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Benchmarking of broiler production technology in Malaysia

(Penanda aras teknologi pengeluaran ayam pedaging di Malaysia)

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Abstract

The broiler production technology benchmarking in Malaysia was determined by studying 312 broiler operators in Peninsular Malaysia. The Fuzzy Logic Model (FLM) was applied to benchmark the technology status in broiler farms. Purposive farm samples of open and close house system were selected, where each housing system was compared to determine the best technology practices. Result showed seven technologies namely accreditation, housing and infrastructures, cooling system, rearing practices, method of disinfection, pest and pollution control, and farm waste management were selected to develop benchmarking parameters. Each parameter was evaluated based on the quality features which were classified as worst, average or best. The overall result showed that 13% of broiler farms were categorised as best, while 74% were moderate and the rest were considered as worst farm in terms of technology practices. The technology level average score for close house was 0.595, which was higher than for open house system of 0.402. In both systems, the technology level of broiler production for those selected farms were average. Maximising the use of existing local technology as well introducing improved and significant new technologies would be appropriate to gear up this industry to be more competitive.

Introduction

Since the 1960s, the global broiler production has been growing faster than that of any other meats in both developed and developing country. The growing pattern can be expected to continue because of the inherent efficiency in feed conversion and the lower production costs associated with intensive poultry production costs and production (Chang 2007). In fact, worldwide broiler industry has increasingly produced 194.4 million tons in 2011 (FAO 2011). Broiler is one of the important industries that contributes source of high quality proteins, minerals and vitamins to balance the human diets. Moreover, broiler is the third most consumed meat in the world after beef and pork (Heidari et al. 2011).

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Declining broiler prices and increasing income have also been contributing to increases in per capita consumption. The world average per capita poultry meat consumption was around 14.6 kg in 2012 (FAO 2012). FAO recommend that daily protein intake would be 60 g per person and 35 g is expected to be from animal sources.

According to USDA (2007), United States has contributed the highest broiler production in the world (22.5%), followed by China (18.5%) and Brazil (15.4%). It is no doubt that the US broiler industry has been a technological and marketing leader. One of its major technology contribution is the development of contract farming and vertically integrated production systems that prevail in the world broiler industry (Ollinger et al. 2000). Contract farming has been the dominant means of coordinating broiler production in the United States since the mid-1950s (Martinez 2002). It is clear that contract farming and vertical integration have indeed contributed greatly to higher production efficiency, more consistent to product quality and the ability to respond to consumer demand for a variety of value added products.

Broiler industry is one of the important components in Malaysia agriculture sectors. In 2010, broiler production in Malaysia has contributed 53.2% of total livestock production which was valued at RM10.85 billion (Tapsir et al. 2011). This industry has experienced high self-sufficient level which was achieving 128.1% in 2011 (MOA 2011). The overall production has expanded steadily in line with the growth in local demand and was able to meet the export market to some countries. Broiler meat is a primary protein source for a majority of the population in Malaysia, with a per capita consumption of 35.3 kg in 2011 (MOA 2011).

The technology usage on broiler farming in Malaysia derived from contract farming system. Contract farming has been introduced in Malaysia since 1980s. Under contract farming, feed companies known as integrator usually provides the chicks, feed, management and veterinary services to the growers. While the growers provide labour and broiler houses. At the end of the contract, broiler growers receive a payment per kilogram of live broiler produced. Some of the broiler growers would receive performance-based bonuses from the integrator. Currently, there are 10 integrators that played an important role for broiler production industry in Malaysia. Among them is Leong Hup Poultry Farm which dominated the largest broiler production shares that equal to 17.73% (DVS 2011). Overall, the success of contract farming in Malaysia has been supported by various factors such as the efficiency of feed and chicks supply to small and semi-commercial broiler growers, exploiting economics scale among commercial broiler growers, government support, and rules and regulations that contributed to the development of broiler industry (Tapsir and Mokhdzir 2003).

Currently, broiler production system in Malaysia is divided into two systems namely close house and open house. Technology usage and practices for both systems are clearly different. Close house system is more efficient and effective than open house system. Almost 60% of the total broiler farm in Malaysia operated in close house system (DVS 2011). The advantages of the close house system are comfortable environment, controlled ventilation, optimised productivity, environmental friendly broiler farming and better quality of chicken yield. On the other hand, construction cost to build up housing and infrastructure for close house system is higher than open house system. According to broiler growers in 2014, total cost to build up close house system was between RM18 and RM25 per bird. The objective of the study was to determine the broiler production technology benchmarking in Malaysia.

