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Cultivating Success: Strategies for Small Pig Farmer Enhancement

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Abstract

Pig farming by smallholders has been an essential source of income for poor tribal populations in Assam, an important area in India. With the use of interventions in knowledge acquisition, pig variety substitution, shelter management and veterinary services, recent research aimed to increase the ability of these smallholder pig farmers. Using pre-made, semi-structured questionnaires, a two-stage stratified random sample with 180 tribal farmers was carried out before and after the treatments. After implementing enhanced husbandry methods and improving shelter management, 70% of beneficiaries reported satisfactory conditions in and around pig shelters, while 25% indicated perfect conditions. Notably, high-yielding native or exotic crossbred pigs in the region supplanted bland local pig species by 50%. Prior to the interventions, 86.2% of farmers bred pigs for fattening; however, 91.8% of them started breeding sows to produce piglets. These approaches fostered beneficial improvements in agricultural methods by demonstrating a solid influence on raising and socio-psychological aspects. The adoption of a "piglet production farming system" strengthened food security in the area while improving raising circumstances.

Keywords: Pig farming, smallholders, research, socio-psychological aspects, piglet production farming system, Food security

INTRODUCTION

Small-scale pork producers are vital to the changing agricultural environment as they full fill the increasing demand for pork products and support regional economies (1). These farmers, those are the stewards of this vital sector, confront particular possibilities and difficulties that call for creative thinking to achieve sustained success and expansion. Small-scale pig farmers handle many facets of their business on a more personal level, caring for smaller herds (2). In addition to being necessary for their means of livelihood, these farmers' success guarantees the health and profitability of the pig farming sector as a whole. The program acknowledges the need to provide small-scale pig farmers with strategic methods that include all aspects of their operations to assist and enhance their skills (3).

Effective farm management is essential to small-scale pig producers' success (4). This entails embracing technology innovations, adopting sustainable practices and making the most use of available resources (5). Modern technology integration, such as data analytics and precision farming, can provide priceless insights into feeding effectiveness, herd health and overall farm performance. Small pig producers could maximize environmental impact while increasing output by using these tools to make educated choices (6). "Cultivating Success" highlights the significance of education and training for small pig producers. Making educated judgments requires access to relevant and up-to-date information on best practices, disease management and market trends (7). Collaborative efforts among agricultural institutions, government organizations and industry experts can open doors to chances for continuous learning and skill development, allowing small pig producers to adapt to changing problems and opportunities (8).

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Market access and diversity are critical success factors for small pig growers. Developing strong marketing strategies, researching niche markets and forming alliances with local firms can help these farmers secure consistent revenue streams and develop a long-term market presence (9). In addition, boosting the development of high-quality and specialized pork products could open doors to premium markets, improving the economic sustainability of small pig farming operations (10).

The purpose of the research (11) evaluated the effects of Precision Livestock Farming (PLF) on swine production with an emphasis on automated sensor monitoring. The results demonstrate its financial feasibility by highlighting its favorable impacts on performance and carbon reduction. Nonetheless, there are several restrictions, such as the need for further study to maximize technology and handle any issues.

The mixed-methods study (12) evaluated pig farmers' antimicrobial drives. The 22 carefully selected farmers' semi-structured interviews revealed complex management, stocking and health issues. The findings were corroborated by a questionnaire survey of 261 randomly selected pig farmers. Sustainable store partnerships could be advantageous. Self-reporting biases and driver complexity limit the research.

Thai mixed-methods research (13) examined antibiotic use in pig farming. Half of 84 pig farmers surveyed used antibiotics for preventative purposes, with expertise, money, health advice and cooperative participation influencing service. Critically essential antimicrobials, particularly colistin, were common, requiring gradual limitations and better veterinary services to improve farmers' health advice. Focus on one nation and biases are study limitations.

The research (14) studied 540 cooperative and 270 non-cooperative Chinese pig farmers' cooperative membership and safe yield. Using propensity score matching (PSM) to overcome self-selection bias, cooperative involvement promotes safe practice adoption, depending on cooperative and farmer characteristics. Based on sensitivity analysis, feed and breed practices are solid, but unobservable can alter immunization, medicine and waste disposal.

The research (15) examined porcine dermatitis & nephropathy syndrome, reproductive failure & multi-systemic inflammation in piglets and sows infected with Porcine circovirus 3 (PCV3). Open Reading Frame 2 (ORF2) 524 nucleotides matched GenBank sequences 98.5% to 99.2%. The data imply PCV3 can cause gilt reproductive failure. Limitations include the need for further study to determine the cause and viral effect.

