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Assessing the competitiveness and comparative advantage of broiler production in Johor using policy analysis matrix

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Abstract

Malaysian poultry policy aims to provide remunerative prices for producers and to guarantee a steady supply of poultry products at stable and affordable prices to consumers. Broiler meat is the most important and the cheapest protein source in Malaysia and trade protection could stimulate the local industry and enhance food security. The study attempts to evaluate the competitiveness and comparative advantage of three different scales of broiler production in Johor using policy analysis matrix (PAM). The existing protection and the level of comparative advantage are ascertained through PAM indicators. The results show that Malaysia has strong competitiveness position in every scale of broiler production especially the largest scale. But, the protection through import curtailment resulted in higher domestic prices than the world price. To increase competitiveness, the broiler industry should reduce the dependence on expensive and unstable cost of corn based feed.

Introduction

The livestock industry, especially the non-ruminant sub sector, is vital in accelerating growth in the Malaysian agriculture. Its contribution to the gross domestic product (GDP) showed an upward trend where it increased from 9.1% in 2006 to 11.5% in 2010, reflecting an annual growth of 6.6% (The Department of Statistics, Malaysia, 2012). The broiler industry, as an integral part of the non-ruminant sub sector, has recorded enourmous growth, largely propelled by efficient and organized entities in the industry where large companies control greater share of the market. Johor and Perak constitute more than 50% of broiler production in Malaysia (DVS, 2012). Johor has the highest production because of its close proximity to Singapore, Malaysia major export destination of live chicken. In 2012, poultry farming contributed 57.5% to the total livestock value added, while beef contributed 2.2%, mutton 0.1%, pork 9.9%, eggs 27.2% and milk 3.2%. The poultry meat also achieved more than 130% self-sufficiency in the period from 2007 to 2012 (DVS, 2012). The high percentage share of poultry sector to the total livestock value added and the increasing poultry's self-sufficiency level suggests that the sector supplies tremendous protein needs of the population. Although the term poultry farming represents broilers, ducks, turkeys, quails and geese, in Malaysia, the poultry industry predominantly consists of broilers and ducks. The relative percentage of broilers consistently form about 96% of the total poultry population in 2012 while ducks make up of only about 3% (Agrofood Statistic, 2012). In summary, poultry meat, particularly broiler, is an important source of animal protein in Malaysia where the per capita consumption has reached almost 40 kg in 2011. Apart from high domestic consumption, poultry industry also recorded trade surplus in live animals and in processed products in 2008 (Tables 1 and 2). In order to be competitive, the poultry industry must maintain and improve its comparative advantage and should strive for non-government interventions.

According to the DVS, the feed cost normally constitutes more than 70% of the broiler's total cost of production. This is also supported by other researchers (Chanjula and Pattarmarakha, 2002; Ismail *et al*., 2013).The source of raw materials in the feeding system is usually composed of 55% corn and 52% soy bean meal. Both ingredients are imported and their prices fluctuate according to world demand and supply which results in higher domestic price broiler compared to the world price. Clearly, there is a need to reduce the cost of feed in order for the

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Table 1. Export, import and balance of trade (BoT) for live animals, 2007-2008

Commodity	2007 (RM '000)			2008 (RM'000)			Changes in BoT (RM value)	Changes in BoT (%)
	Export	Import	BoT	Export	Import	BoT		
Live Animals	482,524	172,242	310,282	566,738	189,037	377,701	67,419	21.7
Cattle	764	77,822	-77,058	5	90,302	-90,297	-13,238	-17.2
Goats/Sheep	201	54,401	-54,200	19	55,595	-55,576	-13,75	-2.5
Live poultry	479,075	39,418	439,657	562,741	39,111	523,630	83,972	19.1
Others	2,484	424	2,061	3,973	4,029	-56	-2,116	-102.7

Source: Ministry of Agriculture, 2009

Table 2. Distribution of surplus in the BoT for processed products, 1997-2008

BoT	HS Code (6 digits)	Commodity	Average RM ('000)
Surplus	020711	Broiler and Capons, Whole, Fresh or Chilled	3375.94
	020712	Boiler and Capons, Whole, Frozen	28.59
	020713	Broiler and Capon Cuts and Edible Offal, Fresh or Chilled	184.47
	020714	Broiler and Capon Cuts and Edible Offal, Frozen	458.32

Sources: Global Trade Information Services, 2010

industry to remain competitive and sustainable. Hence, the study on competitiveness is important in order to ascertain the current level of comparative advantage and government protection, if any, for the industry to stay competitive in times of unstable prices of agriculture commodities. In addition, the poultry sector is also one of the promising industries that could contribute to the food trade surplus in the future (Ismail and Wan Bakar, 2013).

