpose

7: Network of WMG/WMA and other relevant programmes in research area

Networking among the members of Water Management Group (WMG) and the Water Management Association (WMA) is the key success of Blue Gold Programme in polder no. 30. The research study was done by actively involving the WMG and WMA.

WMG name	Polder	Union	Upazila	District
Basurabad	30	Batiaghata	Batiaghata	Khulna
Basurabaduttarpara	30	Batiaghata	Batiaghata	Khulna
ChakSolemari	30	Batiaghata	Batiaghata	Khulna
KismatPhultala	30	Batiaghata	Batiaghata	Khulna
Mailmara	30	Batiaghata	Batiaghata	Khulna
Maitbhanga-	30	Batiachata	Batiaghata	Khulna
Bhennabunia	50	Datiagliata	Datiagnata	Khuina
Phultala	30	Batiaghata	Batiaghata	Khulna
BoyarbhangaPurba	30	Gangarampur	Batiaghata	Khulna
Debitala	30	Gangarampur	Batiaghata	Khulna

Table 2: Name of WMG

As part of our research we have studied on the issues that the pigs are supplied by any other NGOs or service providers in the region as well as our selected area. The polder no. 30 is densely populated by lower caste Hindu who used to rear, culture and marketize the pigs. Though pigs are religiously prohibited by the Muslim but it has acceptability by the neighbor. However, our field data says that after SIDRE and AILA disaster CARITAS-Bangladesh, ManusherJonno Foundation, Jagrata Juba Shangha, Care-Bangladesh, EEP/shire, Save the Children, Shushilan, *Nice Foundation*, Ganagabeshona O Unnyan Foundation, Uttaran, Paritran and CSS NGos have distributed huge no. of hogs/pigs to the community. This has been given based on their micro household plan and their livelihood demands. In the last 3 years, following number of pigs were distributed among the community by the NGOs:

Name of NGOs	Project/issues	No. of House Holds (HHs) covered	No. of pigs distributed
Caritas-	General	3500 House Holds	Around 1500 pigs
Bangladesh			
CSS	Credit	House Holds who planned	5500 pigs
		for pig rearing – 2900	
		HHs	
ManusherJonno	Rights based project	Delivered by partner	Through partner
Foundation		NGOs	NGOs morethan
			2000 pigs
Jagrata Juba	Livelihood,	300 HHs	300 pigs
Shangha	SUNDARI Project		
Save the	EEP/shiree	2100 HHs	2100 pigs
Children			
Shushilan	EEP/shiree	200 HHs	410 pigs in greater
			Khulna

Table 3: Pigs distributed among the community by the other NGOs after 2010

Name of NGOs	Project/issues	No. of House Holds (HHs) covered	No. of pigs distributed
Nice Foundation	Bangladesh NGO	400 HHs	200 by direct Aid
	Foundation, Global		
	Fund for women.		
	MJF		
Ganagabeshona	Manusher Jonno	250 HHs	400 Direct Delivery
O Unnyan	Foundation (Rights		
Foundation	Based INGO)		
Uttaran	shiree/other project	560 HHs	810 pigs
Paritran	MJS/other project	In Satkhira, Paritran NGO	2010 pigs were
		is working on livelihood	delivered free of
		support of lower caste	costs informed by
		Hindu who used to rear	Field staff
		pigs and eat pork	

There were some prevailing limitations that the piggery promotion in Muslim country is a risky tasks. Our research team found that the other NGOs supported by Pally Karma Shayak Foundation (a Micro Finance institute) especially Jagorani Chakra Foundation, Thangamara Mahila Samajkallayan Sangstha, Satkhira Unnayan Sangstha, Ideal- Satkhira, Rural Reconstruction Foundation, Nabalok Parishad, Unnayan Prochesta, Codec Bangladesh, Bureau Bangladesh, Noabeki Foundation and Uddipon gave loan to the pig farmers which was started in 2010 after Aila disaster. There are some perceptional limitations due to religion but not a threat for farm extension.

8: Study design and methods analysis

8.1: Review of literature

During our research we tried to collect information from secondary sources especially on the pig rearing community. There were limited information and journals we come across to know about the issue. However, a book THE PARIAH PEOPLE – An Ethnography of the Urban Sweepers in Bangladesh" published by Mr.Asaduzzaman carried out a research on Sweeper community in Dhaka and Faridpur but it did not cover the life style of pig rearing community. Mr. Rahman and Dorieke from *Netherlands* did a study on the pigs to investigate either these animal are keeping any role in the livelihood of the community. It has many social and economic barriers but undoubtedly it has silently keeping a great role in the livelihood of these marginalised and socially excluded communities. The study focuses on the rights of the kawra community but not as a whole on the hygienic pig farming and its technicality. As per the Rahman's findings out of 64 districts in 59 districts Kawras/pig rearers are living and rearing pigs. It has huge internal and external markets. Some information related to pig farming, treatment, marketing facilities and breeding were collected from website which were incorporated as references.

8.2: Rapport-building

Before starting the research study the research team with the help of Blue Gold Khulna Office organized 8 meetings with 9 WMGs and Batiaghata WMA which was finally selected for action research. One of the main objective of rapport building and transect were to make relationship with local people, collect the information on pig farming, life and livelihood of pig rearers, social barriers and other professional opportunities for the community. The

research team has collected information from 9 villages by going to the door to door to identify the pig rearers who have either have pigs now or have pigs earlier at their homestead and also collected information who have practical knowledge on pig farming.

8.3: Focus group discussion and study areas/FGD participants

There are 60 villages in Batiaghata Upazila under polder # 30. The research team has conducted 8 individual meetings and 25 Focus Groups Discussions (FGD) in 28 places of 20 villages to know about the pig rearing and social situation by using questionnaire. The focus group discussions sessions gave insights into not just what participants think, but also why they think it. It can reveal consensus and diversity of participants' needs, experiences, preferences and assumptions. It allows group interaction such that participants are able to build on each other's ideas and comments to provide in-depth view not attainable from individual questioning. One of the main objective of FGD was to collect the information of locality, population, livelihood, pig cultivation, marketing, its traditional adaptation strategies and remedies. Based on reviews of literature, contacts with projects, the existing network of WMG/WMA and past fieldwork we identified traditional pig rearing and open grazing pig rearing in Bangladesh with only 2 Varieties namely Local Black and Dolkomol.

8.3.1: Focus group discussion sampling and methods

We drew a purposive sample of rural locations from among those with WMG or with other

collective action initiatives related to pig rearing, trading and marketing. However, more of the community pig farming initiatives, informal groups and livelihood groups were sampled in the polder no. 30. This zone since this is a relatively more hazard prone area, and Nice Foundation has its base and activities in that region.



Overall, we undertook 8 meetings with WMG and WMA members where 350 male and 274 female a total of 624 people from the villages were participated. Moreover, during the period 25 FGDs were conducted where 309 male and 227 female from 20 villages were participated. It was an ideal that in one FGD 10-15 participants but due to high interest in one FGD more than 25 participants were participated. At each survey site/WMG the research team collected background information on pig rearing, social notions, collective action and development initiatives, the communities past pig farming system and the rural economy.

8.4: Benchmark survey

The study area was selected at Polder no. 30 under Batiaghata Upazilla of Khulna district. This polder is densely populated by lower caste Hindu who used to rear, culture and marketed the pigs. The study was conducted within WMG members who have pig rearing experience and living in different villages. Most of the ethnic groups are farmers that keep a good number of pigs, small ruminants and poultry in addition to cropping. Polder 30 is a humid area and is predominantly a Hindu dominated area where pig production and consumption is not prohibited. The location was purposively chosen for the study because majority of the farmers in the study areas are involved in pig production. The area is also known as local

open pig markets in the area A total of 200 households involved in pig rearing were selected from this area. The study was conducted in August 2015 to October 2015. Before collection of data, a baseline questionnaire was prepared in accordance with objectives of the study. Later on, the questionnaire was validated against field condition. Before data collection, various households in different villages were visited. Finally, 200 pig owners from different sites were selected randomly and interviewed. Data related to housing, feeding, breeding, marketing, disease prevalence and major constraints of pig production were collected, compiled and analyzed. Descriptive statistics such as percentages, means scores and frequency tables were used in the analysis of the data generated.

8.4.1: Sex and age characteristics of respondents

The sex characteristics of households are shown in Fig. 1. The result indicates that the majority of pig keepers in the sample were females (87%) with small proportion of males (13%). Women empowerment, their access and rights, social and family security and many other problems can be solved or can be partially solved from this point of view. The age characteristics of households are shown in Fig. 2. The majority of the respondents were between ages 30 and 55 years (73.5%) and 24% and 2% for 20-29 and 55+ year's age group respectively. The advantage of these types of age groups engaged in livestock activities will help in easy technology transfer and more flexible to new techniques and applications.







Figure 3: Respondents' age characteristics

8.4.2: Educational characteristics of respondents

The educational status of pig keepers in the study area is shown in Fig. 3. The majorities of pig keepers in the study area are literate people from read and write up to primary level (23%), secondary or higher level (75.5%) with few illiterate groups (1.5%). These kinds of educational status may facilitate the implementation of more appropriate in pig rearing procedures.



Fig 4: Respondents' education levels

8.4.3: Land holding

The study indicates that 20% of respondents owned no agro land while 64% have less than two acre of land for farming, which is not sufficient to live in a subsistence agricultural system in Bangladesh (Fig. 4). Further, among the respondents, 81% have only 1-50 decimal homestead lands and 9% have no land at all which ultimately indicates the vulnerability of livelihood and economic opportunities and income for the participants and drive them engaging in other types of work (Fig. 5). In fact, most of the landless people of this area of Batiaghata rear pigs to support their livelihood.





Fig 5: Respondents' land holdings

8.4.4: Livestock and pig ownership status of respondents

It was evident that, FFS farmers of the study area reared 100% Black variety and in an average 2.66 number of pig reared per household. Among the Black variety, they had 74% of boar and 26% sow (Fig. 6). There was no found any other varieties for rearing in the study area. Pigs were gained on an average 60 - 70kg body weight until selling. The farmers who are rearing sow got 4.5 numbers of piglets per pregnancy of sow and mortality rate was 44%. Piglet management is very critical to the farmers and they had no any training on pig rearing before FFS through this project. For this reason farmers are shown low interest in rearing sow instead of boar. Most of the respondents are also rearing other species of livestock like cattle, goat, sheep and poultry. In this study we found that they reared pigs as an additional income generation.



Fig. 6: Pig rearing status in 200 households.

8.4.5: Experience and purpose of pig keeping

Pig keeping in Polder 30 area is introduced livestock production as most of respondents have experience of pig keeping from less than a year 52%, 1-3 years 32.5% and more than 3 years 15.5% (Fig. 7). This indicates that pig keeping is an emerging livestock production. All pig owners were interested to pig keeping is for marketing (92%) and pork consumption (8%). In addition, they assured that the purpose of pig keeping in the study area was for profit and extra income. The result of this assessment indicated that pig rearing would be an additional income source to the poor people of minority group. The majority of respondents are interested because of its less land requirement as first followed by less capital and prolificacy.

8.4.6: Seasonal variation in pig fattening and breeding

Our field facilitator asked farmers which season is preferable for pig fattening and breeding and about 52% farmers prefer to rear pigs at spring while about 31% prefers at both spring and summer. Near about 12% farmers prefers rearing pigs year the round and rest of 5% preferred other seasons in scatterly. They chose dry seasons because of empty of agricultural land and availability of piglets.

8.4.7: Pig housing

In the study area, farmers were made housing with just fencing (61%) rather than closed shed (10%) and with roof only (29%) (Fig. 8). In backyard farm, no ideal measurement was followed. The roofs of the sheds were made of Goalpata (52%), straw (27.5%) and others like soil tyles, tin, etc. (21.5%). Further, floor of the house was made of soil (88%) and concrete (12%). In this study area, few conscious farmers were reduced heat stress by spraying water; pigs were allowed to wallow in nearby clay area during summer. The piggery was sited to take full advantage of prevailing winds by keeping both sides open. In winter, pigs were protected from cold by using thick cloths and gunny bags.



Fig. 7: Shed characteristics of pigs.

8.4.8: Feeding system

There was no provision for balanced feed supplementation in family level farming. The pig owners used to supply daily rice polish (71%), grass (10%), kitchen garbage (16%) and (3%) with some unconventional feeds like cauliflowers, arum and hilly grass to adult and piglets. They never supplied vitamin-mineral premix for their growth. In addition, they supplied food to the pigs 01 (4%), 02 (88%), 03 (8%) times in a day. The amount of feed depends on the age and the reproductive state of the pig. It is recommended that concentrate feed should be supplied at morning and evening and roughage should be provided at noon. Pigs rely on both concentrate and roughage. Rice polish is their most common food, but they could benefit from having a concentrate feed which is a balanced diet containing carbohydrate, protein, fat, etc. Further, they grow faster with vitamins and minerals. Piglets have higher protein requirements than mature ones.

8.4.9: Pig health management

From the total of respondents only 3% consult veterinarian and 24% consult rural animal practitioner while the remaining 73% had no access to veterinary services. Most of pig keepers do not have sufficient knowledge how to manage sick pigs. Mortality of pig is a problem in the study area. From the total of respondents (69%) had no idea about vaccination and (84%) never used anthelmintics for deworming their pigs. This may be due to their lack of knowledge and insufficient training on pig rearing system. From total respondents 100% had no training. For the first time they received training on pig rearing from NF-BG program.

8.4.10: Sanitation and waste management

Sanitation is important to keep the pig's disease-free as well as human health. A mechanism for easy cleaning and removal of waste is necessary for any type of pig housing. Housing in a barn and removal of manure daily are recommended to keep the floor dry to reduce odor. Proper ventilation is required to remove ammonia (NH₃), methane (CH₄) and hydrogen sulfide (H₂S) gases (King et al. 1998; Moore, 2002; Johnson et al. 2001). In this study, most of farmers (100%) was not using any kind of disinfectant and they have no waste management systems. As a result they are rearing pigs in unhygienic manner with low production. For sanitation of pig house disinfectant should be used that are active against a wide range of viruses, bacteria and fungi, safe to handle, active in the presence of dust or organic matter, has a long period of activity, non-irritant, non-staining, non-toxic, non-corrosive, colored, safe and effective when used in water systems and capable of use through pressure washers (Smith 2005).

8.4.11: Constraints of pig production

Bangladesh is a majority Muslim country. Pork is prohibited in Islam religion. Muslim peoples are not interested in pig farming. Pigs are omnivorous and voracious animal. They require more feed daily. For the rural pig owner, it is difficult to meet up their demands for feed. As a result, pigs are suffering from malnutrition. The major feedstuffs of pigs that available are of low quality, which do not meet their productive and reproductive performances. The maximum pig population of the study area was indigenous type which has low productivity in comparison to exotic breed.

Minimizing mortality of piglets is a constraint. Young piglets fail to suckle their mother and gradually become weak and finally die. The farm owners have limitations in the knowledge of vaccination. Pigs in family level farming often face diseases like Foot and Mouth Disease (FMD), Hemorrhagic Seticemia (HS) and anthrax. They have no interaction with local veterinary hospital. As a result, they do not know the causes of disease and preventive measure. There is lack of bio-security particularly in family level farming. Pigs are always exposed to other livestock and migratory birds and affected by diseases. Drugs are quite expensive. Most of ig owners are not interested to treat their pigs. Pigs often die from poor husbandry practices. Due to religious restriction, there is no established pork marketing system which in general, hinders pork production. Mid level buyers are controlling the local market. Alleviating constraints to marketing, improving marketing and market information, and upgrading marketing infrastructures will potentially increase the welfare of smallholder producers and urban consumers. The government should also work on cultural and behavioral change of the people and also formulate an appropriate policy regarding pig production in the livestock production strategy.

8.4.12: Consumption and income generation through pig rearing

On an average 29.07 kg pork was consumed by the respondent's family members per year. Mostly they sold adult pigs (average n=2) per year at home (87%) or at village market (13%). Most of farmers did not sell piglets. In this study we only found one farmer who sells 25 piglets per year. Although selling price of pigs depends on body weight and disease free condition, they sold an adult pig average 9,787 BDT and each piglet 2000 BDT. They have no idea or they do not care about profit margin from sell of pigs/piglets, because they are rearing pigs in traditional method.

8.4.13: Public health significance

The study tried to assess the public health status of the persons who are involved with pig farming. Pig farm manure contains a number of components of concern to human health, including heavy metals and pathogenic bacteria, and may emit volatile gases. Numerous studies have shown adverse physical and mental health effects on both pig farm workers as well as people in neighboring communities. Eye, nose, and throat irritation, headache, nausea, diarrhea, cough, chest tightness, palpitations, shortness of breath, stress, and drowsiness are some of the most frequently reported problems. People suffering from asthma or allergies complain that the odors exacerbate their existing illness. Another study conducted in the U.S. state of North Carolina reported a significantly higher incidence of mental health symptoms, including increased levels of tension, depression, anger, fatigue, and confusion, amongst residents living near pig production facilities, in comparison to a control group. In this study, we also asked the farmers ever they suffered from any diseases during pig rearing. Only few participants said that they suffered from several symptoms like nausea, abdominal pain, skin diseases, headache, coldness, etc. There are many zoonotic diseases occurred which may transmit to human. Aside from disease, another critical problem faced by conventional pig farmers is pig waste. Seeing as hogs on average produce three times the amount of excrement as humans, the waste of these animals presents a significant dilemma.

