Implications of Tariff Rate Quotas Liberalization in the South African Livestock Industry

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1. Introduction

Agricultural trade has continued to play a major role in the South African economy. Between 1994 and 2004, agricultural export contributed an annual average of 4.6% to total exports and agricultural imports an annual average of 2.05% to total imports (DTI, 2005). In addition, despite the drop in the contribution of the agricultural sector to GDP from about 20% in the 1930s to around 4% in early 2000s (DoA, 2005), it remains an important sector to the economic growth with the gross value of agricultural production reaching R68 596 million in 2002/03 (NDA, 2005).

Imports as a percentage of domestically produced agricultural commodities and products amounted to 4% in 1990 and increased to 7% in 2000 (Jooste, Kruger and Kotze, 2003). However, with the increasing potential for agricultural imports lies the challenge of monitoring the impact of such on both the producers and consumers of agricultural products. For instance, Cassim, Onyango and Van Seventer (2002) observed that the South African tariff schedule still remains complex and that a cumbersome tariff structure may limit gains from openness, while Lewis, Robinson and Thiefelder (1999) observed a slight worsening of South African terms of trade due to increased demand for imports.

In addition, trade statistics by the South African Revenue Services (SARS) since 1994 show that the increase in import demand for agricultural commodities and products in South Africa are unevenly distributed among sub-sectors and product groups. Therefore, the challenge of monitoring the impact of import demand *viz a viz* trade policy would prove

more rewarding if conducted on a sub-sector level. In this study the main focus is on the livestock and meat trade in South Africa.

2. Meat trade with specific reference to TRQs

After the liberalization of the agricultural sector and phasing out of past protection mechanisms, South Africa introduced a process of tariff reform in compliance with WTO regulations. Furthermore, a system of tariff rate quotas was introduced in compliance with WTO regulations; this is achieved by imposing a lower in-quota tariff to imports within the quota limit imposed, while imports above this level attract a higher tariff (in meat trade, the applied tariff represents the over-quota tariff rate).

Table 1 supplies information about the importance of TRQs in the South Africa livestock industry in value terms. Two indicators are employed for the measurements. Firstly, the potential value of imports on the HS8 tariff lines for which TRQs are applicable and their importance relative to total value of imports (column 2). Secondly, the actual values of imports are represented in value terms. This is done by multiplying the actual quantity of imports under TRQs by the unit price of each product (as in column 4).

The results in Table 1 shows that of all imports of livestock products in South Africa in 2003 (which is worth about R1.01 billion), TRQs were used to administer 35 per cent (worth about R0.36 billion). It should be noted that this is a substantial amount considering the fact that total imports included those from the SACU countries of which zero tariff was applicable.

Table 1: **Relative importance of TRQ to livestock products and TRQ imports by main commodity (2003)**

Product	Total imports	Of which: imports of HS8 products for which TRQs are opened	As per cent of total imports	Actual value of TRQ imports	As per cent of total imports	Ratio of actual to potential TRQ imports i.e. fill rate
	1	2	(3) =(2)/(1)	4	(5) = (4)/(1)	(6) = (4)/(2)
	Rand ('000)	Rand ('000)	%	Rand ('000)	%	%
Meat of bovine animals	280,000	185,878	66	163,180	58	88
Meat of swine	113,066	35,511	31	35,511	31	100
Meat of sheep	64,823	29,350	45	29,350	45	100
Meat and edible offal of poultry	551,105	104,519	19	104,519	19	100
Total	1,008,994	355,258	35	332560	33	94

A recent study by Pustovit and Schmitz (2003) observed that assuming complete liberalization of agricultural policies in all OECD countries, South Africa would be a net-exporter of all the major meat products, including beef, pork and poultry. Presently, however, South Africa remains a net-importer of most of these products. In this study, the impact of a change in tariffs and tariff rate quotas (TRQs) on the livestock industry in South Africa are investigated.

3. Theoretical background

Several studies (Ingco, 1995; Bureau and Tangerman, 2000; Boughner, de Gorter and Sheldon, 2000; Herrmann, Kramb and Monnich, 2000; Skully, 2001) have examined the approaches to liberalizing TRQs which would result in greater market access. While it is obvious that increasing the quota volume or lowering the in-quota tariff can both result in improved market access, Bureau and Tangerman, (2000) have argued that each of the

two forms of reform are only applicable under different scenarios. They argue that both the fill rate and import demand can influence the mode of TRQ reform which would be effective. A low fill rate combined with limited import demand (even at lower tariff) would not respond to either larger quota volumes or a lower in-quota tariff. However, substantial TRQ liberalization exists with the expansion of import quotas when existing TRQs are filled, but a reduction in in-quota tariffs in such cases will only create rents.

