



## An Evaluation of Knowledge Transfer Project: A Case of Native Chicken Raising Development in the Drought Area of Buriram Province

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 11 Sept 2023	<p><i>This study aims to evaluate the knowledge transfer project: A case study of native chicken raising development in the drought-affected areas of Buriram Province, focusing on the process of knowledge transfer, technology, and innovation to enhance the capabilities of native chicken farmers and increase the efficiency and cost-reduction of native chicken raising in the drought-affected region. The methodology involves: 1) assessing the community context and general conditions of target farmers in three communities, namely Ban Sawai So, Ban Khok Sa-At, and Ban Kaset Burana in Sakae Phrong Subdistrict, Mueang District, Buriram Province, with a total of 105 participants; 2) evaluating the processes of knowledge transfer, technology, and innovation to enhance the capabilities of native chicken farmers, involving 40 participants; 3) assessing the outcomes in terms of improved efficiency and cost reduction in native chicken raising; and 4) evaluating the implementation and practices within the communities to assess the knowledge, understanding, and practical application of target farmers in utilizing the transferred knowledge for native chicken raising. The research tools include general data questionnaires, a 5-point Likert scale survey, and semi-structured interviews. The research findings indicate that the targeted community still practices traditional methods of rearing native chickens, which involve free-range farming without proper feeding and good management practices, resulting in low production yields. However, after receiving knowledge transfer on native chicken breeds, nutrition, management, and learning from successful model sources through field visits, farmers have made changes in their farming practices. They have transitioned from traditional farming methods to semi-intensive farming and have expanded their knowledge by applying it in their community. These efforts have empowered farmers to develop their own capabilities in native chicken production to generate income.</i></p>
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> Knowledge, Transfer, Native Chicken Farming, Drought-Affected Areas

### 1. Introduction

For the past several years, Buriram Province has remained one of the ten poorest provinces in Thailand. The majority of farmers in Buriram rely on rice farming and crop farming as their main livelihoods. The province's arid climate during the summer season results in severe drought, affecting approximately 2,980 rai of agricultural land and 17 reservoirs covering 40,000 rai across 23 districts, with 87,779 households experiencing various difficulties (Buriram Provincial Agriculture and Cooperatives Office, 2020). In the years 2019–2021, Buriram Province experienced a severe drought, leading to shortages of water for domestic use and agricultural purposes throughout the province. This has had a significant impact on crop cultivation and livestock rearing. Although Buriram Province possesses important tourist attractions that could generate substantial income for local communities, the direct income is primarily concentrated in specific tourist areas or urban regions. Meanwhile, rural areas, particularly those affected by severe drought and lacking development as tourist destinations, continue to face

economic challenges. Community members and farmers often seek employment in the service sector, resulting in a labor shortage in the agricultural sector. Furthermore, due to the current social structure and an increasing aging population, the agricultural sector has shifted towards hiring labor, resulting in lower profits or even losses for farmers and leading to debt-related issues.

Based on the research and on-site academic services provided by the researchers, various issues regarding the livestock management practices of farmers in Buriram Province have been identified. Farmers engage in livestock farming as their main or supplementary source of income, raising a variety of animals such as beef cattle, dairy cattle, goats, sheep, pigs, laying hens, meat chickens, native chickens, and rattus losea. Large and small-scale livestock farming, including pig farming, requires significant space, including pastureland, food sources, and water resources, unlike poultry farming, such as laying hens or native chickens. Native chickens are poultry that can be raised in all areas. They are easy to raise, have delicious meat, and are resistant to diseases. Also, they can find their own food naturally. They are in high demand in both local and international markets, such as Cambodia, where the purchasing power exceeds 2 tons per day. It can be said that native chickens are economically viable livestock that can generate substantial income for farmers. Most farmers in Buriram Province still keep native chickens in their households as a source of food and supplementary income. Some focus on raising them as their primary income source and can sell them for a price ranging from 90 to 120 baht per kilogram (Somkuna et al., 2019b). However, the challenges of native chicken farming lie in the lack of standardized production and management systems among farmers, as well as inadequate veterinary care, resulting in low survival rates of baby chickens and a small number of broilers, which are insufficient to meet market demand. Additionally, farmers do not collaborate in raising or producing native chickens, leading to a lack of resource sharing, such as incubators and animal feed. In terms of marketing, farmers have to sell their chickens through intermediaries, who determine the purchase price based on their own discretion or the condition of the chickens. Consequently, farmers receive a lower income than they should.