9: Stakeholder regional/inception workshop

After signing of the contract between Blue Gold Programme and *Nice Foundation* a project inception workshop was arranged with 52 participants from livestock Department, Khulna Administration, WMA/WMG members, Water Board, pig farmers, pig traders, civil society members, Blue Gold programme staff and consultants, journalists and managing committee members of *Nice Foundation*.



One of the main objectives of the inception workshop was to share the research objectives, outputs and deliverables among the different stakeholders so that they can understand the issue in order to complete the research project timely. Pig rearing in Muslim country is challenging and there is a social barrier which is a question to way forward but through this workshop it was made clearer to all participants that the research will enhance the existing pig farming in a hygienic method. Dr. AKM Mostafa Anower, Principal Researcher of the project was presented the research paper and all participants discussed on the papers. Mr. Bijlmakers of BG has presented the BG programme. The representatives from Water Development Board expressed his deep gratitude to the organizers for such a challenging research and opined that the research time is not significant in terms of the expected outcomes. He suggested if it takes off well and the research processes are well in order it should be considered for extension. The District Livestock Officer, Khulna and Upazila Nirbahi Officer suggested to the research team to make it real participatory and also said that in terms of expected results the time and resources are very limited which need to be considered in future.

10: Establishing pig demonstration farm

In order to establish a hygienic pig farming system to follow by the farmers the research team

has established a demonstration farm in Fultala village of Batiaghata Upazila under polder no. 30. The tin shed demo farm was 30 feet long 10 feet wide and 8 feet height with brick fencing. The floor was sloped with water drainage system and a waste shockpit were connected for dumping the manure. The water sources must be available at site. To minimize the cost manual labour for sweeping, feeding and washing is enough. In a day three times the washing, bathing and regular uses of



disinfectantsis quite sufficient for hygienic management of 8 pigs. The participatory Action research was conducted by involving caretaker family Mr. Ashim and his wife and also the WMG and WMA members who looked after the whole process time to time. The caretaker has used separate utensils for 4 varieties of pigs, separate sandal, separate, feeding bowl, pot, drum for water to see the diseases issues. There were 5 chambers each of 8 ft x 6 ft for 1 sow and 1 boar including the spaces for piglets.

In the demo farm, 4 varieties of Banibunu, Local traditional Black, Dolkomol and White (Yorkshire) total 4 male and 4 female were placed in farm. In order to see the cost effectiveness, growth and income from the different varieties, we supplied those concentrated feed and green grasses. Following are the piglet status of demo farm:

Name of WMG	Name of Village	Varieties	No. of Pigs	Piglets
		Black	1 male 1 female	03
Fultala WMG	Fultala	Dolkamol	1 male 1 female	04
		Banibunu	1 male 1 female	0
		White	1 male 1 female	06
			Total	13

 Table 4: Piglet status of demonstration farm

11: Household base pig farms (trial farms)

In order to test the household base farming 10 households (HHs) were selected and provided with 01 male (Boar) and 01 female (Sow) pig of different varieties to each HH. For breeding purposes, they were brought sow to the same variety of boar when heat was detected. These HHs were used as trial pig farms for FFS sessions. 50% feed subsidy were provided from the project beside local feeds to assess the profit and losses, rate of mortality, diseases in seasons, hygienic status, and the breeding situations. We found that 01 sow gave birth highest 07 and lowest 03 piglets from



first pregnancy. We have noticed that on an average 01 piglet was died. *Therefore*, the survival rate was around 80%.

Table 5:	Piglet	status	of trial	farms
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WMG	Village	Farmer	Pigs	Piglet	Piglet
				Born	Survived
Basurabad	Basurabad Madhapara	1. Ms. Sharshaty Biswas	Male 1 Female 1	06	06
Basurabad Uttarpara	Basurabad Uttarpara	2. Ms. RenukaMi stry	Male 1 Female 1	05	05
Chak Solemari	ChakSolemari	3. Ms. BoikaliDh ali	Male 1 Female 1	06	06
Kismat Phultala	KismatPhultala	4. Ms. Mongali Roy	Male 1 Female 1	07	07
Mailmara	Mailmara	5. Mr. BipulMon dol	Male 1 Female 1	-	
Maitbhanga- Vennabunia	Maitbhanga	6. Mr. DulalTara fder	Male 1 Female 1	04	04
	Vennabunia	7. Mr. Subash Boiragi	Male 1 Female 1	06	06
Phultala	Phultala	8. Ms. Gita Golder	Male 1 Female 1	-	
Boyarbhanga Purba	Boyarbhanga Purba	9. Mr. Narayan Biswas	Male 1 Female 1	05	05
Debitala	Debitala	10. Ms. Tanusree Roy	Male 1 Female 1	06	06

The detail status shown in Table - 16 7 piglets of kismot Fultala trial farm of black pigs –all are healthy left

Crossed between black and Banibunu 3 Banibunu and 3 black born – All are male right



Research report on 'Securing the livelihood through improvement of Kawra/pig-rearing community of Southwest Bangladesh'

Case study

The pig farmers are concerned about selecting the sow because if the sow selection is perfect then the piglets will be very strong and number of piglets will be more than expectations.

In Kismotfultala village the trial shed owner *Mr. Diponkar said "I have 15 years experience of pig rearing. I was interested in pig fattening and I made loss several times and stopped rearing for few years. After involving with Nice Foundation Research project I can easily differentiate where my mistakes were in earlier. This system is very hygienic and neat and clean which I never thought of, even when Nice Foundation instructed us to install ring slab for pig waste manure, we were thinking about foolish idea, but when the trial farm started and I cleaned 3 times everyday, I found that it is very interesting and I was not felt any dirtyess and not infected with any kind of disease.*

In my shed, I found 07 piglets from first pregnancy and I was so excited to taking care of them. I was taken care and consult with Upazila Veterinary Officer and Nice Foundation staffs on health management of pig and piglets. All of them are still alive with good health condition. I also compared with fattening and breading system and I am sure breading is more profitable than pig fattening. He also said, sow selection is important for breeding because the size of mother and the health condition is important".

We have also a case of 03 piglets where the sow was so fatty and gave birth only 03 piglets. Unfortunately, 02 piglets were died within 20 days. We have closely observed and found that due to less number of piglets born the milk were excessive with the mother and the piglets used to take excessive milk which made them loose motion. Treatment was given and caretaker was asked to separate the baby from mother which was not possible because the mother did not allow to separate, therefore the babies were taken milk morethan they required.

However, the caretaker and the other rearer confirmed us that the piglets were died of excessive milk intake. Moreover, sow was fed balanced diet which made it very fatty and over milch for the piglets. From this case study, we understood that the selection of sow and diet is very important for producing and managing piglets.

12. Involvement of district- and upazila-level livestock officers

Case study

A goal of our research was to develop a relationship between pig rearers and livestock experts of Upazilla Veterinary Hospital. We motivated farmers in their FFS and now they are going to Veterinary Hospital to receive advice and suggestions on pig health issues, like treatment of sick pigs, deworming and vaccination. We engaged Livestock officer and Veterinary Surgeon in this program from beginning of our work (in workshop, training and frequently visit of our demo and trial farms) and they are supporting us willingly.

For this activity, local farmers are showing their keen interest in hygienic pig farming system. Pig farmers of the study area never visited veterinary hospital as it is not easy to take those like other animals. But after FFS the ULO, UVO, Livestock Service Providers used to visit as and when called by the farmers. In the whole process of research, the District and Upazila Livestock Officers were engaged to link the community for providing their technical services to the pig farmers. They were updated on the research actions.

One pig woman farmer name Ms.Purnima Rani of Maitvangha village who used to rear pig in traditional way during last 10 years said "I was at my father's house 20 years and now 10 years at my husbands house culturally these two families are rearing pigs and we eat pork. Last 30 years I never thought of treatment of our pigs by government Doctor but during the last few months I saw govt. Doctor and community para vet is coming and asking us about our pigs. Initially I thougt they are making fun with us and there might have hidden interest of stopping the pigs rearing but after few days discussions and FFS session it made me clearer that Nice Foundation is really want to promote our pig farming systems. The Veterinary Surgeon has committed and asked us to call them as and when our pigs become sick. I am happy that my 02 piglets survived which were about to die".

13: Polder based group formation and nurturing

Case study

After survey and discussions with WMG and WMA 200 pig farmers were finalized to form groups. In 9 villages under 8 WMGs 10 groups were formed in each 20 farmers who have past experiences or have existing pigs at home and are interested in pig farming. One Field Facilitator looked after 3-4 groups with 60-80 pig farmers.

Through the group management and FFS approach the FF has facilitated on capacity building for group management, social linkage, confidence building and demanding services. In every month beside FFs session the FF has conducted meeting with the farmers in grousatleast twice in a month. The main agenda were discussed on FFS session topics, date of arrangement, hygienic pig shed construction, pig marketing, feeding, treatment, piglet management, and liaison with WMG/WMA and ULO office. Through the whole process their overall capacity has been improved. Gita Rani, Fultala has limited knowledge on pig rearing but she has a dream to establish a farm. After including her in the FFSs and groups she has learnt manything about rearing, feeding, breeding, treatment, marketing and extension.

Gita said: "Initially I thought that the pig business is very profitable and Nice Foundation came here to make business. In our area almost maximum Hindu are rearing pigs. Therefore the pork price per kg is lower than other area. Everybody welcomed Nice Foundation that they will give piglets but some people are unhappy on them when they saw they did not give anything except motivation and training (FFS). But after completion of group activities, FFS and field day, we are clear and we are now confident that if we are united we can change our position economically".

WMG	Village	Male	Female	Total
Basurabad	BasurabadMadhapara	0	20	20
Basurabaduttarpara	Basurabaduttarpara	0	20	20
ChakSolemari	ChakSolemari	8	12	20
KismatPhultala	KismatPhultala	5	15	20
Mailmara	Mailmara	7	13	20
Maitbhanga- Bhennabunia	Maitbhanga	1	19	20
	Bhennabunia	2	18	20
Phultala	Phultala	0	20	20
BoyarbhangaPurba	Boyarbhanga	6	14	20
Debitala	Debitala	4	16	20
Total		33	167	200

Table 6: Farmers' group formation and nurturing

14: Pig farmers field school curriculum development workshop

One of the important actions of the Research is to conduct pig FFS in 10 schools. Before that

Dr. Munir Ahmed facilitated Nice Foundation to develop FFS curriculum for the Field Facilitators. A workshop was organized on 14th August 2015 for developing curriculum. A total of 25 participants participated from Livestock Department, Water Development Board, Agriculture department, University Teachers, DSL office, UNDP livestock representative. District livestock offices. AD. Rangamati pig farms and Blue Gold Programme. The draft curriculum was prepared by Dr. Munir Ahmed,



BG who presented it in the workshop. He divided the participants into two groups who came up with their technical opinion and suggestions to finalize the FFS curriculum. There were 15 sessions set out on the curriculum for FFS. The experts also suggested a common hygienic pig trial shed design, so that the pig farmers can rear the pigs in a hygienic manner.

15: Training for Field Facilitators

Three Field Facilitators were engaged in 10 FFS at 9 selected villages to cover 200 pig farmers during the research period. A 03 days long training was given by Dr. Munir Ahmed and BG Khulna staff on FFS approach. After training they conducted FFS sessions as per plan. They have continued with the groups of the 200 pig farmers in order to build their capacity on managing groups, organizing events, playing role on implementing research activities.

16: Pig Farmers Field School Session

The **Field Facilitators** have conducted 15 FFS sessions with one field day with targeted pigfarmers/traders and consumers as per FFS schedule. In each group there were 20 participants from selected village of polder no. 30. The hygienic pig trial sheds were established in the premises of selected HHs whom were supported with 01 sow and 01 boar for farming.

The sessions covered:

- ✓ Hygienic shed making
- ✓ Pig selection boar and sow
- \checkmark Pig rearing at household level
- ✓ Feeding formula nutritious feed preparation with sources concentrated and green grasses
- \checkmark Growth rating
- ✓ Breeding system
- ✓ Caretaking during pregnant and cleaning
- ✓ Pig health: Diseases and treatment with vaccination and prevention
- ✓ Piglets care and management Early birth to weaning

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- \checkmark Business plan and capital investment
- \checkmark Women empowerment through animal husbandry
- ✓ Inputs delivery
- ✓ Networking
- ✓ Income generation through joint pig management
- \checkmark Linkages with business community and marketing system
- ✓ Field day

17: Field days

The field days were organized after completion of 15 sessions within 8 months. In each FFS on average about 100 peoples from farmer, nonfarmer, students, teachers, club members, WMG, WMA members and general villagers participated and visited the hygienic pig trial shed. Table7 shows the number of participants where 1120 people were participated and came to know about the hygienic farming system.



Table	7:	Participants	attending field	days
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Date of	Name of FFS	Participants		Total
field days		Male	Female	
13.06.2016	BasurabadMaddhopara	24	74	98
15.06.2016	Vennabuniya	28	77	105
17.06.2016	Maightvanga	58	83	141
18.06.2016	Kismatfultala	45	56	101
19.06.2016	Phultala	28	78	106
20.06.2016	Mailmara	48	64	112
22.06.2016	BasurabadUttorpara	43	59	102
23.06.2016	Debitola	38	77	125
24.06.2016	Boyarvanga	46	81	127
26.06.2016	Choksholmari	28	75	103
Tot	tal Participants	386	724	1,120

Case study

Subash Boiragi of Vennabunia actively participated in field day event who organized the event at his house premises.

He said: "I have seen BG has arranged field day on chicken, cow, goat rearing and other issues but when pig FFS started I was thinking how the day will be organized because pigs are not like other animal that can move. I came, attended, seen and satisfied. Foreigners are very rare that I found attended and seen the pigs. I was scared initially and thought that they will study and impose us to rear cow or other animals because maximum people dislike this animal except lower cast Hindus.

I was observing the Field staff and found that they are educating our women and monitored our pig farming. They have instructed and practitically showed how hygienic farming is to be established, which is good but still it will take time because people are used to rear traditional way during last 200 years. Nice Foundation has supplied ring slab which has compelled our farmers to establish hygienic pig shed. He said, our farmers have to wait for open grazing field piglets because there are no systems of piglet production at house.

In spite of huge interest to rear pigs all time the farmers are not getting piglets. Now, I saw the trial shed farmers are producing piglets which have huge market and piglet'sscarsity will be reduced. Now, I trust the activities of Nice Foundation."

18: Process documentation and books/ records keeping

The Field facilitators were provided with guidelines that they will note down all the points that they have seen in the field. Everyday they documented it and based on that we have given them decisions in the field. Moreover, in each FFS there was a register book maintained with daily information of pigs, feed, piglets, growth, diseases and other social issues. Other documents in the project like book-keeping, records of planning, meeting, conference, field data and history of the research were kept in order to validate the authenticity of data. Following is a format of field data collection which was maintained by FF of their each visit at site.

Nice Foundation Process Documentation Project: Name of FF:							
Date	Event	Participants	Agenda	Outcomes	Days Findings		
	Meeting w WMG member of polder # 30	ith EC members ers local leaders	Site selection sharing oveal project, base line information generation and profile documentation	Nine sites selected,			

Table 8: Format of process documentation.

19: Knowledge sharing and learning visit

In Vietnam visit we have intensively observed the small, household and medium sized pig farms where we have acquainted with many technical and intensive farming systems. The Vietnamese are used to eat pork almost every day. There are number of institutes, universities and government departments doing research and keeping roles in promotion of pigs but in Bangladesh silently there are huge number of eater, farmers and traders who do not have technical and social support.



In Vietnam farmers are rearing high breed like Yorkshire and the growth is very rapid. The rearing system is hygienic and very systematic. Pigs can take feed, drink water and bath alone and no need of manual assistance which is very impressive and less labor oriented. The weaning, quarantine and piglets section is separated which is very organized. Farmers are using wooden slat on floor to protect piglets from cold. Most of household farmers are rearing few sows for breeding purpose and after birth of piglets reared those 5-6 months for selling and other farmers collect piglets from other breeding farm and reared them.

This system made them profitable and may be applicable in Bangladesh. The household pig farmers are keeping the pigs at homestead level which is similar to Bangladesh but they kept those in a very systematic and hygienic manner. Household levels to commercial farmers are well trained in artificial insemination. More interestingly, the pig production is totally dependent on concentrate feed without supply of roughage and it makes them net 40% profitable compared with their investments.

Their market system is very organized. Farmers sell growing pig to the slaughterhouse which is maintained by Vietnam Government and few companies.100% farms are taking care by the women including employment creation and the female member of the house helps in marketing and feed collection and waste management which is replicable. The Government

subsidy to farmers for integrated farming (fish, pig, duck, chicken and pigeon) is remarkable. They got subsidy for semen processing and collection, vaccines and technical supports from Government. The systematic pig production, breeding, rearing and waste management is very standard which can be followed in Bangladesh in order to lessen the social barriers and improvement of livelihood of the pig rearing community.

