INCOME GENERATION OPPORTUNITIES THROUGH SECONDARY AGRICULTURE TOWARDS SUSTAINABILITY IN ANGUL DISTRICT OF ODISHA: A CASE STUDY

ABSTRACT

AIMS: The aim of the study was for attempting various income Generation interventions to address poverty, unemployment and lack of economic opportunities which could increase participants' ability towards secured livelihoods. Secondary agriculture is essentially a way of business development that aids in providing farming households in rural areas with income and employment.

Place and duration of the study: The study was conducted in Krishi Vigyan Kendra Angul, Odisha between 2016-17 to 2021-22.

Methodology: PRA survey of the village followed by group discussions and other approaches were conducted to identify the constraints and accordingly the process planning was performed for strengthening their livelihood. By the technological interventions from Krishi Vigyan Kendra, Angul the famers took trainings for grasping ideas & scientific knowledge about the enterprises. Periodically some critical inputs under various programme were also provided from the KVK.

Results: As a result, year after year the farmers practicing bee-keeping could able to earn in an average of Rs. 5,14,100/- from 180 bee boxes by selling pure honey & bee-colonies. Besides this, another group of farmers with improved colour poultry breeds under backyard condition with an average yield of 1.62 kg could earn an average net return of Rs. 14,742/-.

Conclusion: Given that the world's population is quickly growing, it is imperative for global agriculture to turn to secondary agriculture (honey bee and poultry farming) in order to provide opportunities not only for improving livelihood but also for nutritional security.

Keywords: Enterprises, Income Generation, Productivity, Secondary agriculture

1. INTRODUCTION

Commented [N1]: need to improve

Angul district has come into existence as a separate district consequent upon the re-organisation of districts in Odisha on 1st April 1993. As per the agro-climatic condition, it comes under Mid Central Table Land zone in 840.16' to 850.23' East Longitude and 200.31' to 210.41' North Latitude with 300 meters above MSL. The river Brahmani flows in the middle and Mahanadi demarcates the western border of the district. Industries like NALCO, NTPC, Jindal & TATA steel and Talcher Coal Field have brought the fame of the district to national level. The climate of the zone is fairly humid with dry and hot summer followed by wet and humid monsoon and mild winter having average normal rainfall of 1401.9 mm per annum. The soil of the district is mostly Red Lateritic, Sandy & Alluvial in nature (District Council of Culture, Angul 2005).

Due to population explosion and social conflicts majority of the joint families have been disintegrated into nuclear families, as a result of which the size of land holding is fragmented into smaller sizes. Therefore, the proportions of small and marginal farmers in the district are 16.8 & 77.3 % respectively. Emphasis is always given to select small and marginal farmers having small land holdings as that enables them to practice improved agricultural technologies in their own field and can demonstrate different practices to the fellow farmers. As field-based agriculture is always affected by natural calamities, price fluctuation and inefficient marketing system, adoption of secondary agriculture plays a vital role in improving the livelihood of a marginal or small farm family (District Council of Culture, Angul 2005).

Commented [N2]: use update information

Krishi Vigyan Kendras (KVKs),are unique extension institutes of Indian Council of Agricultural Research (ICAR) which aim at delivering technologies at the doorsteps of farmers in their respective districts and are the key organizations for the holistic development of village communities by adopting proper agricultural and allied practices towards sustainability.

Bee-keeping is an enterprise which requires a high investment with very high returns. This enterprise not only gives return from selling honey, wax and colonies but also helps in increasing crop yield by improving pollination (Orissa Forestry Vision, 2020). Bee-keeping and pesticides don't really go hand in hand because chemicals cause the insects to die. So, the farmers are asked to refrain from using pesticides while rearing the bees. Hence KVK, Angul intensified honey bee rearing in the backyard of marginal and landless farmers in the district by giving training and providing some critical inputs to the practising farmers. Similarly, Angul is having a good number of cattle like cows, buffaloes, goats and sheep as domestic animals (Directorate of Economics and Statistics, Orissa 2008). Bullocks are mostly used for the traditional method of cultivation in the district where as cows are mostly kept for milk. Besides these, poultry farming now-a-days is becoming a popular enterprise in which chicks like Aseel, Kadaknath, Vanaraja, RIR etc. are now being distributed in SCSP scheme by KVK, Angul.

