1. INTRODUCTION

The ongoing deregulation of domestic agricultural marketing, and the tariffication of imports according to SACU's commitments under GATT, means that the level of tariffs on agricultural products set by the Minister of Trade and industry are, or very soon will be, the most important intervention by government in the agricultural sector.

In this paper, beef trade in the Southern African Customs Union (SACU) and specifically South Africa, Namibia and Botswana is investigated to quantify the effects of liberalized beef trade in the SACU. The focus will be on regional supply and demand and will show the effect of world prices and tariffs on beef trade in the SACU. This is deemed essential due to the changing marketing environment domestically and abroad. In the absence of a tariff on beef imports, a decline of approximately 14 percent in the domestic price is necessary to clear the market. Efficiency in the beef industry will have to increase significantly if beef producers are to compete with non-SACU members. The decentralization of the beef industry holds various advantages, especially if the desperate need to create employment opportunities in rural areas, the skew distribution of income and the poverty level in rural areas is considered. Existing infrastructure's sustainability should be market driven.

2. RESEARCH METHODOLOGY

A cost minimizing transport model of the type that is well established in the economic literature was used. The pioneering work can be found in Takajama and Judge (1971). Theoretically, the model operates with the objective function of minimizing transport costs taking into account supply and demand capacity, as well as domestic and world prices. An advantage of such a model is that the effect of international trade can easily be introduced into the model without changing its structure substantially. The model considers effects of tariffs as well as the effect of exchange rate changes on the optimal flow of beef. The model is short run in nature, since the demand, location and size of plants etc., are taken as given and will permit producing and flow activities. This cost minimizing transport model was developed on Gauss 366, a mathematical computer program (For a detailed discussion of the transport cost minimizing model and underlying assumptions see Jooste, 1996).

3. DATA USED

The break-up of the national supply and demand of beef in South Africa into different regions presented problems because of a paucity in the data. The old development regions were therefore used as observation units. The specific reference points in each region was chosen after consideration was given to the findings of Eales (1979), the centrality of each point and economic factors such as transport costs.

In order to estimate the impact of different macro-economic variables on the optimal distribution of beef a

THE IMPACT OF DIFFERENT MACRO-ECONOMIC VARIABLES ON THE OPTIMAL DISTRIBUTION OF BEEF IN THE SOUTHERN AFRICAN CUSTOMS UNION

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This paper analyzed the impact of different conditions affecting prices, portrayed by means of scenarios, on the optimal distribution pattern of beef. The effects of liberalized beef trade in the SACU is quantified in this paper. The focus is on regional supply and demand and the effect of world prices and tariffs on beef trade in the SACU is estimated. This is deemed essential due to the changing marketing environment domestically and abroad. In the absence of a tariff on beef imports, a decline of approximately 14 percent in the domestic price is necessary to clear the market. Efficiency in the beef industry will have to increase significantly if beef producers are to compete with non-SACU members. The decentralization of the beef industry holds various advantages, especially if the desperate need to create employment opportunities in rural areas, the skew distribution of income and the poverty level in rural areas is considered. Existing infrastructure's sustainability should be market driven.

The pioneering work can be found in Takajama and Judge (1971). Theoretically, the model operates with the objective function of minimizing transport costs taking into account supply and demand capacity, as well as domestic and world prices. This is expected to be done. The cost minimizing transport model, as given and will permit producing and flow activities. This cost minimizing transport model was developed on Gauss 366, a mathematical computer program (For a detailed discussion of the transport cost minimizing model and underlying assumptions see Jooste, 1996).
normal year, good rainfall and poor rainfall year was identified by calculating the mean off-take rate for the past seven years. A normal year was defined as to have an off-take rate of 19% to 24% was such a year. A good rainfall year was estimated to have an off-take rate of 16%, whilst a poor year was estimated to have an off-take rate of 12% or less. The results of a normal year are represented in this paper.

