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Outscaling of Rice-Based Farming System (Rice + Duck) in Claveria, Cagayan

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RESEARCH ARTICLE INFORMATION

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ABSTRACT

The threat of the COVID-19 pandemic and the impact of climate change necessitate outscaling relevant matured technology like a rice-duck farming system that would directly complement and sustain the Department of Agriculture's initiatives in food security. Hence, a study was conducted at the Municipality of Claveria, in Barangay Union and Mabnang. Two demonstration plots of rice+ducks with a total area of 1,000 m^2 were established in both barangays. Ducks controlled weeds and golden apple snails at the same time improved the structure of the soil. From the targeted 100 farmers capacitated, the project exceeded by 35% due to the interest of the community to participate in the rice-duck technology. The project launched three Cagayan Valley Duck Delights recipes which opened as business opportunities to farmers and were transferred to Union and Mabnang Duck Raisers Association and two restaurants from Abulug and Claveria, Cagayan. The result of the project signifies the efficiency of integrating ducks in the irrigated rice ecosystem which is comparable to the yield of rice alone. The study built community awareness that Muscovy ducks are beneficial in rice farming and, likewise, created business opportunities; hence, the project was expanded to four barangays in Claveria, Cagayan with the full support of the Mayor in LGU-Claveria to adopt the introduced technology.

Keywords: *integrated rice duck farming, Muscovy Duck, Cagayan Valley Duck Delights, rice-based farming system, rice monocropping*

Introduction

The current challenge today is how to achieve food security due to the impact of COVID-19 pandemic disrupting the regional agricultural value chains, and posing risks to households. This disease created a heightened awareness of food safety for producers, businesses, governments, and consumers (FAO, 2020).

The success is to develop a massive intensification of food programs. One of the keys to exploring the productivity and profitability derived from the various ecosystems is to recognize the capacity of the small household to sustain their food production. The Department of Agriculture encourages farmers to adopt nationwide programs that boost agricultural production. Integrated farming is recommended to enhance the productivity of the farmers. The threat of the pandemic and the impact of climate change call for outscale a relevant matured technology like a rice-duck farming system that would directly complement and sustain the Department of Agriculture's initiatives in food security.

A method of rice farming that relies on ducks to eat insects and weeds has been in the news. The "*aigamo* method" of growing rice was developed in 1989 by Takao Furuno, a farmer in Fukuoka Prefecture, and it allows for the production of healthy and delicious rice while relying on less labor than previous methods. From its beginnings in Japan, it has made its way to rice-growing countries like South Korea, China, Vietnam, the Philippines, Thailand, and even Iran.

The *aigamo* is a cross-breed of wild and domestic ducks. The *aigamo* method for growing rice involves releasing aigamo ducklings into a rice paddy about one or two weeks after the seedlings have been planted. Between 15 and 20 of these birds are needed for every 1,000 square meters of farmland. Also necessary is a shelter where the ducklings can rest and take refuge from rain. In order to protect them from dogs, cats, weasels, and crows, the field should be surrounded by an electric fence and protected from above by a fishing line.

The ducklings help the rice seedlings grow by eating both insects and weeds that get in the way. The farmer can then grow the rice without using pesticides or herbicides. The ducklings' droppings become an important source of natural fertilizer. In addition, they stir up the soil in the rice paddy with their feet and bills, a process that increases the oxygen content of the soil, making it more nutritious for the seedlings.

Growing rice and ducks together in an irrigated paddy field could be a solution to providing food security for the surging population in the Philippines. Integrated rice-duck provides an innovative and local solution, not only it does increase income and food security but it is also environmentally friendly. Studies showed that the integrated rice-duck system was highly beneficial for the farmers from an economic point of view. Besides increasing the yield of rice, the infestation of weeds and insect pests was controlled by ducks in the rice-duck system (Hossain, 2005).