4. Methodology and data used

Empirical literature shows several approaches that have been used to study the implication of trade liberalization on the agricultural sector. The overarching approach followed in this study is in line with the work of Takayama and Judge (1971) and McCarl and Spreen (1980). This approach allows for sectoral analyses of allocation of resources among spatially separated market. The model is spatial partial equilibrium in nature and consists of the primary (beef cattle, broilers, pigs, and sheep) and secondary (poultry, beef, pork and sheep meat) livestock and meat sub-sectors. Furthermore the model delineates South Africa into its nine provinces, as well as neighbouring important meat producers – Namibia and Botswana. The model explicitly incorporates the processing level (that is the slaughtering process) within a regionalized framework. Also, the demand system was calibrated to the necessary micro-economic conditions.

4.1 Tariff rate quota handling

Following Junker, Wieck, Jansson & Perez (2003), the functioning of tariffs and tariff rate quotas was represented by the sigmoid function as follows:

Equ (1)

$$TARR_i^{eff} = TARR_i^{pref} + (TARR_i^{MFN} - TARR_i^{pref}) \left[sigmoid\left(\frac{\alpha}{QIMP_i^{trq}} (QIMP_i - TRQ_i * 1.01) \right) \right]$$

where: $TARR_i^{eff}$ $\qquad$ = Effective tariff (ad-valorem or specific)

$\qquad$ $TARR_i^{pref}$ $\qquad$ = Preferential tariff

$\qquad$ $TARR_i^{MFN}$ $\qquad$ = Most favourite nation tariff

$\qquad$ $QIMP_i$ $\qquad$ = Gross import quantity

$\qquad$ TRQ_i $\qquad$ = Tariff rate import quota

$\qquad$ α $\qquad$ = Positive parameter

When used for the representation of a two-tiered tariff line such as TRQs, the sigmoid function ensures that the preferential tariff is the effective tariff on the in-quota quantity while the MFN tariff is effective on over-quota imports. The three general cases can be summarized thus:

- Quota unfilled: effective tariff at preferential level

- Over-quota imports: effective tariff at MFN level

- Quota exactly filled: effective tariff between the two

The expression that represents the implementation of the effective tariff in the model under a TRQ regime is given as:

Equ (2)

$$TARR_{i,r}^{eff} = TARR_{i,r}^{pref} + \frac{\exp(\min(0, (QIMP_{i,r} - TRQ_{i,r}) * \alpha))}{1 + \exp\left[-abs((QIMP_{i,r} - TRQ_{i,r}) * \alpha) \right]} * (TARR_{i,r}^{MFN} - TARR_{i,r}^{pref})$$

With this expression, effective tariff levels have now become a variable rather than a parameter. The applied or effective tariff (either specific or ad valorem) generated using equation (2) may be different from the observed tariff rate by a value representing the error of approximation incurred by using the sigmoid function.

With the ad valorem and specific tariff values endogenously generated in the model, the import (or border) price can also be generated endogenously using the following equation:

Equ (3) $Im\,pp_{i,r} = ((Domprice_{i,r})*(1.+0.01*TariffA_{i,r}^{eff})) + TariffS_{i,r}^{eff}$

where: $Im\,pp_{i,r}$ = Import price

   $Domprice_{i,r}$ = Average domestic price

   $TariffS_{i,r}^{eff}$ = Effective specific tariff

   $TariffA_{i,r}^{eff}$ = Effective ad valorem tariff

The traditional measurement of welfare uses the consumer and producer welfare. Following Britz (2003), this modeling framework uses the equivalent variation to integrate a well-behaved demand system for welfare analysis.

Using available data on the current South Africa tariff regime and the minimum market access quota commitments in livestock meat products, four liberalization scenarios were conducted for all commodities in the model. The different scenarios examined include:

- A 33 per cent expansion of quota.

- A 33 per cent decrease in MFN ad-valorem tariffs.

- A scenario combining the two reforms described above.

- Full liberalization scenario with all tariffs set to zero.

The objective of the scenarios was to examine how regional domestic prices would respond to policy changes under alternative trade policy reforms. The policy instruments affect border prices, which in turn results in changes in demand, supply and domestic prices. In addition, welfare changes were also measured for the different scenarios.

5. Results

The results pertaining to the different scenarios are reported in Appendix A[1] and summarized as follows:

- For the four secondary products (beef, pork, mutton and poultry) the border prices declined by between 0.89 and 2.39 per cent for scenario one, 2.35 and 7.96 per cent for scenario two, 2.96 and 9.97 per cent for scenario three and 8.25 and 25.19 per cent for scenario four.