Commented [N3]: recent statistics

So, in the present study KVK, Angul has put an effort to intensify Bee-keeping and introduce improved poultry breeds for rural scheduled caste poultry farmers. A baseline survey was made from 10 nos. of practising Bee-keepers during 2016-17 and it was found that, they had the constraints like lack of land resources, capital, technical knowhow, process of rearing of bees etc. Similarly, before introducing the improved poultry breeds, a baseline survey was conducted and information was collected from 30 backyard poultry farmers of two villages of Angul district though personal interview, questionnaires and group discussion. The information was collected on the performance of existing *desi* birds, dual purpose birds and problems faced by them in their management aspects. It was observed that, high mortality in day old chicks, less availability of chicks and its feed in nearby locality, poor weight gain, less egg production by *desi* birds and lack of broodiness in the dual purpose chicken and lack of technical knowledge were the major constraints for providing a continuous source of income for rural poultry farmers.

Hence, Krishi Vigyan Kendra, Angul designed the present study to know the economic impact of rearing honey bees and improved poultry breeds in Angul district of Odisha. With this background, the study was conducted with the following objectives: i) To study the economic status of Honey bee farmers after scientific interventions, and ii) To study the economic status of farmers after rearing of improved poultry breeds.

2. METHODOLOGY

Commented [N4]: This section is not clear, need improve. Is it case study??

At the beginning of the study, training programmes on different aspect of Bee-keeping and Poultry Farming were planned to educate the farmers. Then the centre distributed different bee-keeping equipment like veil, gloves, nucleus boxes, smokers, queen gate etc. to practicing farmers and 21-day old chicks to only those farmers who had made poultry shed by them. There are different types of bees you can work with, Indian or foreign and different types of bees produce different quantity and quality of honey, in different regions. Which bees are best for your area you will learn with experience? Farmers received their training in bee keeping from KVK in different sequential periods. If you are planning to start a bee keeping business, you must train yourself. After the training you must consult the bee keepers in your locality that will provide you guidance and advise which will be as useful as your training. The books from which you learn are important but practical knowledge is even more important.

They continued that there are two important things with bee keeping - one is the honey you get and the other is the bee sting that you have to guard yourself against. The bees don't attack and sting unless they sense danger. You will learn with experience, how to treat bees, how to handle them and to collect honey without being stung by the bees. Among the farmers, one farmer *i.e.* Mr. Bijaya Bir of Banatala village started his business gaining all the knowledge, ideas and practices from KVK and continued his study till date by extending the bee boxes and selling honey. According to Mr. Bir, another aspect of bee keeping is where you place your boxes. The type of honey you get depends on the plants that are around the boxes and from which the bees can collect nectar for the honey. Different flowers grow in different seasons in Odisha; hence you get different type of honey in different seasons. You can harvest honey 2-3 times in a year from your boxes. Then he describes the process of collecting honey. You must always use mask and gloves. You must keep a smoke sprayer handy in case the bees get angry. You should use custom made stands to place boxes on, so that insects don't eat up the honey. You must be extremely careful while opening and closing the boxes, making sure that the bees don't get offended. You should have good outer coverings for the box. In rainy or other seasons when the nectar is not available for the bees, you can give the bees artificial food.

Next part is the extension of income of poultry birds by SC farmers of Angul district who could gain ideas of poultry bird rearing from KVK. The KVK distributed the chicks with rearing all kinds of vaccinated procedures. The day-old chicks of improved breeds like Aseel, RIR, Kadaknath, Vanaraja were procured from CPDO, Bhubaneswar. The chicks were reared for 21 days in poultry brooding unit of KVK, Angul. During those 21 days rearing period vaccinations to all the birds were done. Ranikhet disease vaccine (F strain/ La Sota strain)

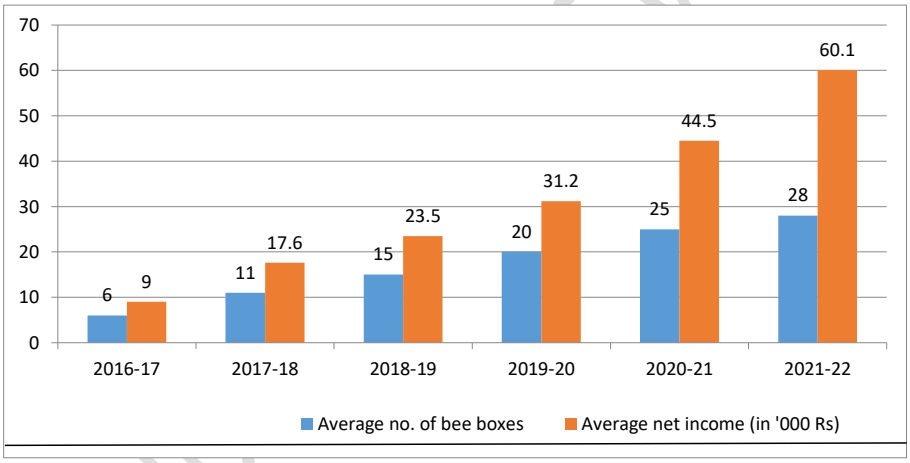
was done on 7th day and booster dose on 21th day of age. Infectious bursal disease or Gumboro disease vaccine was done on 14th day. Multivitamin suspensions were given to all chicks during firsts 10 days. During the initial 5 days chicks were fed with suji followed by commercial starter poultry feed up to 21 days. Body weight gains on weekly basis were recorded. Before distribution of chicks training programmes on different aspects of poultry farming such as housing, brooding, feeding, disease control and preventive measures, poultry products and by products, and marketing management were organized and also farmers were distributed extension literature on poultry birds and its management. During the total trial period the required health care measures were being provided at the doorstep of farmers by KVK scientists. The data on body weight gain, egg production, mortality% and the cost of cultivation and returns aspects of backyard poultry farming were collected from the farmers.

