



Role of markets and consumers' preferences in improved native chicken demand in Cambodia

Wondmeneh Esatu, Hoa Hoang, Menghak Phem, Sothyra Tum, Chhay Ty, Mulugeta Yitayih, Tsion Yemane and Tadelle Dessie

Key messages

- Market demand dictates cambodian farmers' preference of chicken breeding goal traits.
- Some economic traits such as presence of yellow skin are important in genetic improvement of indigenous chicken such as Skouy in Cambodia.
- Consumers are willing to pay more for indigenous chicken than exotic ones.
- Chicken breeding programs and the marketing of improved chicken can lead to a viable business model with a high chance of sustainability and financial feasibility.

Background

Smallholder poultry keepers in Cambodia mainly keep local or indigenous chicken (Burgos, S. et al. 2008). The average chicken holding per household is by far higher in Cambodia with 36.79 ± 37.63 (Yitayih et al. 2023), than in African countries such as in Kenya with 14.9 ± 15.94 (Anyona, et al, 2023) which is driven by consumer demand for the local chicken products compared to imported or exotic chickens. The Australian Centre for International Agricultural Research (ACIAR)-funded, International Livestock Research Institute (ILRI)-led collaborative research with National Animal Health and Production Research Institute (NAHPRI) and Livestock

Development for Community Livelihood Organization (LDC) has been engaged in the Participatory Indigenous Chicken Breed Improvement Program (PIC-BIP) is improving the genetics of one of the most preferred local chicken 'Skouy' in Takeo Province with huge participation of farmers. So far, the participatory definition of the breeding goal traits and market preference of farmers has been assessed and major wet markets in provinces that are within the reach of Skouy and native chicken distribution have been assessed.

Poultry production systems in Cambodia

Three main chicken and duck production systems co-exist in Cambodia (Yitayih et al. 2023): (i) traditional, small-scale, extensive backyard/garden poultry production, (ii) semi-intensive, small- to medium-scale, market-oriented, commercial chicken/duck production, and (iii) intensive, large-scale, industrially integrated chicken/duck production. Commercial farms supply most of the poultry products in Phnom Penh, Kampong Cham and Siem Reap, and the main cities. Most inputs are imported from China, Thailand and Vietnam and live bird traders are key agents in poultry marketing.

Participatory Indigenous Chicken Breed Improvement Program (PIC-BIP) in Cambodia

Participatory indigenous chicken breed improvement is a process through which smallholder poultry producers are regularly involved in enhancing genetic gain. Their involvement includes defining breeding goals and priorities, selecting or providing indigenous chicken breeds to be considered, evaluating the improved birds, engaging the breeders/scientists, and multiplying and marketing the genetically improved chicken. The goal is to enhance meat and egg production and transform the existing free-range system. In participatory indigenous chicken breed improvement programs, nucleus farms are needed to keep elite chicken where continuous genetic improvement is expected to occur. The nucleus farms can be owned by private chicken companies or farmers interested in the chicken strain under consideration. It should be financial motivation that attracts and keeps them involved. Apart from the nucleus farms (selective breeding), additional smallholder farmers who keep chicken and conduct performance evaluation and multiplication are required. These farms receive chicken from the nucleus farms and provide feedback on the performance of the chicken. In cases where open nucleus breeding programs are preferred, these smallholder farms will give the best cocks back to

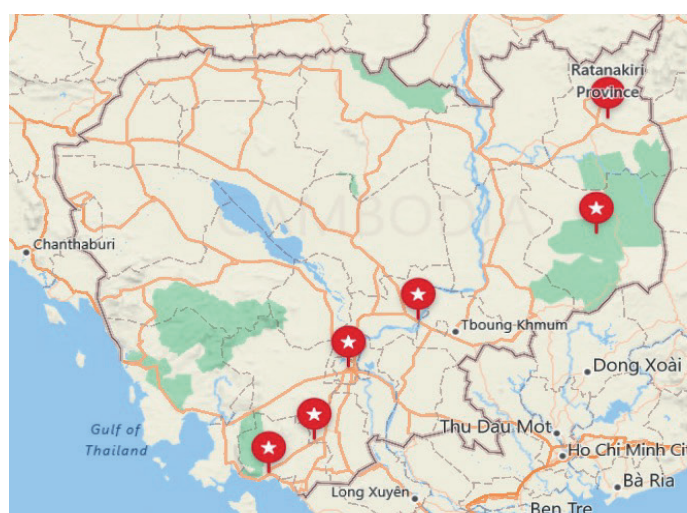
the nucleus flock to advance the improvement. On-farm and on-station testing of the chicken is also required to determine the magnitude of genotype by environment interaction.