If we look at Bangladesh farming system, it is fully dependent on manual operation but in Vietnam it is automatic system like bathing, feeding and waste washing. All the systems are possible to implement in Bangladesh but it needs huge infrastructural arrangement like farming place which we have, uninterrupted power supply which we do not have, availability of feed which we have, automatic feeding machine which we do not have, automatic waste treatment plant where we have used sanitary pit, auto showering system which we can adopt but need power and motor at farming place. Moreover, this short time project cannot address all those it needs resource and long time. It also needed a development intervention beside research initiatives. Immediately we have success on the model of hygienic system which has become popular among the farmers and community people within this period. This should be replicated in wider way.

After coming back from Vietnam the research team planned and implemented the following activities:

- Shared visit findings and documents (rearing, farming, waste management, feeding system, marketing procedures) with all field staffs and has given plan to them to share the findings and knowledge in FFS session with pig farmers. These are continued.
- Women are encouraged to increase the number of pigs in the homestead farm which is very popular in Vietnam and profitable. Some women are interested and ensured us if they can afford to buy more piglets then they will do it.
- Using wooden slot for piglets already been introduced
- In Bangladesh breeding at household level is not popular but in Vietnam it is profitable which we have shared with the farmers who are still need more technical support for this
- Piggery at homestead level is profitable if it rears in a hygienic manner which is becoming popular to the women farmers
- Govt. subsidy for the poor women farmers can be useful which we have informed them and it needs more action and should link with govt. service providers.
- In Vietnam the farmers used disinfectants for the visitors as well as for farmers when inspect or work at the farm but in Bangladesh it is never happened. We have motivated the farmers and instructed the farmers to use savlon In Vietnam most of household farmers are rearing few sows for breeding, after 5-6 months they sell boar which is profitable. In our project we have already instructed the farmers to sell the male pig after pregnant of female.

20: Endline Survey

During the 11 months reported in this document, 200 farmers received specific trainings on pig farming in order to be able to improve their livestock farming conditions in the target villages of the project. There are still remaining many farmers who did not receive training on pig farming. We hope that trained farmers will be able to transfer pig rearing techniques to others farmers in their village. But regular monitoring is essential to handle them. Although we have done endline survey at the

last moment of the project, but there is found limited improvement data. Because of short duration of the project, farmers just received updated information and technologies from us. It is recommended that if we will survey after one year, then it will better to find out their improvement. After completion of FFS, farmers are showing their interest in rearing pigs for piglet production instead fattening, they are using anthelmintics to prevent external and internal parasites, vaccines for disease prevention, using disinfectants and cleaning pig shed regularly to minimize bad odor which will also ensure farmers health condition. They are now more conscious to communicate with local veterinary hospital and to calculate profit margin from this farming system.

Field visit



Chapter 2 Marketing and Supply Chain

Pig markets in Bangladesh are very limited because only a section of people has the demand of pork. In Batiaghata area marketing is extremely needed because the number of producer is higher than demand that are rearing pigs in a unhygienic system. There are many limitations and barrier we tried to collect from the field. We have collected information of local market, outside market and national market. The information covers the existing business strategies, local middleman, number of businessman involved inbetween the producer and consumer.

During our research we have developed a questionnaire and prepared a profile of local pig businessman and buyers which includes; what is the size (scale) of the value chain? What is the geographic spread of pigs/pork? What are the recent and anticipated growth trends? What is the potential for the future? Who are the market actors? Which actors (service providers) are providing the services? What is the level of competitiveness? What are the factors which affect the competitiveness? What are the opportunities in this product? What are the key constraints in the marketing?

Based on the above we have collected information on existing marketing system. As there are a limited number of formal marketing sources so we were not able to assess the production to national marketing channel. Moreover, our research was on pig hygienic production focussing on piglet to piglets therefore meat production got less priority which limits us to assess the pork market. However, in order to see the existing and potential future market we have collected some information from local and national level sources.

1: Local pig marketing

Pigs are rearing within the minority community, tribal and sweeper community where the market is limited mostly at local level. During our research we found that the demand of pork is very high against pig supply. There are local consumers who used to buy pork only one day in a week but they need those almost everyday like mutton and beef for Muslims. We have assessed the local market in Jessore and BatiaghataUpazila and found there are weekly open pork market which is absent in other parts of Bangladesh. But there are many middleman who captured the local market and almost all the pigs that are produced in the area are to be sold to them by the producer, otherwise, if they sale those to other buyers next time he will not buy the pigs or if they buy that will be lesser than existing market price. So this monopoly market deprived the producers to get actual price of pork.

2: National pig marketing

There should be a link between local and national market. We have visited Dhaka farmgate pork market which was established in 1960s. We talked to Anil Sangma who started selling pork in 1988. We asked him how they collect the pork, he replied there are middleman who collect alive pigs from Khulna, Bagerhat, Satkhira, Jessore, Rajshahi, Pabna, dinajpur, Rangpur, Faridpur and Iswardi and placed thousands of pigs in Tangail. From there they take them to Kaliganj under Gazipur. There are slaughtering center in Kaliganj. Tangail is the entry and transit point there is a middleman who sale those to Kaliganj slaughtering middleman. After slaughtering another middleman supply those to farmgate shop. We asked him is there any slaughtering centre in Dhaka, he replied no but one or two can be slaughtered in the sweeper colony by themselves. It is Muslim country, so neither City Corporation nor any private place can be used for slaughtering. Kaliganj is densely populated by Christians and there are 40 villages where 90% are Christian and 52,000 are living in those villages where pork selling is open and have high demand pork.

We understand that the slaughtering house is 50 km from Dhaka pork selling centre, therefore the rate become high. We have seen that in Batiaghata per kg pork is BDT: 200 but in Farmgate Dhaka it is more than 300 BDT. So from Producer to consumer there is a margin gap of BDT 100 Taka.

Pig parts	BDT per kg
Pork	180
Undercut	320
Ribs	170
Liver	150
Sauces	240
Bacon	300
HAM (Smoked)	500
Salami	450
Tortoise	300
HAM (Boiled)	400
Intestine	25
Stomach	70

 Table 9: Price of different parts of pigs

We need more information on value chain by addressing and identifying the Actor / participant, smallholder, input supplier and output market players directly participating the value chain, Function: activities performed by actors in the value chain, Governance, learning, and benefits among participants in a value chain actors. We also need to work on pigs commercially viable service that is sustainable through private sector transactions, and that improves the performance of the value chain, its access to markets, and its ability to compete. They may be private for-profit or not-for-profit firms, NGOs, government agencies CBO, WMG, WMA that aim to expand and improve a value chain by enhancing capacity of them and integrating them into quality input supply system and high value output market system.

We have tried to collect information from 3 and 5 star Hotels in Dhaka where we have limited informal access to share on the issue. However, we have informally shared with a staff of Sonargaon Hotel who informed that we are careful about the customer and boarders health. We can not buy pork from outside which are not branded and certified. Our pork demand is good which we import from Singapore, Hongkong, Thailand and China. There is huge demand of white variety pigs. However, for catching such market we need more technical support from the government and business community. In Vietnam local market is huge and the national and international markets are ensured by the government. The pigs are carried by long van from the village farmers to the town market and process those in a hygienic slaughtering center for supply. However, in Bangladesh context it will take time to consider this sector as one of the major income earning sources by the government and business community.

3: Pig trading middlemen and businessmen

There are some middlemen from the same community who buy pigs from house to house and sale it to Dhaka or other city suppliers. Sometimes they collect pigs from open grazing fields and supply those to the outside buyers. We have collected a history of a middleman.

Case study

Subodh Mondol (48) started collection of pigs from house to house and open grazing field during when he was at 15 years old. His father was a pig trader who involved him in this business. He collect alive pigs with per kg rate BDT: 180 and sold those to JessoreVaina area by taking margin of BDT 20 per kg, He said it depends on the market. In off season or when high demand are there especially in Puja festival the rate rises upto 250 BDT at house and we sale those BDT 270 per kg. On an average he keeps a margin of 20 to 30 BDT per kg. He said, it is very profitable business but it needs cash capital because it needs cash for purchasing pigs from the producer.

We asked him about social obstacles or any oppose had he faced during last 30 years. He replied, only a section of people eat and knows about the pork and its sources. Usually we carry those at night. Ten years ago no truck drivers were agreed to carry those but now some Drivers who are from lower caste agree to carry but rate is higher than any other goods that they carry. He said, there is no support either from community or government to promote this business.

What types of support you expect, he replied, government may lend money without interest both to producer and trader so that poor can be benefited. He said, those who are rearing pig as well as trading pigs both are poor and neglected. The neighbor and society treat us lower caste and see angle eyes. He said, "We do business, we are not thief, and we are doing business honestly and keeping role in nutrition supply for a section of people. Government should help us". In order to link the pig growers we have prepared a profile of pig buyers which helped our FFS pig farmers to sale the pigs.

4: Profile of pig traders

We also found some small and medium size pig farms in part of polder # 30 whom are also buy pigs from the small farmers and trade those at market days. In our study 88% pig farmers demanded for outside market channel, 10% replied that the local market is enough and 2% respondent, they are happy that they get the pork with cheap rate which is good for them. Without market capture the grower will be looser. The market promotion study needs more time and resources which was not covered in this research study. Following are the profile of middleman and pig traders:

Name of	Trading day	Traders	No. of pigs	No. of pigs traded
market/spot			slaughter	
Batiaghata	Every Tuesday	11 traders	30-50 pigs	50-70 pigs/piglets
Sadar				
Mailmara	Every Monday and	2 traders	20-30 pigs	Maximum pigs and
	Friday			piglets are selling
Sukhdara	Every Thursday	3 traders	10-15 pigs	from the
Badamtala	Every Sunday and	3 traders	25-30 pigs	households and big
	Thursday			grazing field/pal.
Boyervanga	Every Monday and	2 traders	30-35 pigs	We found on an
	Friday			average 150-160
Khalsabunia	Every Saturday	2 traders	10-15 pigs	pigs/piglets every
Kasari Bari				market day.

Table 10: Pork/pig/piglets selling market in Polder no. 30

Table 11: Pig traders at Batiaghata

Name of	Spot/village	No. of	Remarks
businessman		pigs	
BidhanDhali	Hetalbunia, Batiaghata	60 pigs	
BiplobMondol	Mailmara, Batiaghata	40 pigs	
ProshenRoptan	Basurabad, Batiaghata	200 pigs	All these spots are under the BG supported WMG which
ParimolMondol	Debitola, Batiaghata	70 pigs	were involved during the
Sadhu Mistry	Debitola, Batiaghata	20 pigs	research.
Narayan Biswas	Boyervangha,	10 pigs	
	Batiaghata		
UzzalMondol	Boyervangha,	300 pigs	
	Batiaghata		
ProkashBiswas	Boyervangha,		Sale pork 300 kg per market
	Batiaghata		day
Gouranga	Boyervangha,		Retailer at market day
	Batiaghata		
JatanDhali	Boyervangha,		2 times in a week on market
	Batiaghata		day
NitaiBiswas	Boyervangha,		Sale pork 300 kg per market
	Batiaghata		day
Goutom	Boyervangha,	8-10 pigs	Retailer at market day
	Batiaghata	slaughter	
ShadhuBoiragi	Boyervangha,	per week	2 times in a week on market
	Batiaghata	on market	day
Biddutbasti	Mailmara, Batiaghata	day	Sale pork 300 kg per market
		(Twice in	day
SurojitDhali	Mailmara, Batiaghata	a week in	Retailer at market day
Ashok Majumder	Mailmara, Batiaghata	10 spots)	2 times in a week on market
			day

Name of businessman	Spot/village	No. of pigs	Remarks
KishnapadaDhali	Mailmara, Batiaghata		Sale pork 300 kg per market day
Shamir Mollik	Mailmara, Batiaghata		Retailer at market day
Biplob	Maitvanga, Batiaghata		2 times in a week on market day
Mrinal	Maitvanga, Batiaghata		Sale pork 300 kg per market day
Subrata	Maitvanga, Batiaghata		Retailer at market day
Dulali	Badamtala, Batiaghata		2 times in a week on market day
Prem Chand	Jalma, Batiaghata		Sale pork 300 kg per market day
Nikhil	Hatbaria, Batiaghata		Retailer at market day
Tapon	Chaigharia, Batiaghata		2 times in a week on market day
Tulu Miah	Chaigharia, Batiaghata		Sale pork 300 kg per market day
Katrik	Jalma, Batiaghata		Retailer at market day

Table 12: Pig traders outside of Batiaghata

Name of Businessman	Spot/village	No. of pigs buy at a time	Year of Business
ChotonMondal	Kajdia, Khulna	300	12 years
Tapon Kumar	Baluti, Bagerhat	200	15 years
BiswaNath	Dumuria	350	10 years
Ram	Taragonj	300	13 years
SubodhTarafder	Dumuria	200	20 years
NagenMondol	Jessore	350	15 years
PanchuMondol	Narail	300	20 years
Khitish	Satkhira	300	20 years
SubodhMondol	Jessore	250	20 years
Arjun	Jessore	200	20 years
Monoranjan	Jessore	300	20 years
ParimalBiswas	Jessore	350	15 years
Sunil	Narail	300	20 years
Sukumar	Satkhira	300	20 years
Chittaranjan	Jessore	350	15 years
Nitta	Narail	300	20 years

Chapter 3 Gender Dimensions

Gender refers to the socially created roles played by women and men that are assigned on the basis of their sex. Gender is used as a means of examining similarities and differences between women and men without direct reference to biology, but rather to the behavioral patterns expected from women and men and their cultural reinforcement.Gender Equity is the process of being fair to women and men. To ensure fairness, measures must often be available to compensate for historical and social disadvantages that prevent women and men from otherwise operating on a level playing field.

Gender equality means that women and men enjoy the same status. Gender equality means that women and men have equal conditions for realizing their full human rights and potential to contribute to the national, political, economic, social and cultural development, and benefit from the results. Gender equality is therefore the equal valuing by society of both the similarities and differences between women and men.Refers to equal rights, responsibilities and opportunities for women and men, it does not mean sameness. In other words it does not imply identical rights, responsibilities and opportunities, nor does it imply equal numbers or percentages. Equality includes both quantitative and qualitative aspects. The quantitative refers to distribution issues whereas the qualitative refers to valuation issues.

It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic, and societal spheres so that women and men benefit equally and inequality is not perpetuated.

From the beginning of the study the research team emphasized on the gender issues in the whole research approach. There were 3 Field Facitators out of that two women were engaged. The team also conducted 8 meetings with 8 WMGs where BG Dhaka representatives were present. In those meetings 624 members were present out of that 274 were women. The team also conducted 25 Focus Group Discussions where 309 male and 227 female were present.

The research project have conducted one inaugural and one FFS curriculum Development workshop. Considering the professional background and the relevency we have invited 20% women participants in those workshops and found that in inaugural workshop 40 male and 12 female and in curriculum workshop 4 female and 21 male were participated.

During selection of FFS participants we have surveyed 10 villages of 400 BHHs where 50% male and 50% were female respondent from there we have seleted 33 male and 167 female pig farmers who were collectively rearing pigs one after another round the year. Out of 167 female 7 are widowed and 4 are separated. We also found from our record that all male are head of household and among 167 women 27 are head of households. In the Hindu community they are traditionally living in joint family therefore head of households usually remains with the senior members (father, grand father).

We found that the pig rearing community as a whole lost their confidence among them women are most because of their profession and lower caste situation. They do not feel free to mix with other casts and community therefore they are introvert. During FFS sessions the FF were discussed about the other social issues like family planning, attend in puja, invitation to other houses especially in marriage ceremony, dowry, human trafficking, child marriage and decision making in the family.

During FFS sessions we found that 95% women were present on the otherhand 80% men were present in the sessions. It has happened due to high mobility and working outside by the male participants. It is true in Bangadesh context working with women for any kind of training, courtyard sessions, delivery of message aand participation are ensured by the women.

In the demonstration farm the project has engaged one woman who have long experiences on piggery. Her husband is a pig trader and also household pig rearers who jointly gave time to research demonstration farm. During selection of trial shed farmers the community have selected 6 women and 4 men who have past experiences and have interest to rear the pigs hygienically.

In our project material purchase committee we have engaged WMG members and formed the committee headed by woman staff. We also tried to procure the materials especially pig feed from women entreprenures but which was very rare to get.

The research team has conducted 10 Field days where BG representatives, local Govt. representatives, WMA, WMG members and village pig rearers, interested pig rearers an future pig rearers were invited and presents in the Field day sessions. In 10 Field day sessions 380 male and 720 female total 1,120 people were present who were learnt about hygienic pig rearing and share their experiences. The research team awarded the best performers of FFS where 8 women and 2 men were awarded first prize.

In the FFS training there were a chapter of Gender issue discussions where the FF were discussed on the topics. The FF was received orientation from the office provided by Dr. Munir and Mr. Rahman. The topics were : gender meaning, gender and development, position and condition of women and men, gender awreness, gender equality, barriers of women in the society, equality and equity, women empowerment through livestock/pig farming, gender and law, clause and punishments etc.

During our field survey we have involved WMG members to select the right pig farmers where we kept in mind to select the women who are separated, divorced and widowed. We found women are rearing pigs traditionally in the household by getting help from her husband especially for collecting ruffage as feed and contact with buyers for selling pigs.

Survey based index not based on aggregate statistics or secondary data through primary interview. We have also considered production, time, resources, leadership and income of targeted households.