Demands for beef was calculated taking into account the population in the former TBVC-states and self governing areas. Data on supply and demand were obtained from the Meat Board (1995), Most Board of Namibia (1988-1995), Ministry of Agriculture in Economy, Ministry of Agriculture and Information (1995) and the Development Bank of Southern Africa (1995).

Sample data pertaining to the transport cost of beef were obtained from Mainline Carriers (1995). Since road transport rates between all the market and supply source points were not available a model to reflect road transport rates for beef cuts was postulated as :

$$C = b_0 + b_1 \cdot d + b_2 \cdot \Delta T + e$$

where \(C\) represents the cost in cents of shipping a kilogram of beef from point \(i\) to point \(j\), \(d\) is the kilometres between \(i\) and \(j\), \(b_1\) and \(b_2\) are unknown parameters to be estimated and \(e\) is an unobservable random error. This functional form was previously used by Wallace and Judge (1959) and was postulated in the belief that transport rates are an increasing function of distance, 1.6 per cent a year increase at a descending rate. As stated before, the function was postulated as having a linear form and was estimated so that the parameters represent all observable variables and the least square procedure was used to estimate the unknown parameters. The results obtained were as follows:

$$\begin{array}{ll}
C = 0.0000101 \cdot M + 0.0037538 \cdot \Delta T \\
3.344 & 3.7956 \\
3.0001 & 0.0001 \\
0.0 & 0.0001 \\
0.0 & 0.0001 \\
R^2 = 0.9722 \\
F & = 55.76 \\
(Degrees of freedom = 34)
\end{array}$$

The estimated equation was used to calculate the road transport rates for beef between all pairs of regions. Rail transport costs for cattle and beef cuts were obtained from Purdy and Matthews (1995). The minimum rates for beef were chosen as the relevant transport cost in each case. Due to the unavailability of an adequate sample, rail rates for shipping live cattle, rail rates were assumed to accurately reflect live weight costs.

4. TARIFFIFICATION OF BEEF PRICES IN THE SACU

According to the Board on Tariffs and Trade (BTT) (1995) it is important to present and future tariff policies regarding the agricultural products will serve primary economic policies and that the tariff policy will harmonize with agricultural policy and the Reconstruction and Development Programme (RDP).

An investigation by the Board on Tariffs and Trade (1995) into the tariff dispensation of red meat, edible offal and preparations of red meat revealed that producers in the SACU cannot compete against the EU's subsidised meat in the southern African market without tariff protection. Dutiable imports are justified. Expenditures in the EU to support farm prices have had the EU to be self-sufficient in many products. The Board on Tariffs and Trade (1995) into the tariff dispensation of red meat, edible offal and preparations of red meat revealed that producers in the SACU cannot compete against the EU's subsidised meat in the southern African market without tariff protection. Dutiable imports are justified. Expenditures in the EU to support farm prices have had the EU to be self-sufficient in many products. To stimulate the distribution of beef in South Africa.

The BTT is of the opinion that, taking into account the long-term price of beef in the SACU and the landed cost of products imported from the EU, a duty of 40 per cent ad valorem is a reasonable reflection of this price disadvantage. For purposes of this study an ad valorem duty of 40% will therefore be used to stimulate the optimal distribution of beef in South Africa.

5. THE EXCHANGE RATE

Hogendon and Brown (1979) state that, apart from monetary and fiscal policy, exchange rate policy is the third macro-economic tool available to governments to influence a country's economy.

According to Caves and Jones (1985), the devolution of the exchange rate will raise domestic prices of goods and will switch expenditure (home and abroad) towards the goods of the devaluing country. This implies that the devaluing country has become more competitive. Devaluation increases expenditure on domestic goods because in Keynesian terms, it improves the trade balance and thereby promotes an increase in the level of income and employment. The income increase will again raise imports and therefore partly offset the effect of the devaluation on the balance of payments (Caves, 1985). An appreciation will have the opposite effect.

Van Schalkwyk et al (1995) and Jooste et al (1995) estimated the effect of changes in the exchange rate on different products, including maize, wheat, etc. They concluded that the exchange rate plays an important role in increasing domestic producers competitiveness.