Based on preliminary studies conducted in 2019, it was found that farmers in three targeted communities in Sakae Phrong Sub-district, Muang District, Buriram Province, generate income from raising native chickens during periods when they are not engaged in farming or cropping, particularly among elderly farmers. These farmers have a strong desire for knowledge, technology, and innovation in the field of raising native chickens to create a sustainable income that can be applied practically. This will enable them to provide food and income for their households and become self-reliant.

The community in Sakae Phrong Sub-district, Muang District, Buriram Province, is a large community where the majority of the population is engaged in agricultural activities. They primarily raise free-range native chickens, which are used for household consumption and as an additional source of income. There are local food sources for the native chickens within the community. However, during drought periods, the number of native chickens decreases. Therefore, researchers have initiated a project to transfer knowledge and develop the practice of raising native chickens in drought-affected areas in the Sakae Phrong Sub-district. This project aims to utilize knowledge transfer, technology, and innovation to enhance the capabilities of native chicken farmers, develop commercial poultry farming skills, and evaluate the management processes of targeted farmers. The goal is to empower native chicken farmers to apply commercial poultry production knowledge within the community, generate income for households, and develop a sustainable occupation for the community.

Knowledge transfer plays a crucial role in connecting researchers and the community, facilitating the exchange and integration of existing knowledge among farmers. This includes implementing farm practices that lead to the generation of new knowledge that can be applied and circulated systematically as a learning exchange. Such efforts support and develop efficiency in respective fields (Hoischen-Taubner et al., 2018; Jeena & Kutrakul, 2018). This, in turn, has an impact on improving the socioeconomic conditions at the grassroots level, fostering a positive attitude towards native chicken farming as a profession, and creating sustainable income. These efforts are based on the foundation of cooperative agricultural production, leading to the formation of a strong community in commercial local chicken production in drought-stricken areas of Buriram Province.

Therefore, this research aims to evaluate the knowledge transfer project for the development of native chicken farming in drought-stricken areas of Buriram Province. The focus is on the processes of knowledge transfer, technology, and innovation to enhance the capabilities of native chicken farmers and improve efficiency while reducing the costs of chicken farming in drought-affected areas. These efforts serve as a guideline for the future development of native chicken farming to generate income in other areas of Buriram Province.

## 2. Materials And Methods

### Target Group

The main target group consisted of 40 farmers in three communities: Ban Khok Sa-At, Ban Sawai So, and Ban Kaset Burana in Sakae Phrong Subdistrict, Mueang District, Buriram Province, who had been continuously engaged in native chicken farming for more than 3 years. The target group for providing general information consisted of 105 individuals who were farmers engaged in agricultural occupations in the Sakae Phrong Subdistrict.

The research process and tools used in the study were as follows:

1. A study was conducted on the general situation of native chicken farmers in all three communities, with a total of 105 participants. A questionnaire was used to collect general information regarding agricultural practices, economics, and native chicken farming.
2. 40 participants who have been continuously engaged in native chicken farming for more than 3 years were selected to participate in the project for knowledge transfer and development of native chicken farming in drought-affected areas of Buriram Province.
3. A training workshop was organized with the aim of transferring knowledge, technology, and innovation to a targeted group of farmers in the areas of commercial organic native chicken production management. The workshop incorporated the knowledge transfer approach proposed by Distanont et al. (2012) and covered various aspects of native chicken farming, including breeding, feeding, livestock management, processing, and the utilization of agricultural residues to enhance their nutritional value as animal feed. In addition, the farm record-keeping and accounting management, as well as the evaluation, were conducted using questionnaires to gather opinions and satisfaction levels regarding the training programs aimed at enhancing the production capacity of native chicken in Buriram Province. Additionally, questionnaires were used to assess opinions and satisfaction levels regarding the knowledge transfer training programs aimed at improving the production capacity of native chicken in Buriram Province. The questionnaires were designed using a 5-point Likert scale.
4. The observation of successful case studies through farm visits of experienced farmers was conducted.
5. The knowledge was expanded into practical implementation on the farms of the targeted group of farmers.
6. The economic returns from native chicken farming were evaluated through the use of questionnaires and interviews.
7. The implementation and practices within the community were assessed to evaluate the knowledge, understanding, and practical application of the target group of farmers in utilizing the acquired knowledge for native chicken farming. This assessment was conducted using an unstructured questionnaire and interviews.
8. The knowledge management and extraction of lessons from farmers who have implemented practices within the community.
9. The knowledge was summarized and shared back with the community.

