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THE COMPARATIVE ADVANTAGE OF DRYLAND SOYBEAN PRODUCTION IN BRITS, NORTH WEST

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The effect of policy on the South African soybean industry is analysed, using the policy analysis matrix. The absence of effective protection from cheap imports of soy-cake and -oil, as well as the ineffectiveness of the processing industry, lead to relatively low farmgate prices of soybeans in South Africa. This could result in producers using their resources for more profitable crops, thus depriving the South African feed industry to benefit from more full fat soy in feed rations.

DIE VERGELYKENDE VOORDEEL VAN DROËLAND SOJABOONPRODUKSIE IN BRITS, NOORDWES OMGEWING

Die effek van beleid op die Suid Afrikaanse sojaboonindustrie is ontleed d.m.v. die beleidsanalisematriks. Die afwesigheid van effektiewe beskerming teen goedkoop invoere van sojakoek en -olie, asook die ondoeltreffendheid van die prosesseringsindustrie, lei tot relatiewe lae plaashekpryse van sojabone in Suid Afrika. Dit kan daartoe lei dat produsente hulle hulpbronne aanwend vir meer winsgewende gewasse, wat die Suid-Afrikaanse veevoerindustrie sal ontneem van die voorreg om meer volvetsoja in te sluit in veevoerrantsoene.

1. INTRODUCTION

Soybean production in South Africa has steadily increased over the last four to five years. This is because the value of soybeans in feed rations is realised more and more by feed manufactures. This lead to a growing demand for soybeans and soybean products in South Africa. Soy products, like soy cake and full fat soy, is increasingly been used as substitutes for fishmeal in feed rations, because it is cheaper. Soy oilcake is mainly imported from Argentina and then mixed with soy-oil and nutrients to compose a balanced feed ration. These feed rations are cheaper than a ration consisting of full fat soybeans but however does not give the same performance of production (Hancock, 1998). Full fat soybeans have one disadvantage and that is that its effective storage period is about three weeks (Beumer, 1991). This disadvantage of full fat soybeans makes it difficult to import it from the USA especially to the inland.

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With the former regulated market environment the Oilseed Board was in control of the organisational part of the industry. In this environment, prices were determined by domestic demand and supply as well as export pool prices obtained by the Oilseed Board. Prices were fixed for a season and producers were faced with a single channel marketing scheme (NAMC, 1998). Currently, prices are derived from international soy cake and soy oil prices (Willemse, 1999). The deregulated and liberalised market environment in which soybean producers find themselves today, lead to this study. The questions to be answered is how free is the current oilseed market, what is the impact of the new environment and what policy measures are required to make the soybean market more efficient.

2. METHODOLOGY

According to Monke & Pearson (1989) the PAM (Policy analysis matrix) could be used to investigate the following:

- The impact of policy on competitiveness and farm-level profits;
- the influence of investment policy on economic efficiency and comparative advantages; and
- the impact of agricultural research policy on changing technology.

The PAM approach makes use of double entry bookkeeping. The one part calculates the profitability and thus the difference between income and costs. The other part measures the impact of divergences if the difference between observed variables and variables that will occur if divergences are removed, still exist. Profitability is measured horizontally whilst divergences are measured vertically in the matrix. Private prices are revenues and costs which originated on farm level, whilst social prices can be seen as world price equivalents or shadow prices measured at the same reference point (in this study at farm level).

3. GATHERING AND PROCESSING OF DATA

The data used for private prices was taken from a study completed by Weber (1999). The data is provided in prices per hectare soybeans produced. The production and input values is taken for a typical farmer in the Brits North West region, whose average crop is about 2,5 tons of soybeans per hectare, with a distance to the nearest co-operative of ±15 kilometres.

Soybeans in the USA are known for its good quality, especially regarding the protein content (Hanke, 1972). The protein content of soybeans is the major determinant of soybean prices (Willemse, 1999). Domestically produced soybeans are relatively low in protein content in comparison with the USA and differ from year to year with relatively high variation. Contracts are available from various buyers of soybeans in South Africa. In this study, contract prices at Brits in the North West province are used. These contract prices are determined through negotiations and are derived from world prices of soy cake and soy oil. Processors make provision for the difference in protein content when they estimate the price, which they are willing to pay. The private and social revenues used in this study provide for protein and spatial differences. The protein content of soybeans and soy cake was taken as 38% and 48% respectively for the USA and as 32% and 44% respectively for South Africa. This difference in protein content is acknowledged by the oilseed industry in South Africa.

A complete list of the data used is available from the authors. The data was used to determine the social prices for the corresponding inputs and outputs whereafter the gross margin per hectare was calculated. The complete calculation of the social prices can, due to a limitation in space, not be provided but it is also available from the authors on request. After the data was processed, a PAM matrix was constructed (see Table 1).