The randomized control study (16) in two Ugandan districts examined the participatory biosecurity training that affected pig farmers' African Swine Fever (ASF) control knowledge, attitudes and practices (KAP). After 12 months, 425 of 830 farmers getting training had substantial knowledge increases. Focus group talks challenged the idea that knowledge alone hampers biosecurity adoption. The research shows biosecurity training's effectiveness and problems.

The EFFORT research (17) discovered more antimicrobial resistance genes (ARGs) in pig and poultry farm dust than in animal feces. Pig and poultry dust resistomes correlated with fecal resistomes. The dust bacterial microbiome and dust resistomes linked strongly. Additionally, farm dust resistomes were favourably related with on-farm antimicrobial usage (AMU). Farmers' resistomes can be affected by farm dust or animal excrement, but no significant changes were seen. These data show the intricacy of livestock farm antimicrobial resistance processes.

The research (18) examined the human-animal relationship (HAR) in pig farming, including farmer attitudes, pig behaviours, husbandry procedures and animal welfare. On 52 farrow-to-finish farms, it used interviews, behavioural tests and productivity data analysis. The third farmer profile prioritized HAR, which increased pig confidence and productivity. Farmer attitudes affect pig farming techniques, welfare and production, according to the research.

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The study goal (19) was to evaluate and compare the production and economic activities of polish pig farms to those in Germany, Denmark, the Netherlands and Spain, with an emphasis on live pig production. According to the findings, production size has a considerable impact on efficiency and competitiveness, with big farms in Poland and Spain that is completely competitive. Data availability and the dynamic nature of the agriculture industry could be limitations.

The researchers (20) tested Escherichia coli from UK pig farms for Antimicrobial Resistance (AMR) using a One-Health approach. The whole genome sequencing of 492 isolates revealed a variety of AMR patterns, including "old" drug resistance. They found no concomitant resistance to critical drugs; however 35% of patients were multidrug-resistant. Coli on pig farms battle AMR in animals. Limitations include pig farms and the need for further study to validate solutions.

This effort intends to assist small pig farmers in overcoming problems, capitalizing on opportunities and contributing to the sector's resilience and vitality by concentrating on effective farm management, ongoing education, market access and environmental sustainability. These farmers can achieve success in an ever-changing agricultural world through coordinated efforts and targeted interventions.

METHODS AND MATERIALS

Study Area

In the state of Assam, which is situated in northeastern India, this study was conducted in 14 villages spread across 5 districts (Weston Assam, Dhemaji, Assam North, Assam South Tripura and Assam east). The majority of the indigenous populations living in these settlements are underprivileged. The research area's geographic coordinates are around 26.2006° N latitude and 92.9376° E longitude. The area receives 2352 mm of rain on average per year. The weather in this region is characterized by a warm and humid climate, with winter temperatures hovering between 6–8 °C and summer temperatures soaring to 35–38 °C.

To collect a variety of data for this investigation, a two-stage stratified random sample was used. The distribution of smallholder pig farms and farmer interests were taken into account while allocating Gram Panchayats, or village governments, in rural India. Villages were selected at random to become strata-1 in each Gram Panchayat. Following that, a minimum of 15% of farmers who raise pigs were randomly selected as strata-2 for data collection in each village was chosen.

Farmers' activities

In the current study, 180 tribal pig-rearing farmers took part in a five-year program (June 2017 to May 2022) focused on four key areas: (a) improving pig care knowledge through formal and informal education, (b) optimizing shelter management, (c) implementing a pig breeding program to produce improved piglets to meet local demand and (d) improving pig wellness management through periodic veterinary treatment facilities to improve overall health.

Training

The 180 farmers were separated into six groups and got three days of hands-on training at the North Eastern Hill Region, Assam Centre in Jorhat, West Assam. The training included building pig shelters, practicing pig farm management methods including disinfectant cleaning and disease prevention using lime powder and complete care recommendations for piglets, developing animals and pregnant animals. Furthermore, the training addressed issues such as feeding techniques that included concentrate feeds and local feedstuffs, illness prevention, first-aid treatment, record-keeping and the economic elements of pig farming. Informal education was provided during farm visits.

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Data collection

We collect data from 180 tribal pig-rearing farmers. Economic data was gathered, including feed costs, gross and net profits. In smallholder pig farming economics, daily feed costs and selling prices of fattener pigs and piglets were determined using a unit of one female and one male pig. The real selling price of piglets as well as the daily food costs for a 3-5 person household was taken into account.