Methodology

Primary data were collected at the farm level from selected broiler operators who were involved in the production. Farm visits and personal interviews were conducted to gain information on the farmer's profile, the accreditation obtained, housing and infrastructure, rearing practices, animal health management and biosecurity control. The information about management practices as well as production cost and return were also collected. The lists of producers were obtained from the Department of Veterinary Services (DVS). Secondary data was obtained from journal articles, patents, books and magazines. Secondary data were also gathered from government agencies such as MARDI, DVS, Farmer's Organization Authority (LPP) and Federal Land Development Authority (FELDA).

A total of 312 broiler operators were selected by purposive sampling technique for open and close house systems. The selection for broiler operators were divided into three components based on the farm size as follows:

i) Small scale: <10,000 broilers (n = 5%)
ii) Medium scale: 10,001 - 50,000 broilers (n = 60%)
iii) Large scale: >50,001 broilers (n = 35%)

Fuzzy Logic Model

Fuzzy Logic Model (FLM) method was chosen as a model to benchmark technology status of broiler production for the selected sample survey. Three major steps of operation were applied in the FLM decision making process, selection of fuzzy inputs and outputs, formation of fuzzy rules and fuzzy inferences. Prior analysing using FLM benchmarking indicators need to be constructed by taking into consideration all farm level parameters. Each farm parameter was determined by qualitative method based on the quality features which eventually classified into three categories of achievement (best, average and worst). The technology benchmarking indicator score assumptions for broiler production were obtained based on the current production in Malaysia. The score assumptions were determined as below:

i) Best technology practice: FLM score ($x \geq 0.6$)
ii) Moderate technology practice: FLM score ($0.4 \leq x \leq 0.6$)
iii) Worst technology practice: FLM score ($x \leq 0.3$)

Broiler farm technology indices were determined using FLM. FLM analysis was conducted to all technology parameters to determine the technology indices for both close and open house systems. The technology parameters were accreditation, housing and infrastructure, cooling system, rearing practices of farm, disinfection, pest and pollution control, and farm waste management technology. The farm technology indices would exhibit the current farm situation in technology practices.

Results and discussion

The majority of broiler operators were at an average age of 47 years old. Approximately 34% of them had primary education while only 2% graduated from the tertiary level of education. The majority of them had an experienced in broiler farming for 13 years. About 68% of them were in the contract farming system and the rest were operating on their own. The contract farming system has been the most preferred among Malaysian broiler farmers because production and marketing risks could be minimised or shared with integrators/companies.

In parallel with the recent expansion of technology utilisation in livestock production, the broiler industry in Malaysia has also gone through the similar advancement. There were several technologies in broiler farming that could be seen such as farming system, breeding, housing design and equipments, feed and nutrition, capital intensive production and product quality compliance (Tapsir et al. 2011). The analysis of primary

data showed seven major categories of parameter indices for broiler production technology assesment. The parameters were accreditation, housing and infrastructure technology, cooling system technology, rearing practices of farm technology, disinfection technology, pest and pollution control technology, and farm waste management technology (*Table 1*).

Accreditation parameter explained the certification and standard of accreditation obtained for broiler farm. This accreditation covered *Sijil Amalan Ladang Ternakan* (SALT), *halal* certification, Veterinary Health Mark (VHM), Good Animal Husbandry Practices (GAHP) and others. Parameters for housing and infrastructure technology described the use of housing technology includes close and open house systems with all the equipments. Cooling system technology helps to control temperature inside housing system and only implemented for close house system. Rearing practices of farm technology represented the practices for broiler production management regarding technology implementations. Finally, disinfection technology, pest and pollution technology and farm waste management technology indicated the importance of biosecurity control especially animal health management to ensure the safety and healths of broiler chicken.

Extensive descriptive analysis on selected farm variables was conducted to obtain the level of technology practices. The results showed housing and infrastructure technology, disinfection technology and pest and pollution control technology achieved high score as compared to the other technologies parameter (*Figure 1*). Obviously, close house system had better technology implementation than open house system, which was indicated by a high score for accreditation parameter. Animal health management, feed management and biosecurity control elements were most concerned by farm operators because they reflected profit and loss achievements. Therefore, it was not surprising that these parameters obtained high score in the level of technology practices. Among the technology practices adopted for this parameter were feeding system, disinfection method, vaccination practices, flies and odour pollution control, farm waste management and disposal of broiler carcass. Meanwhile, accreditation, cooling system technology, rearing practices of farm technology and farm waste management technology parameters had lower score compared to other evaluated technologies. The lowest score for these

