

Livelihood Up-gradation: A Case of Integrated Approach for Resource Management

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ABSTRACT

Rural livelihood is dependent on a number of factors including the integration of different farm enterprises which can supply all the basic needs of the families and at the same time could improve the lifestyles of the farm families. Assam is a land dominated by tribal, marginal and small farmers with poor resource base like lack of assured irrigation facilities, small operational holdings, insufficient transport and communication facilities, traditional technology, low input utilization in farm sector, small cash at the disposal of the farm families and so on. At the same time the demand for meat (protein) is increasing. Almost all the tribal farmers are rearing pigs of local breed with low productivity and small litter size. Pork is one of the main sources of protein for the tribal farmers. The availability of pigs was 4.2 per 100 people in Assam in 1987 which rose to 4.83 in 1999. As per the 2003 livestock census, the total pig population in Assam rose from 1.08 million in 1997 to 1.53 million only in 2003. The growth of pig population is due mainly to low productivity and poor reproductive efficiency. It was hypothesized that integration of pig with fisheries and vegetables farming along with cross bred pigs and proper management practices, the production efficiency of the homestead could be improved to a great extent. Under the present study as part of a Livelihood project under NAIP, ICAR, New Delhi, 1070 farmers with homestead ponds from three disadvantaged districts of Assam, namely, Kokrajhar, Diphu and Lakshimpur were provided with technological backstopping in the form of introduction of Hampshire male pig for improvement of local breed, services of de worming, introduction of Indian major carps in homestead ponds and vegetable cultivation in marginal land around the ponds. Our efforts were directed in establishing the fact that the available resources at the disposal of the farmers could be integrated and with little bit of technological intervention, the livelihood could be made more secure and the available natural resources could be manipulated for enhancing income to a great extent. After two cycles of litter, a group of 170 farmers were selected randomly for final data collection. The data were compared with the base data collected before start of the project. It was found that the farmers were able to earn an average income of Rs. 1,16,875.00 per family from all the three components against a cost of Rs. 29,000.00. Income from pig farming was Rs. 19,200.00 only before IFS (Integrated Farming System) was introduced. The reproductive efficiency enhanced to a great extent as the farmers were able to get 34-36 piglets from two cycles on a unit of two female and one male pig. In addition, pig sludge recycled was 2.5 q/ family. As this was used as fish feed, it helped in maintenance of environmental hygiene. Moreover, a total of 114 additional man days was created.

Key words : Rural livelihood ; Enterprises; Lifestyles; Farm families; Traditional technology; Management;

Assam is located in 240-280 N latitude and 89050/ - 97040/ E longitude with a total geographical area of 7.84 million ha with two major river systems-The Brahmaputra and the Barak with an extensive network of perennial tributaries causing heavy flood and erosion during the summer. The state is having a population of about 31.17 millions (Rural population is 26.7 millions) (2011 census) belonging to diverse language and ethnic

groups. Though the state is rich in natural resources like oil, coal, natural gas, limes and stones, yet it suffers from lack of infrastructures, power and health facilities and is characterized by low productivity. The farmers are mostly marginal (63.74% with 0.43 ha per capita land holding availability) and small (21.51% with 1.21 ha per capita land holding availability) and basically with a rain fed rice based farming system.

The traditional food production systems has not proved to be viable enterprises in Assam as is reflected in their livelihood standard with 48 percent of its population below 5 years of age being stunted (NFHS-3). On wealth index, Assam is in the lowest 20 percent of the states in India (NFHS-2). In addition to the major food rice, people of different ethnic groups depend on fisheries, livestock and birds, at traditional level of production. Each enterprise is being treated as a separate entity in absence of clarity of integration with incorporation of modern knowledge of production, resource management and sustainability.