Analysis of statistics

The effect of the pig-rearing intervention was evaluated by the tabulation of relative percentages and frequency levels. The impact of the intervention was ascertained by using a t-test to data on economic advantages. By multiplying frequency counts by matching weights, perception indices (PI) were used to assess the effect on socio-psychological aspects. The degree of progress was indicated by the PI scores, which ranged from 0 to 100, with 100 being the greatest improvement and 0 representing no change. The study used nonparametric Wilcoxon Z statistic to assess the effects of several pig-rearing strategies on various parameters.

PERFORMANCE EVALUATION

Farmers' socio-economic profile

The grantees lacked formal education but had basic literacy abilities such as reading and writing their names. Around 15.5% were illiterate, while 22.3% had finished their primary education. Furthermore, 18.4% and 2.4% of recipients in the study region had completed secondary and upper secondary school, respectively. Regarding family structure, the majority (72.42%) belonged to small or medium-sized family groupings, with 79.5% having a nuclear family structure. Regarding land ownership, 52.8% and 25% of farmers owned 1-2 bigha and more than 2 bigha, respectively, with rainfed land accounting for three-fourths of the total. In terms of economics, a significant proportion (70.58%) of recipients had an annual income ranging from INR 28,000.00 to INR 48,000.00. In contrast, 14.5% had the lowest annual income, while 17.6% belonged to the high-income category, earning more than INR 48,000.00 annually. Table (1) shows the socioeconomic condition of the recipients and figure (1) illustrate the Socio-Economic Profile of Pig Farmers (n=180), Showing Education, Family, Land Holding, Income and Sources.

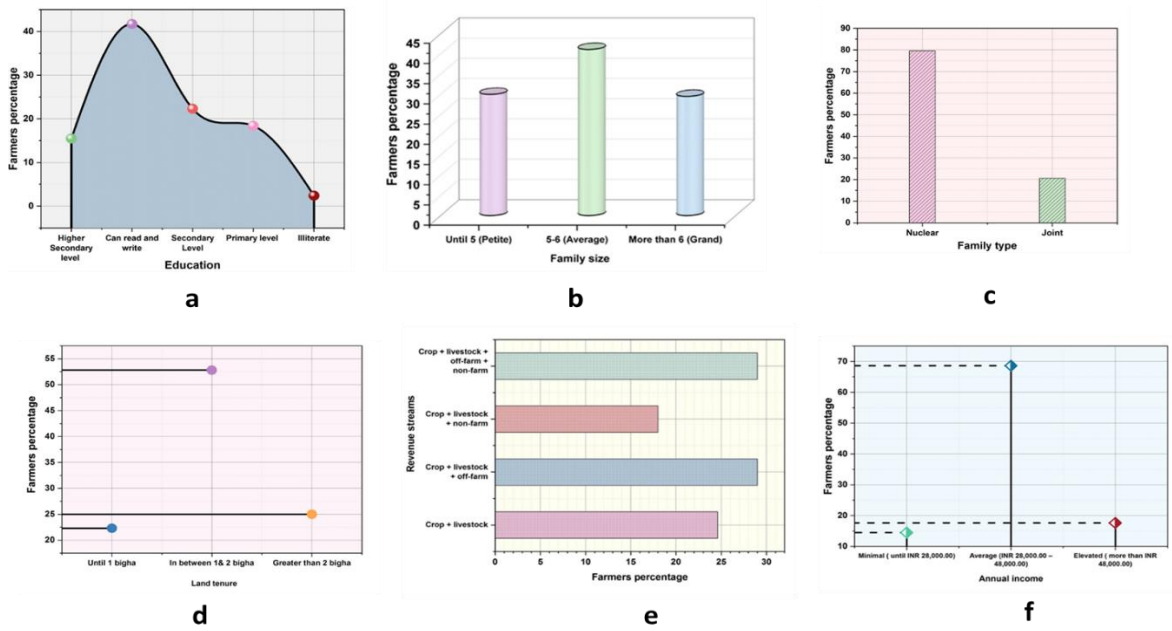

Figure (1). Illustrate the Socio-Economic Profile of Pig Farmers (n=180), a) Education, b) Family size, c) Family type, d) Land tenure, e) Revenue stream and f) annual income (Source: Author)

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Table (1). Socioeconomic situations of pig farmers (n=180) (Source: Author)

