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Government Incentives and Comparative Advantage of the Sheep Industry in Malaysia

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ABSTRAK

Kajian ini mengira kadar perlindungan dan faedah bandingan pengeluaran bebiri dari sudut persepektif penggantian import. Pada keseluruhannya, penemuan kajian ini mendapati pengeluaran bebiri di Malaysia mendapat perlindungan sebagaimana yang ditunjukkan oleh nilai NPR. Harga tempatan adalah 32% lebih tinggi daripada harga dunia. Nilai EPR pula menunjukkan bahawa pengeluaran beberi mempunyai galakan. Dari segi faedah bandingan, didapati hanya ladang yang bersaiz > 75 bilangan ternakan mempunyai faedah bandingan yang tipis. Ini menunjukkan bahawa pengeluaran beberi secara kecilan tidak viable dari segi ekomomi dan sosial.

ABSTRACT

This study computes the protection rates and comparative advantage of sheep production from an import substitution perspective. The results show that, in general, sheep production in Malaysia is moderately protected as shown by the NPR. Domestic price is about 32% above the world price. The value of ETr, on the other hand, indicates that there is an overall net incentive in sheep production. In terms of comparative advantage, this implies that with a small herd size, sheep production is not viable economically and socially.

INTRODUCTION

The agricultural sector continues to play a major role in the Malaysian economy through its contribution to GDP, foreign exchange earnings and employment. In 1988, its contribution was about 21.1% to GDP, 22.1% in total exports and 31.3% in employment. The livestock industry contributed about 3.5% to overall GDP in 1988 and its contribution to the agricultural sector increased from 16.27% in 1988 to 19.47% in 1991. The main components of the livestock industry were pigmeat, poultry and eggs, which comprised about 90% of total livestock production. The others were beef, mutton, milk, hide and offal. The small ruminant (sheep and goat) subsector plays a minor role in the livestock industry. For the last three decades, the consumption of mutton has shown an increasing trend, while local production has shown a downward trend. The self-sufficiency level also shows a downward trend. It was at 38% in 1960 and declined to 25% in 1970. In 1993 the self-sufficiency level was approximately 10% with 90% of the mutton being imported in order to meet the demand. In 1993 the value of imports was approximately RM30 million. Although mutton is less popular than beef and poultry meats, it is acceptable to all races in Malaysia and about 72% of the population in Peninsular Malaysia consume mutton(HOA 1992). Production remains essentially a subsistence activity with herd sizes ranging from 2 to 20. There are few large sheep/goat production units. The future of the sheep industry appears bright with the current interest shown by the plantation sector. In recent years, research and field experience have shown that sheep rearing under immature oil palm and rubber is technically feasible (Wan Mohamed *et al.* 1988; Mohamad *et al.* 1990). The plantation sector, with its large

financial resources, is more likely to make headway in commercial mutton production. The development of the sheep industry in this country will not only significantly increase mutton production but will also provide an alternative income-generating activity for smallholders, thus furthering the diversification of agriculture production. The integration of sheep with plantation crops will reduce the use of weedicides. Research and field trials have shown that the cost of weeding can be reduced by 15-25% (Zakaria 1990). Thus the participation of private companies, such as Guthrie, Sime Darby, and Golden Hope will speed up mutton production in Malaysia.

The Livestoch Industry

The objectives of the Malaysian livestock policy are: (i) to encourage local production of meat to reduce dependence on imports, (ii) to save and foreign exchange, (iii) to provide employment, (iv) to ensure consumers a stable meat supply at affordable prices, and (v) enhance the nutritional adequacy of diets in the rural areas. With the introduction of the New Economic Policy (NEP) in 1970, livestock programmes in the ruminant subsector became a means to increase farm income and thus reduce the incidence of poverty. With the above objectives, the livestock policy was started as an import substitution strategy. Government intervention has contributed significantly to the development of the livestock sector. The non-ruminant sector (pigs and poultry) has certainly benefited tremendously from the control of diseases, import controls and duties imposed on such products while the ruminant subsector (cattle, buffaloes, sheep and goats) has been the recipient of direct government assistance. As shown in Table 1, more than three-quarters of the expenditure from 1981-1993 was devoted to beef cattle. Milk production received the second largest allocation, while the sheep/goat scheme received least funds. However, in the last few years the sheep/goat scheme has been given priority over the dairy subsector. This indicates that government intervention in the development of the sheep/goat industry has been intensified but whether this is profitable and economically viable is yet to be answered.