The objective of this study is to evaluate and assess the competitiveness and comparative advantage of three different scales of broiler production in Johor using policy analysis matrix (PAM).The contribution of this study is mainly in production and trade. Are local farmers producing broilers as competitive as those abroad? If they can produce at relatively lower comparative costs, then the industry can sustain exports. At the prevailing price of broiler and high cost of inputs, it is vital for the industry to enhance competitiveness and comparative advantage in order to increase Malaysia's export share of live chicken in the world.

Materials and Methods

PAM requires both primary and secondary data. Secondary data refers to data such as prices (domestic and borders), factor cost which were derived from published reports (such as Ministry of Agriculture and Agrobased Industry, 2012; Department of Statistics, 2012) and tradable inputs and outputs. The primary data used in this study were collected through a field survey involving the producers in the broiler industry in Johor. Johor was selected due to its major contribution to the production of broiler production in Malaysia. In 2003, broiler producers in Johor accounted for about 13.8% of the total in the country after Kelantan (17.7%) (Bisant and Fatimah, 2008), similarly the market in Johor is relatively concentrated with the top 4 largest producers accounted for about 61.3% of the production.

For this purpose, the study has adopted a non-probability sampling method that is a purposive sampling technique. This technique is deemed suitable as non-probability approach is suitable for an in-depth interview of the respondents (Given, 2008). In the context of this study, the in-depth interview is appropriate to solicit the detailed cost of broiler production, the primary information required for PAM analysis. The study has specifically utilized stakeholder sampling involving the producers from three categories which are: large producers (who owns more than 150,000 birds), medium (with 30,000 to 150,000 birds) and small (less than 30,000 birds).This division is necessary to enable comparison in terms of competitiveness and efficiency between the three categories of producers. The study has interviewed a total of 21 producers from the three categories from the following 4 main production districts in Johor: Muar (6,387,000 birds in 2008), Kluang (4,313,000 birds in 2008), Batu Pahat (8,257,250 birds in 2008) and Pontian (8,054,150 birds in 2008).

The Policy Analysis Matrix (PAM) is computational framework, delivered by Monke and Person (1989) and augmented by Master and Winter-Nelson (1995) for measuring input use efficiency, comparative advantage among commodities and the degree of government interventions. The PAM is a

Table 3. The general structure of policy analysis matrix (PAM)

Price	Revenues	Cost		Profits
		Tradable Inputs	Domestic factors	
Private price	*A*	*B*	*C*	*D = (A – B –C)*
Social price	*E*	*F*	*G*	*H=(E –F – G)*
Effective of Divergence	*I =(A –E)*	*J =(B –F)*	*K =(C –G)*	*L =(I –J = D –H)*

Source: Monke &Pearson (1989)

simple identity where Profits equal Revenue minus Cost as summarised in Table 3.

The calculations of policy analysis matrix are as follows:

1. Domestic Resource cost (DRC) = G / (E – F) (in the local currency)
2. National Protection Coefficient (NPC) = A / E
3. Effective Protection Coefficient (EPC) = (A –B) / (E –F)
4. Coefficient of International Competitiveness (CIC) = G / (IVA) (in foreign currency)
5. International value Added (IVA) = E – F (In foreign Currency by dividing the IVA (E – F) BY shadow exchange rate)

The nominal protection coefficient NPC is a simple indicator of the incentives or disincentives in place, defined as the ratio of domestic price to a comparable world (social) price. NPC can be calculated for both output (NPCO) and input (NPCI). NPCO is the ratio between private and social revenue of the output (i.e. the ratio of domestic market price of the product to its parity price at the broiler production area). If NPCO >1, it indicates that the private price of output is greater than its parity price and hence producers are positively protected (subsidy) in the broiler production. If NPCO < 1, it indicates that producers are taxed on the broiler production. If NPCO = 1, it indicates a neutral situation (Pearson et al., 2003). NPCI is the ratio of private to social cost of tradable inputs (i.e. the ratio of the private to the social values of all tradable inputs). On the other hand, the NPCI is one of ratio to determine tradable input transfers. NPCI is expressed as ratio of value of tradable inputs at private price (B) to value of tradable inputs at social price (F).If NPCI >1, it indicates that producers are taxed when they buy tradable inputs. If NPCI < 1, it indicates that they are subsidized. NPCI = 1 represents a neutral situation.

