An integrated model for developing indigenous chicken in Padang, West Sumatra, Indonesia

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Abstract. This study was carried out using triangulation approach to explore the existing condition in Padang to establish an integrated model for developing indigenous chicken in West Sumatra on November to December 2018. Triangulation process consisted of a feed availability analysis to support strengthening indigenous chicken; location quotient (LQ) rule to analyze the location of indigenous chicken development basis as well as SWOT analysis. The results showed that there were five sub-districts categorized as basis location. Feeding availability could be likely at an increase of 63 % (265,000 head) to the existing number of indigenous chickens. SWOT analysis revealed that there will be an increasing opportunity to develop indigenous chicken using an integrated model where sustainable development goals used as a main reference.

1. Introduction

Local governments have an obligation to provide a self-sufficient in food access, distribution and supply. Padang municipality due to its position at the beach of western part of Sumatra island faces a harder challenge to fulfil the task of preparing sufficient food. The natural disaster-prone area due to earthquake and likely tsunami, flooding and road access hinder probably Padang from outside areas. Then, it was nearly 20 % of population sharing in West Sumatra province living in Padang, clearly requires committed effort to keep safe food consumption. These challenges make Padang be – a must – prepared condition to anticipate both natural blow and restriction of food supply to provide population demand.

In the last five years, Padang has been experiencing a steady growth of market in term of tourist destination and targeted city of university-level students to enhance their competencies. While most of the journey destination is an outside municipality, Padang plays an important role due to its airport, guest house, travel, and famous culinary endorsement [1].

Option to select IC, has several judgement bases, within an integrated approach in agricultural development concept. IC plays an important entry point to provide an effective food supply in a disaster situation. IC is likely distributed to nearly all households due to its semi-intensive style of keeping. IC could also be a cheap concern in term of financial allocation compared to cattle option. IC requires a small piece of land and easily anticipate the difficult access to space in urban area. IC scheme could be used in a synergic and collaboratively with poverty eradication effort [2]. Then, an effort to increase women participation in a household role which is precisely relevant to the matrilineal concept in
Minangkabau culture. Those reasons exist in the perspective of sustainable development goals and framework.

2. Materials and method
Based on necessary data collection, a triangulation approach was used in methodology to explore existing condition; feed availability; location quotient/ LQ and SWOT analysis. Secondary data was collected from the respected publication of state bureau of statistics, Padang municipality or local government organization and the Faculty of Animal Science of Universitas Andalas studies.

Two kinds of both rice processing by-product and corn product availability to support feeding indigenous chicken growth were calculated by using an annual consumption of a head of chick. Its result was decreased by number of current head of IC. Thus, there was a gap in term of number of IC compared to the existing condition as could be further developed. Its formula was;

\[ PPT = POL - Popril \]

\[ PPT = \text{IC development potential/number of head} \]
\[ POL = \text{Optimum number of IC supported by annually feed production} \]
\[ Popril = \text{Current IC population} \]

Correct location to develop IC were counted by using LQ formula. Both number of IC and population at a sub-district location were compared to total number of similar data at Padang level. The results showed several sub-districts categorized by a basis of IC developing center. Its formula was;

\[ LQ = \frac{Si}{Ni} \]

\[ Si = \text{ratio between number of IC and population at certain location/ sub-district.} \]
\[ Ni = \text{ratio between number of IC and population at Padang municipality} \]
If \( LQ > 1 \) referred as basis location/ cluster to develop IC

Finally, strength, weakness, opportunity and threat (SWOT) formula was used to analyze both internal and external condition of IC in Padang. The SWOT results showed an empirical basis for establishing integrated and conceptual model to develop IC. Its model showed in Table 1.

| Internal | S/trength | W/eakness |
|----------|-----------|------------|
| O/pportunity | Using internally strengths to gain benefit from external Opportunities | Achieve benefits from decreasing internal weaknesses and use external opportunities |
| T/hreats | Using internal strengths to minimize external threats | Decreasing both internal weaknesses and external threats |

3. Results and discussion
Based on three categorized findings as required in the study objectives, an integrated model of developing IC in West Sumatra was proposed within a sustainable development goals perspective. First, feed availability to support IC in Padang from locally products basis, which contained two categories; rice processing by-product and corn. Raw data of the existing figure of both elements shown in Table 2. As calculated by first formula, those elements could solely provide to increase IC number by 63 % (265,000 head).