Government intervention can distort the operations of the market, producing a set of prices that may differ from 'free' market price. Consequently, relative output and input prices within and across industries are altered, affecting the pattern of production incentives. The purpose of this study is to estimate the magnitude of distortions due to government intervention and the extent to which an import substitution regime can save foreign exchange. An indication of comparative advantage or disadvantage will show the efficiency with which domestic resources are used in such an activity.

TABLE 1
Livestock development programme in Peninsular Malaysia 1981-1992, (Million $)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Beef Cattle													
Allocation	15.000	5.939	1.972	8.000	8.822	5.750	3.520	6.019	6.660	6.000	8.000	7.000*	
Expenditure	14.583	3.563	2.879	7.950	7.125	5.757	2.720	2.657	6.474	6.617	5.495	5.495	8.320
Dairy													
Allocation	4.000	4.150	1.328	1.500	1.800	2.680	0.867	2.210	2.470	1.693	2.00	3.000	2.500*
Expenditure	3.478	5.923	1.327	1.399	1.649	2.419	0.846	NA	2.296	1.416	1.866	1.887	
Sheep/Goat													
Allocation	1.000	0.440	0.081	0.151	0.240	0.760	3.200	3.800	5.000	4.077	2.000	4.000	2.000*
Expenditure	0.472	0.314	0.066	0.139	0.217	0.639	2.910	NA	4.969	3.818	1.919	2.287	

Source: Department of Veterinary Services, Kuala Lumpur
Note: NA = Not Available
* = Estimate

METHODOLOGY

Inorder to measure the extent of government intervention, in the production of the commodities concerned, two measures will be used. These are nominal protection rate (NRP) and effective protection rate (ERP). The domestic resource cost (DRC) or resource cost ratio (RCR) will also be used to measure competitiveness. These measures have been used widely in comparative advantage studies by authors for various agricultural commodities (Cabanilla 1983; Baldwin 1984; Gonzales 1984; Hoey *et al.* 1989).

Nominal and Effective Protection Rates

The nominal protection rate (NPR) measures the rate by which the domestic price of a final product deviates from the world or border price of a comparable product, where such a product is not subject to quantitative restriction. The measure can be stated as follows:

$$NPR = \frac{P_i^d - P_i^b}{P_i^b}$$

where

NPR = Nominal protection rate for output commodity i

P_i^d = Domestic (financial) price of commodity i

P_i^b = Border (economic) price of commodity i for foreign price multiply by the official exchange rate

The magnitude of the direct intervention on a particular commodity is measured by the gap between its domestic $\left(P_i^d\right)$ and border price $\left(P_i^b\right)$. Thus interventions such as export tax, quota, levy and import tariff, force market price to deviate from its social value. The effective protection rate (EPR) measures the effects of protective measures not only on traded outputs but also on traded inputs. It therefore views the rate of protection in terms of value added to the commodity concerned. The EPR can be measured by using the following formula:

$$EPR = \frac{Va_i^d - Va_i^b}{Va_i^b}$$

where

EPR = effective rate of protection of commodity i

Va_i^d = value-added at domestic price of commodity i

Va_i^b = value-added at border price of commodity i

Domestic Resource Cost (DRC)

The domestic resource cost (DRC) method is widely used in resource allocation studies, especially those which focus on entire sectors of the economy. In countries where import substitution or export promotion is an important objective, it is useful to estimate the cost of domestic currency required to save or earn a unit of foreign exchange for an intended project. Thus, by expressing the cost of saving or earning a unit of foreign exchange as DRC, direct comparison may be made with the official exchange rate and various shadow prices for foreign exchange. Such a comparison is the basis for evaluating the comparative advantage. The DRC can be estimated as:

$$DRC_i = \frac{\sum_j V_i^d a_{ji}}{\left(P_i^b - \sum_j N_j^b a_{ij}\right) 1/OER}$$

DRC = domestic resource cost per unit of commodity i

V_j^d = (domestic valuation at accounting price (net of taxes and subsidies) of the opportunity cost of non-traded factors

P_i^b = border price of commodity i

N_j^b = the value of imported input

a_{ij} = input requirement coefficient j per unit output i

OER = official exchange rate

In DRC estimation, all outputs and inputs are valued in economic price. The denominator in the above equation is value-added in border prices but expressed in dollar rather than domestic currency. Using the DRC measure as defined above, comparative advantage is indicated by expressing the DRC relative to the

shadow exchange rate (SER). This must be or same bageks foot not be.[1] This ratio is also known as the resource cost ratio (RCR). Hence, the economic activity can be determined whether it has comparative advantage for the country, depending on the ratio of DRC/SER. Thus if:

(i) $\frac{DRC}{SER} < 1$ denotes comparative advantage

(ii) $\frac{DRC}{SER} = 1$ denotes neutral advantage/ disadvantage

(iii) $\frac{DRC}{SER} > 1$ denotes comparative disadvantage

The first identity implies that the social cost to produce commodity i domestically would be less than import cost. The second identity indicates that it is neutral in comparative advantage, i.e. the social cost of domestic production is exactly equal to import cost, while the third identity is the reverse of the first, i.e. comparative disadvantage. An analysis of comparative advantage could answer either of the following two questions:

(i) Could the resource employed in broadly defined sectors or subsectors of the economy be put to more profitable use elsewhere?