The aigamo method was adopted in the Philippines using Mallard ducks to integrate into the rice field. Mallard duck is commonly raised for egg production and in Region 02, Agaid (2014) adapted the technology – the rice duck farming system – using Muscovy duck which is raised for both egg and meat production. The rice-duck (Muscovy) farming system is a friendly technology and a business opportunity in Region 02. Rice-duck production increases the farmers' profit, which subsequently enhances their capability to contribute to food self-sufficiency and sustainability. It is shown that the income from rice with ducks is doubled compared to the conventional practice (rice alone).

Furthermore, the project was outscaled at Claveria, a third class municipality in the province of Cagayan consisting of forty-one (41) barangays. The town, being endowed with vast plains and rich bodies of water, is primarily an agricultural area. The major source of income of the populace is shifted from logging or wood industry to rice farming and fishing. It is a potential eco-tourism destination because of its churning beaches as the favorite hangout of tourists especially at sundown.

Barangay Union and Mabnang were the identified project sites known for their unity as noted in their association known as SANJERA and receptiveness in adopting technologies. Union has 144 hectares and Mabnang has 92 hectares of rice farm especially planted with hybrid during the dry season and inbred during the wet season with a production of 4 tons/ha. Claveria is noted as one of the highest adopters in hybrid rice production. However, the yield remains low because of calamities such as floods, drought, and the presence of unfavorable environments like saline and submerged areas. Hence, the rice duck farming system was introduced to give additional income to the rice farmers. The beneficiaries had chosen Muscovy duck to integrate with rice because it is easier to raise and has a potential market. The Muscovy duck can be cooked on different menus; likewise, its meat and egg type is a favorite of Ilocano and other tribes. This can be raised in the backyard and serve as biological control of rice pests.

Considering the benefits and environmental friendliness of the system, rice-duck farming is seen as an innovative approach especially since both lives and livelihoods are at risk from this pandemic, affecting significant elements of both food supply and demand. Hence, it mitigates the pandemic impact across the food system.

Methods

Establishment of Model for Rice-Duck Farming System

Coordination with Local Government Unit

Coordination with the Local Government Units- MA Claveria was done to identify qualified recipients. The project implementation, guidelines, schedule of activities, and Memorandum of Agreement were discussed. All activities were coordinated for partnership.

Identification of Farmer-Cooperators

Farmer-cooperator was selected by LGU based on the criteria below:

- Owner-cultivator or leasehold-cultivator
- Preferably registered at the Registry System for Basic Sector in Agriculture (RSBSA)
- Tenant or owner of at least 0.5 to 1.0 hectare of rice farm

Geo-Tagging and Geo-Referencing

Site inspection was conducted to validate areas of individual recipients. Geo-tagging/geo-referencing of farms of the recipients was done to determine the location of the production area using Global Positioning System (GPS) gadgets.

Conduct of Technical Briefing

To equip the farmers with more technical knowledge of sustainable practices, technical briefings were organized. Technical experts were invited to extend their knowledge to the farmers with the technology intervention introduced.

Distribution of Input and Equipment

Farm inputs, equipment, and a starter kit that includes 5 heads of ducks per farmer cooperator, poultry plastic net, hammer mill, egg incubator, and plucker machine were provided in Barangay Union and Mabnang, Claveria, Cagayan.

Technology Intervention

In rice+duck farming system practices, the palay check system was followed in the rice production system following the key checks such as high-quality seeds, well-leveled fields, synchronous planting, water management, proper nutrient management, and harvest and post-harvest management.

The technology of the rice+duck farming system was implemented following the package of technology as shown in Table 1.