Approach

- i. Focus group discussion (FDG) among nucleus farmers, researchers, and district officers

We conducted three FDGs in Takeo among nucleus farmers, researchers from the National Animal Health and Production Research Institute (NAHPRI), the Livestock Development for Community Livelihood Organization (LDC) and district livestock officers and data collectors participating in the breeding program. FDG participants were asked to sit in different groups and identify major chicken traits preferred by consumers, explore market demands and their preferences for the Skouy chicken in Tram Kak District, Takeo Province.

Figure 1. Visited major provincial wet markets in Cambodia. (Picture by Wondmeneh Esatu)



- ii. Rapid assessment of wet markets in selected provinces

Wet markets were surveyed in selected provinces along the Mekong River and northeast Cambodia. Wet markets are the major outlets of poultry products in Cambodia. In each market, 5–6 poultry product kiosks were visited. Discussions were held with the vendors or kiosk owners about the type of products they sell, where they source them from, the price and why they focused on the particular product. Highlands (e.g., Ratanakiri and Monduliri) and dry areas (e.g., Takeo) were included. Sellers were asked where they received the chicken from and the major market demands.

- iii. Discussion with farmers

Along the way, 10 smallholder poultry keepers were interviewed regarding keeping indigenous chicken. We collected information on why they keep indigenous

chicken, the benefits they get, and quality parameters associated with the indigenous chicken.

iv. Characterization of Skouy chicken in Tram Kak, Takeo (Skouy niche area)

Takeo Province is known for advanced poultry production where native chicken are multiplied with hatcheries of various capacities and sold to smallholder farmers. The Skouy chicken breed improvement program is situated in the province. Farmers and traders in all visited markets identified Skouy as the most preferred type and described its physical characteristics. In the mountainous areas, the supply of Skouy is lower due to low demand, as they are expensive.

The characterization of Skouy was then conducted in Tram Kak District, Takeo Province involving about 25 mature chickens according to FAO 2012.

Findings

Participatory definition of breeding goals

The findings of the FGD are shown below in Table 1. Participants identified important traits that have direct implications for the marketing of indigenous chicken in Cambodia. Long shanked chicken are preferred because they can forage in paddy rice fields and run fast to escape predators. Other preferences were for fast growing chicken that can be sold at a relatively young age.

Table 1. Traits of indigenous chickens identified by farmers (FDG) in Tram Kak District, Takeo

Traits	Characteristics
Mature chicken	Black and white barred/red stripes (Bicolor)
Shank colour	Yellow
Egg colour	White
Comb type	Pea/strawberry
Feather cover	Fully covered
Market age	3.5 months
Market weight	1.5 kg in males /1.2-1.3 kg in females
Shank length	10-12 cm in males/10 cm in females

Market assessments

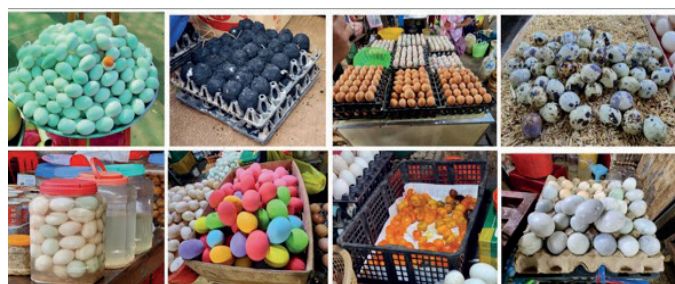
The names of visited major provincial wet markets (poultry products outlets) are shown in Table 2 and Figure 1. These markets serve 27% of the population and the information collected from them gives a representative picture of the situation.