The Effective Protection Coefficient (EPC) was used to measure the total effects of intervention in both input and output markets. EPC is the ratio of value added, measured at private prices (A-B) to that of social prices (E-F). If EPC value is greater than one it suggests that government policies provide positive incentives to producers. It also implies that the overall impact of the existing policy results in a net positive incentive to broiler production while values less than one indicate that producers are not protected through policy interventions taxed (represents a net disincentive). EPC =1 implies either no intervention or the net impact of various distortions in both the input and product markets results in a neutral effect on value added.

The DRC has been widely used in developing countries to measure efficiency, comparative advantage and guide policy reforms (World Bank, 1991).The DRC is the tool to measure comparative advantage of different scales of broiler production in Johor; Itis defined as the (G/ (E-F) and it indicates whether the use of domestic factor is socially profitable (DRC<1) or otherwise (DRC>1). The broiler production can be ranked according to the DRC values, and this ranking is taken as an indication of comparative advantage or disadvantage within that scale.

The Social Cost Benefit (SCB) is defined by the ratio of total resources cost (F+G) to the revenue (E). The SCB supposed to provides more accurate rankings of the comparative advantage of alternative activities (Master and Nelson, 1995; Ismail and Radam, 2004). In this study, only one activity (broiler production) is investigated and thus, the ranking between DRC and SCB is expected to be the same. An international Value Added (IVA) is the difference between the growth revenue in USD and tradable cost in USD. Positive IVA implies net foreign exchange earnings. The main disadvantage of such a measure is that it neglects the role of domestic factor (Sattar, 1982). A Coefficient of International Competitiveness (CIC) is the ratio of Domestic Resource Cost (expressed in domestic currency economic prices) to international value-added (expressed in foreign currency). It measures the ratio of domestic resources cost necessary to earn a unit of foreign exchange. If the value of the CIC is less than the prevailing exchange rate, the product is economically profitable. The merit of DRC and CIC is that they take into account domestic factor costs, as well as, tradable inputs and outputs. In other words, if CIC is less than official exchange rate that means the competitiveness of the broiler export is fare at this official exchange rate. If it is more than the official

Table 4. Protection coefficients for broiler production in Johor, 2013

Scales	NPCO	NPCI	EPC
Large	1.09	1.15	0.98
Medium	1.17	1.15	1.17
Small	1.22	1.15	1.85

Table 5.Ranking of broiler production in Johor, 2013

Scales	DRC	SCB	IVA	CIC	Rank
Large	0.271	0.745	445	0.87	1
Medium	0.632	0.942	201	2.02	2
Small	0.960	0.996	133	3.07	3

exchange rate,broiler export is not competitive at international market until devaluation occurs, that is, until government depreciates the Malaysian Ringgit to a new level lower than the prevailing rate.

Results and Discussion

The summary results of protection coefficients on the three scales broiler production in Johor are shown in Table 4.The NPCI coefficients values show that domestic broiler prices in all three scales are more than one in Johor suggesting that the government policies are increasing input costs for all broiler scales through various taxed. Similarly, the NPCO is also greater than one in all scales indicating that the Malaysian government policy has resulted into some form of protection in the broiler industry. This result shows the highest nominal incentive rate is found in large followed by medium and small scale, respectively. The Effective Protection Coefficient (EPC) values show there are significant difference in the degree of policy transfer for different scale of broiler production; 0.98, 1.17 and 1.85 for large, medium and small respectively. This result indicates that the net impact of government policy influence broiler industry in terms of output price policy and tradable input price policy. The production of broiler in large scale is not protected and is taxed at 2 percent while the medium and small scale producers are protected through policy interventions (represents a net disincentive).