The project evaluation was divided into three aspects:

1. The evaluation of the conditions and practices of native chicken farming as a livelihood in drought-affected areas of Buriram Province
2. The evaluation of the skill development process among farmers in native chicken farming through knowledge transfer, technology, and innovation
3. The evaluation of the efficacy enhancement and cost reduction of native chicken farming in drought-affected areas of Buriram Province

### Data Analysis

1. The questionnaire via a 5-point Likert scale was analyzed by calculating the mean value.
2. The unstructured interview was analyzed by using content analysis based on frequency.

### 3. Results and Discussion

#### The evaluation of the conditions and practices of native chicken farming as a livelihood in drought-affected areas of Buriram Province

The assessment findings of the general situation of farmers in the target community, with a total of 105 participants, revealed that the majority were female, accounting for 78.80%. The age range was between 41 and 50 years, and the highest percentage, 62.20%, had completed primary education, while 17.80% had completed secondary education. The households mostly consisted of 2–5 members, with the highest percentage at 90.30%. Additionally, 97.65% of the household members engaged in agricultural work, with 2–5 members involved. Among them, 40 individuals, accounting for 42.00%, had 3-5 years of experience in native chicken farming, as illustrated in Table 1.

**Table 1** *General Information of Farmers*

Item	Number (N=105)	Percentage
<b>1. Gender</b>		
-male	40	22.20
-female	65	78.80
<b>2. Education</b>		
-Primary school	65	62.20
-Secondary school	19	17.80
-Diploma	7	6.70
-Bachelor degree	2	2.20
-Post-graduate studies	0	0
-No opinion	12	11.10
<b>3. Age (years)</b>		
20-30 years	12	12.60
31-40 years	25	26.25
41-50 years	32	33.60
51-60 years	14	14.70
61-70 years	7	7.35
<b>4. Family member (persons)</b>		
2-5 persons	86	90.30
6-10 persons	15	15.75
More than 10 persons	4	4.20
<b>5. Family members who work in agriculture sector (persons)</b>		
2-5 persons	93	97.65
6-10 persons	10	10.50
More than 10 persons	2	2.10
<b>6. Experience in native chicken raising</b>		
1-3 years	37	38.85
3-5 years	40	42.00
More than 5 years	28	29.40

#### Agriculture and Economic Data

The majority of farmers, 48.90%, had agricultural land holdings of 5–10 rai, followed by 37.80% who had land holdings of more than 30 rai. Regarding the area used for agriculture, 31.10% had an area of 5–10 rai, while 26.70% had an area of less than 5 rai. In terms of animal husbandry, 60.00% engaged in livestock farming within their residential area, while 24.40% practiced livestock farming within the agricultural area. The labor utilization in agriculture showed that 35.60% relied solely on household labor and partially hired labor or machinery, while 33.30% utilized only household labor and machinery. The sources of capital used in agricultural activities revealed that 37.80% relied on other sources of funding, while 22.20% utilized savings or personal capital, as well as loans from

cooperatives and village funds. The average annual income from agricultural activities, particularly rice farming, was found to range from 1,000 to 30,000 baht per year, accounting for 40.00%. As for field crops, the average annual income ranged from 1,000 to 80,000 baht, representing 22.22%. Farmers were part of the network of the Ministry of Agriculture and Cooperatives, accounting for 24.40%, and 6.70% served as soil doctors. The next group in line was the rice farmers, accounting for 11.10%. As for their membership in other networks, 13.30% were members of other organizations, while 8.90% were members of Village Health Volunteers (VHV). Regarding income from animal husbandry, 20.00% derived their income from livestock farming, while 80.00% did not have any income from livestock farming. The main source of income from livestock farming was 51.10%, while 48.90% earned additional income, and 20.00% generated income from livestock farming averaging 20,001–40,000 baht per year, as shown in Table 2.