3. RESULTS AND DISCUSSION

Commented [N5]: Discuss according to objectives/ purpose. need to improve

3.1 Bee-Keeping

fig 1 : Bee-keeping economics from 2016-17 to 2021-22



One of the success stories is Mr.Bijaya Bir of Bantala village of Angul district who was feeling frustrated & depressed owing to his unemployment until Krishi Vigyan Kendra, Angul as a mandatory routine work, once visited his village and interacted with Mr.Bir during 2016. The centre surveyed his status and knew that, he started bee keeping in 2006 with 6 boxes with an initial investment of Rs.12,000/- only (Table 1). As his profit increased, he started spending & increasing the number of bee units and boxes. During that time, he had raised the number of boxes from 6 to 17. In the previous year 2022, he could earn Rs.5,14,100/-by extending is bee units and boxes to 240 selling 1.1 quintal of honey from his backwards.

3.1.1 Support of KVK and other agencies/departments

Mr.Bir got the opportunity for honey bee training with his own interest from OUAT in the year 2002. After intervention of KVK he got motivated and started rearing of honey bee in a scientific way in the year 2006 with 6 boxes of honey bee and slowly he develops interest on honey bee and multiplies the colonies to 17 boxes (Table 1). His keen desire to be productive and economically active impressed KVK scientists and consequently he was trained in scientific bee keeping at KVK and OUAT, Bhubaneswar in several phases.

Table 1. Economic study of beekeeping by Mr Bijaya Bir

Items	**Year (2002)**	**Net Income (Rs.)**	**Year (2004)**	**Net Income (Rs.)**	**Year (2014)**	**Net Income (Rs.)**	**Year (2017)**	**Net Income (Rs.)**	**Year (2022)**	**Net Income (Rs.)**
Honey (No. of Box)	6kg(2)	1200	24kg (6)	4800	68kg (17)	20400	120kg (32)	36000	1.1q (240)	3,85,000
Bee box with colony	-	-	-	-	10	7000	15	10500	180	1,26,000
Queen gate	-	-	-	-	8	80	12	120	150	1500
Honey Extractor	-	-	-	-	1	200	3	600	8	1600
	Total	**1200**		**4800**		**27680**		**47220**		**5,14,100**

Today he is earning Rs.5,14,100/- per year from sale of honey, bee equipment, bee box and colonies of *Apisceranaindica*

3.1.2 Scope and scale of operation of the enterprise

Mr.Bijay Ku. Bir have 180 honey bee boxes with colonies of *Apisceranaindica*. He started honey bee rearing with 6 boxes and able to multiply the colonies and by selling them he is getting more benefit.

Fig 2 : Mr. Bir at KVK Campus

Fig 3 : Bijaya's Bee Unit

Fig 4 : Innovative honey extractor

3.1.3 Specific Achievement

Economic joviality has been achieved by adopting this innovative skill of self-employment by others in nearby areas. He has inspired & trained many persons and is a master trainer for Jan Sikshya Sansthan for Dhenkanal & Angul district and as on date is a satisfied grooming entrepreneur. Slowly due to his own interest he is now able to prepare the wooden bee boxes and other bee equipment like bee veil, queen gate, dummy board etc. Besides this he has his own innovation in making the honey extractor, which makes the

extraction easier with minimum loss of honey in less time. At a time 7kg of honey can be extracted with this extractor.