(ii) Would the expansion of a particular production activity be profitable?

Project appraisal is concerned with (ii). Thus given the formula to measure government intervention and comparative advantage, one can determine whether a particular country has comparative advantage (Scandizza and Bruce 1980; Gittinger 1982).

Data and Analysis

For the purpose of this study, surveys were undertaken at both farm and post-farm level to gather information to compute intervention and comparative advantage indices. A total of 111 farmers were interviewed from all over Peninsular Malaysia, but 11 farmers had to be dropped from the sample due to insufficient information. A total of 10 processors and traders were interviewed in order to collect information on trading and processing costs. Table 2 shows the breakdown of the sample size for each of the farm size categories.

TABLE 2
Distribution of sample size for the respective farm size

Farm size	No. of animals	No. of samples
I	< 25	22
II	25 - 50	34
III	51 - 75	21
IV	> 75	23
Total sample		100

The two sets of data collected from the survey are (i) sheep inventory and estimation of farm production cost and (ii) cost profile at each market intermediary (post-farm) of the sheep industry.

The production system is subdivided into their scale of operation, expressed in terms of the number of animals in the farm. In this study, the scale of operation is categorised into farm sizes, as shown in Table 2.

A weighted average procedure has been used to calculate the various indices for a respective farm size and also for the processing and marketing sectors at the post-farm level.

The cost profiles collected from the farm and post-farm surveys were the expenses incurred by private operators. The values were converted into economic values for the calculation of comparative advantage indices. Conversion factors (CF) formulated by Veitch (1986) were used to derive the economic valuation. Table 3 shows the conversion factor to translate financial costs to economic costs. The costs were further broken down into their domestic and foreign components, necessary for the calculation of DRC.[2]

1 SER is equal to the official exchange rate multiplied by 1 plus the foreign exchange premium stated in decimal form.

2 For detailed discussion on this section refer to: Zainalabidin and Mad Nasir (1991).

RESULTS AND DISCUSSION

Protection Rates

The impact of market intervention policies on production is captured by the two measures, NRP and EPR. A comparison of the observed domestic price with the border related price reveals the impact of the policy which causes a divergence between the two prices. A positive NPR implies that protection is given to domestic producers, while a negative value indicates a penalty or tax is imposed on producers.

The values of NPR and EPR are shown in Table 4. The NPR, which measures the difference between the domestic and border related prices expressed as a percentage of the related price, shows that the domestic price was about 32% above the world price. Although there is no direct intervention by the government on the rate of duty for both import and export of sheep and its by-products there is, however, an implicit quota that has been set by government as an import permit is required. This permit specifies the amount of meat that can be imported. Thus sheep production in Malaysia is moderately protected.

A limitation of NPR is that it measures only the effects of intervention on the price of the livestock products. It does not measure the effects of intervention on the tradable inputs that go into sheep production. The EPR makes up for the deficiency in the NPR by capturing the extent to which policies in the product market cause value-added[4] to differ from what it would be in the absence of such policies. The

TABLE 3
Conversion factor[3] from financial to economic values

Item	Conversion Factor
Intermediate Input	
Feed	0.95
MVS0.88	
Repair & Maintenance	0.78
Water	0.75
Electricity	0.84
Fuel & Oil	0.88
Livestock Purchase	0.95
Office Supplies	0.90
Tax	
Licence	
Primary Input	
Labour	0.82
Depreciation:	
Building	0.86
Equipment	0.90
Transportation	0.70
Interest:	
Building	1.30
Equipment	1.30
Livestock	1.30
Transportation	1.30
Working Capital	1.30
Land Rent	1.00
Losses	1.00

Source: Veitch 1986.