Table 1: Policy analysis matrix (PAM)*

	Revenue	**Cost**		**Profit**
		Tradable inputs	**Domestic factors**	
Private prices	**A** (2735.43)	**B** (935.82)	**C** (763.48)	**D** (1036.13)
Social prices	**E** (3574.93)	**F** (788.31)	**G** (650.92)	**H** (2135.70)
Effect of divergences and efficient policy	**I** (-839.50)	**J** (147.51)	**K** (112.56)	**L** (-1099.57)

Source: *Monke & Pearson (1989) and own calculations*

4. INTERPRETATION OF THE PAM-VALUES

Values as described in this section are all applicable on the PAM matrix (see table 1). The PAM matrix is discussed on the basis of nine variables namely:

a) Private profitability;
b) private cost ratio;

c) social profitability;
d) domestic resource cost;
e) effect of divergences;
f) nominal protection coefficient;
g) effective protection coefficient;
h) profitability coefficient;
i) subsidy ratio to producers.

Private profitability (D = A-B-C)

Private profitability is obtained from the first row of the PAM. Private income and costs refer to realised measured market prices. In this case a private profitability of R 1 036,13/ha was calculated. This value is an indication that there is an incentive for producers to produce, given the positive farm prices. This value must also be compared with other commodities that could be produced with the same resources. According to calculations by Properboer (1999), soybean prices must be 2 to 2,2 times that of yellow maize to be equally profitable. Currently this ratio in prices is in the region of 1,6 to 1. With a price ratio of 1,6 the incentive to plant yellow maize rather than soybeans are much stronger amongst producers, because of a higher profitability.

Private Cost Ratio (PCR = C/(A-B))

The PCR is the ratio of domestic factor cost to added value in private prices. Added value is an indication of the amount that the industry can pay for domestic factors and still be competitive. This ratio must be as low as possible to maximise profits. In this case the ratio is equal to 0,4243 which is relatively low. The reason for this low ratio is because added value is relative large in comparison with the domestic factor costs.

Social profitability (H = E-F-G)

Social profitability is the difference between income and cost measured in social prices. Social prices are world price equivalents of tradable domestic products and inputs. The social profitability measures the comparative advantage or economic effectiveness of the related industry. H in this case is equal to R 2 135,70/ha (H>0). This is an indication that soybean production in South Africa compared to the importation thereof has a definite comparative advantage and soybeans could be produced economically efficient in South Africa.

Domestic Resource Cost (DRC = G/(E-F))

The DRC is the ratio between the real cost of production of one unit of the item in demand and the income from the sale of that item. DRC is calculated by dividing the domestic factors with the difference between the income and tradable input costs (all at social prices).

In this case the DRC is equal to 0,2336 (DRC<1). This financial ratio is low which is an indication that social profit is maximised and that producers have a comparative advantage.

Effect of divergences

Each vertical measurement (the difference between private and social prices) is explained by the effect of policy implications or market failures. Social prices correct for the effect of changing policy (policy which lead to inefficient application of resources). It is thus necessary to distinguish between distortionary policies, which lead to losses in income, and efficient policies, which neutralise the effect of market failures and contribute to greater income. Because efficient policy corrects divergences, it decreases the difference between social and private valuations.

In this case the output transfers (I) is equal to a negative value of R 839,50/ha and the input transfer (J) is equal to R 147,53/ha. Output and input transfers originate because of two types of policies that create differences between private and social prices (Monke & Pearson, 1989):

- Commodity specific policies (for example taxes, subsidies and trade policies); and

- Exchange rate policy.

Commodity specific policy cause output prices to increase because of protection. In this case the difference is relatively large. However, in practise the domestic price for soybeans is derived from the international soy cake and soy oil price after providing for the domestic processing cost. The USA imported soy cake is produced cheaper than South African soy cake because their processing costs per ton is lower. This results in higher farmgate prices for soybeans in the USA. The USA has a scale advantage in processing and production of soybeans. The USA produces around 75 million tons of soybeans each year in comparison with 200 000 tons of production in South Africa. The ineffective and technical inefficient processing of soybeans in

South Africa in comparison with the USA could be given as the main reason for relatively low domestic farmgate prices. The supply of soybeans in South Africa is becoming more problematic each year. The non-existence of an import tariff to make the domestic producer more competitive may lead to the stagnation of the soybean industry. The input transfer J>0 is an indication that domestic costs of tradable inputs are bigger than the social costs. Producers are in this case at a disadvantage because of policy implications and it could be subscribed to the different taxes on domestic inputs. The net transfer is the sum of the individual effects of product and factor markets. Positive entries in the two cost categories J and K represents positive transfers, thus J and K are subtracted from I in the calculation of the net transfer. In this case the net transfer is equal to negative R 1 099,57/ha. According to this, policy has a net negative effect on the industry. Policy comes in the form of taxes on inputs, import tariffs on inputs and other factors like the technical inefficiency of domestic processors. Thus, a disincentive for producers to produce soybeans and an incentive for producers to rather change to less taxed industries. The major contributor to this disincentive is the derived price for domestically produced soybeans.