Table 1. Rice+Duck Farm Management Practices

Farm Activity	Rice+Duck Farm Management Practice
Installation of Fence	Using poultry net, a fence was constructed around the rice + duck plot to prevent ducks from escaping and protect them from other animals
Rice production followed the palay check system	The rice variety used was the farmers' preference
Distance of planting	20 cm x 25 cm to allow ducks in grazing at the field
Pesticide Management	No pesticide was applied.
	Ducks were used in controlling weeds and insect pests at the rate of 200 Muscovy duck heads/hectare
	1-month-old – 2-month-old ducks were allowed to graze in the rice field from 30 DAT and withdrawn before flowering
Care and Maintenance of Ducks	Provision of low-cost housing and a pond for ducks
	Supplemental food like forages (20%) mixed with rice bran (20%), palay (50%) and corn (10%) was provided
Post-harvest activities	
Ducks	Ducks were transferred to laying house after the allowed grazing period in the field. Usually used as a breeder or fattened for disposal and serves as additional income
Rice	Harvested rice was sold fresh to local dealers.

Project Monitoring

Regular monitoring and visitation of the techno demo sites was conducted by the researchers together with the co-operator and MLGU technician to ensure timely and proper implementation of the technology demonstration

farms, assess the performance whether the actual progress of the project met the objectives and expected output or not, and determined the farmers' feedback on the project.

Data Gathering

The following were the data gathered to determine the effects of the technology interventions applied: yield per hectare (tons/ha), cost of production per hectare (PHP), net income per hectare (PHP), expansion areas, economic analysis, and number of farmer adopters.

Capability Building of Enhanced Technology Promotion

Conduct of Technology Trainings

To equip the farmers with more technical knowledge of sustainable production practices, technical briefings were organized. Technical experts were invited to extend their knowledge to the farmers. A sequence of trainings and briefings was conducted regarding the introduced technology interventions. Social distancing and wearing of face masks were strictly implemented. The trainings were focused on rice production, rice + duck integrated farming system, duck production, feed formulation, and Cagayan Valley Duck Delight.

Conduct of Mini-Field Day

A mini field day was carried out to showcase the recommended package of technologies and their positive results. Limited participants attended the said activity to observe social distancing.

Production and Distribution of Information, Education, and Communication (IEC) Materials

In order to disseminate information, IEC materials such as leaflets and modules regarding the POT were produced and distributed to the farmers.

Enterprise Development

Conduct of meeting regarding the organization of Duck Raisers Association was conducted in order to link them to various possible market institutions. The launching of Cagayan Valley's duck and native delights was also simultaneously conducted throughout Region 02 to promote different duck recipes highlighting Duck Marinado, Bibeko, and Muscovy wings for adoption by the farmer beneficiaries or the Duck Raisers Association that served as their business enterprise. The target markets are the existing restaurants, resorts, groceries, Kadiwa outlets, cooperatives, and direct consumers.

Ethical Considerations

The authors confirmed that the ethical procedures were observed in the conduct of this study**.**

Results and Discussion

Identification of Farmer Co-operator

Identified farmer beneficiaries exceeded the target by 22% due to the interest of farmers in the project. From the target 100 beneficiaries, a total of 122 were identified as farmer-beneficiaries. Seventy-one (71) FBs at Barangay Union and fifty-one (51) FBs at Barangay Mabnang of Claveria, Cagayan. Thirteen (13) additional adopters were also recorded in the project due to the good impact of the project after the conducted field day resulting in a total of 135 capacitated farmers (Figure 1).

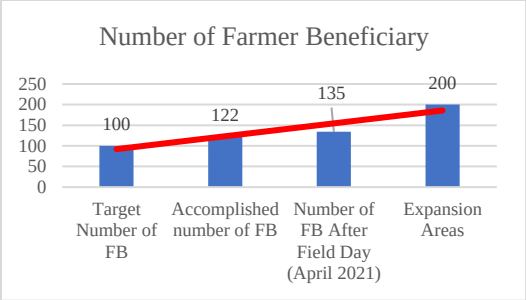

Figure 1. *Farmer Beneficiaries Capacitated by the Project*

With the successful implementation of the project, it expanded its area with the full support of the Mayor of LGU-Claveria. Thus, four (4) barangays of the said municipality were identified with fifty (50) farmer-beneficiaries of each barangay and was given five (5) heads of Muscovy ducks each.