Our research also covers the pig rearing, household works of women, income generating options, women mobility, violence against women, decision making process, dowry, participation in social



function and on their confidence. We found that out of 200 households 100% women are at

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home work. 10% said they are attending WMG meeting as and when called for, 1% participated in primary school committee, and 15% participated in cultural committee like puja. 40% women responded that their husband respect their decisions and shared with them especially seed sowing, investment and son and daughters marriage. 60% women responded they are directly involved with different IGA like rearing goat, cow, pigs and agricultural activities. No one found participated in political parties except silent supporter. 20% said culturally they are handling cash at home and their husband keeps the cash with them. 70% responded that their husbands allowd them to go to cultural event, village fair, village market and other festivals like marriage function of neighbours.

During the period the field facilitators faced challenges ensuring the female participants in the FFS sessions that their husbands are discouraged them to participate because of taking care of her husbands when they are back from the work field and elderly people and children at home. The FFS sessions were for morethan 2 hours which was very hard to manage by some participants. To manage those women the FFS sessions were prolonged and sometimes delivered the topics separately for those participants. After training some women were interested to rear pigs morethan one but their husband do not support them because they do not want to invest for morethan one pig, therefore women's opinion are not valued. One case

Case study

"Ela Ganguly planned for 2 pigs at her house by constructing a hygienic pig shed. She managed money but her husband did not allow her because he is interested in one pig who can easily collect ruffage for one pig. In the sessions the FF has trained them that 2 is profitable but Ela Ganguly could not exercise her voice even after getting training on pig rearing and gender issues. She said, I do not need gender training but my husband needs such training then he may change his attitude"

The affirmative action for empowering women especially the section of women who are involved with pig rearing is quite low. The Empowerment has to be holistic (Political, Social and Economic), Universal (equal opportunity in playing field) and Participative and Inclusive. The Holistic Approach covers Health, Nutrition, Water, sanitation, Political participation, Asset base, credit, Technology, Skills and Education. For wholistic assessment there are in need of more study including looking at access to water, resources, cash dealings, mobility, asset ownership, entrepreneurs development and decision making at household level.

Name of FFS	Pig Farmer		Total
	Male	Female	
Chok Sholmari	8	12	20
Mailmara	7	13	20
Boyarvanga	6	14	20
Fultala	0	20	20
Debetola	4	16	20
Bosurabad uttorpara	0	20	20
Bosurabad moddhopara	0	20	20
Maitvanga	1	19	20
Kismotfultala	5	15	20
Vennabuniya	2	18	20
Total	33	167	200

Table 13: FFS ig Farmers gender ratio

Date of field day	Name of FFS	Partic	Total	
		Male	Female	
13.06.2016	Basurabad Maddhopara	24	74	98
15.06.2016	Vennabuniya	28	77	105
17.06.2016	Maightvanga	58	83	141
18.06.2016	Kismatfultala	45	56	101
19.06.2016	Fultala	28	78	106
20.06.2016	Mailmara	48	64	112
22.06.2016	Basurabad Uttorpara	43	59	102
23.06.2016	Debitola	38	77	125
24.06.2016	Boyarvanga	46	81	127
26.06.2016	Chok sholmari	28	75	103
Tota	l Participants	386	724	1,120

Table 14: FFS Field day participants

Chapter 4 Key Findings, Lessons and Recommendations

1: Key Findings

Extensive pig production systems, e.g., intensive pig production or other forms of enriched production, have gained increasing interest in the country. Traditional pig farming especially open grazing or free range is popular but it has high piglet mortality and unhygienic therefore social obstacles are usual. So the open grazing is becoming a challenge for the pig farmers. Consequently, introduction of hygienic pig production systems calls for establishment of quality assurance programs that ensure production of high quality pork, as demanded by the local and international consumer segments. The present research was carried out to establish initial guidelines for hygienic pig producers in the production of piglets and high quality pork considering that traditional systems with access to out-door area are going to be the most unhygienic systems with low profitability. Mostly farmers are dependent on roughage and kitchen garbage based feeding system and they reared pig for fattening purposes in Bangladesh. Therefore, the demonstration (demo) farm was established to select the appropriate variety available in Bangladesh which may contribute to the development of economically profitable hygienic farming systems for production of high quality pork and piglets.

2: Pig demonstration farm

In demo farm, we observed comparative study related to growth performance and birth of piglets among the 04 varieties - Local traditional black, Dolkomol, Whitish and Banibunu.In demo, we placed 01 male and 01 female of each variety and supplied them concentrate and roughage feed. In addition, we measured sanitation, wastage disposal, vaccination and other health care regularly.

3: Growth performance

The growth performance (body weight) of all varieties was recorded and results are shown in Table-15. The result shows that within the research period Local Traditional Black (Black) variety was highly gained body weight (61.3 and 64.3 kg) compared with Dolkomol (55.7 and 57.5 kg), Whitish (58.0 and 62.0 kg) and Banibunu (47.8 and 43.6 kg) in both of boar and sow, respectively (Fig. 9). Further, we found that sow were gained more compare to boar in Local, Dolkomol and Whitish varieties except Banibunu where boar was gained more compare to sow. This is important that sow were gained high, because they took in a high amount of feed during pregnancy and weaning period. But the variety Banibunu was not pregnant during study period. In addition, it is noticed that Banibunu is rare variety in Bangladesh and we introduced them in demo farm in late stage.



Fig. 8: Growth performance of demo farm

4: Feed consumption rate

Feeding costs make up a large percentage of the total cost of pig production. Our research estimated to reduce feeding costs and to increase production. It is true that growth performance depends on daily feed intake and feed containing nutrients. The feed ingredients and supplements were used in all varieties are presented in Table-15. The data presented on feed chart indicated that the rations so formulated which contained acceptable levels of nutrients. To minimize the cost, we adjusted balanced concentrate feed with roughages which are locally available. Therefore, we supplied them 01 kg balanced concentrate feed and 02 kg roughages to each animal daily. The concentrate feed was provided them two times in a day (half amount at morning and rest amount at evening) and the roughage was supplied at noon. The caretaker was recorded their intake of feed amount regularly. The daily feed intakes are presented in Table-15. The result shows that Black variety was higher consumable pig that fed in full amount. On the other hand, Dolkomol intaked concentrate (0.9 and 1.0 kg), White (1.0 and 1.0 kg) and Banibunu (0.8 and 0.7 kg) in both of boar and sow, respectively. Beside this, Dolkomo intook roughage (1.8 and 2.0 kg), Whitish (1.6 and 1.8 kg) and Banibunu (1.8 and 1.6 kg) in both of boar and sow, respectively. These results indicate that Dolkomol and Whitish are preferred concentrate feed than roughage and Banibunu were consumed less amount of both type of feeds which we formulated in this study.

5: Reproductive performances

Reproductive performances of different varieties are shown in Table-15. Although growth and feed intake rate were low in White variety, but they shown higher reproductive performance in demo farm compare to Black and Dolkomol. Whitish sow gave birth of 06 healthy piglets, Dolkomol 04 and Local black 03 piglets. We were taken maximum care during birth of piglets. Unfortunately white sow gave birth at 1.25 am at night and caretaker found them in the morning death. We did not get enough information on them to assess the real causes. Actually Whitish are more sensitive to our environment than other varieties including management system. In case of Dolkomol, 02 piglets were died within one month after birth and 02 piglets are alive. In case of Black, all of 03 piglets are alive till now. Therefore, higher survival rate of piglets was found in Black variety (Table 15).

6: Disease occurrence

The disease occurrence rate was observed in lower rate in demo farm due to proper management of sanitation and vaccinations were followed. Local variety was more resistant and did not find any diseases. There was not found any remarkable diseases during entire research period in demo farm except few diseases/symptoms (Anorexia, fever, diarrhea and dermatitis) were observed in Dolkomol, Whitish and Banibunu.

7: Homestead farming - trial farms

The main achievement of the current research project is hygienic pig farming at household level is highly profitable against the investment and the piglet production is more profitable than the pig fattening (Table-16). In that case piglet management is more technical and need technical support to the pig farmers. Most of farmers are interested in fattening in this area. To increase the high interest in piglet production, we tested the household base farming and 10 households were selected and provided 01 boar and 01 sow of same variety to each. In this study, we tested 08 HHs with Local and 02 HHs with Dolkomol varieties.

8.Growth performance

The growth performance (body weight) of trial farms was recorded and results are shown in Table- 16. The result shows that Black variety gained more average body weight (50.5 and 55.6 kg) compared to Dolkomol (45.5 and 49.5 kg) in both of boar and sow, respectively (Fig. 10). Here, we also found that body weight was higher in sow than boar in both of varieties. This result indicates that according to growth performance Local variety is the best at HH level pig farming.



Fig. 9: Growth performance of trial farms

9: Feed consumption rate

Traditional pig farmers do not care on balanced feed or amount of feeds of pigs. They mostly used to feed rice polish, boiled rice, kitchen garbage or arum. In this study, we provided our formulated concentrate feed to the farmers of trial farms. As demo farm, we also supplied 01 kg concentrate and 02 kg roughage feed to each animal. Most of them followed our instruction, but 04 farmers did not care. They mostly fed concentrate feed. They fed roughage at minimal level or not (Table-16). As a result we found their lower growth and specially lower reproductive performances. The result shows that Black variety was higher consumable pig that intake feed in full amount compare to Dolkomol.

10: Reproductive performances

Reproductive performances of trial farms are shown in Table-16 and Fig. 11. Out of 10 trial farms, piglets were born in eight farms, one (Trial-2) was shown 3 times heat but not conceived and in another one (Trial-7), boar was become sick then farmer replaced new boar in farm. Out of 08 farms where we supplied Black variety, 07 sows were pregnant. Again out of 2 farms where we supplied Dolkomol, 01 sow was pregnant, but another sow was not pregnant due to sick of boar. Among them, trial-1 (Black) shows higher reproductive performance by giving birth of 07 piglets and lowers 04 piglets in trial-6 (Black). Average piglets production rate is 5.6 in each pregnancy. Feed consumption rate is closely related with reproductive performances. 02 sows were not pregnant due to imbalance feed supply and farmers careless to management. Therefore, we recommend that balance ration is essential to get piglets and Black variety is the best in piglet production at HHs level.



Fig. 10: Reproductive performance in trial farms. Please note that the details on the piglets status shown in Table 16 page 56

11: Disease occurrence

Most of trial farms were affected with few minor diseases/symptoms (Table-16). But the farmers who were taken proper care, they benefited and got piglets. The farmers who were not maintained proper management of biosecurity, they did not get piglets yet.

12: Social issues

One of our project concerns was to assess the social notions on pig rearing. As a Muslim Country we found there are significant social barriers in Pig farming in the other area because pork is prohibited in Muslim culture. We have collected information that in 59 districts pigs are rearing, grazing, trading and managing by the minority Hindu Kawra, Namasudra, Rishi and Sweeper community. In polder number 30 of Batiaghata Upazila most are Hindu community who are used to see it as one of the farm animal.

The surrounding people are from same community and there have been no major obstacles of rearing pigs in the research area. *Moreover*, the farmers are motivated to farming in a hygienic system which was a predemand of the neighbors who are now happy and supportive to the piggery promotion. Nice Foundation research team collected data from the field and has asked 200 neighbours of pig farmers where they responded that if the pigs are rearing in a modern farming system then we do not have objections and we will welcome the organizations if they provide them with modern technology because it gives us nutrition and we love to eat pork at least once in a week.

There is open market for other meat except pork in the village market as well as urban places in Bangladesh. In Batiaghata there are 8 open pork shops market from where pork eaters collect pork. We have asked Mr. Afjal Hossain who lived together in the Vennabunia area about open marketing of pork who *replied "there are many Hindu people who like pork and there is pork shop. He said, I personally do not like it but I never discourage them to rear and trade it. He said it is possible only in majority Hindu area but not possible where the Muslim community is majority. He said if the shops are neat and clean and remain separated from other vegetables/materials shops then we have no objections*". In Matvanga Mr. Sobhan Fakir a 5 member's family lived together with Pig farming Hindu community during last 15 years who said "I am always frustrated when I saw the pigs are running and *deficating beside road side, I personally dislike it but during last 15 years I saw those and I become used to see those like other animals. I found a trial shed established in Dulal Tarafder's house who is rearing pigs in a very neat and clean system. I shared with other Hindu pig rearers and asked them to follow Dulal's trial shed" If the situation improves I think Muslim members will have no reservation*".

We also conducted a session with WMG Kismotfultala and found Mr. Hasan and Mr. Shahinur whom said, as a Muslim we have reservation on pigs but we found it very profitable for the poor pig farmers. Mr. Shahinur said, 10 years back I was really scared of pig farmers and I used to discourage them and invite them to rear other livestock but they never react in front of me and silently they continued rearing and farming pigs. I found it unnecessary making gaps between me and my neighbours. Last year when Nice Foundation came up with a solution I am really impressed and shared my concern with Nice Foundation. He said, still I am confused the farmers will adopt the hygienic system or not, we asked him why his realization is like this. He answered it will take long time to change the traditional notion because they are used to old rearing system for last 200 years. We cannot expect the situation

will be changed within a few months or years. He said the Muslim people are happy that the pigs are promoting by Govt. and NGOs through a hygienic system. He said, I have seen the trail shed of Diponkar of Kismotfultala who has 7 piglets from one female pig at a time and all are alive & healthy, it is very interesting and we have a model in front of us to refer to other farmers to rear like Diponkar as a hygienic system". It will help us to pursue other farmers to follow the system"

We found it supportive by the neighbors considering it as one of the professional and cultural rights of pig rearing community. Our experiences in the Hidu and Muslim community found that the progressive Muslim leaders do not create any obtacles for rearing but their concern is to rear the pigs in isolated area where peoples' movement is comparatively less and the odor smell should not come out.

13: Environmental status

Pig manures can be used for the purpose of bio-gas and organic fertilizer in agricultural field. We found that SubodhTarafder used pig waste in vegetable field which was used as fertilizer. It gave good result alternative to chemical fertilizer. In other area in Aranghata, Dumuriaa Kawra family has bio-gas plant supported by BRAC. The farmers said, pigs are very friendly and manage themselves as one of the pet animal. The farmers rear those in two systems ie; at household and open grazing system. The open grazing is at roadside, khasland, fallow land and off seasons in rice fields. During grazing pig droppings and other biological wastes are open which the land owners see it as organic fertilizer and allows in off time to graze. The household level pig droppings are instructed to manage through ring slab. The pig shed models were given to the community for managing the pig wastes. We found positive impact in the agricultural field.

In our benchmark survey report we found out of 200 respondents none has reported adverse effect of environment. Almost all 200 respondents said there are odor smell breezed that create nuisance in the society due to unhygienic farming system. At the end line we found 80% respondents said that odor smelling is reduced after installation of ring slab for managing pig wastes and 2-3 times sweeping of floors. 20% respondents said the situation improved slightly but need more hygienic attempt especially sweet water sources and drainage system in the farm.

Varie ties Body	Sex	At period	starting	At ending	the g	Total body weight	Daily fee (Average	ed intake e) per pig	Disease/ Symptoms	Birth of niglets	Remarks
weig ht (Kg)		Age (wk)	Body weigh t (Kg)	Age (wk)	Body weigh t (Kg)	gained (Kg)	Conce ntrate (Kg)	Roughag e / Others (Kg)	occurrence	(No.)	
Black	Boar	18	21.7	54	83	61.3	1.0	2.0	-		
	Sow	16	19.7	52	84	64.3	1.0	2.0	-	03	All piglets survive
Dolk omol	Boar	18	15.3	54	71	55.7	0.9	1.8	Anorexia		
	Sow	16	12.5	52	70	57.5	1.0	2.0	Fever, Dermatitis	04	02 piglets died
Whiti sh	Boar	18	12.0	54	70	58.0	1.0	1.6	Pneumonia		
	Sow	16	11.0	52	73	62.0	1.0	1.8	Anorexia, Pneumonia	06	Gave birth at mid night just after birth the piglest crawled to near dyke found dead in the morning.
Banib unu	Boar	08	7.2	44	55	47.8	0.8	1.8	Pneumonia, Anorexia		
	Sow	08	6.4	44	50	43.6	0.7	1.6	Fever, Pneumonia, Anorexia	-	Pregnant (Tentative)

Table 15: Performance of demonstration farm.