**Table 2** Data of Agricultural Farming and Economic Income

Item	Number (N=105)	Percentage
<b>1. Agriculture holding area</b>		
-5-10 rai	51	48.90
-11-20 rai	9	8.90
-21-30 rai	5	4.40
> 30 rai	40	37.80
<b>2. Agriculture area</b>		
< 5 rai	28	26.70
-5-10 rai	14	31.10
-11-20 rai	32	10.20
-21-30 rai	9	8.20
> 30 rai	12	11.10
> 50 rai	10	10.20
<b>3. Livestock raising area</b>		
- Around the house	63	60.00
-In the farm	26	24.40
-others	16	15.60
<b>4. Household labor in agriculture works</b>		
-Use only household labor and machine	35	33.30
- Use only household labor, machine and hire labor	37	35.60
-Hire labor and use machine	7	6.70
-others	26	24.40
<b>5. Budget for agriculture work</b>		
-farmer's saving	23	22.20
- farmer's saving and loan from Bank of Agriculture and agricultural cooperatives	14	13.30
- loan from Bank of Agriculture and agricultural cooperatives and informal loan	5	4.40
- loan from Bank of Agriculture and agricultural cooperatives and village fund	23	22.20
-others	40	37.80
<b>6. Average income from agriculture (bath/year)</b>		
-rice production (1,000 – 30,000 bath)	43	45.15
-field crop (1,000 – 80,000 bath)	23	22.22
-horticulture (50,000 bath)	2	2.22
-Livestock (1,200 – 170,000 bath)	9	8.89
-others	28	26.67
<b>7. Membership of Ministry of Agriculture and Cooperatives</b>		
- Being a member of Ministry of Agriculture and Cooperatives	26	24.40
-Clay doctor (Mor Din)	7	6.70
- Rice production member	12	11.10
-Agricultural butler	0	0
-Agricultural housewife	5	4.40
-Volunteer livestock	2	2.20
- Not a Member of Ministry of Agriculture and Cooperatives	78	75.60

8. Membership of other agency networks (calculated 78 farmers)		
- Being a member of other agency networks	14	10.92
-Village health volunteer	9	7.02
-Thai national defense volunteer	2	1.56
-Female group of the village	2	1.56
- not being a member of other agency networks	51	39.78
9. Income from livestock		
-Received income from livestock	21	20.00
-There was no income from livestock	84	80.00
10. Type of income from livestock		
-Main income	54	51.10
-Extra income	51	48.90
11. Average income from livestock per year (bath/year)		
1,000-10,000	5	5.25
10,001-20,000	16	16.80
20,001-40,000	67	70.35
40,001-80,000	11	11.55
80,001-160,000	4	4.20
More than 160,000	2	2.10

### Animal Husbandry Data

The majority of farmers, 22.22%, raised 3–50 native chickens; on the other hand, 8.89% of farmers raised 1–9 purebred pigs. Regarding their knowledge of animal husbandry, it was found that 57.80% of participating farmers obtained training from government agencies, while 40.0% gained knowledge from their own experience in farming. The knowledge acquired in animal husbandry could be transformed into a source of income for families. It was found that 73.50% considered it their main occupation, while 26.50% considered it a secondary occupation within the family. In terms of livestock farming practices, the majority of farmers (51.00%) practiced backyard farming and utilized locally available feed. The most common issue encountered in livestock farming was external parasites, accounting for 42.20% of cases. When it came to livestock sales, 20% of farmers sold their animals directly. In terms of living conditions, 82.20% of farmers faced noise-related issues caused by pigs disturbing their neighbors, while 24.40% did not take any measures to address livestock-related problems. A significant proportion of farmers (53.30%) were familiar with organic animal husbandry or organic farming practices. Additionally, 95.60% of farmers expressed a desire to transition from traditional to semi-intensive farming or organic farming practices, as presented in Table 3.

**Table 3** Data of Animal Domestication

Item	Number (N=105)	Percentage
1. Livestock raising		
-Native chickens 3 -50 heads	24	25.20
- Native chickens > 50 heads	16	16.80
-Commercial chicken 10 heads	2	2.22
-Layers 2-60 heads	21	20.00
-Swine 1-9 heads	9	8.89
-Native swine 8 heads	2	2.22
-Beef cattle 2-8 heads	7	6.67
-Dairy cattle	0	0
-Others (Buffaloes, sheep, goat)	24	25.20
2. Knowledge about livestock production		
-Experience from their own	42	40.00
-Training workshop from government officers	61	57.80
- Training workshop from private sector	0	0
- Others	2	2.20
3. Gaining income from knowledge of livestock production		
-Knowledges can gain main income for family	77	73.50