The other PAM indicators such as DRC, SCB, IVA and CIC for broiler production in Johor are reported with their ranking in Table 5. According to DRC the broiler productions have a comparative advantage in all the three categories as the values of DRCs are lower than one. The DRC of large, medium and small scales of broiler production is 0.27, 0.63 and 0.96 respectively. This indicates that the large scale broiler production in Johor has the highest comparative advantage compared to other two scales of broiler production in the same region. This is in accordance with a study by Padilla-Fernandez and Nuthall (2012) which concludes that inefficiency differences among farm size groups appear to be related with physical input used and cost. The higher input usage by the large farm tends to increase the quality produced and with the low price of inputs, the large farm generates a larger profit. These indices suggest that there exist an efficient allocation of resources in all scales of broiler production in Johor. This is plausible due to the efficient utilization of resources that results in lower cost of production and it could also be ascribed to the technological advancement in broiler production.

Based on the SCB analysis the broiler production also indicates high comparative advantage since the price of the commodity increased gradually throughout the period resulting in higher benefit that inflate the denominator. The large scale broiler production appears to achieve high comparative advantage since the SCB value is about 0.74. This followed by the medium scale broiler production at 0.94, and small scale broiler production at 0.99. However, the SCB indices suggest that the small scale broiler production is close to operating at comparative disadvantage. Similar to the DRC indices the largest scale respondents achieved the highest comparative advantage followed by medium and small scales respondents.

The absolute competitiveness of broiler production which is measured by the international value added per tonne reflects the foreign exchange saving or earns in the industry. In general, the foreign exchange earning in broiler production for a large scale per tonne in Johor is USD 445 which is more competitive than the other two scales that recorded only USD 201 in medium and USD 133 in small scale. All values are positive suggesting some form of absolute competitiveness at the national level. International Value Added (IVA) in Johor for all scales of broiler shows similar findings. It is obvious that the broiler production at the national and international levels is highly competitive in all the three scales and profitable at the prevailing exchange rate for the years under study. The CIC of broiler production for all scales under the official exchange rate (RM 3.33 per USD, as published by Maybank on 30th Dec.2013) is relatively fair. Moreover, CIC for broiler production in large scale shows high competitiveness compared to the other two scales which equal 0.87. The broiler production in the medium and small scales is also competitive with CIC values of 2.02

and 3.07 respectively. But, their CIC value appears less competitive compared to the large scale broiler production. Nevertheless, the CIC indices prove that the broiler production is competitive at the current level of exchange rate; which implies that the broiler production is internationally competitive at the prevailing international prices.

Conclusion

The study is an application of the policy analysis matrix (PAM) to the broiler production of different scales in Johor. The 21 broiler operations are divided into three scale categories; the large operator is greater than 150,000 birds, medium scale is 30,000 birds to 150,000 and small scale is less than 30,000 birds. The private costs in PAM indicate that the cost of large scale broiler production in Johor less than the other two scales. In general, all the scales have comparative advantage based on DRC and SCB values less than one. Both indices, however, provide the same ranking even though with different values for different scales of production. In terms of IVA and CIC, the large scale broiler production found to be more competitive because the values are positive apropos with reference to competitiveness at the domestic level. The performance of the large scale operator in terms of comparative advantage indices reflects the progress of existing technology in enhancing resource utilization in the broiler chicken production. However, the improved feed formulation that will include local agricultural waste as the main ingredient may be able to improve the level of comparative advantage in the broiler production in the future. In terms of incentives and disincentives, the NPCO and NPCI in all scales are greater than one but EPC in large scale is less than one while the other two scales are greater than one. The value of NPC in input and output indicate that there is protection in terms of import restriction but there is no subsidy on the inputs such as chemicals and feed. An EPC value of less than one indicates that government policies provide negative incentive to large scale producers while a value greater than one indicates that the medium and small scales producers are protected through policy intervention in the broiler production.

Despite the heavy dependence of imported raw materials for feed (corn and soya bean), the broiler industry is still able to remain competitive. This is largely due to the technological innovations that help reduces cost of production and hence increases productivity. However, lately the world saw an increasing trend of crude oil and cereal prices (in particular corn and soya bean) which are challenging the industry in terms of rising cost of production and hence dampen profitability. Thus, it is imperative that the industry seek cheaper feed alternative particularly from local like palm kernel cake (PKC) to maintain its competitiveness and sustainability.

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