6. THE OPTIMUM DISTRIBUTION OF BEEF BETWEEN REGIONS WITHIN THE SACU

Different scenarios were developed in order to model the distributional pattern of beef under different macro-economic conditions. The availability of beef from Namibia and Botswana is restricted to the actual quantity of beef exported to South Africa, whilst the quantity of beef that can be imported from non-SACU members to South Africa is unlimited.

6.1 Scenario

Scenario 1: An ad valorem tariff of 40% is levied on imports of beef

The optimal distribution of beef under scenario 1 is shown in Figure 1. Under this scenario the shortage of beef in South Africa will be supplemented by imports from non-SACU members. This scenario also involves that the exchange rate remains the same and that there is an increase in the world price within a specific year.

Scenario 2: No tariff is levied on beef imports

In this scenario the international price of beef is lower (approximately 8%) than the domestic price. No tariff is levied on beef imports.

Scenario 3: The international price is equal to the domestic price of beef

In this scenario the differential between domestic and international prices will not play a role in the distribution of beef in South Africa. Transport cost, the availability of locally produced beef and the different prices of beef in Namibia and Botswana will determine the distribution of beef between regions.

Scenario 4: All the cattle are slaughtered in the region of origin

The locality of existing processing plants made it necessary to simulate the distributional pattern, given the existing national Agricultural Board in South Africa.

In this scenario the optimum pattern is determined in a situation where all cattle are slaughtered in the region of origin, including cattle imported from Namibia. Eales (1979) has shown that the decentralization of abattoirs in South Africa will enhance productivity and efficiency. Without gradual decentralization, the beef sector's competitiveness will remain impaired over the long term. Adding value to a primary product also reduces wealth in the region where the value adding process occurs. The price situation will be the same as for the distribution of beef in a normal year when a 40 per cent ad valorem tariff is levied on imports from non-SACU members.

Scenario 5: The world price of beef increases and the exchange rate of the Rand depreciates

World trade liberalisation is expected to result in increased international prices for beef over the long run. In order to investigate the effect of a further increase in the world price for beef on its local distribution over the long run, the world price was assumed to increase by 6.1 per cent per year. This was assumed to result in an increase in the world price for beef on its local distribution between regions. The price situation will be the same as for the distribution of beef in a normal year when a 40 per cent ad valorem tariff is levied on imports from non-SACU members.

6.2 Results: The optimal distribution pattern of beef under different price scenarios

Scenario 1: An ad valorem tariff of 40% is levied on imports of beef

Namibia exports beef to regions A and D, whilst Botswana exports beef to regions H. Region F exports its beef surpluses to regions E, G and H. The shortage of beef in region H is furthermore supplemented from region J, whilst beef from regions B and C. Region C also exports beef to region E. It can then be postulated that should more beef be exported to region G then Namibia will have to export some of its beef to another region; competition between Namibia and Botswana may increase significantly. The quantity of beef exported to region H by Namibia will be reduced.

Scenario 2: No tariff is levied on beef imports

Figure 2 shows that, if no tariff is levied on imports and local prices do not decrease to import parity, no inter-regional trade will take place. All the locally demanded beef will be purchased from the local producer within the region. Due to the shortage of space only the results of a normal year are represented in this paper.
normal year, good rainfall and poor rainfall year was identified by calculating the mean off-rate for the past seven years. A normal year was defined as to have an off-rate of 80% 1990 was such a year. A good rainfall year was estimated to have an off-rate of 65%, whilst a poor year was estimated to have an off-rate of 10%. An off-rate of 5% was used for the shortage of space only the results of a normal year are represented in this paper. Demand for beef was calculated taking into account the population in the former TBVC-states and self governing areas. Data on supply and demand were obtained from the Meat Board (1995), Most Board of Namibia (1998-1995), Ministry of Agriculture in Botswana (1995), Directorate Agricultural Information and simulation (1995) and the Development Bank of Southern Africa (1995).