- Demand for poultry responded most to changes in border prices, followed by beef, sheep meat and lastly pork. The number of animals slaughtered declined most for pigs, followed by cattle and sheep as a result of TRQ liberalization.

- As expected consumer welfare (as measured by the equivalent variation) increased with more liberal trade policies, i.e. R60.6 million for scenario 1 to R468.2 million for scenario 4. The Western Cape Province experienced the largest gains while the Limpopo Province experienced the lowest gains.

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[1] Due to space limitations, tables showing the impact of the different scenarios on domestic prices, demand, supply and producer prices per product per province can not be shown. However, the main findings are discussed.

- In the case of scenario 1 the change in consumer welfare represents a change in real gross national income of 0.04 per cent or 0.06% change in real disposable income. For scenario 2 the change in welfare represents a change of 0.10% in the real gross national income or 0.16% in real disposable income. For scenarios 3 and 4, respectively, comparable figures are 0.13% and 0.20%, and 0.33 and 0.5%.

- The largest decline in beef and sheep meat prices due to liberalization will be recorded in the Eastern Cape and KwaZulu-Natal Provinces. This is noteworthy since in these two provinces, the cattle and sheep numbers owned by emerging producers are more than those of the established commercial farmers. The implication of the results are that the development efforts by government aimed at commercializing emerging commercial stock farming in order to address equity and poverty may be slowed down considerably with further trade liberalization; especially since substitution with other agricultural enterprises are limited.

- The results obtained for scenarios 1 and 2 have quite important policy implications, especially over the short to medium run, and if one takes into account the level of support afforded to, for example OECD countries. On the one hand, consumers could benefit from cheaper meat, but one also has to take cognizance of the potential impact on producers of livestock (as stated this sub-sector are vitally important). A potential recommendation based on the relative difference between the impacts of these two scenarios is that TRQ liberalization in the South African livestock industry should first be implemented by expanding the existing quota rather than reducing tariffs. The reason for this is that quota

expansion brings about moderate changes in domestic prices of livestock and meat products as compared to tariff reductions.

6. Conclusion

Considering the continued protection in developed countries and its negative impact on South Africa's livestock meat trade (Pustovit and Schmitz, 2003), it is expected that further liberalization should be properly analyzed in order to allow for well informed policy making. Equally important is the economic importance of this sector in South Africa's rural areas, and the impact of further trade liberalization in South Africa's livestock industry on rural livelihoods (Hoekman, Michalopoulos, Schiff and Tarr, 2001). This sector contributes more than 40% to the gross value of agricultural production and approximately 80% of the total agricultural land (of which 68% is currently used for livestock production) of South Africa is suitable for animal husbandary. The importance of this sector to alleviate poverty and contribute to food security is also recognized by government. On an institutional level it is vitally important that policy makers in different government departments give proper consideration to the potential impact of further trade liberalization since it could significantly affect individual departmental imperatives. For example, expansion in current quotas might be a more proper policy directive than reducing applied tariffs over the short to medium run to comply with trade liberalization targets, but at the same time have a minimal impact on poverty and upliftment programmes.

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Appendix A

Table A1: Impact of TRQ liberalization on border price of livestock meat products

Commodity	Base border price (R/kg)	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Border price (R/kg)	% change	Border price (R/kg)	% change	Border price (R/kg)	% change	Border price (R/kg)	% change
Beef	11.71	11.43	-2.39	10.97	-6.33	10.78	-7.94	9.33	-13.47
Mutton	16.48	15.98	-3.00	15.17	-7.96	14.83	-9.97	12.33	-25.19
Pork	10.38	10.29	-0.89	10.14	-2.35	10.08	-2.96	9.53	-8.25
Poultry	12.35	12.14	-1.69	11.80	-4.47	11.66	-5.62	10.54	-14.63
Average	12.73	12.46	-1.99	12.02	-5.28	11.84	-6.62	10.43	-15.39

Table A2: Equivalent variation as a result of the four trade liberalization scenarios

Region	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Total monetary change (Million rand)			
Western Cape	9.4	25.0	35.5	73.2
Northern Cape	8.5	22.5	28.2	65.4
Free State	7.1	18.8	23.6	54.9
Eastern Cape	5.1	13.4	16.8	39.0
Kwazulu-Natal	5.5	14.5	18.2	42.3
Mpumalanga	8.4	22.3	28.0	65.2
Limpopo	2.5	6.6	8.3	19.4
Gauteng	8.8	23.3	29.3	68.0
North West	5.3	14.0	17.6	40.8
South Africa	60.6	160.4	205.5	468.2