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- Knowledges can gain extra income for family	28	26.50
<b>4. Native chicken raising system</b>		
-Backyard system and used of local feedstuffs	60	63.00
- Backyard system and used of commercial feed	11	11.10
-Intensive system and used of commercial feed	2	2.20
-Others	32	31.10
<b>5. Diseases found in native chickens</b>		
-Digestive system	17	13.30
-Respiratory system	16	15.60
-Internal parasites	12	11.10
-External parasites	44	42.20
-Others	16	16.80
<b>6. Selling of native chicken</b>		
-Farmers sell native chicken by themselves as live chickens	21	20.00
- Farmers sell native chicken by themselves as carcass	0	0
-Selling via middles man	21	20.00
-Gathering as community economy	0	0
-Others (used as food in household)	63	60.00
<b>7. Environment problems from native chicken raising</b>		
-Feces from native chickens	12	11.10
-Sound from native chickens	86	82.20
-Flies and other insects	5	4.40
-Others	2	2.20
<b>8. How to solve the problems from native chicken raising</b>		
-Asking helps from government officers	9	8.90
-Asking helps from neighbor and veterinary drug stores	16	15.60
-No action	26	24.40
-Others	54	51.10
<b>9. Acquaintance the organic agriculture or organic native chickens</b>		
-Know about organic agriculture or organic native chickens	56	53.30
-Do not know about organic agriculture or organic native chickens	49	46.70
<b>10. Needs in adaptation from original system to organic farming</b>		
-Famers want to adapt from original system to Semi-intensive system and organic farming	100	95.60
-Farmers do not to adapt from original system to organic farming	5	4.40

From the evaluation conducted on farmers before and after the transfer of knowledge, technology, and innovation in native chicken farming, it was found that farmers had acquired knowledge, understanding, and the ability to apply that knowledge in various aspects, including native chicken breeds, native chicken feed, livestock management, sanitation and disease prevention, cost data collection, return on investment, and production efficiency of native chickens. The attitude towards raising native chickens to generate income and problem-solving in native chicken farming were also examined, as shown in Table 4, indicating that farmers had gained increased knowledge and skills, leading to improved productivity in native chicken farming.

**Table 4** Apparent Lessons of Farmers before and after Applying the Knowledges to Target Farmer's Farms (N=40)

Item	Apparent lessons (Before knowledge transfer knowledge)	Apparent lessons (After applying the knowledges to target farmer's farms)
Native chicken breeds	Farmers knew some native chickens' breeds such as Pradu Hangdum, Leung Hang Khao while they did not know crossbred native chickens.	After training workshop, the farmers received more knowledge and could differentiate between pure breed and crossbred native chicken.

Native chicken feeds	<p>Farmers knew some feedstuffs and procedure in simple native chicken feed formulation such as rice bran, broken rice, leucaena leaves meal.</p> <p>Farmers bought some protein supplement sources such as soybean meal and fish meal or concentrate mixed in diet. Local feedstuffs such as spinach, gourd leaves or wastes from kitchen were used in the diet.</p> <p>Farmers knew some herbs that could be used in native chicken but did not use continuously.</p>	<p>Some Thai herbs such as moringa leaves and mulberry leaves also used in the diet. Dietary supplementation of herbs was the knowledge adopted from training workshop and application in their farm and used as growth promotor and stimulated the antibody of native chickens.</p>
Native chicken management	<p>Farmers knew procedures to manage the housing for native chickens which should have high roof, good ventilation and the sunlight can pass through. It makes the cage/house dry and suitable for native chicken than the house that has lower roof. Native chicken cage or house should build tightly as for protection the chickens from natural enemy such as dog, cat, snake or hawks. Farmers knew feeding management both backyard system and semi-intensive system by feeding the concentrate or complete feed in the evening when the chickens were back to the cage.</p> <p>In addition, fattening native chickens would receive the concentrate two times a day in the morning and evening time. Fresh vegetables or some natural grasses could supplement in the feed as a vitamin and fiber source and also reduce stress in the chickens. Before the training workshop, the farmers did not know about vaccination program in chicken, this caused high mortality rate in young chicks.</p>	<p>After the training workshop, the farmers knew about vaccination program and could be applied in their farms.</p>
Diseases and sanitation	<p>Farmers did not know about housing or farm sanitation, vaccination program and protection of native chicken diseases. This caused high mortality rate especially in young chicks</p>	<p>After training, the farmers knew about infectious diseases and how to use the vaccination as for preventing the diseases.</p>
Data of cost, return profit, and productive performance collection of native chickens	<p>Farmers did not collect the data of income and expenditure record of native chickens and also productive performance of native chickens. Since the Farmers did not collect the data of income and expenditure record of native chickens and also</p>	<p>After training, farmers could collect the data of income and expenditure of native chickens and also productive performance of native chickens such as weight gain, feed intake and feed cost per gain.</p>