3 The method of project appraisal involves the movement from a private or financial appraisal to an economic or social appraisal. In financial appraisal, costs and benefits are identified and valued solely from the point of view of their impact solely on the project's private profitability. But the impact of the project may be much wider than this, and may have repercussions on the economy in various ways. The incorporation of these wider effects involve an economic or social appraisal. The parameters required for an economic appraisal comprise a set of shadow or accounting prices (AP), which replace conventional market prices (MP) in the appraisal. Thus, a comparison of cost structure at MP with that at AP provides what is called the CONVERSION FACTOR (CF), which may be applied to convert market values to accounting values. The system of appraisal used by Veitch for Malaysia is based on Little-Mirrlees methodology with world prices as the numeraire, hence, CF by definition can be expressed as follows (Veitch 1986):

$$CF = AP/MP$$

4 Value added is measured by the difference between the value of the output of the particular firm and the value of all inputs purchased from outside the firm. Thus, the value of output minus the value of externally purchased input is equal to value added (Gittinger 1982). Since the value added is a residual concept, clearly what is purchased, and hence the value added of any commodity, will vary according to the time period being considered and the level of analysis (Scandizzo and Bruce (1980)).

TABLE 4
Nominal and effective protection rates

Farm	Domestic Price	Border Related Price	Value of Tradable Input		Value of Value-added		NPR	EPR
			Financial	Economic	Financial	Economic		
I	12.36	9.35	2.67	2.58	9.69	6.77	32.19	43.13
II	12.36	9.35	2.68	2.47	9.68	6.88	32.19	40.70
III	12.36	9.35	2.79	2.58	9.57	6.77	32.19	41.36
IV	12.36	9.35	2.50	2.32	9.86	7.03	32.19	40.26

Note: NPR = Nominal Protection Rates
EPR = Effective Protection Rates

EPR is thus an indicator of the net incentive or disincentive effects of all commodity policies affecting production costs. The values of EPR indicate that there is an overall net incentive in sheep production where the values show that value-added is at least 40% more than what it would have been in the absence of protection.

The comparative advantage of sheep production in terms of import substitution strategy is measured by the resource cost ratio (RCR) and domestic resource cost (DRC). The computation of RCR and DRC detailed in Table 5. The values of RCR and DRC indicate that only Farm IV has marginal comparative advantage in sheep production. The results illustrate that as the farm size becomes larger, it tends to have comparative advantage. The values of DRC in Farms I, II and III indicate that the social cost of producing 1 kg of mutton domestically is more than the import cost. Thus, DRC computed at RM6.94, RM3.08 and RM2.94 for farms I, II and III respectively exceeded the official exchange rate of RM2.70. For Farm IV, the domestic resource cost is about equal to import cost.

Since the RCR values (i.e. DRC/OER) indicate that Farms I, II and III have no comparative advantage, sensitivity analysis is applied to determine the parity price for the RCR to be equal to 1. The sensitivity analysis, shown in Table 5, indicates that the cif price has to be increased to around RM11.70 in Farm I, RM10.20 in Farm II and RM 9.84 in Farm III for sheep production to have comparative advantage. This represents an increase of around 7.0 - 28.0% above prevailing output prices.

Table 5
Comparative advantage indicators

Farm Size	I	II	III	IV
Rb	9.63	8.06	7.59	7.13
Rf	0.13	0.13	0.13	0.13
Cif	9.20	9.20	9.20	9.20
a	2.47	2.47	2.58	2.32
e	0.20	0.20	0.20	0.20
RCR	2.57	1.14	1.09	0.99
DRC	6.94	3.08	2.94	2.67
Cif when RCR = 1	11.77	10.20	9.84	9.12

Note: Exchange rate RM2.70 = US$1.00

DRC = RCR x OER
Rb = domestic resource input to production and marketing
Rf = domestic components of transport costs from port to wholesale
Cif = import price
a = tradables costs component of production and marketing
e = traded components of transport from port to wholesale

CONCLUSION AND POLICY IMPLICATIONS

This study attempted to measure the protection rates and comparative advantage of sheep production because of the interest shown by policy-makers in the prospects of integrating sheep rearing with plantation crops to maximise income from agriculture. The analysis indicates that sheep production is moderately protected and does not have comparative advantage except in farms with more than 75 animals. This implies that, at the current level of production,

i.e. small herd size, sheep production is not economically or socially viable. Thus, if economic efficiency is the main objective, sheep production should not be continued except on a large scale as the social cost of a unit of local mutton from small farms costs more than imported mutton.

Further research and development should be continued, especially in large-scale breeding; adapting the animals to local conditions; and sheep rearing in the plantation sector. Malaysia produces agro-industrial by-products and wastes in abundance which can be used for sheep feed. Research and development should also be continued to overcome the current technical constraints. At present only large-scale sheep production should be encouraged.

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