The rice, being the main staple food, is grown in around 2.84 million ha in Assam with a productivity of 1.77 t/ha against a national average of 2.18 t/ha (2008-09). The total area under agriculture is 2.73 million ha out of which 0.47 million ha are flood affected and 0.094 million ha is draught prone. But livestock like pigs and fishes are also important component in traditional farm enterprises that are practiced by the small and marginal farmers in Assam. The livestock and poultry population is about 485 million in India. In Assam the livestock population increased from 12.92 million in 1994 to 13.47 million in 1997 and 14.02 million in 2003. The pig population increased from 0.83 million in 1994 to 1.08 million in 1997. In 2003 the total pig population in India was 13.5 million while it was 1.53 millions in Assam, reared traditionally and forming a part of the food system of the major ethnic groups like Bodos, Mishings and Ahoms. Pig meat is getting popularized day by day in Assam. Sarkar (2011) commented that the *Desi* pig in Assam had poor reproductive efficiency and suggested breed improvement with introduction of Hampshire. The total meat production from all animals was 20.94 thousand tones in Assam in 2002-03.

India produces about 6.57 million metric tonnes of fish with inland fisheries sector contributing 3.76 million metric tonnes. Assam has 23,000 ha of ponds offering great opportunities for culture fisheries and mostly these are homestead ponds. The fish production in Assam is only 2.19 lakh tones (2009-10) though the demand for the fish was much higher, i.e. 3.5 lakh tonnes (2009-10). Culture fisheries in Assam are still to get momentum in many districts particularly in the selected districts of the project. The present productivity level from fish ponds is 1.7 tonnes/ha/year as per the FFDA, Assam.

Vegetables were grown in 0.25 million ha of land in 2009-10 in Assam. There is a great scope for

increasing this area considering the flood prone area available in Assam.

Prevalence of traditional system of farming and non integration of the enterprises coupling with extension systems of different departments working almost in isolation, rather than being interdependent on one another for solving the farmers' problems could be hypothesized as the main reason for low productivity in the state resulting in reduced quality of the life of the farmers. Opportunities like availability of huge water areas in the form of ponds, traditional experiences of the farmers in rearing of pigs, dependence on fish and meat by the people of the locality, opportunities for production of vegetables and availability of appropriate technology and scientific staffs made it possible to undertake the livelihood project in Assam under NAIP by Assam Agricultural University, Jorhat.

The study area was three disadvantaged districts of Assam- Kokrajhar, Karbi Anglong and Lakhimpur out of the 23 districts identified by the Planning Commission, India. These are deprived of proper road communication and other development initiatives. The districts are populated mostly by tribal farmers like Bodos and Mishings, Ahoms, Minorities along with a large number of SC and backward population. Agriculture for these farmers was the main source of sustenance and is characterized by low productivity, poor access to credit and extension, low adoption of technology, vulnerability to risks, poor soil and water management, limited provision for availability of inputs, poor savings habit, poor infrastructures and small holdings. The most important being the lack of integration of the enterprises on a scientific platform.

The farmers under the project area had the experience of rearing pigs of local breed under traditional method. Though fish was an important component of their daily diet, it was collected mostly from rivers, streams, wet lands, i.e., all the natural sources. Fish culture was very rare and even those who practiced it were not as per the recommended packages. Local vegetables were grown on small patches but without full recommended packages.

The average land holding sizes varied from 0.80 ha in North Lakhimpur district to 1.20 ha in Kokrajhar and 1.48 ha in Karbi Anglong. North Lakhimpur and Karbi Anglong is flood affected every year. Karbi Anglong is also is mostly water stressed and a large proportion of it is hills. Only negligible area in North Lakhimpur and Karbi Anglong is under effective

irrigation (below 6.00 %). The waste assimilation like use of pig sludge or pond water for recycling etc. was very poor. The savings habit of the farmers in the study district was also poor, so were the health and hygiene conditions. The highest pork population is at North Lakhimpur district followed by Karbi Anglong and Kokrajhar but the highest pork meat production was in Kokrajhar district (77.13 t). The fish production varied between 25.42 q/ha to 28.42 q/ha in the selected districts (SREP Report, State Department of Agriculture, Assam).

The study was undertaken with the specific objectives of determining the improvement achieved in the productivity through introduction of agro-ecologically appropriate Pig-Fish-Vegetables systems, protection and utilization of natural resource base and environment as a result of introduction of IFS and improved extension efforts and to help in developing entrepreneurship amongst the beneficiary farmers.