	productive performance of native chickens. This caused the farmers could not estimate the cost and profit of production by their own and also could not plan for native chicken production properly	
Attitudes of farmers on the native chicken raising and adaptation of increasing the production	Farmers had right attitudes on native chicken production but they did not know how to increase as a commercial production	Farmers had right attitudes on native chicken production and they need to adapt from ordinary production system to be a commercial production
Problems solving in native chicken raising	Some farmers had a small area so they could not raise a large number of native chickens. Some farms raised a large number of native chickens until the feed was not sufficient for the chickens. Moreover, infectious diseases found in some farms. In addition, the problems of internal and external parasites were found in all farms.	After the training workshop, the farmers knew how to build the chicken house as for raising a large number (50-100 birds) by using the materials that could be found in their area, this could save the cost. Moreover, the farmers knew some natural anthelmintic drug that made from herbs. Marketing was a problem since the price of native chicken would increase during dry season (after rainy season). So that selling plan the native chicken should be done during dry season or some festivals such as New year, Chinese new year, and Songkran festival.

### The evaluation of the skill development process among farmers in native chicken farming through knowledge transfer, technology, and innovation

From the evaluation of skill development among farmers in native chicken farming through the transfer of knowledge, technology, and innovation, including the following aspects: native chicken breeds, native chicken farming management, native chicken marketing, types and uses of herbs in native chicken farming, utilization patterns, and herb preparation. The evaluation also covered topics such as increasing productivity, reducing mortality rates, marketing strategies, production planning, data collection, and production efficiency. Before the training, farmers were given a simple test consisting of 10 questions. Subsequently, training sessions were conducted to enhance their capabilities in the specified areas, including both theoretical lectures and practical exercises. After the completion of the training, farmers were required to take the test again and participate in interviews to assess their knowledge and understanding. The feedback and satisfaction regarding the training for enhancing the production efficiency of native chickens in Buriram province were generally high, as shown in Table 5.

**Table 5** *Opinion and Satisfaction on Training Workshop for Increasing the Productivity of Native Chicken Production in Buriram*

Items	$\bar{x}$	S.D.	Ranging
1. Project publicity	4.30	0.77	9
2. Registration and documents	4.20	0.81	11
3. Place for training workshop	4.33	0.70	8
4. Appropriate time for training workshop	4.17	0.80	12
5. Lunch and drink during training workshop	4.26	0.76	10

Items	$\bar{x}$	S.D.	Ranging
6. Trainer ability	4.67	0.51	1
7. Techniques and procedure to transfer the knowledge	4.57	0.63	3
8. Answering questions of trainers	4.37	0.83	7
9. Appropriate of media in training workshop	4.41	0.63	5
10. Explanation of trainer during demonstration	4.41	0.69	6
11. Training workshop correlated with daily life	4.61	0.60	2
12. Knowledge from the training can be applied to the farm	4.54	0.75	4
Overall satisfaction	4.40	0.70	

From the evaluation of farmers' satisfaction with the skill development process in native chicken farming through the transfer of knowledge, technology, and innovation, it was found that overall satisfaction was high ( $\bar{x} \pm \text{S.D.} = 4.40 \pm 0.70$ ). When considering the satisfaction results in each aspect, it was found that the highest level of satisfaction was observed in three aspects, while two aspects had a high level of satisfaction. The aspect with the highest satisfaction level ( $4.70 \pm 0.50$ ) was satisfaction. From the knowledge transfer and development process for enhancing the nutritional value of agricultural and industrial waste for native chicken feed, as well as farm accounting for targeted farmers, it was found that farmers were able to apply the acquired knowledge to transform their native chicken farming practices. Previously, they practiced free-range farming or traditional farming methods. However, with the acquired knowledge, they were able to adopt a semi-intensive system, which allowed them to reduce the loss of native baby chicks by up to 6 weeks by separating them from the mother hen and rearing them in confinement. Additionally, farmers utilized agricultural waste such as bran or broken rice enriched with yeast as supplementary protein feed for native chickens. This contributed to increased income through the sale of native chickens.

#### **The evaluation of the efficacy enhancement and cost reduction of native chicken farming in drought-affected areas of Buriram Province**

From the evaluation of the efficacy enhancement and cost reduction in raising native chickens, involving 40 farmers who have undergone skill development in native chicken farming through knowledge transfer processes, it was found that the cost and returns for raising one native chicken amounted to 49.97 baht (as shown in Table 6). A single native chicken weighing approximately 1.3–1.5 kilograms can be sold for 85 baht per kilogram, resulting in earnings of 110.50–127.50 baht. This indicates an increased profit per chicken. In the traditional free-range system, where native chickens find their own food naturally, the weight gain is slower and the mortality rate is higher compared to the semi-intensive system, which is a combination of confinement and free-ranging.