Provision of Agricultural Inputs/Equipment

Different interventions were distributed to the farmer-beneficiaries. Seven hundred ten (710) heads of breeder ducks were distributed at the start of the project, four hundred fifty-five (455) heads to Barangay Union, and two hundred fifty-five (255) heads to Barangay Mabnang. The 200 heads of Muscovy duck were distributed as replacements for the mortality brought by Typhoon Ulysess.

Moreover, trichantera cuttings were also distributed as a source of feed formulation for the ducks. Poultry plastic nets were used as enclosures for the rice field and backyard duck house were also distributed. One (1) unit of egg incubator, (1) unit of plucker machine, and (1) unit of hammer mill were distributed to each barangay as shown in Table 2.

Table 2. List of Distributed Inputs and Equipment

Input/ Equipment	Quantity
Breeder ducks	910 heads
Trichantera cuttings	1,464 pcs
Poultry Plastic Net	25 rolls @ 90m
Egg Incubator	2 units
Hammer Mill	2 units
Plucker Machine	2 units
Breeder Ducks (expansion areas)	1,000 heads

Technology Intervention

Rice + Duck Package of Technology (POT)

Muscovy duck was released 30 days after transplanting with two hundred (200) heads per one (1) hectare. After 30 days of transplanting of rice, one (1) month- to two (2) month-old ducklings were released to graze in the rice field and withdrawn before flowering. The ducks were used to control weeds, insect pests, and golden apple snails; hence, the application of pesticides was prohibited. For the first three to five days, the ducklings were kept in the field for 2 to 4 hours a day. Upon reaching three months old, ducks were removed from the rice field before the flowering stage. These ducks can be used for the next cropping season as breeders or sold live or cooked as additional income. (Agaid, 2014.)

In addition, two (2) model sites were established showcasing this technology that created awareness among neighboring farmers of the advantages of integrating ducks in rice fields. From monoculture farming, beneficiaries were able to adopt the integration of rice + duck.

Table 3. Comparative Yield Performance of Rice + Duck FS and Rice Monocropping

Cropping Season	Rice Alone Production			Rice + Duck Production		
	Union	Mabnang	Average (t/ha)	Union	Mabnang	Average (t/ha)
WS 2020	5.6	5.4	5.5			
DS 2020-2021	2.26	2.3	2.28	2.58	2.6	2.59
WS 2021	5.3	5.82	5.56	6.19	6.29	6.24
DS 2021-2022	5.75	5.92	5.835	6.12	6.37	6.245

Table 3 shows the comparative yield performance of rice + duck vs. rice mono-cropping of farmer beneficiaries from WS 2020 to DS 2021-2022. During the wet season of 2020, distributed Muscovy ducks were not integrated into the field. Ducks received by the farmer-beneficiaries were subjected to backyard raising for reproduction.

Low production yield was recorded during DS 2020-2021 with an average of 2.28 t/ha in rice monocropping practice and 2.59t/ha in rice+duck technology. The recorded low yield during this season was due to the continuous rain that damaged the two main sources of the irrigation canal (average rainfall amount shown in Figure 2) and brown leaf hopper pest occurrence. The presence of produced Muscovy duck during this season compensated for the low yield experienced by the farmers as presented in Table 3.

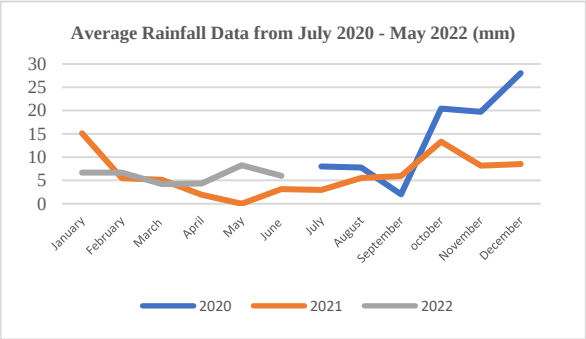

Figure 2. *Average Rainfall Data from July 2020-May 2022*
(Source: Agromet Weather Station, DA-NCES)