Table 1. Benchmarking technology parameter for broiler production

1. Accreditation *Sijil Amalan Ladang Ternakan* (SALT), *halal*, Veterinary Health Mark (VHM) and Good Animal Husbandry Practices (GAHP)
2. Housing and infrastructure technology Open and close house system
3. Cooling system technology Cooling pad, exhaust fan, generator
4. Rearing practices of farm technology Brooding practices, feeding system
5. Disinfection technology Medicine, vaccine, method of disinfection
6. Pest and pollution control technology Effective microorganism (EM), odour and pollution control
7. Farm waste management technology Management of farm waste, disposal of broiler carcass

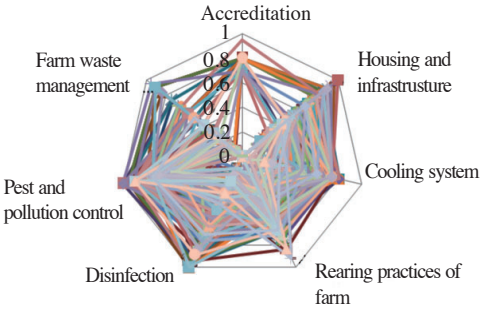

Figure 1. Broiler production technology practices based on FLM analysis

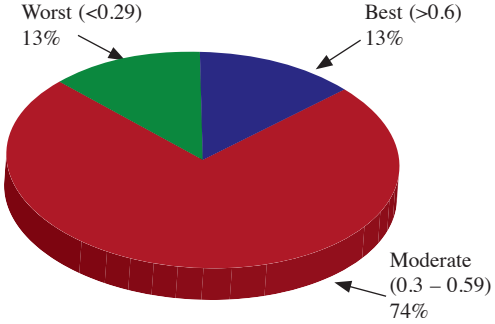

Figure 2. Overall FLM analysis

parameters did not mean that the broiler operators were neglecting the aspects of broiler housing and infrastructure. It only indicated that those technology practices were among those at the minimum level. Throughout observation, they were integrating the automatic/mechanised and manual technology practices for these parameters. It was financially hard for them to fully practice all the sophisticated technologies especially for medium scale broiler operators.

The FLM analysis showed that 13% of broiler farms were at the best level, while 74% were moderate and the rest were considered at the worst level in terms of technology practices (*Figure 2*). The analysis also explored that most of the broiler farms which obtained the 'best' status in technology practices were from close house system, while the 'worst' status were definitely from open house system. It also revealed that the 'best' status broiler farms obtained high score for all technology parameters.

The relative comparison analysis of the current technology status in the close and open house systems analysis showed that the technology level average score for close house system was 0.595, which was significantly higher than the open house system of 0.402 (*Figure 3*). It was clearly proved that the close house system had better technology practices.

Technology gap analysis is obtained by comparing the best and the worst broiler farm technology indices for each housing system. The lower value of difference would mean that the technology gap is narrower and vice versa.

The technology gap analysis for open house system was 0.4 and close house system was 0.445. The technology gap analysis for close house system was slightly bigger than open house system. It was because the comparison from lower to best technology practices were bigger. Furthermore, the number of technology usage in the close house system was more than the open house system and involved large capital cost if broiler operators want to upgrade the existing technology. Most of the close house system growers were in the medium scale and mostly have an intention to become high scale growers in future. For open house system, the narrower gap between technology practices among farms were varied from very traditional method to more advanced practices especially in rearing practices.

Conclusion and recommendation

The technology applications for broiler industry in Malaysia were still in moderate level in both close house (0.585) and open house system (0.442). However the overall technology index in close house system was relatively better. The seven broiler technology parameters developed to capture the current status of technology practices were accreditation, housing and infrastructure technology, cooling system

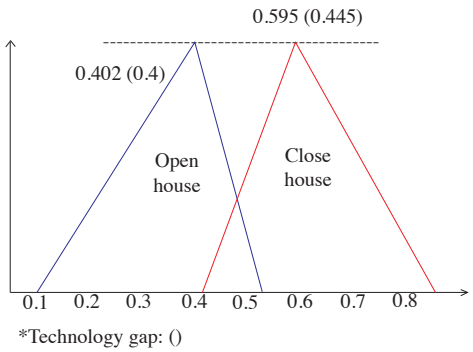

Figure 3. Broiler production technology indices and technology gap between close and open house system

technology, rearing practices of farm technology, disinfection technology, pest and pollution control technology, and farm waste management technology.