METHODOLOGY

The IFS module of Pig-Fish-Vegetables was introduced to groups of 1070 farmers of the three selected districts in the year 2009-2010 which constitutes the population in all the three disadvantaged districts of Assam- Kokrajhar, Karbi Anglong and Lakhimpur where the project was in operation. A sample of 170 beneficiary farmers was selected randomly from all the three districts as sample. Care was taken to distribute the selected beneficiaries almost equally from all the districts (55-60 from each district). After about 14 months of introducing the pigs (two cycles of piglet production) data were collected with the help of a schedule by personal interview.

Technology intervention: The beneficiary farmers were experienced in rearing local breeds of pigs in open enclosures and owned homestead pond. The pond size was of 450 m². One male Hampshire with two local piglets was provided to each of selected farmers. Provision of vegetable cultivation around the pond in a plot size of 1000 m² was also taken into consideration while selecting the beneficiary farmers. The major interventions included balanced diet, deworming and vaccination for the pigs; recycling of pig dung by channeling the dung into fish pond to substitute fish feeds and add fertilizers in the pond, introduction of composite fish culture with Rohu (*Labeo rohita* Ham.), Catla (*Catla catla* Ham.), Silver carp (*Hypophthalmichthys molitrix* Valenciennes.), Mrigal (*Cirrhinus mrigala*

Ham.) and Grass carp (*Clenopharyngodon idella* Valenciennes.) into the ponds, and irrigation of selected vegetables crops with the existing pond water. About 400 fingerlings of the above mentioned species were introduced into the ponds. Vegetables grown were Okra in summer and Cabbage in winter. In addition, farmers were encouraged to lend their male pig for servicing to other farmers in exchange of money or piglet.

The selected beneficiaries were provided with skill training in areas of management of pigs, production and management of culture fisheries, vegetable productions, management of groups, net working etc. before distribution of inputs.

Social intervention: The farmers were mobilized into forming a village level cluster in each village with elected President and Secretary for each village level cluster where each and every issue both technological and social concerning the project activities were discussed.

Local NGOs, one for each selected district was involved in mobilizing people's efforts, developing and implementing action plans and providing the catalytic effects between the project staffs and the farmers and other stakeholders. The project utilized the services of Research Associates for technical backstopping on a regular basis and also provided the necessary training to the beneficiaries. Regular (weekly) discussions of beneficiaries were held at village level with the NGO and the project staffs.

Baseline survey: A baseline survey was conducted on certain specific dimensions like production and management aspects of piggery in the districts, reproductive efficiency of local pigs, production and culture practices of major carps and production of vegetables in the marginal land around the homestead ponds in addition to data connected with soil, climate, community, crops/enterprises in the area before the technological interventions were made. Cabbage and Okra was never grown in marginal land around the pond but the productivity of other vegetable was 2.43q/ha/yr that was grown in other areas.

The final data after implementation of the project activities were collected on the following dimensions spread over a schedule during May/June, 2011.

- i. Number of piglets per two cycles after bred with Male Hampshire (number).
- ii. Income from sale of piglets at three months (Rs.)
- iii. Income in the form of money in exchange of services provided by the sampled farmer to other non beneficiary farmers by the male Hampshire

- iv. Pig dung production (Fish Feed Equivalent Waste) in q
- v. Production of fish from the 450 m² pond (q per plot)
- vi. Production of vegetables from 1000 m² plot (q per plot)

RESULTS AND DISCUSSION

It is observed from Table 1, that the average piglets per cycle with the local breed were only 6, the maximum & minimum being 4-8 per cycle. Further enquiry revealed that the local pigs were mostly fed with locally available feeds such as kitchen wastage, wastage of locally made rice bear, taro etc. They were kept mostly in earthen floored sty in night and were allowed to roam whole

day. In fact, pigs were not even sheltered in most cases and found mostly in unhygienic mudded area of the homestead. Concentrates were hardly fed. Only about 10.00 % farmers fed concentrates, that too only during the bearing stage. After care was almost nil leading to about 20% mortality of piglets during the 1st month itself. However, once Hampshire was introduced, the per cycle production of piglets increased on an average to 9 piglets (the maximum & minimum being 8-13 per cycle) and mortality rates reduced to a great extent because of improved feeding (concentrates) and de worming. The income from piglets (two cycles) itself was on an average Rs. 75,600/- (three months age) against an income of Rs. 10,200/- (two cycles) when pigs were reared alone.