Sample data pertaining to the transport cost of beef were obtained from Mainline Carriers (1995). Since road transport rates between all the market and supply source points were not available a model to reflect road transport rates for beef was postulated as:

\[ C = b_M d_M + b_d d_d + e \]

where \( C \) represents the cost in cents of shipping a kilogram of beef from point \( i \) to point \( j; d_M \) is the kilometres between \( i \) and \( j \), \( d_d \) and \( e \) are unknown parameters to be estimated and \( e \) is an unobservable random error. This functional form was previously used by Wallace and Judge (1959) and was postulated in the belief that transport rates are an increasing function of distance and that the rate increase at a decreasing rate. As stated before, the function was postulated as having a linear and one polynomial term. The parameters \( b_M \) and \( b_d \) represent all observable variables and the least square procedure was used to estimate the unknown parameters. The results obtained were as follows:

\[ C = 0.00001 M + 0.003753 M^2 \]

\[ 3.344 \quad 3.7956 \]

\[ p < 0.001 \quad 0.001 \]

\[ R^2 = 0.9722 \]

\[ F \text{ value} = 557.76 \]

\[ (\text{Degrees of freedom} = 34) \]

The estimated equation was used to calculate the road transport rates for beef between all pairs of regions. Rail transport costs for cattle and beef cuts were obtained from Pardy and Matthews (1995). The minimum rates for beef were assumed to be the relevant transport cost in each case. Due to the unavailability of an adequate sample of rail rates for shipping live cattle, rail rates were assumed to reflect cost of shipping.

4. TARIFFIFICATION OF BEEF PRICES IN THE SACU

According to the Board on Tariffs and Trade (BIT) (1994), it is important to present and future tariff policies regarding agricultural products will serve primary economic policies and that the tariff policy will harmonise with agricultural policy and the Reconstruction and Development Programme (RDP).

An investigation by the Board on Tariffs and Trade (1995) into the tariff dispensation of red meat, edible offal and preparations of red meat revealed that producers in the SACU cannot compete against the EU's subsidised meat in the southern African market without tariff protection. Beef is a subsidised product; hence imports are justified. Expenditures in the EU to support farm prices have had the EU to be self-sufficient in many products. The tariff policy was assumed to accurately reflect live shipment costs.

The BTBT is of the opinion that, taking into account the long-term price of beef in the SACU and the landed cost of products imported from the EU, a duty of 40 per cent ad valorem in a freely tradable reflection of this price disadvantage. For purposes of this study an ad valorem duty of 40% will therefore be used to simulate the optimal distribution of beef in South Africa.

5. THE EXCHANGE RATE

Hogendorn and Brown (1979) state that, apart from monetary and fiscal policy, exchange rate policy is the third macro-economic tool available to governments to influence a country's economy.

According to Caves and Jones (1985), the devolution of the exchange rate will raise domestic prices of goods and will switch expenditure (home and abroad) towards the goods of the devolving country. This implies that the devolving country has become more competitive. Devolution increases exports to a domestic goods because in Keynesian terms, it improves the trade balance and thereby promotes an increase in the level of income and employment. The income increase will again raise imports and therefore partly offset the effect of the devolution on income ( países, 1985).

An appreciation will have the opposite affect.

Van Schalkwyk et al (1995) and Jooste et al (1995) estimated the effect of changes in the exchange rate on different exchange rate policies, including maize, wheat, etc. They concluded that the exchange rate plays an important role in increasing domestic producers competitiveness.

6. THE OPTIMUM DISTRIBUTION OF BEEF BETWEEN REGIONS WITHIN THE SACU

Different scenarios were developed in order to model the distribution patterns of beef under different macro-economic situations. The availability of beef from Namibia and Botswana is restricted to the actual quantity of beef exported to South Africa, whilst the quantity of beef that can be imported from non-SACU members to South Africa is unlimited.