Table 16:	Performance	e of Trial farms
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Varieties	Sex	At starting period		At the ending period		Total body weight	Daily feed intake (Average) per pig		Disease/ Symptoms	Birth of	Remarks
		Age (wk)	Body weigh t (Kg)	Age (wk)	Body weigh t (Kg)	gained (Kg)	Conce ntrate (Kg)	Rougha ge / Others (Kg)	occurrenc	piglets (No.)	
Trial-1 (Black)	Boa r	18	22	53	80	58	1.0	2.0	Fever		
Kismot Fultala	So w	17	21	52	82	61	1.0	2.2	Dermatitis	07	All survive
Trial-2 (Black) Fultala	Boa r	18	22	45	71	49	2.0	-	-		
	So w	17	21	44	78	57	2.0	-	Fever, Dermatitis, Diarrohoea	-	three times heat came but not pregnant
Trial-3 (Black) Soilmari	Boa r	14	23	44	67	44	1.0	2.0	-		
	So w	14	21	44	70	49	1.0	2.0	Dermatitis	06	All survive
Trial-4 (Black)	Boa r	14	18	45	68	50	2.0	1.0	Fever, Diarrohoea		
Basuraba d uttarpara	So w	14	18	45	73	55	2.0	1.0	Fever, Diarrhoea	05	All survive
Trial-5 (Black) Basuraba d Modhapar	Boa r	14	18	44	65	47	1.0	2.0	-		
	So w	14	20	44	74	54	1.0	2.0	Dermatitis	06	All survive
Trial-6 (Black) Maitvang	Boa r	18	20	45	72	52	1.0	2.0	External parasitic infestation		
а	So w	18	19	45	76	57	1.0	2.0	Dermatitis	04	All survive
Trial-7 (Dolkomo l) Mailmara	Boa r	18	19	44	68	49	1.2	1.0	Fever		Boar become sick and now changed
	So w	22	25	48	75	50	1.2	1.0	Fever, Pneumonia , Anorexia	-	Waiting for pregnancy
Trial-8 (Dolkomo l) Debitola	Boa r	16	21	42	63	42	1.5	1.0	Fever		
	So w	14	17	40	66	49	1.5	1.0	Fever, Diarrohoea	06	All survive
Trial-9 (Black) Vennabun ia	Boa r	14	13	45	71	58	1.5	0.5	-		
	So w	14	14	45	78	64	1.5	0.5	Fever, Pneumonia	06	All survive
Trial-10 (Black) Boyervan ga	Boa r	20	24	47	70	46	1.0	2.0	Anorexia		
	So w	18	26	45	74	48	1.0	2.0	Anorexia	05	All survive

14: Lessons/Challenges

- \checkmark This study revealed that the main purpose of pig production is to get additional income for the household.
- ✓ The study is only in the polder area where 90% are Hindu community whom are mostly involved with pigs; They were supportive and cooperated the research team during the study. Only little area was Muslim in the research area whom were subsequently interviewed and said in a Muslim Country it is odd looking if it sees in the street when grazing in the open field but if these are reared in a place where public mobility is less and rear hygienically we will have no objections. We also interviewed a Mosque Imam who answered "it must not be visible before and after prayer (4 times during day time) but if the pig rearers in their own place without showing us we do not have objections". So, the pig rearing is not problem but the problem is rearing process and pig management.
- \checkmark In order to disseminate the technology among the farmers trained person is essential in pig farming system.
- ✓ Combined feed formulation (concentrate feed with roughage) can minimize cost effectiveness and also promote more production.
- ✓ The traditional pig farmers are not concerned about the hygienic pig farming but after visiting our demo farm and trial shed they were encouraged to make their farms and sheds hygienic
- ✓ In both demo and trial shed we found that Piglet management is very technical and extra care should be needed at least up to 30 days of piglet age
- ✓ People's demand was so high especially getting pigs free of cost from the project which created inter-conflicts between trial farm pig farmers and general farmers.
- ✓ Pig fattening is traditionally popular and the rearers are interested in fattening rather piglet production. But our study and profit calculation showed that piglet production is profitable. The present marketing of pork is dependent on local demand but some outside buyers from Tangail, Jessore and Dhaka come to the area who is middleman which is not a sustainable market.
- ✓ The study pointed that the pig farming in the study area enabled producers to generate additional income which in turn helps in achieving food security self-employment for landless and unemployed people in the study area.
- ✓ As pigs are among the animal species which are expected to fulfill the growing demand of meat in local and international markets, hygienic production system and value creation approaches should be introduced in the pig farming system.

15: Recommendations

- ✓ Follow-up action research can be continued as scaling up to other polders by covering the areas of piglet production, fattening trial and extension of hygienic pig farming system. Due to high demand of pig farming, the poor household can be supported with piglets and training technology and support for hygienic pig farming shed.
- ✓ Piglet to piglet production and pig fattening was not compared due to time and resource constraints. A comprehensive fattening and piglet production can be piloted in the scale up study.
- ✓ Marketing of live pigs and pork to be channelized by community initiators from the producers not through middleman. The national market profile/buyers profile or an inventory will help finding out the marketing opportunity.

- ✓ The local level advocacy were initiated during the period but it needs to expand so that the pig rearers can get support nationally. A national level workshop can be arranged by involving civil society members, human rights activitist, govt. officials, supporters, journalist, lawyers and NGOs.
- \checkmark Pig farmers community are deprived of their livelihood and social rights which can be studied further.
- ✓ The maximum pig population of the area was indigenous local Black type which has given good result interms of piglet production performance and disease tolerance. A comparative study with other areas like Rangamati or exotic breeds should be done in future.
- ✓ In the study area, Kitchen garbage's are normally fed to their other livestock species. In this case, a further research can be carried out with restaurant wastes in pig farming.
- ✓ The WMA and WMG were played an active role during the research period that can be supported for pig farming institutionally for exploring it as income earning venture which will help them sustaining the WMA/WMG even after completion of BG activities in the area. The WMG can initiate pig farming collectively from where they will get profit and will ensure the marketing. Through the rearing process the WMG fund will be increased which will help sustaining them and the dependency on other sources will be reduced.
- ✓ The pig farmers adolescent girl and boys can be motivated through some courtyard sessions on future modern pig farming and marketing system.
- ✓ The marketing information must be made easy for the farmers, and marketing infrastructures will potentially increase the income of farmers which will contribute in the national income. The government should also work on cultural and behavioral change of the people and also formulate an appropriate policy regarding pig production in the livestock production strategy.

Chapter 5 Case Studies

Case study: a case of traditional pig rearing

RinaBiswas, 40, wife of IndrojithBaswas, is a mother of five children. Besides maintaining family she has reared pigs for 15 years. Though she was rearing pigs for long time but her initiative not so effective for her family rather has created chaos with her neighbor. Her situation is unveiled by recent incident. In February 2016 she purchased two black piglets with BDT. 3150. At the time their weight was 21 Kg. Next four months she reared these two behind her house in a dirty, damp and frowzy place. She gave them rice, paddy husk, arum greensas feed.

She did not give attention on cleanliness of her pig. Though she had invested her time, money and labour but her pigs did not grow upto expected level of weight. After all initiative and labour of Rina two pigs became 31 Kg after 4 months means only 10 Kg increased. On the other hand neighbors become annoyed on her and relationship became cold with Rina day by day due to odor smelling of pig wastes. The local buyers were reluctant to buy Rina's pig due to observed dirty, damp and frowzy condition. Again Rina and her 10 years daughter and her husband attacked by dysentery, skin etching and diarrhoeal disease due to unhygienic situation.

These unhygienic rearing consequences effect on both public and animal health. As a result profit margin becomes decrease and Rinabecomes loser. She had suffered physically, mentally and socially. Rina has seen the trial shed of Nice Foundation and found it very neat and clean and odorless. She realized where her fault was and how to rear the pigs. Our FF asked her to rear the pigs following the trial shed that was confused and demanded support for making a hygienic shed. She felt that hygienic farming is essential.

Case study: a case of hygienic pig farming

Sharoshati Biswas-35 is a traditional pig rearer. With the support of her husband, Shankar Biswas, she reared pigs during last 10 years, but she never got expected profit. The FFS farmers selected her to establish the farm at her premises and she was interested in it by taking challenges that she must know where her lackings were in earlier farming. With the support of Nice Foundation she has established a hygienic trial shed and got black species 1 boar and 1 sow from the research project. She was instructed on taking care of pigs including cleaning, using disinfactants, sweeping, bathing, feeding and treatment/vaccination. In her homestead FFS sessions were conducted where she attended each session such 15 sessions she has completed and got certificate from the project on field day.

When she started rearing the sow and boar then their weight was 22 KG and 20 KG. Usually she gave them protein affluent granular, liquid, arum greens and other vegetables thrice a day. In summer she bathed them twice a day and in winter one time a day. Pig waste directly dumped to ring slab and there is no odor or nuisance smel come out. As a result weight of swine twice within short time. Due to healthy environment and not spreading musty neighbors are happy. Sharoshati and her family members are also disease free. After 7 months the sow gave birth 7 piglets. Usually the farmer's rear pigs for fattening purpose not for piglet production. Many villagers are coming to see the piglets. Sharoshati creates good will in her community and her pigs have demand on that community because of rearing in a cleanliness atmosphere. Sharoshati and her family are so happy and collectively they are taking care of piglets. She said, it is unbelievable that we can produce piglets.

Sharashati have calculated and will get 3 times benefit than anyother animal rearing. She is now confident and said, I will produce piglets and sale those to my neighbors, and this will give me double benefits. She also explained to other FFS members that it is possible only we got training on it. I never thought that there in a Muslim country we will be trained on a prohibited issue. She also thought that the rolling Govt. is positive in this issue. However, we made her clearer that this is not political agenda; it is your rights which Nice Foundation promotes. Now she dreams to expand her trial shed and supply her product to Dhaka. After observing the success of Sharoshati some pig farmers are motivated and willing to rearing pig in trial shed management procedure.

Case study of the transition of a local businessman

ProshanRaptan, 42, is ason of Rash Mohan Raptanliving in Basurabadh who originally born inSukdara, Surkhali of BatiaghataUpazila. His father was a rice dealer. No one of his family has involved with pigs trading except Proshan. He was not so fortunate to be educated. He involved with many business even though once upon a time he engaged himself with his father's rice business. But the success remained out of his hand.

During his deep frustration in 2000 he saw a big pal of 200 pigs are grazing by a grazer boy who talked to him. After hearing all this he started survey of pork demand and got huge response. Initially he planned to start business with a few pigs accordingly he started his business journey with 25 pigs by BDT: 75,000. In each week he had slaughter 2 or 3 pigs and sold pork in village market and house to house who ordered him. He stocked the pigs for few days and then slaughtered them for pork selling. He found it very profitable and hard cash return inspired him to expand the business. But due to some opponent he did not continue the business in his own village because it spread odor smell and the wastes were not hygienically managed. He shifted his pig stocking sites to Debitala another village of BatiaghataUpazila. Same problem occurred in Debitala and again he shifted his farm on a riverside but still there are some people who opposed that the river water is polluting by pig wastes.

He has visited *Nice Foundation* demo farm and become impressed by seeing that only ring slab and regular sweeping can make the farm environment friendly. He was convinced and motivated and shared with his community people that he will construct the farm same as *Nice Foundation* demo farm but in a low cost system. The community people gave him time for few months to re-construct the farm in a hygienic manner.

Presently his farm is in Basurabadh and on an average he stocked 200 pigs at a time before selling those to farmer and slaughtering. We asked him, how he collects pigs, who replied, usually he collected pigs from surrounding villages that rears 1-5 pigs at a time. He also said, when the demand is huge he collects from outside of the area like Barisal, Satkhira, Jessore, Kushtia etc.

He said, in the past I did many business but it is only business which is very profitable with minimum investmentwithin short time. He said, "If the farmer's rear following the Nice Foundation model the price can be demanded little higher than the traditional rearing". We asked him to buy the pigs from our FFS farmers who said, already I have contacted with some FFS farmers whom are in my knowledge.

Appendices

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Appendix 1

Pig Farming and Management

Introduction and description of pigs

The co-existence of animals and humans are going on since ancient times. In the past, peoples were living in the forest. At that time forest animals were their neighbors. Then they noticed that few animals are very docile, not cruel. After that humans started to utilize them in a variety of plays. In ancient times it was considered pigs as wildlife; Kings were hunt wild pigs and many of them were eaten pork. Pork is one the favorite dish to the Europeans and Americans. There is a phobia to pigs in our country, because of religion. For this reason, the people of this country were not in favor of pig rearing. In addition, pigs were reared in dirty environment. The persons who were reared pigs, they were not able to supply sufficient feeds. Moreover, pigs have been accustomed to eat wastage and scraps of food.

Some terminologies in pig production

AI - artificial insemination.

Barrow- male pig castrated before reaching sexual maturity.

Boar- male hog or pig with intact testicles.

Castrate- remove testicles by surgery.

Colostrum- first milk produced by the sow; it provides immunity to the baby pigs for the firstfew weeks.

Creep feeder- area accessible to small pigs but not their dams, in which a high protein supplement is provided.

Cull sow- full-grown female sold for slaughter.

Dressing percent- percentage of the carcass usable, compared to live weight.

Farrow- to give birth to pigs.

Flush feed- increase feed to stimulate ovulation in females.

Full-(self)-feed- animals are allowed to eat as much as they will clean up; feed is available at all times.

Gestation period- pregnancy, lasting about 114 days in swine.

Gilt- young female that has not yet produced a litter.

Growing-finishing pig- animal weighing between 40 and 220 lbs. that is being fed for slaughter.

Runt- small or weak pig in a litter.

Shrink- weight loss, usually temporary.

Sow- female which has farrowed at least once.

Wallow- water-filled depression or container large enough for pigs to lay in to cool off during

warm weather.

Weaning- removing young from their mother.

Yield- percentage of the carcass in the four lean cuts: ham, loin, picnic, and Boston butt.

Different varieties of pigs and their description

One of the important objectives of our current research was to collect different varieties of pig for rearing and to observe breeding performance and production rate among them. Further we observed their sustainability and if there is problem occurred how to solve the issues. In this study, we collected four varieties of pigs. These are Black, White (Chinese), Dolkamal and Banibuno. Interestingly, the names of these varieties are not scientific names, named by local peoples. Local and Banibuno were collected from Monirampur under Jessore district and Dolkamal and Whitish were collected from Indian border area.

Local Black

They are black in color. They are a bit restless compared to other varieties. They are habituated in all kinds of foods including rice, rice starch, and molasses mixing food, cake, biscuits and rice polish. Beside these, they also like to eat cursed root-cast skin of arum, ground earthworms or other insects. They gain body weight very fast. This variety is available in the local market sufficiently. Comparatively their meat is delicious and they have huge demand in local market. But they do not have demand in outside of the local market, because they eat dirty food stuffs and live in anywhere.

White or Chinese varieties

They are white in color and quite calm. Their ears, size and shape of the body look like Jamunapari goats. The body growth is quite fast within a short time. Their meat price is comparatively higher than other varieties. The demand of their meat is attracted to foreign tourists and in international hotels. They prefer to eat mixture of rice, rice bran, molasses and salt. They do not like to eat the local foods. But in this study we found that after 2 months of the following birth, they could be accustomed in any kind of solid foods. Once upon a time, this variety was reared by Kawra community located at Mongla port. Nowadays, pig rearers are not interested to rear this variety, because of decreasing presence of foreign travelers at this port. It is very difficult to find out this variety in the country. However, they are still available in West Bengal, India.

Dolkamal

This is quite rare breed of pig. They are very quiet and small in size. They look brown in color. There is huge demand of this breed in country, but it is very difficult to find them. Because farming system did not develop yet. However, they are found in few states of India. We could not review the taste of the meat and market demand. This information's might be found in our next follow-up study. They are three times meal in a day. Rice starch, rice cake, rice polish and rice bran are very favorite to them.

Banibuno

There is a myth that they were living in forest and that's why called Banibuno. Their behavior is little crazy. They are light brown in black stripe. They are comparatively large in size and gained body weight within a short period. They eat 4-5 times in a day. The demand for their meat is high to the local consumer. It could be profitable if reared them in farming system.

Breed of Pig

There are approximately 60 species of pigs are available in the world. Famous breeds are Large White Yorkshire, Middle white Yorkshire, Berkshire, Chester White Hampshire, Tamworth, Lamcombe, etc.

Nomenclature of pig

Table A1: Nomenclature of pig

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Artiodactyla
Family:	Suidae
Genus:	Sus
Species:	S. scrofa
Subspecies:	S. s. domestica

Life span of pig

Life span of a healthy pig is about 15 years. But for meat purpose, pigs normally sacrifice before its life span. The entire life span of the pigs is depending on farmer's choice and plan.

Physical characteristics of pig

	J I B
Life span	10-15 years
Normal bodytemperature	$102-103^{0}$ F
Respiration Rate	10-20/minute
Pulse Rate	70-90/Minute
Age of Sexual maturity (Female)	6-9 months
Age of Sexual maturity (Male)	9-12 months
Menstrual period	2-4 days
Breeding age (Female)	9-12 Months
Breeding Time	2 nd and 3 rd days of menstrual period
Pregnancy period	112-115 days
Birth of piglet per pregnancy	4-10
Body weight of piglet after birth	1 Kg

Table A2: Common physical characteristics of pig

Body features of pig

Body shape of pig becomes elongated. They have four legs, long nose and short tail. They can move their nose and head becomes downwards for breathing. Their skin is very thick with few hair follicles. Hair becomes hard and straight forward. They suffered from heat exchange during winter and summer due to insufficient hair follicle. They cannot eat more at a time because of their small size of stomach.

Space requirement of pig

- For adult male pig 50^2 Ft
- For grower pig 13^2 Ft
- For pregnant sows (including delivery) 60^2 Ft

Housing of pig

The common systems of keeping of pigs include the followings:

Extensive or Free-range (Scavengers)

The free-range system is the traditional system of rearing pigs in most parts of the world. The system is cheap as it requires little investment. It also requires minimal management. Each family keeps a few pigs per herd which are allowed to scavenger or wander freely and pick up food when and where they can. No special housing other than for night shelter is required and there is minimum disease controlled and hygiene maintained.