Table 2. Visited provincial wet markets in Cambodia. (NIS, 2019)

Provincial market	Population	Distance from Phnom Penh(km.)
Kampong Cham	895,763	124
Kampot	592,845	148
Ratanakiri	204,027	588
Mondulkiri	88,649	521
Takeo	899,485	78
Phnom Penh	2,129,371	

The wet markets are outlets for poultry products and other livestock products. Various types of eggs and poultry meat products are sold. Generally, eggs and meats from indigenous chicken and ducks are preferred and fetch higher prices as compared to those from imported chicken. The supply of eggs is approximately a quarter of the supply of duck eggs. Embryonated eggs, salted eggs and hard-boiled eggs are more expensive than unprocessed or uncooked ones.

Figure 2: Egg market: Various chicken egg products left to right Top: Hard boiled duck eggs, charcoal pasted duck eggs, chicken eggs, quail eggs. Low: duck eggs emersed in salty water, coloured duck eggs, yolk, and geese eggs. (Picture by Wondmeneh Esatu)



In all markets visited, duck eggs are popular. Ducks' eggs are sold fresh, embryonated, hard boiled, put in salty water and even covered with charcoal (Figure 2). The available chicken eggs are largely imported commercial (brown shelled) and some of small-sized eggs from native chicken. There is also a very limited supply of quail eggs. Evidence from the baseline survey also indicates that chicken egg consumption and marketing is less common than duck eggs marketing and consumption (Yitayih et al. 2023). Smallholder farmers in Cambodia mainly keeps chicken for meat production.

Meat markets

In all markets, poultry meat is sold as eviscerated duck carcasses, chicken carcasses, shank, internal organs (Figure 3). The meat from black bone chicken is highly preferred although the supply is limited. Usually, crossbreeds of black bone and non-black ones are available in all markets visited.

The yellow colour: Shank and skin

Skin colour is an important economic trait in meat-type chickens and a uniform bright skin colour can increase the sales value of chicken in Asia such as China (Wu et al. 2021). Yellow colour is highly appreciated in the wet markets and as is known from the discussion with farmers and consumers. Traders in the wet market even paint some poultry with turmeric to mimic the yellow skin colour. This approach gives the desired colour to the skin but not to the shank. Farmers keep indigenous chicken because of the market demand and taste of meat at home. The consumers believe that native chicken is better quality. The yellow shank and skin colour make them different from imported chicken strains.

Figure 3. Meat Market: Different poultry products in Cambodia left to right. Top: commercial broiler meat, mixed colour meat from CP, quail meat, local yellow skinned Cambodia chicken. Middle: chicken Shank, Duck feet, chicken blood, quail gizzard. Bottom: Black-bone meat, Black-bone live, yellow-skinned duck, live duck (Picture by Wondmeh Esatu)



The barred feather and variability of feather colour of Skouy chicken

The result of the FGD, the discussion with farmers and the characterization revealed that the majority or dominant feather pattern is barred. Based on the information from chicken keepers, researchers, and district officers, Skouy was characterized as shown in Table 1. Further in the characterization of Skouy chicken at the smallholders and markets was identified as bicolor. Based on the observation during the characterization, additional feather colour (barred), is also dominant in the flock. Sex-linked genes affecting plumage colour and patterns and the rate of feather development are useful

in sexing of day-old chicks (Olori 2019). The barred gene can be used to differentiate the sex of day-old chicks. Barring is incompletely dominant and will almost always show. One copy produces white bars in the bird's feathers, and two produce wider white stripes. In the Skouy chicken, the barred can be used in future selective breeding programs.