**Table 6** Production cost per one head of native chicken

Items	Cost (bath)
1. Labor	-
2. Concentrate feed	44.97
2. Concentrate feed	-
4. Vitamins and drug use in farm	5.00
total	49.97

Note: 1. The price of concentrate is 12.85 baht per kilogram, and the average feed conversion ratio (FCR) of native chickens is 3.50. Therefore, the cost of feed for a 1-kilogram weight gain is equal to  $12.85 \times 3.50 = 44.97$  baht.

In addition, based on the survey data on the farming and marketing of native chickens in 2021, which was conducted with 40 farmers who had undergone skill development in native chicken farming through knowledge transfer, technology, and innovation in drought-affected areas, it was found that the number of chickens for each farmer increased as a result of the knowledge transfer process. The number of chickens tended to increase from September to December, and their selling price was higher during this period compared to other months. This was because it was the end of the rainy season and the beginning of the dry season, which led to an increased demand for native chickens in local markets,

provinces, and regions. Additionally, farmers utilized agricultural waste as feed for native chickens, such as unmilled rice and rice bran, which were available in their own households, helping to reduce the cost of feed. As for the production costs, including the cost of housing, necessary equipment, breeders, chicken feed, vaccines, medications, and other expenses, the total production cost was 49.97 baht per chicken. For one-week-old chicks, the production cost was around 3 baht per chicken, which included the cost of chicken feed. The returns came from selling native chickens at approximately 20 weeks of age, weighing between 1.2 and 1.6 kilograms, with an average selling price of 70–85 baht per kilogram. Farmers made a profit of 20 baht per chicken from the sale. The returns from selling two-day-old chicks were 20 baht per chicken, and for one-week-old chicks, the returns were 25 baht per chicken. As the age increased by one week, the selling price increased by 5 baht per chicken.

Based on the evaluation of the conditions and the farming practices of native chicken as a livelihood in the target area, which is one of the drought-affected areas in Buriram Province, it can be observed that the majority of farmers practice traditional methods of native chicken farming, such as backyard systems or free-range systems. The main objective of this farming method is to provide food for households and generate income for the families. The native chicken breed used is the original local breed found in the region. However, with the knowledge transfer process, farmers have become aware of the market demand for specific breeds in the lower northeastern region, particularly the breed with yellow shins.

Therefore, there has been an expansion of breeding white-tailed yellow chickens, which have an average daily growth rate of  $6.71 \pm 1.32$  grams from 0 to 4 weeks of age, and an average of  $15.11 \pm 2.81$  grams from 4 to 8 weeks of age. When fully grown at 20 to 23 weeks, they can weigh up to 2.0–2.5 kilograms (Yamkong, 2014). Farmers use locally available animal feed ingredients such as broken rice, rice bran, and unmilled rice. For protein supplementation, they use soybean meal, fish meal, or feed concentrates purchased from pet food stores. These are supplemented with various protein-rich plant leaves, such as leucaena, gourd, amaranth, and napier grass. Additionally, they incorporate herbal supplements such as turmeric, andrographis, and *Tinospora cordifolia* into the native chicken's diet to enhance their immune system based on the knowledge acquired through training. These practices start at 1 week of age, aligning with the report by Somkuna & Somkuna (2018). However, there is no significant prevention of important epidemic diseases through vaccination programs, resulting in a high mortality rate among native chickens. After receiving the knowledge, farmers are able to apply it themselves on their farms, especially in terms of feed management, farming practices, and disease prevention. Nevertheless, natural predators still pose a challenge. Farmers have improved their native chicken housing by constructing higher-roofed shelters that provide good ventilation and allow sunlight to penetrate, making the coops drier and more comfortable for the chickens compared to low-roofed shelters with poor ventilation and damp litter, which make chickens easily infected and weak. In addition, the semi-intensive chicken housing system has the advantage of providing natural predator protection for chickens, such as dogs, cats, snakes, or hawks. In the management of native chicken farming, farmers can provide feed both in the form of backyard free-range feeding with additional concentrated feed in the evening or through a system where feed is provided twice a day, namely in the morning and evening.