Nominal Protection Coefficients (NPC)

The comparison of the extend of policy transfers between two or more systems with different outputs requires the calculation of ratios. The NPC shows the impact of policy present or absent which cause the divergences between two prices. The NPC of tradable outputs NPCO are defined as A/E and show the degree of output transfers. NPCO<1 is an indication that policy lead market prices to decrease with a percentage lower than that of social prices. In this case the NPCO is equal to 0,7652. The processor is thus receiving a price discount of 23,48%, which presents a financial transfer from the producer to the processor. The producer in this case is unprotected.

The NPC of tradable inputs (NPCI, calculated by B/F) is the ratio between the private prices and the social prices of tradable inputs. This ratio highlights the degree of tradable input transfers. The NPCI also measures financial transfers which originate because of governmental policies or market shortcomings. The NPCI measures the value with which market prices of tradable inputs exceed their social prices. In this case the NPCI is equal to 1,18714 which is an indication that producers are paying a premium for tradable inputs. The average market price of tradable inputs is 18,71% higher than social prices. Domestic producers are therefore taxed.

Effective Protection Coefficient (EPC)

EPC is the ratio between the value of the value adding of domestic inputs in private prices (A-B) and the value of value adding of domestic inputs in social prices (E-F). Thus EPC is equal to (A-B)/(E-F). This coefficient measures the degree of policy transfers of product markets (output and tradable input policy). The EPC does not account for the transfer effect of factor market policy. In this case the EPC is equal to 0,6458. The EPC is an indication of policy and market circumstances for both output and purchased inputs on the incentives or disincentives to produce a product. In this case the EPC indicates a disincentive to produce. The low private prices for soybeans are mainly responsible for this disincentive. This is however not a complete indicator of incentives.

Profitability Coefficient (PC)

An extended measurement to accommodate factor transfer is the PC. This is the ratio of private and social profits (D/H). The PC measures the incentive of all policies and services as an estimation of the net policy transfer. In this case the PC is equal to 0,4851. This is an indication that existing policy implications as mentioned above do not contribute as an incentive to produce soybeans.

Subsidy Ration to Producers (SRP)

Another incentive indicator is the SRP. The SRP is the net policy transfer as a part of the total social income (SRP is equal to L/E). The SRP shows the part of the profits in social prices, which are needed, if a single subsidy or tax was received for all the commodities and macro economic policy. The SRP in this case is equal to negative 0,3076. This is an indication of the net tax which producers pay.

5. CONCLUSION

The major aim of PAM analysis is to determine the impact of government policy on the private profitability of agricultural enterprises and to evaluate the effectiveness of resource use (Monke & Pearson, 1989). In this study it is shown that soybean producers in South Africa do not enjoy protection, in fact they are taxed. The results show that the effect of divergences and efficient policies on profits is negative and relatively large. This could be subscribed to the fact that inputs for the production of soybeans are taxed and that the derived prices for soybeans are relatively low. Prices of domestically produced soybeans are lower because the processing cost of soybeans in

South Africa is higher than that of the USA. It should however be kept in mind that the private profitability of soybeans remains positive.

In case of larger investment in the development of processing techniques and larger production of soybeans in South Africa, scale advantages could be obtained and the picture could change. The exchange rate also plays an important role because domestic prices for soybeans are derived from international prices of soy cake and soy oil. Producers could however enjoy a degree of protection if tariffs on the imports of soybeans and soy products are increased. It is necessary that the soybean industry become more competitive by using better technology in the processing of soybeans. South Africa will have to obtain a scale advantage in production and processing to stay competitive. This is even more important if the fact is considered that the value and quality of soya-cake and full fat soya could be increased through better processing. The profitability of soybeans is dependent on the efficient allocation of inputs because as it was shown in the results of this study, inputs are taxed relatively high in comparison with the social prices thereof. At the time this articlewas written the soybean price was around 1,66 times that of yellow maize. Given the break-even ratio of more or less 2,2 (Properboer, 1999) it could be derived that yellow maize could be produced more profitable in comparison with soybeans with the same resources. Current policy implications are exerting more pressure on the profitability of soybean production.

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