6.1 Scenarios

Scenario 1: An ad valorem tariff of 40% is levied on imports of beef

In this scenario the distribution of beef is investigators with a duty of 40 per cent ad valorem on imports from non-SACU members. This scenario also includes that the exchange rate remains the same and that there is not an increase in the world price within a specific year.

Scenario 2: No tariff is levied on beef imports

In this scenario the international price of beef is lower (approximately 8%) than the domestic price. No tariff is levied on beef imports.

Scenario 3: The international price is equal to the per capita income of beef

In this scenario the differential between domestic and international prices will not play a role in the distribution of beef within South Africa. Transport cost, the availability of locally produced beef and the different prices of beef in Namibia and Botswana will determine the distributional pattern between regions.

Scenario 4: All the cattle are slaughtered in the region of origin

The locality of existing processing plants made it necessary to simulate the distributional pattern, given the existence of national agreements.

In this scenario the optimum pattern is determined in a situation where all cattle are slaughtered in the region of origin, including cattle imported from Namibia. Eales (1979) has shown that the decentralization of abattoirs in South Africa will enhance productivity and efficiency. Without gradual decentralization, the beef sector's competitiveness will remain impaired over the long term. Adding value to a primary product also induces wealth in the region where the value adding process occurs. The price situation will be the same as for the distribution of beef in a normal year when a 40 per cent ad valorem tariff is levied on imports from non-SACU members.

Scenario 5: The world price of beef increases and the exchange rate of the Rand depreciates

World trade liberalisation is expected to result in increased international prices for beef over the long run. In order to estimate this, a scenario was assumed that an increase in the world price for beef on its local distribution over the long run, the world price was assumed to increase by 6.1 per cent per annum. As a result of the exchange rate of the Rand, beef will be sold.

6.2 Results: The optimal distribution pattern of beef under different price scenarios

Namibia exports beef to regions A and D, whilst Botswana exports to region H. Region F exports its beef surplus to regions E, G and H. The shortage of beef in region H is furthermore supplemented from region J. Whilst beef from regions A and C. Region C also exports beef to region E. It can be expected that there will be more beef available in region F and C to export to region E, no beef will be imported from overseas.

Scenario 2: No tariff is levied on beef imports

Figure 2 shows that, if no tariff is levied on imports and local prices do not decrease to import parity, no inter-regional trade will take place. All the locally demanded beef will be produced in the country. As a result, the Town harbours and no South African beef will be sold. The transport cost from Rand to the consumption areas is not sufficient to balance the difference between the international and the domestic price of beef.

The only way in which domestic producers of beef can become competitive with South African farmers is to decrease the price of beef by approximately 14 per cent. This will lead to decreased local production of cattle and the contraction of the feedlot industry. If the price of beef on the domestic market in this scenario decreases with approximately 14 per cent the optimal distributional pattern will be similar to that depicted in Figure 1.

Du Toit (1982) estimated the supply price-elasticity for beef at 0.80 for a 5-year lagged real price. Lubbe (1992) estimated the supply price-elasticity for real prices lagged three and six years of 0.539 and 1.03 respectively for the period 1956 -1990. Lubbe (1992) stated that the supply of beef is determined more by the price cycle and herd variation than by the economic situation. This inevitably increases producers' exposure to marketing risks. If the price of beef should decline to the level needed for market clearance, the full effect on the number of cattle marketed will be visible only after the next two to three years have passed. As a result, a producer may be justified to protect South African farmers against these measures.

Eales (1991) estimated the exchange rate of the Rand to the American Dollar as 10% depreciation per annum, which is equivalent to 10% depreciation in Rand. This scenario, however, depicts an unfair situation as South Africa is not against foreign governments.
most probably be shifted to region A in the event of such a situation. If Botswana and Namibia increase their exports to South Africa increased competition between South Africa and the other SACU members can be expected.

The effect of transport costs are such that under this scenario regions B, C and F are still not able to dispose of their surpluses of beef and will have to accept lower prices. This imply that the market will be cleared only if a higher tariff is levied on imports of beef from non-SACU members or, alternatively, that the domestic price of beef must decrease by approximately 6 per cent, leading to a distributional pattern similar to that in Figure 1.