The assessment results of the development process of farmers' skills in native chicken farming through knowledge transfer, technology, and innovation. In this study, data from the targeted farmer group is being collected and used to determine the direction for developing skills in native chicken farming to generate income. Due to the differences among farmers, it is necessary to adjust the knowledge transfer process, technology, and innovation, as described by Adnan et al. (2018), who stated that understanding the level of opinions and basic information is crucial for agricultural development. It has been found that through the process of knowledge transfer in native chicken farming, including practical training activities, field visits, and applying the knowledge on farmers' own farms, farmers have been able to collect data on farming and farm accounting. This has resulted in farmers gaining understanding, identifying problems, developing problem-solving skills, and engaging in effective data collection. Farmers have developed a positive attitude towards native chicken farming and a desire to change their farming practices to increase commercial production efficiency. It was found that 42% of farmers were

able to apply the acquired knowledge to their own farms, leading to increased production of native chickens. This is because farmers have learned through their own practical experiences, which have eventually transformed into skills and tacit knowledge (Jeena & Kutrakul, 2018; Srithong, 2015). Ultimately, Hoischen-Tauner et al. (2018) explained that the process of knowledge transfer involves the exchange of knowledge between experts, such as expert sites and novice sites, referring to farmers, resulting in the development of new skills and knowledge. Similarly, Cadger et al. (2016) described that providing agricultural training to farmers contributes to their learning process and enables them to transfer knowledge within their own farming community through farmer-to-farmer knowledge transfer. This approach significantly enhances agricultural promotion and efficiency.

The results of the evaluation on improving efficiency and reducing the cost of native chicken farming demonstrate that farmers benefit from knowledge transfer processes in practical training activities, farm visits, and the application of knowledge on their own farms. These activities can increase efficiency and reduce the cost of native chicken farming. The average cost of raising native chickens is 49.97 baht per chicken, while the cost of raising one-week-old chicks is 3 baht per chicken. The selling price per chicken is 20 baht, and the price increases by 5 baht per week as the age of the chicken increases. The main cost is attributed to chicken feed, while revenue comes from selling chickens weighing between 1.3 and 1.5 kilograms at approximately 20–23 weeks of age, with an average price of 85 baht per kilogram. Farmers can also profit from selling one-week-old chicks at 15 baht per chicken. It can be observed that farmers who have undergone training through various learning methods have successfully applied the acquired knowledge to their development, synthesizing their tacit and explicit knowledge to elevate their understanding to a higher level. This process involves exchanging and sharing knowledge, which facilitates socialization (Srithong, 2015). Additionally, it leads to the accumulation of knowledge, known as body knowledge, within the community context and fosters innovation, representing a transformative process. The key success factors in knowledge transfer, as reported by Jeena & Kutrakul (2018), Kulasirima et al. (2015), and Suttarat (2009), include: 1) Leadership and strategy, which play a crucial role in the successful transfer of knowledge. 2) Organizational culture. 3) Communication, which is essential for conveying understanding about ongoing developments. The research in this study utilized content created from the problems encountered in the target area as training material. 4) Processes and tools serve as the core facilitators of rapid and convenient organizational learning. In this study, traditional knowledge from local farmers in raising native chickens and innovative technological knowledge from previous and ongoing research were employed as tools for knowledge transfer to farmers. 5) Evaluation, an important factor for assessing the status of processes or activities to determine achievements, efficiency, and effectiveness, leading to further development. In this research, all activities were evaluated using survey questionnaires and participatory and non-participatory observation methods. 6) Organizational structure that supports the exchange and transfer of learning. In this study, both informal groups of farmers and officially registered cooperative groups involved in raising native chickens were considered. Lastly, 7) Learning, a component that prepares individuals to understand and be aware of the importance of exchanging and learning from one another. Prior to conducting this research, relevant stakeholders, including village leaders, agricultural cooperative presidents, and farmers in the target area, were invited to a meeting to establish development guidelines. The aim was to develop the capacity of individuals and groups and management processes in animal husbandry through innovative research (Sriboonruang et al., 2019). Support was provided to generate income from animal husbandry in drought-affected areas by using native chicken rearing as a tool for development, which could later be extended to other economically viable animal husbandry practices.

#### **4. Conclusion**

With the knowledge transfer process, technology, and innovation to enhance the efficiency of native chicken farming for farmers in drought-affected areas of Buriram province, farmers have acquired knowledge and skills in traditional native chicken farming, enabling them to raise semi-intensive native chickens. This method has the potential to increase productivity and income from selling native chickens.

#### **Implications**

Farmers who raise native chickens can apply the knowledge as a guideline for managing native chicken farming in order to generate income. The development model for native chicken farming in the drought-affected area of Sakae, Phrong sub-district, Mueang District, Buriram Province, can serve as a prototype for the development of other drought-affected areas in Buriram Province.

### Further studies

Further studies should examine the process of building resilient communities that can sustain themselves in drought-affected areas of Buriram province by utilizing the livelihood of traditional chicken farming.

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