Figure 2 indicates the average monthly rainfall occurred during July 2020-May 2022. From the month of October to December 2020, the amount of rainfall increased to 28.02 mm which is considered a heavy shower. These months were the months wherein mortality of the distributed breeder ducks increased to 41%. The month of January brought continuous rain resulting in 15.12mm which affected the standing rice crop of the beneficiaries resulting in low yield for DS 2020-2021 and damage to the two (2) main irrigation canals of Barangay Union, Claveria, Cagayan. From February 2021 to September 2021, the amount of rain is relatively low which also affected the growth of the rice plant of the farmers.

The integration of rice–duck in the rice field resulted in farmers reducing farm inputs such as pesticides, herbicides, and molluscicides. It was reported that rice ducks controlled the population of golden apple snails in the rice field. The unpredictable weather conditions at Claveria, Cagayan affected the growth of rice plants and the production of Muscovy duck; however, Table 4 shows that rice+duck has still higher yield compared to the rice monocropping practice of farmers.

Table 4 shows the comparative cost and return analysis of rice alone and rice + Muscovy duck farming on a 1-hectare basis. Low yield was experienced during DS 2020-2021 but the income of farmers was compensated with the presence of Muscovy duck.

Table 4. Comparative Cost and Return Analysis of Rice Monocropping Vs. Rice+Duck FS (1 ha, Rice Variety: PHB 79) WS 2020 – DS 2020-2021

Particulars	WS 2020		DS (2020 2021)	
	Rice Alone	Rice +Duck	Rice Alone	Rice +Duck
Total Cost of Production	**53,800.00**	**101,800.00**	**53,800.00**	**91,800.00**
Rice production	53,800.00	53,800.00	53,800.00	53,800.00
Duck production (200 heads)	-	48,000	-	38,000
Total Gross income	**93,500.00**	**193,500.00**	**38,760.00**	**144,030.00**
Rice	(5.5t/ha) 93,500.00	(5.5t/ha) 93,500.00	(2.28t/ha) 38,760.00	(2.59t/ha) 44,030.00
Duck (200 heads)	-	100,000.00	-	100,000.00
Net Income	**39,700.00**	**91,700.00**	**-15,040.00**	**52,230.00**
Return on Investment (ROI %)	**73.79**	**90**	**-27.96**	**56.89**

Table 5. Comparative Cost and Return Analysis of Rice Monocropping Vs. Rice+Duck FS (1 ha, Rice Variety: PHB 79) WS 2021 – DS 2021-2022

Particulars	WS 2021		DS 2021-2022	
	Rice Alone	Rice + Duck	Rice Alone	Rice + Duck
Total Cost of Production	**54,573.00**	**53,308.00**	**65,877.50**	**66,973.00**
Total Gross income	**94,520.00**	**226,080.00**	**99,195.00**	**236,165.00**
Rice	(5.56t/ha) 94,520.00	(6.24t/ha) 106,000.00	(5.835t/ha) 99,195.00	(6.245t/ha) 106,165.00
Duck		120,000.00		130,000.00
Net Income	**39,947.00**	**172,772.00**	**33,317.50**	**169,192.00**
Return on Investment (ROI %)	**73.20**	**324.10**	**50.57**	**252.63**

The rice + duck integrated farming system increases the income of farmers to 178.84% after three (3) cropping seasons from the farmers' practice which is 73.79%. The increase in income of farmers was attributed to the presence of ducks sold to the market.

Duck Production

Table 6 shows the inventory of the Muscovy duck production. From the delivered 910 heads of breeder ducks, only 545 heads (59.89%) are existing. This was due to the typhoon experienced last October – December 2020 (Figure 2) that brought floods to the two (2) barangays. The total existing inventory from both barangays is 1601 ducks. The accumulated number of live ducks sold was one 1743 heads to interested buyers from Apayao and nearby municipalities.