3.2 Poultry farming

Generally rural families follow low protein diets and so protein malnutrition is prevalent, particularly among pregnant women, nursing mothers and growing children. Rearing improved chicken varieties in rural backyards will increase availability of eggs and meat thereby aiding in alleviation of protein malnutrition, besides providing subsidiary income (Udharwar, 2018). It is efficient in transforming feed protein and energy into human food and it uses a very low capital investment and space for small-scale poultry production which allows poultry production to be practiced even by landless families or other rural poor (Debnath *et al.*, 2011). In Odisha desi/native chicken of about 5-25 numbers are reared by rural households under the traditional scavenging system which provides food and financial security, and has socio cultural and socio-religious significance. But in back yard poultry farming, growth is limited due to high seasonal mortality, low productivity and sub optimal management (Rawat *et al.*, 2016). To combat this different development and extension agencies have been effectively working on promoting backyard poultry as a promising enterprise for rural areas.

Fig 5 : Input distribution

Fig 6 : Scientist (Animal Sc.) imparted training to farmers

The present study was conducted to find out the gain in body weight, egg production, and average age at first laying in the Improved variety Chicken under backyard conditions along with the impact on their socio-economics status of scheduled caste farmers. It was observed that these birds were better resistance to disease with a mortality of 3-7% and meat quality was widely accepted by the native people (Table 2). It was found that the body weight gain pattern was significantly higher than that of desi (country) type birds. The farmer also got higher net return *i.e.* Rs. 14,742/- than the desi breed (Rs. 4745/-).

3. CONCLUSION

Commented [N6]: specify the conclusion according to finding

For making the practice of bee keeping successful, one should have proper knowledge about the nature as well as habits of bees. Also, the beehives should be properly managed in

accordance to different seasons. Honey has high nutritional value and it is also abundantly used in preparing medicines. Apart from honey, bee wax is also produced by honeybee which is used in preparing cosmetics and also used in industries for various works. Care and manipulation of honeybees to enable them to produce and store more honey than they need so that the excess can be collected. Honeybees provide a variety of goods (honey, wax, pollen, royal jelly, propolis etc) and services (pollination) to human society and ecosystem. Across the world the bees support millions of livelihoods while also enriching the ecosystem. Beekeeping is an important enterprise to rural communities and related to agricultural and horticultural production. Due to its nutritional value, it is of high demand by the people.

Angul is an industrial district consisting people of different socioeconomic strata and background. Hence, there is always a high demand for meat and eggs with a special preference over desi and lean type meat. Keeping this in view, the taste of meat and eggs of Improved variety Chicken are similar to 'Desi (country)' birds and more preferred than those of commercial broiler/layer birds. Besides this improved chicken is providing low cholesterol, high protein meat along with special medicinal value in homeopathy and nervous disorder. The meat is also suitable for cardiac patients as it increases blood supply to heart. Also, it is having effectiveness in treating women's habitual abortion and sterility. The eggs can also be utilized to treat severe headaches, asthma and nephritis. Hence, this indigenous breed should be popularized and practiced in backyard rearing system. This farming ensures livelihood security to SC farmers who could rear several chicks in their backwards for economic development. So, secondary agriculture owing to beekeeping and poultry farming can enhance nutritional and livelihood security to the farmers by practicing all these assets in their backyards for profit maximization.

REFERENCES

Commented [N7]: follow journal rules of referencing. Give update and recent reference

1. Udharwar, SV. A case study on Vanaraja: a dual-purpose variety developed exclusively for free range poultry farming in rural and tribal areas. A compendium of PGDAEM-Manage Project review, 2018;1:39-40.
2. Rawat, SK, Gupta, R. Narain, S. Study on the performance of backyard poultry production reared by rural woman in Mahoba, *Indian Res J Ext Edu.*, 2016;15(4):24-28.
3. Debnath, MK, Majumdar D, and Das, PK. Status of backyard and small-scale poultry production to sustainable livelihood- a case study. Journal of Crop and Weed, 2011;7(2): 113-115.
4. Directorate of Economics and Statistics, Orissa(2008). Statistical Abstract of Orissa
5. District Council of Culture, Angul(2005). District Gazetteer Angul.
6. Govt of Orissa: Forest Department, Orissa Forestry Vision 2020.

Table.2. Showing different parameters and economic analysis of Improved variety Chicken and desi bird under backyard system.

Breed	Yield component			Mortality (%)	Yield (Avg. body wt/bird)	Cost of cultivation (Rs./unit of 20 birds)	Gross return (Rs/ unit of 20 birds)	Net return (Rs./ unit of 20 birds)	BC ratio
	Average body wt/25 wks	Avg. egg production/ year	Age of first laying (weeks)						
Desi Chicken	Cock:1.1kg, Hen: 0.9 kg Avg:1 kg	45	26	20	1.0 kg	5,200	9,945	4,745	1.91
Improved variety Chicken	Cock:1.7kg, Hen:1.55 kg Avg:1.62kg	145	25	3	1.62 kg	8,800	23,542	14,742	2.67