SI. No	categorize	count	Farmers percentage
1	Education		
	i) Higher Secondary level	4	15.5%
	ii) Can read and write	75	41.7%
	iii) Secondary Level		
	iv) Primary level	33	22.3%
	v) Illiterate		
		40	18.4%
		28	2.4%
2	Family size		
	i) Until 5 (Petite)	54	30%
	ii) 5-6 (Average)	73	41.1%
	iii) More than 6 (Grand)	53	29.5%
3	Family type		
	i) Nuclear	143	79.58%
	ii) Joint	37	20.6%
4	land tenure (1 bigha =0.25 hectare)		
	i) Until 1 bigha	40	22.3%
	ii) In between 1& 2 bigha	95	52.8%
	iii) Greater than 2 bigha	45	25%
5	Revenue streams		
	i) Crop + livestock	44	24.6%
	ii) Crop + livestock + off-farm	52	29%
	iii) Crop + livestock + non-farm	32	18%
	iv) Crop + livestock + off-farm + non-farm	52	29%
6	Annual income (1 USD =82.97)		
	i) Minimal (until INR 28,000.00)	26	14.5%
	ii) Average (INR 28,000.00 – 48,000.00)	123	68.6%
	iii) Elevated (more than INR 48,000.00)	31	17.6%

Effects of providing shelter for pigs

Table (2) shows that the addition of a pig shelter had a major effect on the neighborhood. Just 6.2% of the farmers in the research region had permanent pig shelters prior to the intervention. Pigs were usually housed in

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bamboo or chopped wood improvised shelters (53.9%) or under trees that were bound with ropes (40%). After the interventions, each of the 180 farmers built a permanent shelter. These can be low-cost structures with a cemented floor, bamboo walls and a roof made of corrugated galvanized iron sheets, or medium-cost structures with a cement floor, brick walls and a roof made of the same material.

In the past, 81.1% of farmers reported that the surroundings of their pig shelters were in bad condition. The majority of farmers gave cleanliness and sanitation in and around the pig shelter top priority after putting in place an upgraded shelter management system. According to the current study, 25% of farmers had exceptional circumstances, while 70% of beneficiaries kept the pig shelter in and around beneficial shape.

Table (2). Before-Impact of Shelter, variety and Health management on farmers' Pig-raising techniques (n=180) (Source: Author)

SI.NO	Individual	Before entering the program		
		Criteria	count	percentage
1	Farmer practices for pig housing facilities	i) Pigs are housed beneath a tree tied with a rope without housing.	72	40%
		ii) Short-term shelter: A smaller bamboo or cut wood enclosure.	97	53.9%
		iii) Stable shelter	11	6.2%
2	Farmers kept hygiene and cleanliness.	i) Bad condition	147	81.1%
		ii) Fine condition	23	12.8%
		iii) Excellent condition	10	5.7%
3	Farmers raised many pig breeds.	i) Local Breeds	90	50%
		ii) Imported Pigs	3	1.7%
		iii) Hybrid Pigs	87	48.5%
4	Pig-rearing purpose	i) Weight Gain purpose	155	86.2%
		ii) Production of Piglets and Breeding	25	14%
5	Pig vaccination by farmers	i) Vaccinated	44	24.5%
		ii) Non vaccinated	136	75.6%
6	Pigs being dewormed by farmers	i) With dewormed	17	9.6%
		ii) Without dewormed	163	90.6%
7	Farmers' access to medical care for sickly pigs	i) Veterinary care availability	52	29.5%
		ii) Limited veterinary		

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		care accessibility	128	71.3%

Table (3). After -Impact of Shelter, variety and Health management on farmers' Pig-raising techniques (n=180) (Source: Author)

SI.NO	Individual	After entering the program		
		Criteria	count	percentage
1	Farmer practices for pig housing facilities	i) Stable shelter: Medium-priced, half-wall and roof built of brick cement, with a floor and corrugated tin. ii) Stable shelter: Low-cost, with a corrugated tin roof, a bamboo-made complete wall and a cement floor	84 96	46.5% 53.4%
2	Farmers kept hygiene and cleanliness.	i) bad condition ii) Fine condition iii) Excellent condition	9 126 45	5% 70% 25%
3	Farmers raised many pig breeds.	i) Ghungroo Heritage Pigs ii) Foreign White Yorkshire Swine iii) Variety of Hybrid Porcines	26 34 120	14.6% 19% 66.8%
4	Pig-rearing purpose	i) Weight Gain purpose ii) Production of Piglets and Breeding	15 165	8.5% 91.8%
5	Pig vaccination by farmers	i) Vaccinated ii) Non vaccinated	158 22	87.8% 12.3%
6	Pigs being dewormed by farmers	i) With dewormed ii) Without dewormed	173 7	96.2% 3.9%

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7	Farmers' access to medical care for sickly pigs	i) Veterinary care availability ii) Limited veterinary care accessibility	164 16	91.1% 8.9%

Pig production system impact

An overview of the present distribution of pig kinds in the research region is shown in Table 2-3. The pig varieties include indigenous Ghungroo pigs, foreign Large White Yorkshire pigs and several crossbred pigs. At first, fifty percent of the farmers raised ordinary neighborhood pigs. Following the initiative, however, the distribution of farmers' choices changed, with 14.6%, 19% and 66.8% choosing to raise native Ghungroo pigs, exotic large white Yorkshire pigs and other crossbred pigs, respectively. In the past, fattening was the main reason for raising pigs for 86.2% of farmers. However, there was a significant change and 91.8% of farmers were producing piglets via sow breeding. The program's influence on diversifying and improving pig-raising methods in the region is shown by this change.