One of the benefits of the project is the family consumption of the produced ducks (egg and duck meat). Duck meat is served as an alternative to pork and chicken as the price of pork and chicken hikes. The 3413 pieces of duck eggs and 970 heads of ducks were allotted for family consumption.

Table 6. Inventory of Duck Production of Barangay Mabnang and Barangay Union, Claveria, Cagayan

Duck Production	Mabnang	Union	Total
Duck received	355	555	910
Existing duck inventory	779	822	1601
Duck consumed	411	559	970
Egg consumed	1578	1835	3413
No. of live ducks sold	739	1004	1743

Feed Formulation

With the introduction of duck as their livelihood, low-cost feed formulation using the distributed trichantera cuttings was introduced. The training on feed formulation conducted was adopted by the farmer-beneficiaries.

Table 7. NCES Feed Formulation

Feed Ingredient	Amount (kg)	Percentages (%)
Trichantera	2.5	50
Rice Bran D1	1.0	20
Corn Grits	1.0	20
Molasses	0.5	10
Total	**5**	**100**

Table 8. NCES Feed Formulation with Commercial Feeds

Feed Ingredient	Amount (kg)	Percentages (%)
Trichantera	2.5	50
Rice Bran D1	1.0	20
Corn Grits	1.0	20
Commercial Feeds	0.5	10
Total	**5**	**100**

The NCES feed formulation, as shown in Tables 7 and 8, shows the different amounts of needed feed ingredients to the low-cost feed formulation of duck. The molasses can be replaced with commercial feeds. The NCES feed formulation ingredients are affordable compared to the use of commercial feeds. The table below shows the required amount of feeds needed by the duck in different ages.

Table 9. Commercial Feeds

Age	Kinds of Feeds	Daily Feed Intake (g)	Total number of feeding days
0-1 weeks	Chick Booster	20 g	7 days
1-8 weeks	Starter Mash	75 g	56 days
9-20 weeks	Grower Mash	100 g	84 days
21-24 weeks	Pullet Developer Mash	110 g	28 days
25-80 weeks	Layer Mash	130 g	385 days

Machinery and Equipment Support

Egg Incubator

Due to the unpredictable weather and continuous rain, duck eggs are at high risk of infertility. With the increasing number of eggs produced by the breeder ducks, an egg incubator was needed to hatch more eggs and to prevent infertility of eggs.

An egg incubator creates the perfect conditions for an egg to incubate and hatch successfully. At 30 days, duck eggs have developed into chicks and taken up most of the space in the egg and they should be transferred to the hatcher tray. The temperature of 37.7° and the level of water in the humidifier were maintained. The distribution of egg incubators to both barangays was handled by the Duck Raisers Association.

Hammer Mill

Corn can help provide extra calories that both layers and meat ducks need to stay warm. Corn is one of the major feed ingredients in the feed formulation for ducks. Farmers in Claveria buy corn kernels and hire milling for their corn. Since their municipality is not one of the top producers of corn in Northern Cagayan, these cost them a lot and the provision of a hammer mill to the farmer-beneficiaries could lessen their expenses in feed formulation.

The hammer mill served as an additional income for the association. Milling costs PHP 2.00/kg. The association has an agreement with the operator with 60-40 division of income, 60% for the association while 40% is allotted for the operator.

Plucker Machine

As support to market enterprise and sustainability of the project, a plucker machine was introduced and distributed to the Duck Raisers Association. This equipment was built to handle feather removal with less time consumed.

Capability Building

A series of trainings/capability buildings as shown in Table 10 were conducted regarding the introduced technology interventions to enhance knowledge and improve awareness and adoption of technology to farmer co-operators /beneficiaries.