Scenario 4: All the cattle are slaughtered in the region of origin

This scenario is similar to scenario 1 with the exception that all the cattle are processed in the same region as in which they were produced. The distribution of beef under this scenario is shown in Figure 4. It is clear that, as stated before, region H has the largest shortage of beef because of the concentration of the population in this region. The largest trade will occur between region H and other surplus producing regions. With all the cattle formally exported for slaughter to South Africa from Namibia now being processed within Namibia, large imports of beef from Namibia are to be expected.

Results of this scenario also point at strong competition that can be expected between Namibia and Botswana. Clearly, these two countries may try to capture larger segments of the South African market. If, for example, Namibia now has more beef to export to South Africa and specifically to region H, Namibia will have to export to other regions, and this may not be profitable. Botswana’s largest abattoir at Lobatse certainly has a locational advantage over the abattoirs in Namibia. The optimal distributional pattern under this scenario differs considerably from the scenario shown in Figure 1. One can postulate that this scenario may, over the longer run, be more sustainable than the scenario in Figure 1.

This scenario involves decentralisation of beef processing, which has advantages for some regions, and disadvantages for others. Clearly, regions where most cattle are produced will benefit under this scenario. Decentralisation of beef processing will involve job creation in regions formally deprived of this due to restrictive measures on the movement of beef. Welfare in these regions will be enhanced. This is very important, especially in the light of unemployment in these areas. If the market is thus brought closer to for instance subsistence livestock farmers this will greatly improve their ability to react on market signals. Sartorius von Bach (1990) showed that the closer the market is to the producer, the greater are the incentives to react to price signals and to market cattle.

Greater efficiency also means that beef can be supplied cheaper, and larger quantities will thus be demanded. As was mentioned previously, the wholesale price elasticity of beef is 0.86. This implies that a decline of approximately 1.83 per cent in the national average price of beef on the domestic market will be sufficient to clear the market and cause domestically produced beef to be distributed. The full effect of decentralisation can only be ascertained by means of employment multipliers, as well as forward and backward linkages on a regional basis.

Scenario 5: The world price of beef increases, the exchange rate of the Rand deprecates to R4.79 per US Dollar

The optimum distribution of beef if the world price increase with 6,1 per cent, the Rand depreciates to R4.79US$ and an ad valorem tariff of 40 per cent is raised, is identical to the distribution of beef as is depicted in scenario 1. It was therefore decided to omit the 40 per cent ad valorem tariff from the model to determine whether the increased world price of beef and the depreciation of the Rand will be adequate to protect domestic producers from imports of non-SACU members. The results of this simulation remains the same as that of scenario 1.

A depreciation in the exchange rate will be to the advantage of domestic beef producers in that it will increase their competitiveness to such an extent that a tariff will not be needed. This is a clear indication that the exchange rate policy will definitely influence the competitiveness of the beef sector in the SACU. The exchange rate is therefore a very important tool through which distributional patterns and trade can be influenced. A negative aspect of such a depreciation in the exchange rate is the fact that it does not induce growth in productivity, but hides inefficiencies in the industry. Although the sector may be competitive over the short-run, inefficiencies will have to be addressed to ensure the sustainability of the beef sector in the SACU.

7. CONCLUSION

This paper analyzed the impact of different conditions affecting prices, portrayed by means of scenarios, on the optimal distributional pattern of beef. In the absence of any tariff on beef imports, a decline of approximately 14 per cent will be needed to clear the South African market. If local prices do not decrease when no tariff is raised all the locally demanded beef will be imported. This constitutes an unfair situation since many exporting countries boost production and exports through, amongst others, subsidies and thereby distort world markets and world trade. This alone is enough justification for a tariff, there must be countervailing actions to offset unfair actions by foreign, competing governments. This view is supported by the Board on Tariffs and Trade.