While, there is also another segment of livestock – as well as direct human consumption – will use such feedstuff, IC figure stated an optimistic category. In fact, chicken farmers find a competitive condition to consume such feedstuff, even feed sources from outside Padang could be also considered.
Thus, chicken farmers competencies reflected in institutional capacity – where one should pay critical attention as an entry point to empower them – play an essential role in IC sustainability. S comprehensive consideration to handle any livestock activity within sustainable development goals (SDG). Thus, indigenous chicken farmers and stakeholders in both public and private sectors should be taken into account [2].

Second, both location and period of time were determinant factors to construct any planning activity basis. Padang existing certain condition to construct an integrated model in developing IC shown in Table 3. Based on LQ results, there were five sub-districts categorized as the basis to develop IC; Bungus Teluk Kabung, Padang Utara, Nanggalo, Kuranji and Koto Tangah. Those sub-districts were mostly located at boundary area, where population density was relatively low. Rice field and corn plot were dominantly also existed in the area. Although current development direction in Padang, also tend to go along a similar track [1, 3].

Table 2. Rice and corn area, harvest and production in Padang

| No | Sub-district     | Rice field /ha | Harvest /ha | Production /ton | Corn area/ha | Rice by products/ Ton | Corn production / ton |
|----|-----------------|----------------|-------------|-----------------|--------------|-----------------------|-----------------------|
| 1  | Bung Te Kab     | 783            | 1,566       | 8,535           | 9.0          | 853.5                 | 9.0                   |
| 2  | Lb. Kilangan   | 578            | 1,430       | 7,336           | 24.6         | 733.6                 | 24.6                  |
| 3  | Lb. Begalung    | 452            | 1,119       | 5,629           | 16.5         | 562.9                 | 16.5                  |
| 4  | Pdg Selatan     | 10             | 19          | 76              | 0            | 7.6                   | 0                     |
| 5  | Pdg Timur       | 76             | 119         | 595             | 0            | 59.5                  | 0                     |
| 6  | Pdg Barat       | -              | -           | -               | -            | -                     | 0                     |
| 7  | Pdg Utara       | 12             | 12          | 52              | 0            | 5.2                   | 0                     |
| 8  | Nanggalo        | 242            | 538         | 2,986           | 50           | 298.6                 | 5.0                   |
| 9  | Kuranji         | 1,965          | 5,261       | 29,725          | 19.0         | 2,972.5               | 19.0                  |
| 10 | Pauh            | 1,061          | 2,824       | 15,326          | 33.6         | 1,532.6               | 33.6                  |
| 11 | Koto Tangah     | 1,295          | 3,706       | 20,385          | 23.0         | 2,038.5               | 23.0                  |
|    | Total           | 6,418          | 16,594      | 90,645          | 130.7        | 9,064.5               | 130.7                 |

* Rice processing by-product was assumed 10% of rice production and corn production was 1 ton/ha.

Source: Calculated from Padang facts and figures [4].