Semi-intensive system

In this system, the animals are restricted to a limited area and therefore the farmer takes whole responsibility of feeding them. The pigs are allowed into the fenced larger yard to graze, wallow and exercise. Housing is mainly of very simple construction and made from simple and inexpensive materials like mud, bamboo and elevated thatched roof. The semiintensive system can be recommended for small holders and beginning pig farmers.

Intensive system

This is the commercial method of pig production under which economic considerations are the sole determinant of herd size. Housing is generally made with more expensive materials. Adequate shade, pen space, feed and water facilities are provided to meet requirements of the pigs.

Low cost and hygienic housing of pigs

Pig houses must be well constructed for maximum performance of the animals. To build low cost housing of pigs in hygienic manner, houses can be constructed using locally available material such as bamboo, straw, etc. House should be built in North-south direction. The length and width of the house will be calculated on the basis of number of pigs reared. At first, four RCC pillar will put at four corners. The height of two pillars of front side will be 08 feet and rest two pillars of back side will be 07 feet. The heights of all pillars indicate including 01 feet at baseline. Floor should be 9 inch height from the baseline (3 inch – sands,

3 inch – brick and rest of 3 inch concrete). Slop of the floor should be 3-4 inches from front to back side gradually. There should be a connecting drain in back side of the floor and this drain will be 6 inches width. There should be prepared fences: firstly 6 inches height with 02 bricks and then at least 4 feet height with bamboo slat. The roof of the house will be made with local materials like straw or Goalpata, depends on availability and cheapest in that area. Size of the roof should be 2-2.5 feet width.

Drainage system of pigs

One waste/manure pit should be prepared in back side of the pig shed. That should be prepared with at least 03 slabs, 01 cover and 01 pipe for removal of gas from slabs. Finally this pit should be connected with the internal drain of the house by a connecting plastic pipe.

Management of pigs

In a small pig farm, male, female, grower and piglet of different ages and sizes can be kept together. Only diseased pigs are kept separately. But in large farm, they are kept in separate shed. Male pigs are kept in well and strong shed with free space and fenced all around. Newborn piglet should be kept with their mother which practice could resolve a lot of problems.

Balanced diet of pigs

Feed is any material, which after ingestion by the animal is capable of being digested, absorbed and utilized satisfy metabolic to needs i.e. being transformed into body elements of the animal. Good feed is necessary for growth, body maintenance and the production of meat and milk. We can use locally available feeds that are less expensive, but be nutritionally complete can when properly prepared.



The nutritional needs of pigs can be divided into six categories or classes. These are water, carbohydrates, fats, proteins, vitamins and minerals. Importance of Feeds and Feeding in pig production cannot be over-emphasized as it accounts for about 60-70% cost of production. Thus, much attention should be given to this aspect and the ability to judiciously manipulate feed ingredients to maximize productivity is therefore central to the maintenance of a stable pig production enterprise, for the enterprise to meet its set objective of profit maximization.

In Bangladesh, pigs are mostly rearing in open free-range system and they cannot get sufficient nutrition from their feeds. As a result their growth was hampered. Moreover, in our previous study, we were supplied restaurant garbage's to pigs and found 50-60% nutritive value. Actually it is very essential to require balanced diet to pigs for their growth as other animals. In addition, they have need sufficient amount of vitamins and minerals. There are need several ingredients to prepare a balance diet for animals. It is impossible to get all

nutritional values from one kind of food. In a feed formulation, main ingredients are maize, wheat and barley which is contained mostly carbohydrate. But for growth of animal, it is essential to supply them protein. So, to overcome this situation, significant amount of various kinds of ingredients are mixed together for maintenance of balance diet. Again, it is also true that the cost of balance feed is high. To minimize the high cost of feed, in this research program, we preferred market available ingredients and local ingredients and we prepared a ration formulation to maintain balance diet of pigs according to age.

Most of pig farmers did not know the source of nutrition according to individual food. Even they did not know that pigs are also required vitamin and minerals as other animals and human. In this program, we taught them what are the common sources of nutrition and how can they prepare a balance diet according to age.

Name of ingredients	Presence of digestible	Percentage of protein
	protein	digestion
	(%)	(%)
1. Grain		
Maize	7.0	70.6
Barley	6.3	76.6
Gram	12.8	73.8
Soybean meal	41.0	72.0
Molasses	-	67.0
2. Grain byproduct		
Rice polish	7.1	63.5
Rice bran	9.0	75.0
Wheat bran	9.2	65.0
Bean	8.0	65.0
Gram particle	12.0	74.0
Gram bran	0	65.0
3. Cake		
Linseed oil cake	23.0	64.0
Almond cake	45.0	71.0
Mustard oil cake	30.0	71.0
4. Dry foods		
Dry fish	61.0	71.0
Dry meat	60.0	61.0
5. Grasses		
Guinea grass	1.8	42.0
Dry guinea grass	2.0	17.0
Green grass	1.6	12.5
Napier grass	1.5	11.5
Para grass	2.0	11.5
Maize grass	1.1	17.0

Table A3: Digestible protein sources of pig

Picture: Balanced Feeding


Carbohydrate

According to the information obtained in pig feed, 75% of the foods contained carbohydrate. Among the carbohydrates, wheat, maize and barley are easily digestible. Molasses is also easily digestible food. Digestive system of pig is not as cattle, buffalo and goat. Their stomach is monogastric, i.e. simple stomach. For this reason, they cannot digest the carbohydrates easily.

Fat

Fat is essential to promote body growth. It is very difficult to digest fat among the carbohydrate, protein and fat. The common sources of fat are almond cake, mustard oil cake, etc.

Protein

Protein is also essential in daily diet of pigs. Protein should be supplied according to body weight of pigs as below:

Description	Body weight (kg)	Protein requirement
		(kg)/per day
	5-10	0.13
Weight gain period	20-35	0.27
	58-100	0.44
Pregnancy period	100-155	0.28
	155-245	0.28
Milk letdown period	130-200	0.75
Boar	105-175	0.34
Sow	175-245	0.28

TableA4: Requirements of protein

Mineral supplements

Name of the elements	Calcium (%)	Phosphorus (%)
Limestone rock	36	7
Sodium dioxide	0	20
Sterilized bone meal	28	14

Feed requirements of pigs

Colostrums (Mother's milk) are very important to the piglets for development of their immune system. As a result, piglets can be secured from infectious diseases. There is a chart of requirement of foods from birth to 6 months of age. It is noted that after 03 months of age, it is better to supply half portion of concentrate and half portion of roughage feeds on daily requirements.

Age	Amount of feed required per day	
(Month)	Colostrums/Mother's milk	Solid foods
1	Only Colostrums/Mother's milk	-
2	Mother's milk	250 gm
3	-	500 gm
4	-	1.0 kg
5	-	1.5 kg
6 or more	-	2.0 kg

Table A5: Feed requirements of pigs.

Feed formulation of pigs

It is very challenging to survive piglets. It is possible to improve survival rate of piglets by proper health management and providing foods.

 Table A6: Feed formulation for a piglet

Ingredients	Amount (gm)
Rice polish	200
Rice bran	100
Wheat bran	125
Almond cake	45
Molasses	24
Salt	03
Vitamin-Mineral premix	03

Table A7: Feed formulation for grower to adult pigs

rable first coalformation for grower to addit prgs		
Ingredients	Amount (%)	
Rice polish	60	
Wheat bran	20	
Sesame cake	06	
Dry fish	06	
Soyabean meal	07	
Salt	0.75	
Vitamin-Mineral premix	0.25	

Control of body temperature of pigs

Every living creature can control their body weight and temperature by the food consumption rate. i.e. if they eat more, their body weight and temperature will be increased. This excess increase of body temperature can be adjusted by their active physical movement after consumption. Normal body temperature of a healthy adult pig is 102^{0} F. On the other hand, infected pig can tolerate up to 104^{0} F. But pig will die if temperature exceeds 105^{0} F. Bangladesh is a tropical country and farmers mostly rear pig in open-free range system.

During this season, pigs can be controlled excess temperature by tumbling in mud and water. Most of animal can control excessive heat or temperature by the "sweat gland". Unfortunately, they do not have sweat gland. As a result they cannot adjust body temperature with environment or room temperature. In farming condition, this condition can also be controlled by watering on the floor, application of ice or cold water on neck region of the pigs. Proper ventilation of the animal shed may be another option to control excess heat. Ultimately pigs will not eat sufficient foods and growth performances will also be decreased in excess heat. Special care should be taken after birth of piglets. During early stage of pig, they are not capable to maintain temperature with environment. The temperature must be lower depending on the age of a pig.



Table A8: Body temperature of pigs

Age	Temperature
Piglet for a week	28.9°C
Piglet for a month	35°C
Piglet for two month	20-27.8°C
Adult pigs weighing 90 kg or above	17.8-22.2°C

Reproduction of pigs

A female pig, called a sow, can become pregnant once it is 8 months old, and usually remain fertile until they are 15 years old. Male pigs, or boars, become sexually active once they are 8 to 10 months old. During their productive months sows enter into a phase called estrus, or "heat," every 21 days when they are not pregnant, sending signals to the boar that they are ready and able to mate. Once the sow gets pregnant, the gestation period lasts 115 days.

Heat detection and breeding timing are very important. Becoming familiar with swine behavior is essential to this critical management skill. Knowing both non-heat behavior and heat behavior makes it easier to identify when a female is coming into heat and when they reach standing heat. Ideally, breeding occurs during a time called 'standing heat' during which time the female will 'lock up', meaning that she will exhibit a natural behavior of standing rigidly and be receptive to mounting of a boar.



A common reason for failure is breeding females before they are in a true standing heat. Take notes on each sow as they begin to exhibit signs of heat and check them every 12 hours until true standing heat is attained. Standing heat can last two days and breeding can occur every 12 hours during this time. With proper heat detection two or three mating are possible. However, a single mating at the correct time is better than multiple mating at the wrong time. Many researchers suggested that to get a better performance of conception and healthy piggery, it is better to mating at their 3rd heat. Common sign of heat are-

- Changes in the female's vulva.
- Vulvas of sow nearing heat may be swollen, red, and discharge mucus.
- Applying pressure to the back of the animal to see if she will stand rigidly is the most common manner to check for standing heat.
- Ears will be in an erect position during standing heat.
- Tail may also move to expose her vulva.

When selecting a boar for a breeding programme, factors such as origination from a specific disease-free herd, performance, soundness and conformation, age of puberty, and other pertinent parameters related to reproduction should be considered. The boar should walk and move freely without any sign of stiffness or lameness. The testes should be normal in shape and size, even, and free from defects. While the width of the testes is directly related to total sperm output, it is not a true indication of the libido or sexual activity of the boar.

Management of boar

The boar is the most important animal on the farm and good management is essential to maintain health and maximize normal reproductive function. When the young boar first enters the farm allow him to make physical but not intimate contact with female pigs. He certainly must not be bullied by sows. Unless this physical contact takes place there is a risk of low sexual behaviour with poor mating, and poor shortened ejaculations. Such animals are often slow to mount and serve with reduced conception, farrowing rates and litter sizes. The same principles apply to the mature boar, he should have constant contact with females. Lameness, stiffness, or difficulty in rising are often prevent 2 or 3 months of lowered fertility. When the young boar first arrives on the farm always manage him carefully, without any aggression and be extremely patient during the first two or three mating.

The floor surface in the mating pen is important. It should be smooth, non slippery and well drained with no projections of aggregate. The pen should be pressure-washed and disinfected at least once a month. If the floor surface becomes slippery the judicious use of dry sand can be a short term solution.

A healthy boar can be serviced till 5-6 years old. For standard practice, according to age of boar and number of mating can be followed as below:

	Age of Boar	Number of Mating
01.	8-10 months	One time in a week
02.	11-18 months	Three times in a week
03.	24 months-more	Four to five times in a week

Table A9: Mating of boar

Artificial insemination

There is no developed of pig farms yet in Bangladesh. For this reason, artificial insemination (AI) in pigs did not practice in Bangladesh. Through AI we can upgrade our local breed for pig production. We hope that near future, AI will also practiced in Bangladesh.

Management of pregnant sows

Once the gilt/sow has been successfully served, conception will occur. The gestation period is 114 days (3 months, 3 weeks and 3 days). Frequent checking of sows should be carried out to detect any that has returned to estrous. Pigs should be kept in small groups to ensure that they all have access to adequate feed. Well fortified feed should be offered in order to supply need of both the mother and her foetus. Green leaves and vegetable is particularly important. Pregnant sows should be shielded from extreme of heat through the provision of shades and wallows.

Farrowing and care of new born piglets

The pregnant animals should be dewormed 2-3 weeks prior to farrowing to reduce the possibility of the dam passing worms to the new born piglets. Also the sow should be in the farrowing unit 4 to 5 days prior to expected farrowing time to allow for adjustment to the environment. Constipation in the sow must be avoided at all cost as this interferes with farrowing process. Supplementations of bran and green stuff during the last week of pregnancy are recommended.

Sign of farrowing:

- Increased restlessness
- Making of nest by arranging her bedding

Management is critical at this time since piglet losses are occur during the first 72hours after birth. Farrowing should be supervised by a trained stockman, in case any farrowing problem such as delayed farrowing and still-births. With special care and attention to dam and her litter up to 8 weeks of age can be realized. Many losses of newborn piglets are caused by stress due to chilling. The stockman must be ready to prevent this by providing extra source of heat. Also piglets must be encouraged to obtain their first successful suckle of colostrum within 45 minutes after birth. Colostrums is the most important food a piglet takes in during the first few hours of its life, because it is a source of both essential energy and antibodies. Failure to obtain colostrum will invariably result in susceptibility to disease and death of the newborn piglet. Within 24 hours of birth, the individual piglet should be marked for identification and record purposes. Ear-notching is the most reliable system. Tie off the navel cord and immerse in dilute solution of iodine, this reduces the possibility of navel infections.

Weaning

Weaning is the practice of separating the young pigs from their mother. It usually exerts stress onthe young. Weaning is normally accomplished when pigs are from 6-9 weeks of age, when they should be capable of subsisting on solid feeds and feeding for themselves. A very high level of management is required for early weaning and therefore it is not a general practice. However, a technique of 'split' weaning can be beneficial, whereby the large piglets are weaned first and the small ones are left with the dam and weaned later.

Body weight and health condition are better criteria than age. It must be emphasized that superior management, rigid environment control and continuous attention to minute details are essential for success in this phase of growth. Other changes should be gradually effected at weaning. Do not abruptly change the ration, but for a few days, continue feeding creep feed mixed with weaner ration and the finally eliminate the creep feed completely at about two weeks after weaning. Early weaning recent developments in the commercial industry are in favour of early weaning at about 4 weeks.

The advantages are:

- Losses in piglets due to overlying and starving are significantly reduced.
- Pigs can be adequately fed, and lack of uniformity in a litter can be overcome.
- Cost in sow feed can be slashed
- The sow looses less weight during nursing
- The dam can be re-bred sooner to produce more litters
- Better producing sows can be retained for longer period.
- Early weaning allows for streamlining of the production and market supply; both w weaners and market hogs can be sold.

Tooth clipping

Piglets are born with eight sharp needle or juvenile teeth and they may need to be clipped. They are extremely sharp and piglets can lacerate the sow's udder and themselves when fighting. The wounds may allow secondary infections to occur and this is often blamed for sows savaging piglets. This procedure should not be routinely required. However, if there are ongoing problems in a herd, this procedure should be carried out within 3 days of birth.

The teeth can be removed using a strong pair of nail clippers. Clippers should be disinfected, and, where possible, only the tips (top quarter) of the teeth should be clipped using sharp, clean clippers, without cracking the tooth or leaving sharp edges. Note that cutting a tooth flush with the gum provides another site for infection.

Castration

After slaughter, large entire males can have a distinctive odour in the carcass which becomes more pronounced when the meat is heated during cooking. For this reason, some butchers and processors tend to refuse to handle boars, or they pay a much lower rate for them. If surgical castration is considered necessary for market and consumer requirements it should be performed by a trained and competent operator. Non-surgical methods are preferable. Surgical castration requires that the animal be adequately restrained and the testes removed by use of a sterile sharp implement such as a knife or surgical scalpel. It is recommended that piglets be castrated after 2 days of age, when they have established their suckling order, and before 7 days of age. When pigs older than 7 days of age are castrated, appropriate and effective restraint should be used. Surgical castration should be avoided.

Health management

A disease outbreak in a piggery can have disastrous consequence. The management practices already described, if carefully followed, will minimize occurrence of disease. That prevention is better than cure is very relevant in the pig farming. A clean, sanitary environment provides the best prevention for internal and external parasite which can be serious problems. Confinement prevents pigs from contaminated fields and dirty lots. Antihelmintics and other drugs, when properly used, aid in elimination of parasites. Antibiotics also protect pigs against disease proliferations and reduce disease outbreaks. They can also promote growth in pigs when given at recommended levels. For diseases that can be prevented through vaccination, a Veterinarian should be contacted to provide such services routinely. A basic knowledge of the main disease which may affect a pig is necessary so that producer can identify and put in place control measures as quickly as possible. Sick pigs generally have the following signs:



- It may not eat or not show interest in feed /water
- It may breathe rapidly indication of a fever
- In white skin-colored pigs the skin may become reddish.
- It may have diarrhea which may sometimes be bloody or blood stained.
- Droopy ears or ears pointing downwards.
- Dull eyes.
- Dull skin and hair.
- Its tail will become limp.
- Separates itself from the rest.

