UNIVERSITI PUTRA MALAYSIA

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By

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POLICY SIMULATION FOR IMPROVING SELF-SUFFICIENCY LEVEL OF BEEF SUB-SECTOR IN MALAYSIA

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Chairman: Professor Zainal Abidin Mohamed, PhD

Faculty: Agriculture

Beef sub-sector in Malaysia has become significantly important as the demand for beef is increasing every year. However, the pace of development for beef sub-sector is still far to meet the self-sufficiency level. The production of beef sub-sector is far left behind by the production of pork and broiler. Beef sub-sector production has to depend on import of live animal and frozen or chilled beef in order to fill the differences between total demand and local supply of beef. Although the government always emphasizes more on the development of beef sub-sector, the outcomes is yet to be seen. At the same time, it has to improve the development of mutton sub-sector and maintain the development of pork and broiler sub-sectors in order to meet the protein requirement of Malaysian population. Generally, the objective of this study is to simulate policy variables affecting the self-sufficiency level of beef sub-sector. Specifically, this study tries to determine factors affecting the meat production and demand, to simulate the effect of importation of cattle for breeding and cattle for

slaughter or feeder cattle on self-sufficiency level of beef sub-sector, and to identify the effect of changes of beef sub-sector on other livestock sub-sectors.

In attempts to analyze the objective of this study, econometric modeling procedure is adopted. Structural equations have been developed for each livestock sub-sectors in the industry using general equation of the market model. Each sub-sector model consists of 3 blocks of component which are inventory, supply, and demand. Most of endogenous variables are represented by separate behavioral equations. Other endogenous variables are identities. The exogenous variables, on the other hand, consist of macroeconomic, policy and other exogenous variables. Econometric modeling for this study use annual time series data to estimate each of the sub-sectors models of the livestock industry. The estimation technique used is 2SLS regression as system of equations. The models are validated through historical simulation using RMSE, RMSPE, and U-Theil inequality coefficient.

Then the beef sub-sector policy simulation analysis is conducted based on Malaysian Agricultural Policy Analysis (MAgPA) model framework. Three different scenarios are set by applying different rates of changes of import of cattle for breeding (ICTB) and import of cattle for slaughter or feeder cattle (ICTS) to achieve the current targeted self-sufficiency level of beef sub-sector in Malaysia of 32.7% by 2020 (National Agro-Food Policy). Firstly, in scenario 1, the rates of changes for ICTB and ICTS are 10% and 15% respectively. Other exogenous variables grow based on the growth rates or rates of changes of the last 10 years data. Then scenario 2 examines the sudden increase in ICTB as the rate of changes is 20% while ICTS value remains at the same level. Other exogenous variables grow as in scenario 1.

Finally, scenario 3 assumes there is a sudden increase in ICTS as the rate of changes is 20% while ICTB value remains at the same level. Other exogenous variables grow as in scenario 1.

The estimation results show the importance of breeding performance in developing the livestock industry. For instance, female cattle in beef sub-sector have the influence on most of the variables in the inventory block. On the demand side, all meat is significantly influence by income with only income elasticity of demand for beef is elastic. Each meat has two substitutes with chicken meat appear to be substitute for all other meat.

The beef sub-sector policy simulation analysis found that scenario 2 not only did not achieve the targeted self-sufficiency level for beef sub-sector, but the level is declining. Scenario 2 also records the lowest self-sufficiency level for mutton and chicken meat, and the consumer surplus in beef sub-sector. Scenario 3, though achieve the highest self-sufficiency, producer surplus in beef sub-sector is the lowest. Self-sufficiency level for mutton and pork in scenario 3 are also lower than in scenario 1. Scenario 1 performs the most ideal implication for the beef sub-sector where the targeted beef self-sufficiency level was achieved and other livestock sub-sectors were stable. Therefore, based on scenario 1, Malaysia should import 68,205 heads of cattle for breeding and 226,841 heads of cattle for slaughter or feeder cattle by year 2017 in order to archive the targeted beef self-sufficiency level in year 2020.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

SIMULASI POLISI UNTUK MENINGKATKAN TAHAP SARA DIRI SUB-SEKTOR DAGING LEMBU DI MALAYSIA

Oleh

MARK BUDA

Julai 2013

Pengerusi: Profesor Zainal Abidin Mohamed, PhD

Fakulti: Pertanian

Sub-sektor daging lembu di Malaysia menjadi semakin signifikan kerana permintaan terhadap daging lembu semakin meningkat setiap tahun. Namun, tahap pembangunan sub-sektor daging lembu masih jauh untuk mencapai tahap sara diri. Pengeluaran daging lembu agak ketinggalan berbanding pengeluaran daging khinzir dan daging ayam. Sub-sektor daging lembu perlu bergantung kepada import ternakan hidup dan daging sejuk beku bagi memenuhi permintaan pengguna. Walaupun kerajaan sentiasa memberi penekanan lebih untuk pembangunan sub-sektor daging lembu, hasilnya masih belum dapat dikecapi sepenuhnya. Pada masa yang sama, kerajaan harus meningkatkan kemajuan sub-sektor daging kambing dan memastikan pembangunan sub-sektor daging khinzir dan daging ayam berterusan agar keperluan protein rakyat Malaysia dapat dipenuhi. Secara umumnya, objektif kajian ini adalah untuk menjalankan simulasi pembolehubah polisi yang mempengaruhi tahap sara diri daging lembu. Secara spesifiknya, kajian ini cuba untuk menentukan faktor-faktor yang mempengaruhi pengeluaran dan permintaan daging, menjalankan simulasi

kesan pengimportan lembu untuk pembiakan dan lembu untuk sembelihan atau lembu fider terhadap tahap sara diri daging lembu, dan mengenalpasti kesan perubahan sub-sektor daging lembu terhadap sub-sektor ternakan lain.