The close house system was basically more efficient and environmentally friendly which resulted in less mortality rate, better feed conversion ratio and shorten rearing period which ultimately enhanced the productivity. By adapting this system, broiler operators would earn higher return. This system was proven in controlling temperature and humidity as well as measuring wind speed to ensure comfortable environment for chicken growth.

Despite that, the close house system is currently adopting minimum technology for farm waste management. It is suggested that this technology should be improved and further strengthened. Moreover, the rearing practice and accreditation have room for improvement for best practices that consequently would uplift the farm management. Regarding this, the linkages between technology provider and extension officer from government agencies especially DVS should be reinforced. This is to ensure that the best technology practices and knowledge among extension workers are enriched to deliver the right information and guidance. Narrowing the technology gap among farms will assure the more significant contribution of broiler production to Malaysian economy. Maximising the use of existing local technology as well introducing improved and significant new technologies would be appropriate to gear up this industry to be more competitive. Nevertheless, recent development shows that most of the farms in open house system are slowly converting to the close house system which is better in technology practices.

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Bibliography

Chang, H.S. (2007). Overview of the world broiler industry: Implications for the Philippines. *Asian Journal of Agriculture and Development* 4(2): 67 – 82

Donald, J., Eckman, M. and Simpson, G. (2001). Renovating or retrofitting older broiler houses. *The Alabama Poultry Engineering and Economics* Jan: 18 – 30

DVS (2011). Seksyen Unggas, Department of Veterinary Services, Putrajaya

FAO (2011). Food and Agriculture Organization of the United Nation. FAO Statistical Yearbook 2011. Rome

—— (2012). Food and Agriculture Organization of the United Nation. FAO Statistical Yearbook 2011. Rome

Heidari, M.D., Omid, M. and Akram, A. (2011). Energy efficiency and econometric analysis of broiler production farms. *Energy*, *Journal of Elsevier* 36(11): 6536 – 6541

MacDonald, J.M. (2008). *The economic organization of U.S. broiler production*. Economic Information Bulletin No. 38

Martinez, S. (2002). *Vertical coordination of marketing systems: Lessons from the poultry, egg and pork industries*. Agricultural Economic Report No. 807

MOA (2011). Perangkaan agro-makanan 2011. Kementerian Pertanian dan Industri Asas Tani, Putrajaya

Ollinger M., MacDonald, J. and Madison, M. (2000). *Structural change in the U.S. chicken and turkey slaughter*. Agricultural Economic Report No. 787

Tapsir, S. and Mokhdzir, H.L. (2003). Pengaruh harga dan pendapatan ke atas penggunaan daging ayam di Semenanjung Malaysia. Retrieved on 9 Apr. 2011 from http://www.johordt.gov.my/ivm

Tapsir S., Mokhdzir, L., Nor Rahim, S. and Jalil, N. (2011). Isu dan impak dalam perladangan kontrak ayam daging di Semenanjung Malaysia. *Economic and Technology Management Review* 6: 33 – 57

USDA (2007). Census of agriculture: United States summary and state data 1, geographic area series, Part 51

Abstrak

Tanda aras teknologi pengeluaran ayam pedaging di Malaysia dikenal pasti dengan mengkaji 312 penternak ayam pedaging di Semenanjung Malaysia. Aplikasi Model Logik Kabur telah digunakan bagi menanda aras teknologi pengeluaran ayam pedaging. Kaedah pensampelan tertuju bagi sistem penternakan terbuka dan tertutup dipilih bagi mengenal pasti ladang yang memiliki amalan teknologi terbaik. Hasil kajian mendapati tujuh teknologi iaitu akreditasi, teknologi perumahan dan prasarana, teknologi penyejukan, teknologi dalam amalan penternakan, teknologi disinfeksi, teknologi kawalan perosak dan pencemaran, dan teknologi pengurusan sisa ladang dipilih sebagai penanda aras. Setiap parameter teknologi dinilai berdasarkan ciri-ciri kualiti teknologi yang dimiliki iaitu tinggi, sederhana dan rendah. Sebanyak 13% daripada keseluruhan ladang ternakan ayam pedaging dikategorikan sebagai memiliki tahap teknologi yang tinggi manakala 74% ladang berteknologi sederhana dan selebihnya berteknologi rendah. Didapati, indeks Logik Kabur bagi sistem reban tertutup adalah 0.595 manakala sistem reban terbuka pula adalah 0.402. Kedua-dua sistem mengamalkan teknologi di tahap sederhana. Memaksimumkan penggunaan teknologi yang sedia ada di samping pengenalan kepada penggunaan teknologi baru diharapkan dapat memberi impak dan suntikan yang lebih besar kepada industri ini supaya lebih berdaya saing.