The assumption is, of course, that if a tariff is raised it will be effective in keeping these products out of the country. The way in which the tariff is applied is therefore crucial. This implies that containers entering the country should be checked for illegal or undeclared products and that declared containers with beef should be weighed to be able to raise the correct tariff. Of course it is practically impossible to check all containers, but if less containers are checked than is internationally accepted the probability of illegal imports will naturally be higher. Allegations by the Namibian Meat Board (1996) are in fact that the application of the tariff policy at the South African harbours is ineffective.

This article has shown that producers further from the market are the producers who are most affected by policy changes. The fact that the Namibian Meat Board (1996) are the first to raise their concerns should...
most probably be shifted to region A in the event of such a situation. If Botswana and Namibia increase their exports to South Africa increased competition between South Africa and the other SACU members can be expected.

The effect of transport costs are such that under this scenario regions B, C and F are still not able to dispose of their surpluses of beef and will have to accept lower prices. This imply that the market will be cleared only if a higher tariff is levied on imports of beef from non-SACU members or, alternatively, that the domestic price of beef must decrease by approximately 6 per cent, leading to a distributional pattern similar to that in Figure 1.

Scenario 4: All the cattle are slaughtered in the region of origin

This scenario is similar to scenario 1 with the exception that all the cattle are processed in the same regions as in which they were produced. The distribution of beef under this scenario is shown in Figure 4. It is clear that, as stated before, region H has the largest shortage of beef because of the concentration of the population in this region. The largest trade will occur between regions H and other surplus producing regions. With all the cattle formally exported for slaughter to South Africa from Namibia now being consumed within Namibia, large imports of beef from Namibia are to be expected.

Results of this scenario also point at strong competition that can be expected between Namibia and Botswana. Clearly, these two countries may try to capture larger segments of the South African market. If, for example, Botswana has more beef to export to South Africa and specifically to region H, Namibia will have to export to other regions, and this may not be profitable. Botswana's largest abattoir at Lobatse certainly has a locational advantage over the abattoirs in Namibia. The optimal distributional pattern under this scenario differs considerably from the scenario shown in Figure 1. One can postulate that this scenario may, over the longer run, be more sustainable than the scenario in Figure 1.

This scenario involves decentralisation of beef processing, which has advantages for some regions, and disadvantages for others. Clearly, regions where most cattle are produced will benefit under this scenario. Decentralisation of beef processing will involve job creation in regions formally deprived of this due to restrictive measures on the movement of beef. Welfare in these regions will be enhanced. This is very important, especially in the light of unemployment in these areas. If the market is thus brought closer to the instance subsistence livestock farmers this will greatly improve their ability to react on market signals. Statius van Bach (1990) showed that the closer the market is to the producer, the greater are the incentives to react to price signals and to market cattle.

Greater efficiency also means that beef can be supplied cheaper, and larger quantities will thus be demanded. As was mentioned previously, the wholesale price elasticity of beef is 0.96. This implies that a decline of approximately 1.83 per cent in the national average price of beef on the domestic market will be sufficient to clear the market and cause domestically produced beef to be distributed. The full effect of decentralisation can only be ascertained by means of employment multipliers, as well forward and backward linkages on a regional basis.

Scenario 5: The world price of beef increases, the exchange rate of the Rand depreciates to R4.79 per US Dollar.

The optimum distribution of beef if the world price increase with 6.1 per cent, the Rand depreciates to R4.79/US$ and an ad valorem tariff of 40 per cent is raised, is identical to the distribution of beef as is depicted in scenario 1. It was therefore decided to omit the 40 per cent ad valorem tariff from the model to determine whether the increased world price of beef and the depreciation of the Rand will be adequate to protect domestic producers from imports of non-SACU members. The results of this simulation remains the same as that of scenario 1.

A depreciation in the exchange rate will be to the advantage of domestic beef producers in that it will increase their competitiveness to such an extent that a tariff will not be needed. This is a clear indication that the exchange rate policy will definitely influence the competitiveness of the beef sector in the SACU. The exchange rate is therefore a very important tool through which distributional patterns and trade can be influenced. A negative aspect of such a depreciation in the exchange rate is the fact that it does not induce growth in productivity, but hides inefficiencies in the industry. Although the sector may be competitive over the short-run, inefficiencies will have to be addressed to ensure the sustainability of the beef sector in the SACU.