Table 1. Income from Pig-Fish-Vegetables per farmer household in selected districts in Assam (n=170)

Technology	Local practices without Integration			Pig-Fish-Vegetables module		
	Production (Nos.)	Costs (Rs.)	Income (Rs.)	Production	Costs (Rs.)	Income (Rs.)
Piglets (Nos./Two cycles)	16(12-20)	8,000.00	19,200.00	36(28-49)	24,208.00	75,600.00*
Piglets in exchange of service by male Hampshire	-	-	-	6(3-8)	-	12,600.00
Fish feed equivalent pig waste in quintals	-	-	-	2.5 q	-	4,075.00
Fish production in quintals (450 m ²)	-	-	-	0.121 q	2,320.00	12,100.00**
Vegetables production in quintals (1000 m ² for summer and winter vegetables each)	-	-	-			
a. Cabbage	-	-	-	0.3 q	1,923.00	4,500.00
b. Okra	-	-	-	0.4 q	1,450.00	8,000.00
Total (Rs.)		8,000.00	19,200.00		29,000.00	1,16,875.00
B:C	1.40:1			3.03:1		
Labour employed in man days	42			156		

*Piglet was sold between Rs. 2,000/ to Rs.2, 200/ per piglet

**Fish was sold between Rs. 90/ to Rs. 100/per kg

It was also seen that neighbouring farmers were attracted with the size and shape of the Hampshire and so, they serviced their local pigs with the Hampshire owned by the beneficiary farmers. The service was provided in exchange of piglets and that way the sampled farmers earned about 6 piglets in two cycle period (almost 15 months). The table further reveals that the pig wastage (litters/urine etc.) was washed to the homestead ponds as per the advice of the project staff. This greatly reduced the feed cost for the fishes in the pond. An amount of 2.5 q. Fish Feed Equivalent Weight of (FFEW) pig wastage was yielded during the two cycle period thereby saving an amount of Rs. 4,075/- which would have been spend on fish feed when grown alone. As the pigs were kept in earthen floor and allowed to roam earlier, pig wastage could not be used for

productive purposes. The new practice of recycling greatly reduced the unattractive odour in the surrounding and also kept the area clean.

The income from the pond increased to about Rs. 12,100/- against a cost of Rs. 2,320/- for the pond of size 450 m² and average production stood at 2.7 q/ pond (450 m²).

It was also found that the beneficiary farmers utilized the marginal area around the pond which was not practiced earlier. With the help of the pond water being used as a source of irrigation during stress, the farmers grew cabbage and Okra in a plot of 1000 m² and earned an income of Rs. 12,500.00. The farmers never utilized such marginal land earlier before the project.

It is further observed from the table 1 that a total

of 156 man days were generated with introduction of the module, an increase of 114 days over the earlier module of pig rearing alone under traditional system. A man day of 221 is accepted as a good indicator of livelihood as per the HDI, 2011.

The overall income with the module was Rs.1, 16,875.00 from Rs. 19,200.00 when pigs were reared alone over a period of two cycles of piglet production. The B: C ratio was 3.03:1 in the new module as compared to the pig only which was only 1.40:1, there by establishing the efficiency of the new module. Tokrishna (2011) reported that fish yield increased up to 11.25 to 12.50 q/ha under pig fish integrated system. Wannakul (1983) also reported that integrated pig – fish system resulted in 40 percent net income over the total revenue.

CONCLUSIONS

The study reveals superiority of the Pig-Fish-Vegetable system over the traditional system in the

selected districts. However, it is to be noted here that extension efforts were given continuously during the period of production with project staffs visiting and advising the farmers on weekly basis. The involvement of NGOs as partner in implementing the project provided additional help in mobilizing the farmers and receiving feedback wherever the problem arose. Involvement of farmers in groups in deciding about various activities on regular basis provided the extra motivation for success of the system. An element of entrepreneurship was also observed as the farmers were found to be interested in providing services of the male Hampshire in exchange of piglets rather than the money which they thought was less as compared to the price they could fetch from the piglet of three month age. Application of extension efforts in project mode was found to be more effective in livelihood up gradation as the income and man days created was found to improve.

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