Table 3. Area, number of populations, and poultry in Padang

| No | Sub-district     | Area (km²) | % (person) | (person/ km²) | Population and household | Poultry |
|----|-----------------|------------|------------|---------------|--------------------------|---------|
|    |                 |            |            |               | House Hold               | Chicken | Duck |
|    |                 |            |            |               |                          |         |      |
| 1  | Bung Te Kab     | 100.78     | 14.50      | 24,926        | 247                      | 3,802   | 30,387 | 16,004 | 4.26 |
| 2  | Lb. Kilangan   | 85.99      | 12.37      | 55,381        | 644                      | 9,304   | 7,027  | 482    | 0.44 |
| 3  | Lb. Begalung    | 30.91      | 4.45       | 121,265       | 3,923                    | 4,762   | 3,106  | 190    | 0.09 |
| 4  | Pdg Selatan     | 10.03      | 1.44       | 59,748        | 5,957                    | 4,957   | 9,009  | 0      | 0.52 |
| 5  | Pdg Timur       | 8.15       | 1.17       | 79,469        | 7,951                    | 11,551  | 5,485  | 260    | 0.24 |
| 6  | Pdg Barat       | 7.00       | 1.01       | 46,010        | 6,573                    | 3,063   | 3,045  | 0      | 0.23 |
| 7  | Pdg Utara       | 8.08       | 1.16       | 70,794        | 8,762                    | 1,324   | 21,092 | 563    | 1.04 |
| 8  | Nanggalo        | 8.07       | 1.16       | 61,110        | 7,572                    | 2,727   | 20,593 | 4,140  | 1.17 |
| 9  | Kuranji         | 57.41      | 8.26       | 146,709       | 2,555                    | 6,564   | 99,846 | 47,804 | 2.37 |
| 10 | Pauh            | 146.26     | 21.05      | 71,965        | 492                      | 10,076  | 11,443 | 1094   | 0.56 |
| 11 | Koto Tangah     | 232.25     | 33.42      | 189,791       | 817                      | 12,568  | 54,591 | 11,977 | 1.01 |
|    | Total           | 694.96     | 100        | 927,168       | 1,334                    | 69,698  | 265,624 | 84251  |      |

Source: Calculated from Padang facts and figures [4].
Thirdly, Table 4 showed the SWOT result as a basis to construct an integrated model within a regional approach. Although there was a relatively lower level of technology, infrastructure and willingness among chicken farmers, stakeholder’s policy commitment to enhancing IC assure a conducive environment. This leads to create an enabling setting and legally develop a cluster approach [5].

External facilities such as local poultry breeding unit, organic fertilizers demand and involvement of both poverty eradication and disaster risk reduction in policy making process directly boost IC development program. It is the role of government to support at a start-up phase as well as involving women participation in the field of livestock [2,3,6].

Table 4. SWOT results in efforts of accelerated keeping IC in Padang

| Oportunity | S/trengh | W/weakness |
|-------------|----------|------------|
| **Internal** | | |
| **Strength** | | |
| comparative advantages in IC commodities | access to land-use and financial provision |
| access and availability of IC technologies | inappropriate of IC production infrastructure |
| strong commitment from policymakers of both central and regional government to develop IC | a relatively low rate of IC breed, feed and biosecurity application |
| policy consideration to involve food security and disaster resilience | a soft level of chicken farmers and stakeholder’s commitment |
| **External** | | |
| **Opportunities** | | |
| number of Padang population | land use access and difficulties in developing IC |
| potential of regional resources | land-use competition from industry and services sectors |
| a high interest of people to raise IC in periphery area | investment in IC development relatively |
| organic fertilizer demand tend to increase | Slow |
| IC breeding unit at Simpang IV produce a qualified breed | effect of climate change and prone |
| entry point to eradicate poverty and disaster risk reduction | disaster area as well as regional isolation potential |

As shown in Figure 1 integrated model construction to accelerate the rate of IC development process involved five elements; preparation, input, process, output and sustainability. Each step encompasses several items which should be carried out in a synergetic manner among stakeholders. Local policymaker’s role facilitates to create an enabling setting based on the model collaboratively. Thus, it is likely an appropriate model to develop IC in Padang in particular and West Sumatra province in general within sustainable agricultural development goals.

Within this framework, as stated by [2] several topics relevant to SDGs put forward in the model. Its scoping reveals from boosting economic growth through the livestock sector’s multiplier effects to achieve a condition of anticipating the effect of natural disaster as well as advancing towards an integrated development approach. Others five topics follow the range, such as; (a) translating fast livestock growth into faster poverty reduction; (b) realizing the potential of the livestock sector to end malnutrition, (c) preventing animal diseases to ensure healthy lives; (d) fostering women’s participation and decision-making powers and (e) turning animal manure into clean, renewable energy.
Figure 1. Model of an integrated approach of indigenous chicken development in Padang

**4. Conclusion**

While Padang municipality is becoming a more urban, IC clusters’ establishment could be further developed next to the boundary areas by likely increasing its number by 63%. Based on a triangulation data analysis, a model to accelerate IC development has been constructed within an integrated approach in order to achieve sustainable development goals.

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