Regular sanitation program

Infections in pig farms and various disease conditions can be prevented if the following essential features of adequate sanitation are adopted:

- Cleaning of all dirts in floor, walls, roofs/ceiling at a regular intervals.
- Proper disposal of manure, feed wastes and other excreta daily to prevent breeding place of flies.
- Construction of proper drainage and manure pit and cleaning of the same at regular intervals to facilitate uninterrupted drainage of liquid excreta.
- Cleaning farm utensils with disinfectant like potassium permanganate, bleaching powder etc.
- Facilitating proper cleaning and keeping floor dry using lime or other disinfectants.
- Burning of all sweeping and scrapings.
- Applying heavy coating of white wash to the floors, walls and partitions, mangers, using 0.5kg of lime in one gallon of water with disinfectants.
- Judicious spraying of disinfectants surrounding the pig sty at a regular interval along with cleaning of garbage.
- Disposal of dead animal properly by burying away from the human habitation.
- Closely observing newly introduced pigs in the farm and keeping them separately (quarantine) for a few days.
- Pigs in good health should be washed or bathed once in a day.

Special sanitation programme (when pigs suffer from disease)

- Diseased animals to be isolated from healthy ones to prevent spread of infection.
- Curative treatment is to be given to the suspected animals which are to be kept in isolation until they are free of infection.
- The contaminated premises and utensils are thoroughly cleaned using disinfectant.
- Pigs surrounding may be disinfected with lime, phenol, formalin, etc.
- Fresh lime can be sprinkled on the floor, walls and ground for disinfecting them.
- Lime or washing soda is commonly used for disinfectant of buildings and farm utensils.
- Whitewash acts as more effective disinfectant when phenol 5% is mixed. Phenol can also be used for disinfecting metallic objects.
- Iodine, iodophore, potassium permanganate, hydrogen peroxide, etc may be used for disinfecting skin infection.
- Potassium permanganate is used extensively for wound dressing and footh bath.
- All utensils, managers, troughs, etc should be scalded with boiling water to which washing soda may be added.
- All waste products including thrown off from the sick animals are infective and therefore must not be allowed to accumulate but should me immediately destroyed, buried or rendered harmless.
- To prevent spread of disease through discharge of nose, mouth, skin, eyes, uterus, sung and urine, all persons other then the attendant(s) of diseased animals should be kept away from infected pens, utensils, clothing's, etc.
- Dry sweeping or dusting may be dangerous as the organism may hang about in the air and settle again on different places. All surfaces should be moistened before sweeping and scrapping.

- Infected manure, bedding materials should be taken out carefully and burnt off.
- After completing the disinfection in every detail the attendant should disinfect his or her hands, arms, booths and other articles of wear.



Disease, Vaccines and Treatment

Most common diseases are affected in pigs

(i) Parasites

These are organisms that live on (external parasites) or in (internal parasites) an host (another organism) in order to obtain food. External parasites mainly cause irritation to the skin surface, often leading to wounds and increase susceptibility to other infections. Common ones are flies, ticks, lice, mange mites, etc. The internal parasites are more common to pigs on free-range. Example is the round worm (Ascarislumbricoides) which causes lots of damage to pig herds.

Heavy infestation leads to inherent piglet's weakness and loss of weight. Others harmful worms are tapeworms, e.gtaeniasolium, which has the pig as its intermediate host, while the adult worm lives in man. Pig becomes infected by picking up eggs from human faeces and larvae then encyst in the pig's muscle. To prevent worm infestation in pig herd, avoid contaminated water and feeds. Clean and remove faeces always, deworm with broad spectrum antihelminthics as recommended by veterinarian.

(ii) Hog Cholera/Swine Fever

This is a highly contagious and acute viral disease of pigs and frequently fatal. The spread is by animal contact, contaminated urine and faeces or other body secretions.

The symptoms are:

- Loss of appetite in affected animals.
- Inflammation of the eye
- High body temperature
- Severe diarrhea
- Discharge in the eye causing eyelids to stick together
- Trembling and incoordination
- Death often results after 7-8 days.

There is no effective treatment except vaccination programme to be instituted if there is danger of hog cholera infection. Avoid contact with infected animals.

(iii)Salmonellosis

This disease is caused by bacteria - several species of Salmonella.

The symptoms are:

- High fever, dullness, anorexia, weakness, nervous symptoms.
- Bluish-red coloring of the ears, limbs and the centre of the belly.
- Bloody spots all over the body.
- Wasting and persistent grayish diarrhea sometimes mixed with blood and shreds or necrotic material from the gut.

Normal hygienic measures pelleted feed, thorough cooking of the swill. Remove feed for two days and provide clean water. Use antibiotics as prescribed by a veterinary doctor.

(iv) Swine dysentery

Known by a number of names, including bloody diarrhoea, hemorrhagic enteritis bloody scours and black scours. It affects pigs of all ages, sometimes causing death.

The symptoms are:

- In acute cases wasting and passing of diarrhoea containing varying amounts of mucus, blood and necrotic material.
- Fever.
- In chronic cases, pigs have grayish or brownish faeces, rough hair coat and low growth rate.

Control by delaying the reuse of the pens of infected animals. Disinfect pens.

(v) Anaemia

The symptoms are:

- Pale skin, weak piglets with high respiratory rate.
- Jaundice.
- Blood stained faeces.
- Early death.

Control and treatment is by providing iron injection or oral paste containing iron. Feeding compost- must be of good quality and supplied daily. Compost of poor quality may contain bacteria. Wood ash can also is put into the pen. This will not provide iron, but it does contain other important minerals.

(vi) Foot and mouth disease

Foot-and-mouth disease is an acute, highly contagious, and viral of animals with hooves, such as cattle, water buffalo, goats and pigs.

The symptoms are:

- Sudden onset of severe lameness, fever, formation of vesicles on coronary bands.
- Blisters can be found on thin-skinned areas like udder, teats, anal area and eyelids. These blisters rapture within one day.
- There may be frothy saliva, anorexia, sometimes hooves become loose and fall off.
- Sows may abort.

Prevention and treatment is through vaccination, quarantine, proper cooking of swill, slaughter and burial.

(vii) Anthrax

Anthrax is a bacterial disease of pigs caused by Bacillus anthracis and associated with contaminated feed containing meat.

The symptoms are:

- Oedema and swelling of the neck region.
- Dysponea (breathing difficulty).
- Fever, anorexia and passage of bloody faeces.
- Sudden death.

Prevention and treatment is through antibiotics (penicillin) as prescribed by a veterinary doctor; and the thorough disinfection of the farm and burning of carcasses.

(viii) Pleural Pneumonia

The symptoms are:

- Acute cases show anorexia, high fever, laboured respiration, red or blue colouring of ear-tips, belly, legs and end of tail.
- Death within 4 6 hours of onset of clinical symptoms.
- Blood stained froth from mouth or nose.
- Abortion.
- In chronic cases, anorexia, coughing and depressed growth rate.

Prevention and treatment is through antibiotics as prescribed by a veterinary doctor.

(ix)Brucellosis

The symptoms are:

- Anorexia, fever, stiff legs, occasional lameness, early abortion (returns to oestrus 5 8 weeks after service as a result of infection of service)
- Infection later in pregnancy gives rise to litter with mummified, still born or weak piglets.
- Bloody vulva discharge and endometritis.
- Retained placenta.
- Boars usually develop orchitis (inflammation of one or both testicles) and epididymitis within seven days of infection.
- The testicles are swollen and painful and permanent sterility can be the result.

Prevention is based on hygienic measures and purchase of stock from clean herds only. No treatment/vaccination is 100% effective. All animals must be slaughtered and restocking should be after one month.

(x) Erysipelas

This is caused by a bacterium agent which lives in the soil pigs can pick up the agent from soil or by animal contact and even humans. In the acute form, sudden death is common. The symptoms are:

• Marked constipation.

- High temperature $(41-42^0 \text{ C})$
- Reddish-purple discoloration of the ear, abdomen and legs.
- Chronic stage leads to arthritis swollen joints, stiffness and heart damage.

For control a routine vaccination programme is recommended.

(xi)Septicemia

This is caused by bacterial agent and transmitted through contaminated food and water. The symptoms are:

- High temperature $(41-42^0 \text{ C})$.
- Swelling of throat and neck.
- Difficult respiration with mucous.
- Difficult swallowing.
- Salivation.
- Death within 8-24 hours.

Control is through proper vaccination and adequate sanitations. Diseased animals should be separated from the healthy animals.

Deworming regularly

The deworming schedule should include prebreeding for all breeding stock and prefarrowing for gilts and sows, prevention of Strongyloides and roundworms in piglets, and one or more dewormings in weanling and growing pigs. Specific strategic schedules should be arranged by veterinarian.

Vaccination schedule for pigs

There are 03 vaccines available in Bangladesh against following diseases:

	Name of diseases	Indication of vaccines		
01.	Anthrax	1 st time at 03 months old and then every 06 months		
02.	Foot and Mouth Disease	1 st time at 03 months old and then every 06 months		
03.	Hemorrhagic septicemia	1 st time at 03 months old and then every 12 months		

Table A10: Vaccination schedule for pigs.

Research Resources

Receipts	Amount (TK)
Fund Received from BG	3,690,750
Loan Received from NF (Refundable by BG)	431,148
Bank Interst Received	5,714
VAT Deducted by BG	120,150
TAX Deducted by BG	80,100
Nice Foundation Contribution	108,000
Total BDT:	4,435,862
Payments	
Head of Accounts	Amount (TK)
Researchers Remunerations	801,000
Researchers traveling and meeting cost	123,554
Action Research Cost	2,806,478
Research Management and Administrative Cost	699,179
Closing – Cash at Bank	5,651
Total BDT :	4,435,862

Fund position

Total committed by BG	4,322,148
Fund Received from BG	3,690,750
Vat/Tax deducted by BG	200,250
Total BDT received from BG	3,891,000
Receivable from BG	431,148

Profit and Loss on Hygienic Pig Rearing at Household level

Number of pigs – Male-1, Female – 1, Age- 6 months Duration of rearing -12 months

Rearing Cost in BDT

Sl no.	Description	BDT
А.	Capital Cost	
	Pig cost – 2@ 5,000 each	10,000
	Hygienic shed making – as per research model	7,000
	Manure management and sanitation	1,500
B.	Feed Cost for 2 adult pigs	
	Concentrated feed -1 kg per dayfor 1 pig = @BDT 18 per	13,140
	kg x 365 days x 2 pigs	
	Non-concentrated feed - $2 \text{ kg per dayfor } 1 \text{ pig} = @BDT 5$	7,300
	per kg x 2 kg x 365 days x 2 pigs	
С	Feed Cost for piglets (2 times 6x2 total 12 piglets)	
	Concentrated feed – 500gm per dayfor 12 piglets = @BDT	6,480
	9.00 per 500gm x 60 days x 12 piglets	
D.	Feed Cost for 6 growing piglets	
	Concentrated feed -1 kg per day for 6 pigs = @BDT 18	9,720
	per kg x 90 days x 6 pigs	
	Non-concentrated feed -1 kg per day for 6 pigs = @BDT 5	2,700
	per kg x 90 days x 6 pigs	
E.	Other costs (treatment, vaccine	1,500
	Total Expenses	59,340

Gross Income

Sl no.	Description	BDT
A.	Sale of 3 months aged piglets @ BDT; 2,000x 6 piglets	12,000
	Sale of 6 months aged piglets @ BDT; 230 per kg x 6 piglets x 60 kg per piglets	82,800
	Sale of Adult pigts @ BDT; 230 per kg x 2 piglets x 90 kg per piglets	41,400
	Total income BDT:	136,200

Net Profit

Gross Income BDT :	136,200
Less: Total Expenses BDT	59,340
Net Income BDT:	76,860





Benchmark Survey Form

Title of the project: Participatory Action Research on 'Securing the livelihood through improvement of Kawra pig-rearing community of Southwest Bangladesh'

Form No.:

Date:

General questionnaires:

A-1	Polder No.: 30		
A-2	Name of WMG / Farmer's Field School:		
A-3	Name of Farmer's Field School Organizer (FO):		
A-4	Date:		
A-5	Identity number of Farmer's Field School:		
A-6	Name of the farmer:		
A-7	Gender: □ Male □ Female		
A-8	Age:		
A-9	Mobile number of the farmer:		
A-10	Education: □ Illiterate □Literacy □ Primary □ Secondary or higher		
A-11	Member of WMG: □ Yes □ No		
A-12	Agricultural land area: decimal		
A-13	Homestead land area: decimal		

Questionnaires related to pig rearing:

B-1	Experience of pig r	earing: N	I onth / Year		
B-2	Number of pig acco	ording to breed/variety:			
	Breed/Variety	Age	Male	Female	Sub-Total
	Black	2-6 Months			
		> 6 Months			
	Dolkomol	2-6 Months			
		> 6 Months			
	Banibuno	2-6 Months			
		> 6 Months			
	White/Cross	2-6 Months			
		> 6 Months			
		Total			
B-3	Tentative body wei	ght (Average): a. Adult	- kg b. Pig	glet (After birth)-	kg
B-4	Number of piglet (s) birth in each pregnan	cy:		
B-5	5 Number of piglet (s) die in each pregnancy:				

B-6	Purpose of pig rearing: I. II. III.			
B-7	Which season is the best for pig fattening? □ Summer □ Rainy □ Winter □ Spring			
B-8	Which season is the best for pig breeding? □ Summer □ Rainy □ Winter □ Spring			
B-9	Pig rearing systems: Intensive Semi-intensive Open			
B-10	Housing systems: Closed shed Without shed Just fencing Others ()			
B-11	Floor of the house: \Box Soil \Box Concrete \Box Others ()			
B-12	Roof of the house: □ Goalpata □ Straw □ Tiles □ Aluminum sheets □ Others ()			
B-13	Feed supply per adult pig(daily)Concentrate-kgGrass-kg			
	$\Box \text{ Rice polish-} \qquad \text{kg } \Box \text{ Kitchen garbage-} \qquad \text{kg}$			
	□ Vitamin premix- kg □ Others- kg			
B-14	Feed supply per piglet(daily)□Concentrate-kg□Grass-kg			
	$\Box \text{ Rice polish-} \qquad \text{kg} \ \Box \text{ Kitchen garbage-} \qquad \text{kg}$			
	$\Box \text{ Vitamin premix-} \text{kg} \ \Box \text{ Others-} \text{kg}$			
B-15	How many times supply feed in a day? □ 01 □ 02 □ 03 □ 04 or more			
B-16	Vaccination to pig □ Never □ Sometimes □ Regular If yes, which vaccines are used? □ Anthrax □ HS □ FMD □ Others			
B-17	When to de-worm your pig? □ Never □ Sometimes □ Regular If yes, how frequently? Every days / months interval			
B-18	Where you can take your pig for treatment? □ Never □ Upazila Veterinary Hospital □ Rural animal practitioner □ Others			
B-19	Do you use disinfectant for cleanliness of pig house? □ Yes □ No			
B-20	Is there any waste management facility? I Yes INO If yes, how do you store?			
B-21	How much pork is needed for consumption in your family per year? kg			
B-22	How many pigs you can sell per year? a. Adult- b. Piglet-			
B-23	Do you have any training on pig rearing? Ues No If yes, where?			
B-24	Do you have other domestic animals? Yes			
B-25	Have you ever suffered from diseases during pig rearing? □ Yes □ No If yes, please mention the diseases or symptoms-			
B-26	Do you face any social barrier related to pig rearing? □ Yes □ No If yes, please mention the social barriers-			
B-27	Where do you sell pig? Village market At home Others			
B-28	Selling price (one) after rearing: a. Adult- BDT b. Piglet- BDT			
Comments of the data collector:				

Signature of the data collector with date



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Endline Survey Form

ধকরের শিরোনামঃ Participatory Action Research on 'Securing the livelihood through improvement of Kawra pig-rearing community of Southwest Bangladesh'

ফরম নং-

সাধারণ প্রশ্নসমুহ

এ-১ পোন্ডার নং - ৩০ ডাব্লিউ এমজি/কৃষক মাঠ স্কুলের নামঃ এ-২ কৃষক মাঠ স্কুল অর্গানাইজার (এফও)-এর নামঃ ଏ-୦ তারিখঃ ଏ-8 কৃষক মাঠ স্কুলের পরিচিতি নাম্বারঃ ଏ-୯ ଏ-୬ কৃষক/ কৃষাণির নামঃ ଏ- ୧ লিঙ্গঃ ক. 🗆 নারী খ. 🗆 পুরুষ ଏ-৮ বয়সঃ শিক্ষাগত যোগ্যতাঃ 🗆 স্বাক্ষর জ্ঞানহীন 🗆 স্বাক্ষর জ্ঞান সম্পন্ন 🗆 প্রাইমারী 🗆 মাধ্যমিক কলেজ বা তদুর্ধ ଏ-ଚ ডাব্লিউ এমজি-এর সদস্য: ଏ-১୦ 🗆 হ্যাঁ 🗆 না কৃষি জমির পরিমাণ (ফসলি জমি এবং ঘের একত্র করে): ଏ-୨୨ শতাংশ এ-১২ বসতবাড়িতে জমির পরিমাণ: শতাংশ