Figure 4 The feather colour variations in Skouy chicken, Takeo. (Picture by Wondmeh Esatu)



Niche Agro-ecology for Skouy production

Based on the observations at the wet markets and interviewing consumers; indigenous chickens are more preferred than exotic ones. In places where commercial poultry farming is common such as Ratanakiri, farmers produce cashew nuts, rubber trees, bananas, the consumption of exotic chickens is higher. This resulted in the huge price difference (USD7.5 vs 2.5) for local and exotic chicken at market, respectively (Table 4). These areas are prone to drought and residents can only afford to buy indigenous chicken during harvest time. The common chicken breeds are Thai synthetic (provided by CP company by crossing three strains), Japfa (a synthetic chicken breed from Vietnam) and Dong Yeung a native Vietnamese chicken. Consumers generally prefer yellow skinned and yellow shank chickens. Unlike the wet market in Ratanakiri, all markets sell chicken with yellow traits. Cheaper prices are the driver for buying the chickens. These chickens are mainly fast growing, and farmers fatten them for about two months and sell them to consumers and slaughterers. The chance that these chickens are used to cross with local chicken is limited but cannot be ruled out.

Variability in supply and price in different provinces

It was observed that the supply of native chicken in the mountain areas of Cambodia (Ratanakiri and Mondulkiiri) is limited as compared to hot areas (Takeo). In mountainous areas chicken products from CP company and Vietnam are more available and native ones are limited. The supply of poultry products in Phnom Penh is higher than the rest of the markets visited. More diverse

products such as a six-month black bone chicken, quail meat and quail eggs, geese eggs, etc. are available (Table 3).

Table 3. Average price of different egg types in selected wet markets of Cambodia

Types	Origin	Price (USD/egg)
Hard boiled salted	Duck	0.2
Immersed in slaty water	Duck	0.18
Immersed in slaty water (hard boiled)	Duck	0.25
Covered with charcoal paste	Duck	0.18
Embryonated (raw)	Duck	0.25
Embryonated (boiled)	Duck	0.375
Table egg	Duck	0.15
Table egg (brown commercial)	Chicken	0.15
Table egg (Moan Sre)	Chicken	0.25

Table 4. Average price of different poultry meat in selected wet markets in Cambodia

Types	Origin	Price (USD/kg)
Native chicken	Native chicken farm	6.5-7.5
Duck (Campbell)	Local farm	3
Muscovy duck	Local farm	3.75
Broiler synthetic	Commercial farm	2.5-3.0
Laying hen	Commercial farm	2.5-3.0
Broiler commercial	Commercial farm	2-2.5

Characterization of the Indigenous chicken

The characterization of Skouy chicken in Tram Kak showed that there is variation in colour, body weight and other important parameters. The within breed variation can be utilized to improve the performance of the flock through selective breeding. Figure 4 and Table 5 show the phenotypic characteristics of Skouy chicken.

Table 5. Characteristics of Skouy chicken (mean values) in Tram Kak, Takeo

Traits	Sex	Body weight
Body weight (kg)	Male	2.25
	Female	1.85
Shank length (cm)	Male	9.50
	Female	8.0
Wingspan (cm)	Male	53.80
	Female	46.0
Body length (cm)	Male	43.40
	Female	38.50
Circumference (cm)	Male	29.72
	Female	29.27

Conclusion

The participatory indigenous chicken breed improvement program in Skouy chicken of Cambodia is vital as the idea was initiated and supported by the national partners. The skouy chicken being highly preferred by the smallholder farmers, the program contributes to poultry development in the country. Skouy chicken is widely kept in niche areas such as Tram Kak. The proportion of Skouy, according to the farmers, is low in the niche market (Takeo). The breed needs to be further improved for the significant traits identified by the farmers. Although farmers prefer to keep and sell Skouy, uncontrolled breeding is expected in the flock visited. The distribution of improved chicken will positively affect income, household nutrition, and employment. The breeding program and the marketing of improved chicken can lead to a viable business model with a high chance of sustainability and financial feasibility.

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Authors

Wondmeh Esatu, Hoa Hoang, Menghak Phem, Sothyra Tum, Chhay Ty, Mulugeta Yitayih, Tsion Yemane and Tadelles Dessie

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Contact

Wondmeh Esatu
ILRI
w.esatu.cgiar.org



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