Table 10. Trainings/Briefings Conducted to Capacitate FBs

Title of Training/Briefing	Date Conducted
Module 1: ▪ Rice Production ▪ Duck Raising Technology ▪ Trichantera production ▪ Rice + Duck Production (POT)	July 22, 2020
Module 2: ▪ Egg and Duckling Production ▪ Feed Formulation ▪ Management of Rodents in Rice production	January 19, 2021
Module 3: ▪ Duckling Production Using Artificial Incubation/Artificial Brooding	January 20, 2021
Capability Building/Briefing to Incubates on Cagayan Valley's Duck Delight (Hands-on Training)	May 18, 2022

Conduct of Field Day

To showcase the rice + duck farming system model, a farmers' field day was successfully carried out last April 14, 2022, at Barangay Mabnang, Claveria, Cagayan. It was participated by 50 farmer-participants. A field day was not conducted in Barangay Union, Claveria, Cagayan due to the insufficient supply of water resulting in the limited establishment of rice fields during the dry season; however, Barangay Union was able to participate in the farmers' field day.

Organization of Association

Two associations were organized during the conduct of the organizational meeting of associations/cooperatives, namely Union Duck Raisers Association and Barangay Mabnang Duck Raisers Association. Union Duck Raisers Association has 71 members while 51 members were from Barangay Mabnang Duck Raisers Association. Each association has elected its own set of officials and linking them to different potential market institutions is easier.

Business Enterprise

The launching of Cagayan Valley's Duck and Native Delight was able to promote and highlight four (4) duck recipes produced by DA-Northern Cagayan Experiment Station, namely duck marinado, bibeko, Muscovy wings, and duck longganisa. The duck recipes were transferred to two (2) associations and one restaurant (Four Sisters Food Hub). Live ducks and ready-to-eat Muscovy ducks were also sold to interested buyers.

Hands-on training on the production, labeling, and packaging of the ready-to-eat and ready-to-cook duck marinado, bibeko, Muscovy wings, and duck longganisa was also administered to the two associations and a restaurant

as adopter of the Cagayan Valley's Duck Delight. With the support of the MLGU Claveria, the ready-to-eat duck products will be displayed in the soon-to-rise Rural Transformation Center, a convergence project where all the products in Cagayan will be displayed.

Table 11. Simple Cost and Return Analysis of Ready-to-Eat Duck Products

Ready-to-Eat Duck Products	Cost of Production	Gross Income	Net Income	ROI (%)
Bibeko	328.00	500.00	172.00	52.43
Muscovy Wings	543.00	960.00	417.00	76.79
Duck Marinade	233.00	350.00	117.00	50.21
Duck Longanisa	260.00	360.00	100	38.5

Presented in the table above is the simple cost and return analysis of different ready-to-eat duck products. The age of Muscovy duck suitable for processed products is six (6) months old with an average weight of 2.5 kg. The bibeko duck recipe has a cost of production of PHP 328.00 . From the 1 kg duck intestines, carcass, and skin, 5 packs @100g/pack were made as the end product. It has a net income of PHP. 172.00 and an ROI of 52.43%.

On the other hand, the Muscovy wings recipe has an ROI of 76.79% with a net income of PHP 417.00 . The total cost of production is PHP 543.00 and a gross income of PHP 960.00, while duck marinado has a total cost of production of PHP 233.00, and a gross income of PHP. 350.00. The cost of duck marinade per kilo is PHP 300.00, and it has an ROI of 50. 21%, while the duck longganisa has a net income of PHP 100.00 with an ROI of 38.5%.

Conclusion and Future Works

Based on the result, it can be concluded that the implementation of the project at Claveria, Cagayan, Philippines was found sustainable since viable farming provides additional yield and income to rice farmers. Likewise, it helped in the reduction of using chemical spray on the field and created a business opportunity for the farmer-beneficiaries. Moreover, the developed duck products served as a business enterprise especially since that low supply of pork was experienced after the occurrence of African Swine Fever (ASF) and duck meat is cheaper than chicken meat and pork. This agri-enterprise is a good opportunity and also a source of income.

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