Untuk mencapai objektif kajian ini, prosedur pembentukan model ekonometrik digunakan. Persamaan struktur telah dibangunkan untuk setiap sub-sektor ternakan dalam industri berpandukan persamaan umum model pasaran. Setiap model sub-sektor mengandungi 3 blok komponen iaitu inventori, penawaran, dan permintaan. Kebanyakan pembolehubah endogen diwakilli oleh persamaan tingkah laku secara berasingan. Pembolehubah endogen yang lain dinyatakan sebagai identiti. Manakala pembolehubah luaran pula merangkumi pembolehubah makroekonomi, polisi dan lain-lain faktor luaran. Model ekonometrik dalam kajian ini menggunakan data siri masa tahunan untuk menganggarkan setiap model sub-sektor dalam industri ternakan. Teknik penganggaran yang digunakan ialah regresi 2SLS dalam suatu sistem persamaan. Model-model ini disahkan melalui simulasi lampau dengan menggunakan RMSE, RMSPE dan pekali ketaksamaan U-Theil.

Kemudian analisis polisi sub-sektor daging lembu dijalankan berdasarkan rangka kerja model Malaysian Agricultural Policy Analysis (MAgPA). Tiga senario berbeza telah ditentukan dengan mengaplikasikan kadar perubahan import lembu untuk pembiakan (ICTB) dan import lembu untuk sembelihan atau lembu fider (ICTB) yang berlainan bagi mencapai sasaran terkini tahap sara diri sub-sektor daging lembu di Malaysia iaitu 32.7% menjelang 2020 (Dasar Agromakanan Negara). Dalam senario 1, kadar perubahan bagi ICTB dan ICTS ialah 10% dan 15%. Pembolehubah luaran yang lain berubah berdasarkan kadar pengembangan atau kadar perubahan

dalam tempoh 10 tahun ke belakang. Senario 2 pula menguji kenaikan ICTB secara mendadak di mana kadar perubahannya ditetapkan pada 20% dan nilai ICTB tidak berubah. Pembolehubah luaran yang lain berubah seperti dalam senario 1. Akhir sekali, senario 3 menganggap ada kenaikan mendadak ICTS di mana kadar perubahannya ditetapkan 20% dan nilai ICTB tidak berubah. Pembolehubah luaran yang lain berubah seperti dalam senario 1.

Hasil penganggaran menggambarkan kepentingan prestasi pembiakan dalam membangunkan industri ternakan. Contohnya, lembu betina dalam sub-sektor daging lembu/kerbau mempengaruhi hampir keseluruhan pembolehubah dalam blok inventori. Pada bahagian permintaan pula, semua daging dipengaruhi oleh pendapatan secara signifikan di mana hanya keanjalan pendapatan permintaan daging lembu adalah anjal. Setiap daging mempunyai dua barang pengganti di mana daging ayam menjadi salah satu dari barang pengganti tersebut.

Analisis polisi sub-sektor daging lembu mendapati senario 2 bukan sahaja tidak mencapai tahap sara diri daging lembu yang disasarkan, tetapi tahapnya juga semakin menurun. Senario 2 juga merekodkan tahap sara diri yang paling rendah bagi daging kambing/bebiri dan daging ayam, dan lebihan pengguna sub-sektor daging lembu. Senario 3 telah mencapai tahap sara diri daging lembu yang paling tinggi. Namun, lebihan pengeluar sub-sektor daging lembu adalah yang paling rendah. Tahap sara diri daging kambing/bebiri dan daging khinzir dalam senario 3 lebih rendah berbanding senario 1. Senario 1 mempamerkan implikasi yang paling sesuai bagi sub-sektor daging lembu, di mana tahap sara diri sub-sektor dagin lembu yang disasarkan tercapai dan sub-sektor ternakan yang lain stabil. Justeru,

berdasarkan senario 1, Malaysia harus mengimport 68,205 ekor lembu untuk pembiakan dan 226,841 ekor lembu untuk sembelihan atau lembu fider menjelang 2017 agar sasaran tahap sara diri sub-sektor daging lembu dapat dicapai pada tahun 2020.

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I certify that a Thesis Examination Committee has met on 17 July 2013 to conduct the final examination of Mark Buda on his thesis entitled "Policy Simulation For Improving Self-Sufficiency Level of Beef Sub-Sector in Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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DECLARATION

I declare that this thesis is my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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MARK BUDA

Date: 17 July 2013

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