ণ্ডকর পালন সংক্রান্ত প্রশ্নসমুহঃ

বি-১	শুকর পালনের অভিজ্ঞতা	ঃ মাস / বছৰ	র			
বি-২	জাত অনুযায়ী শুকরের স	জাত অনুযায়ী শুকরের সংখ্যাঃ				
	জাত	বয়স	পুরুষ শুকর	ন্দ্রী শুকর	মোট	
	কালো	২-৬ মাস				
		৬ মাসের উর্ধ্বে				
	ডোলকমল	২-৬ মাস				
		৬ মাসের উর্ধ্বে				
	বানিবুনো	২-৬ মাস				
		৬ মাসের উর্ধ্বে				
	সাদা / শংকর	২-৬ মাস				
		৬ মাসের উর্ধ্বে				
		সর্বমোট				
বি-৩	ওকরের আনুমানিক ওজন	ন (গড়)ঃ ক. প্রাপ্ত বয়স্ক -	কেজি। খ. বাচ্চা (জন্মের পর	র) - কেজি।		
বি-8	প্রতিবার প্রজননে একটি	দ্রী ওকর কয়টি বাচ্চা প্রসব করেঃ	। ত্রী			
বি-৫	প্রতিবার প্রজননে কয়টি ব	াচ্চার মৃত্যু হয়ঃ				
বি-৬	শুকর পালনের উদ্দেশ্যঃ	ক. খ.	গ.			
বি-৭	মাংশ উৎপাদনের উদ্দেশে	া্য কোন ঋতুতে আপনি শুকর পালন করে	। থাকেনঃ 🗆 যীম্মকাল 🗆 বর্ষাকাল 🗆	শীতকাল 🗆 বসম্ত্মকাল		
বি-৮	বাচ্চা উৎপাদনের উদ্দেশে	া্য কোন ঋতুতে আপনি শুকর পালন করে	। থাকেনঃ 🗆 যীম্মকাল 🗆 বর্ষাকাল 🗆	শীতকাল 🗆 বসম্ত্মকাল		

বি-৯	স্তকর পালন পদ্ধতি ঃ 🛛 ইনটেনসিভ বা নিবিড় 🛛 সেমি-ইনটেনসিভ বা আধা-নিবিড় 🗆 উন্মোক্ত
বি-১০	ওকরের বাসস্থানঃ 🗆 চালাসহ আবদ্ধ ঘর 🗆 চালাছাড়া ঘর 🗆 শুধু বেড়া দেয়া 💷 অন্যান্য
বি-১১	যরের মেঝে (ফ্র্র্যের)ঃ □ মাটির □ পাকা করা □ অন্যান্য ()
বি-১২	ঘরের ছাউনি (ছাদ) ঃ 🗆 গোলপাতার 🗆 খড়বা ছনের 🗆 মাটির টালি 🗆 টিন জাতীয় 🗆 অন্যান্য ()
বি-১৩	থতিদিন একটি প্রান্ত বয়ক্ষ গুকরকে কি ধরনের খাদ্য সরবরাহ করে থাকেনঃ 🗆 দানাদার- কেজি
	🗆 ঘাস বা লতাপাতা- কেজি 🗆 চালের কুঁড়া- কেজি 🗆 রান্নাঘরের উচ্ছিষ্ট- কেজি
	াডটামন/ামনারেল- কোজ 🗆 অন্যান্য- কোজ
বি-১৪	প্রতিদিন একটি গুরুরের বাচ্চাকে কি ধরনের খাদ্য সরবরাহ করে থাকেনঃ □ দানাদার- কেজি
	⊇ খাস বা গতাপাতা- কোজ ⊒ চালের কুড়া- কোজ ⊒ রাণ্ণাখরের ডা¢ছে- কোজ ⊐ জিটামিন মিনাবেল কেজি ⊐ অন্যান্য কেজি
রি-১৫	
ति २७	
14-26	আগান উক্ষরেও <i>। ডকা পিরে খাকেন । কনাঃ</i> । কবনহ । ডকা পেরা হর শ। । এবে এবে । এব এবে । টিকা দিয়ে থাকেল কোন কোন বোগের বিরম্জেঃ । তানকো । গলাফোলা । জন্যবোগ । অন্যান্য
ति₋১۹	
14-21	খাগদ উদ্ধান পূৰ্ণ বাৰ্থ বাৰ্তমান কৰা বিদ্যাল কৰা বিদ্যালয় বাৰ্কে বাৰ্কে বাৰ্কে বাৰ্কে বাৰ্কে বাৰ্কে বাৰ্কে বাৰ খাওয়ালে কতদিন পর পর খাওয়ান? দিন / মাস
বি-১৮	অসন্ত ওকরের চিকিৎসাসেবা কোথায় থেকে গ্রহন করেনঃ 🛛 কখনই না 🗅 উপজেলা প্রাণি হাসপাতাল 🗅 পল্লী প্রাণি চিকিৎসক
	🗆 অন্যান্য
বি-১৯	গুকরের বাসস্থান পরিক্ষার-পরিচ্ছনুতার জন্য জীবাণুনাশক ব্যবহার করেন কিনাঃ 🗆 হ্যাঁ 🛛 🗆 না
বি-২০	গুকরের মলমূত্রসংরক্ষনের জন্য কোনো ব্যবস্থা আছে কিনাঃ 🗆 হাঁ 🗆 না
	হাঁ৷ হলে কিভাবে সংরড়ান করেন?
বি-২১	বছরে আগনার পরিবারে ওকরের মাংশ খাওয়ার পরিমাণঃ কেজি
বি-২২	বছরে কয়টি ওকর বিক্রি করেন ঃ ক. প্রাপ্ত বয়স্ক - টি। খ. বাচ্চা - টি।
বি-২৩	স্তকর পালনের উপর প্রশিক্ষণ নিয়েছেন কিনাঃ 🗆 হযাঁ 🗆 না
	হ্যাঁ হলে কোন সংস্থা হতে ও কতদিনের প্রশিড়াণ নিয়েছেন?
বি-২৪	আপনার বাড়িতে আর কোনো পশু-পাখি পালন করেন কিনাঃ 🗆 হযাঁ 🗆 না
	হ্যাঁ হলে, 🗆 গর্ন্ধ 🗆 ছাগল 🗆 ভেড়া 🗆 মুরগি 🗆 অন্যান্য ()
বি-২৫	স্তকর পালন করতে গিয়ে আপনি বা পরিবারের কোনো সদস্য রোগে আক্রাম্ম্ম হয়েছেন কিনাঃ 🗆 হ্যাঁ 🗆 না
	হ্যা হলে রোগের নাম বা লক্ষণসমূহ বলুন-
<u> </u>	
।ব-২৬	ন্টকর পলিন করতে গিয়ে আপনি সামাজিকভাবে কোনো ধরনের বাধার সম্মুখনি হয়েছেন কিনাঃ । হ্যা । না —
	হ্যা হলে 1ক ধরনেরঃ
বি-২৭	<i>শুকর কোথায় বিক্রি করেনঃ</i> 🗆 বাজারে 🗆 বাড়ীতে 🗆 অন্যান্য স্থানে
বি-২৮	পালনের পর একটি শুকরের বিক্রয় মূল্য কত পেয়ে থাকেনঃ ক. প্রাপ্ত বয়ক্ষ- টাকা খ. বাচ্চা- টাকা
তথ্য সংগ্ৰহৰ	। চারীর মন্ডবাঃ

তথ্য সংগ্রহকারীর স্বাক্ষর ও তারিখ

Farmers Field School Curriculum

Sl	Duration	Key points	Discussions issues
00	2-3 hours	Household visit Farmer Selection for FFS Finalization of participants Benchmark Survey	 Involvement of the family with the said intervention, interest, opportunity If necessary little reshuffles, finalize after discussion with WMG. Ensure resolution with participants list Benchmark survey Analyze the survey result and facilitators will get an overview of the group (practice, production, marketing, service, input)
	(0 day)	 Introduction of FIS Module Introduction of FFS approach, objective & activities. BBT (Ballot Box Test) Group dynamics Small group formation Introduction to the different stages of total life cycle and duration of stages Socio-economic benefits of pig rearing Horizontal learning method and role of the participants 	 Participatory drawing of the life cycle: piglet to piglet For each step in life cycle discussion of important issues related to housing, feed, disease, etc and add this to the drawing Agreement by participants to share learning and become a coach of 2-3 neighbours after each session
2	2-3 hours 07 days after starting	 Piglet stage Recap and present day's program Introduction to ecosystem and PESA PESA with presentations, discussion, decision making Housing-Economic importance of /piglet/pig pen Criteria for ideal piglet/pig housing Locally available low cost material for housing Feed-requirement, Ideal food, available food 	 Considering 3 month age piglets Discuss with participants what is ecosystem. What elements of ecosystem are important for pigs. What do we need to observe. How can we

		 Health –weight, size diseases, Group Dynamics () Special topic (Housing, de- worming/vaccination) Summary, message for horizontal learning, agreements for the action and next meeting. 	 observe. How frequent? How do we record the observations The introduce PESA First time pay a lot of attention to drawing what they observe.
3	2-3 hours 21 days after starting	 Introducing to setting up trial Recap and present day's program PESA with presentations, discussion, decision making Group dynamic () Why we set trial? What will we observe in the trail? How we observe and interpret the result? How can it influences decision making (using practical example) Special topic -record book for record keeping Summary, message for horizontal learning, agreements for the action and next meeting. 	What is trial? Why is it heart for the FFS? Discuss details on trial objectives and process
4	2-3 hours 49 days after starting	 Growing stage I Recap and present day's program PESA with presentations, discussion, decision making Housing- Feed- Feed management for grower pig Health- Group Dynamic () Special topic- Concentrate feed and Fodder cultivation (arum) Marketing-inputs, services, medicines, Summary, message for horizontal learning, agreements for the action and next meeting. 	This stages consider 6-8 months age At least 7 month required for becoming pregnant, as we start at 3 month piglet then need extra 5 month at this stage.
5	2-3 hours 70 days after starting	 Growing stage II Recap and present day's program PESA with presentations, discussion, decision making Housing- Feed- Health- Marketing Group Dynamic () Special topic- Health hygiene and disease prevention Marketing-inputs, services, medicines, Summary, message for horizontal learning, agreements for the action and next meeting. 	

6	2-3 hours	Growing stage III	
	91 days	• Recap and present day's program	
	after starting	• PESA with presentations, discussion, decision	
		making	
		Housing-	
		• Feed-	
		• Health-	
		Marketing	
		• Group Dynamic ()	
		• Special topic- Boar selection and mating	
		• Marketing-inputs, services, medicines,	
		• Summary, message for horizontal learning,	
		agreements for the action and next meeting.	
7	2-3 hours	Enterprise Budget and access to finance	Enterprise budget with
	112 days	• Recap and present day's program	traditional input costs and
	after starting	• Quick observation of the trials pigs and discuss	with improved production
		what actions are needed (mini-PESA)	practice that will show
		Introduce "Enterprise Budget"	high production cost and
		• comparing of "Enterprise Budget" in decision	high return. Compare both
		making	budgets to show the
		Business goal and production plan	benefits.
		• Group Dynamic ()	
		• Special topic- Prepare own business plan and	
		budget (financial requirement)	
		Access to finance	
8	2-3 hours	Women empowerment through pig farming?	
	133days	• Recap and present day's program	
	after starting	• PESA	
		• Group Dynamic ()	
		• Special topic-Women empowerment through	
		livestock	
		• Summary, message for horizontal learning,	
0	0.01	agreements for the action and next meeting	
9	2-3 nours	Input supplies and networking	
	154 days	• Recap and present day s program	
	after starting	• PESA with presentations, discussion, decision	
		• Housing-	
		• reed-	
		• Health-	
		• Marketing	
		• Group Dynamic ()	
		• Special topic-inputs supply chain	
		• Identification of inputs and services for pig	
		Identification of problems in input & services	
		How better input increase production and	
		• now benef input increase production and profitability	
		Risk involved for higher investment	
		 Draw an actor's man 	
		 How networking can help in access to quality 	
		inputs	

		• Summary, message for horizontal learning, agreements for the action and next meeting.	
10	2-3 hours	Food, nutrition, balance diet & malnutrition	
	175 days	problem	
	after starting	Recap and present day's program	
		• PESA with presentations, discussion, decision	
		making	
		Housing-	
		• Feed-	
		• Health-	
		• Marketing	
		• Group Dynamic() Spacial topic Balance dist comparing	
		Summary message for horizontal learning	
		agreements for the action and next meeting	
11	2-3 hours	Gestation stage	Considering 4 months
	207 days	 Recap and present day's program 	6
	after starting	• PESA with presentations, discussion, decision	
		making	
		Housing-	
		• Feed-Feed management for pregnant pig	
		• Health-	
		Marketing	
		• Group Dynamic ()	
		• Special topic-Care of the sow during	
		farrowing and lactation.	
		• Marketing-inputs, services, medicines,	
		• Summary, message for horizontal learning,	
12	2.3 hours	Collective and colleborative action	
12	2-3 Hours	Becan and present day's program	
	237 days	• PESA with presentations discussion decision	
	after	making	
	starting)	Housing-	
	_	• Feed-	
		• Health-	
		Marketing	
		Group Dynamic()	
		Special topic-How collective action influences	
		having more income	
		• Quality and availability of inputs and services	
		• Scope of collective action (vaccination, pig	
		collection, quality piglets etc)	
		Cost benefit analysis for collective action	
		Importance of trust building for collective action	
		Develop a plan for collective action	
		Summary message for horizontal learning	
		agreements for the action and next meeting.	

13	2-3 hours	Cross visit to Demo farm	
	267 days		
	after starting		
14	297 days	Invitation trader/buyer	
	after starting	 Recap and present day's program 	
		• PESA	
		• Group dynamic ()	
		• Special topic- Discuss quality requirements,	
		size, transport etc and win-win situation	
		• Summary, message for horizontal learning,	
		agreements for the action and next meeting	
15	2-3 hours	Weaning stage	
	337 days	 Recap and present day's program 	
	after starting	• PESA with presentations, discussion, decision	
		making	
		Housing-	
		• Feed-	
		• Health-	
		• Marketing	
		• Group Dynamic ()	
		• Special topic- Baby pig management – birth to	
		we aning.	
		• Marketing-inputs, services, medicines,	
		• Summary, message for horizontal learning,	
		agreements for the action and next meeting.	
		End data collection	Same questionnaire as
1.6	0.41		baseline,
16	3-4 hours	Field day and Result sharing	
	352 days	• Field Day	
	after starting	• (feeding and vaccination demonstration booth,	
		Hygienic pigpen style booth, market size pig	
		demonstration(Live) booth	
		• Result Discussion	
		• Cost-benefit analysis demonstration but it	
		would be discussed after having pigiet	
17	Weekafter	Phase out session	
1/	field day	BBT	
		Self evaluation	
		Planning future	
		Etc.	

Sources of information

- 1. Dalit communities in Bangladesh. <u>Global Call Recommendations to End Caste</u> <u>Discrimination in Bangladesh</u>
- 2. www.microlinks.org; <u>www.seepnetwork.org</u>; www.actionforenterprise.org; www.bdsknowledge.org; www.businessenvironment.org; www.markets4poor.org; http://www.enterprise-development.org
- এ আসাদুজ্জামান (২০০১), "THE PARIAH PEOPLE An Ethnography of the Urban Sweepers in Bangladesh", বাংলাদেশ
- 4. DICK MUYS CTA (1984), "PIG HUSBANDRY IN THE TROPICS", Netherlands
- 5. H. Scrres (1992), "MANUAL OF PIG PRODUCTION IN THE TROPICS" Netherlands
- 6. Ian Gordon (1997), "Controlled Reproduction in Pigs, Ireland
- 7. প্রফেসর আব্দুর রহমান (১৯৮৫) "গৃহপালিত পশুর সংক্রামক রোগ তত্ত্ব", বাংলাদেশ
- 8. ডঃ আনোয়ারুল ইসলাম (১৯৮৯), প্রাথমিক পরিবেশিক জীববিজ্ঞান, বাংলাদেশ
- 9. ডঃ লাল মোহন মন্ডল (২০০৩), উন্নত প্রথায় শুকর লালন, পশ্চিম বঙ্গ, ভারত
- 10. ডাঃ সন্তোষ কুমার মুখোপাধ্যায় (১৯৯৭), শুকর পালন ও চিকিৎসা, পশ্চিম বঙ্গ, ভারত
- **11.** Dick Muys (1973), Pig keeping in the tropics, Netherlands.
- 12. King VL. Koketsu Y. Reeves D. Xue J and Gary DD (1998). Management factors associated with swine breeding-herd productivity in USA. Prev. Vet. Med., 35: 255-264.
- **13.** Johnson AK, Morrow JL and McGlone JJ (2001). Behavior and performance of lactating sows and piglets reared indoors and outdoors. J. Anim. Sci. 79: 2571-2579.
- 14. Moore MJ (2002). Basic requirements for intensive pig housing. J. Anim. Sci. 78: 234-267.
- 15. Smith JK (2005). Swine Housing Requirement. J. Anim. Sci. 74: 924-940.