7. CONCLUSION

This paper analyzed the impact of different conditions affecting prices, portrayed by means of scenarios, on the optimal distributional pattern of beef. In the absence of any tariff on beef imports, a decline of approximately 14 per cent will be needed to clear the South African market. If local prices do not decrease when no tariff is raised all the locally demanded beef will be imported. This constitutes an unfair situation since many exporting countries boost production and exports through, amongst others, subsidies and thereby distort world markets and world trade. This alone is enough justification for a tariff, there must be countervailing actions to offset unfair actions by foreign, competing governments. This view is supported by the Board on Tariffs and Trade.

The assumption is, of course, that if a tariff is raised it will be effective in keeping these products out of the country. The way in which the tariff is applied is therefore crucial. This implies that container entering the country should be checked for illegal or undeclared products and that declared containers with beef should be weighed to be able to raise the correct tariff. Of course it is practically impossible to check all containers, but if less containers are checked than what is internationally accepted the probability of illegal imports will naturally be higher. Allegations by the Namibian Meat Board (1996) are in fact that the application of the tariff is policy at the South African harbours is ineffective.

This article has shown that producers further from the market are the producers who are most affected by policy changes. The fact that the Namibian Meat Board (1996) are the first to raise their concerns should
Figure 3: The optimal distribution of beef with the international price equal to the domestic price

Figure 4: The optimal distribution of beef when all the cattle are processed in the region of origin (40% ad valorem tariff)

therefore not come as a surprise. South Africa should be very careful not to harm her neighbours through the ineffective application of a policy to which all concerned parties agreed. Over the longer run South Africa will bear the fruits if labourers from these countries decide to emigrate to South Africa because of the unavailability of jobs in their own countries.

The deregulation of the red meat marketing scheme in South Africa leaves ample space for producers and marketers to achieve higher efficiency. If they do not use the opportunities, they will be forced to do so by market forces, or these market forces may evict them from the market. There are, as mentioned, signs that the traditional price cycle is starting to deviate from its traditional pattern. Forces which may hamper the process of improving efficiency, such as the degree of concentration and health regulations, should therefore receive serious consideration - such forces will, over the long run, impair the welfare of producers and consumers alike and also the welfare of the whole industry and of others related to it. It should, however, be remembered that the beef industry is not an isolated entity, it is influenced by, amongst others, the maize industry. Products used in the manufacturing of animal feeds and the cost thereof will directly and indirectly have an influence on the production cost of beef, and thus its profitability, at least in the case of feedlots and also in terms of supplementary feeds on ranches. Policies regarding the products used as inputs for the beef industry are as important to the beef industry as policies directly applicable to beef.

The decentralization of the beef industry holds various advantages, especially if the desperate need to create employment opportunities in rural areas, the skewed distribution of income and the poverty level in rural areas, are considered. Stimulation of the beef industry to decentralise can largely contribute to overcome these difficulties. The sustainability of existing infrastructure should be determined by market forces. Operating costs must be maintained at as low as possible levels. This implies that these facilities have to be transformed into more cost effective production units which may in cases mean that they should be transformed for purposes other than processing red meat.

NOTE:
1. Formerly Department of Agricultural Economics, Extension and Rural Development, University of Pretoria when paper was submitted.

REFERENCES

DEVELOPMENT BANK OF SOUTHERN AFRICA


Figure 3: The optimal distribution of beef with the international price equal to the domestic price

Figure 4: The optimal distribution of beef when all the cattle are processed in the region of origin


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<th>Population</th>
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</tbody>
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Table 1: Summary of regional beef production and consumption.

NOTE:

1. Formerly Department of Agricultural Economics, Extension and Rural Development, University of Pretoria when paper was submitted.

REFERENCES