Effect on pig management of health

Tables (2) and (3) show how pig health management has an influence. At first, 75.6% of farmers said that excessive pig mortality was caused by factors such as inadequate immunization, improper deworming procedures (90.6%) and restricted or nonexistent access to animal care facilities (71.3%). However, after program participation, a notable improvement was seen. In particular, 96.2% of farmers had access to deworming services and 87.8% of farmers obtained immunization facilities. In addition, 91.1% of farmers had access to veterinary care for their pigs, a significant increase from 29.5% before.

Effect on socio psychological elements

The degree of improvement in five important socio-psychological factors, each of which has been methodically ranked, is shown in figure (2) and Table (4). Beneficiaries benefited from the training sessions, especially in terms of gaining information. The vast majority of recipients (99.97%) said that their comprehension of pig farming and associated methods had increased. Furthermore, according to 67.18% of pig recipients, other farmers in their own communities benefited from the information they learned during the training sessions. Moreover, almost 90.8% of the recipients said that the program as a whole had a positive effect on their standard of living. This suggests that the program's beneficial benefits on participants' economic and well-being are widely acknowledged.

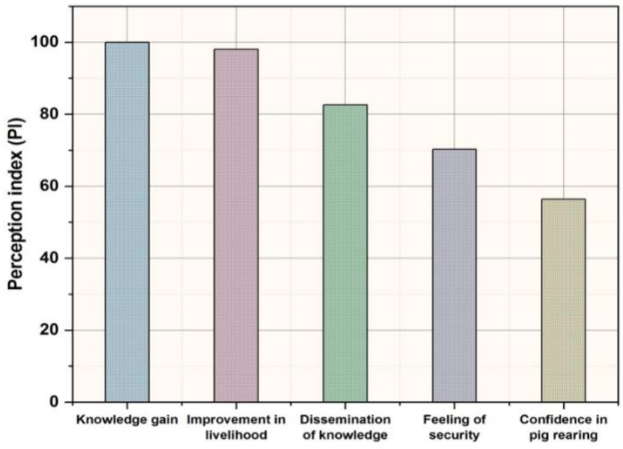

Figure (2). Socio-Psychological Impact of Pig Rearing Intervention among Respondents (Source: Author)

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Table (4). Ranking of Pig Rearing Intervention Impact on Socio-Psychological Factors (Source: Author)

No	Criterion	Perception of Index (PI)	Grade
1	Confidence in pig rearing	56.42	5
2	Feeling of security	70.30	4
3	Knowledge gain	99.97	1
4	Dissemination of knowledge	82.56	3
5	Improvement in livelihood	98.02	2

CONCLUSION

Assam's agricultural environment has undergone significant change credits in large part to the initiatives put in place to increase the success of small pig farmers. There were noticeable and beneficial results from the treatments, which included knowledge enrichment, pig variety substitution, shelter management and veterinarian care. After the treatments, 180 tribal farmers participated in a two-stage stratified random sample survey that revealed significant gains. With 25% mentioning really excellent circumstances and 70% reporting adequate conditions around pig shelters. A major improvement was the switch from native pig kinds with excellent yields to exotic or high-yielding crossbred pigs. The change in farmers' behavior (91.8%) from keeping pigs for fattening to breeding sows primarily for piglet production highlighted how effective the initiatives that were put into place were. Together with having a good impact on agricultural practices, these treatments showed positive socio-psychological effects, indicating a comprehensive change. The development of a "piglet production farming system" was not only a boon to farming but also a driving force behind increased food security in the area. All things considered, Assamese small-scale pig farmers' cultivation of success is evidence of the transforming potential of focused interventions in improving agricultural communities.

Limitation and Future scope

The pricing of pork products are impacted by market changes, which affect small-scale pig producers. Global events, consumer preferences and economic downturns may affect small-scale pig farming profitability. To diversify their revenue sources, small pig farmers could consider producing value-added goods like organic or gourmet pork. Understanding customer preferences and market trends is necessary.

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