

Trade Liberalization in the South African Livestock Industry: implications for rural development

Oyewumi, O.A.¹, Jooste, A.², Britz, W.³ and van Schalkwyk, H.D.⁴

¹*Department of Agricultural Economics, University of the Free State and MERC, National Agricultural Marketing Council, South Africa*

²*MERC, National Agricultural Marketing Council, and Affiliate Professor, Department of Agricultural Economics, University of the Free State South Africa*

³*Institute of Agricultural Policy, University of Bonn, Germany*

⁴*Faculty of Natural and Agricultural Sciences, University of the Free State, South Africa*

Abstract

Livestock farming is an important facet of agriculture and livelihood in South Africa. It forms the essence of rural agriculture contributing food, socio-economic stability, employment and income. After the liberalization of the agricultural sector and phasing out of past protection mechanisms South Africa introduced a process of tariff reform. Furthermore, a system of tariff rate quotas was introduced in compliance with WTO regulations. A partial equilibrium comparative static model was used to investigate the impact of further liberalization in the livestock industry of South Africa, particularly in meat products using four policy scenarios. Specific emphasis was given to the liberalization of the current TRQ regime. 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 conclusion is that the 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 as well as WTO commitments. 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.

Introduction

South Africa's agricultural sector as presently constituted has undergone fundamental changes in three main areas in respect of WTO rules since 1995; namely domestic support, export subsidies and market access. After the liberalization of the agricultural sector and phasing out of past protection mechanisms, South Africa introduced a process of tariff reform; furthermore, a system of tariff rate quotas was introduced in compliance with WTO regulations.

The recent commitment of South Africa to trade liberalization has also resulted in high growth in import demand. Import intensity in South African Agriculture increased from 4% in 1995 to 7% in 2000, with an average change of 52.8% between 1994 and 2000 (Jooste, Van Schalkwyk and Groenewald, 2003). However Cassim, Onyango, and Van Seventer (2002) observed that the South African tariff schedule still remains complex and that a cumbersome tariff

structure may mean uneven protection, and 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 import.

The effects of an increase in import demand for agricultural products in South Africa are unevenly distributed among sectors and product groups (Oyewumi, 2005). Therefore, the challenge of monitoring the impact of import demand *vis a vis* trade policy would prove more rewarding if conducted on an industry level. 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 tariffs and tariff rate quotas (TRQs) are investigated. The importance of TRQs to this sector has been highlighted in Oyewumi et. al. (2007).

Materials and Methods

The approach taken in this study is based on the mathematical programming models developed by Samuelson (1952), Takayama and Judge (1964a, b, 1971) and, McCarl and Spreen (1980). This approach allows for sectoral analyses of allocation of resources among spatially separated market. The partial equilibrium model is comparative static in nature and comprises four livestock products in secondary (broilers, beef-cattle, pig, and sheep) as well as the primary (poultry, beef, pork and sheep-meat) state. Furthermore the model differentiates South Africa into its nine provinces, as well as neighboring important meat producers – Namibia and Botswana.

The model explicitly incorporates the processing level (that is the slaughtering process) within a regionalized framework. This allows for measuring the impact of policy shocks on both the primary livestock and secondary meat sectors. Following Ryan and Wales (1996) the demand system is specified as a family of indirect utility functions depending on consumer prices at the requirements of micro-economic theory (homogeneity, symmetry and curvature) are imposed as it is required of a system explicitly incorporating welfare in the objective function. TRQ is represented by a sigmoid function which is able to smoothly replicate the functioning of a TRQ (Junker *et al.*, 2003). Some important model equations are given below:

Commodity supply function	$PP_{ip}^r = as_{ip}^r + \sum_j bs_{i,j}^r * QS_j^r$
Commodity conversion function	$PP_{is}^r + PD_{ip}^r = ac_{is}^r + \sum_j bc_{i,j}^r * QS_j^r + \sum_{ip} PD_{ip} / p_to_f_{ip}^{is}$
Marshallian demand function	$QD_i^r = F_i^r + \frac{G_i^r}{G} (Valuesum - F_i^r)$
TRQ handling by sigmoid function	$TARR_i^{eff} = TARR_i^{pref} + (TARR_i^{MFN} - TARR_i^{pref}) \left[sig \left(\frac{\alpha}{QIMP_i^{trq}} (QIMP_i - TRQ_i * 1.01) \right) \right]$
Border price	$Im\ pp_{i,r} = ((Domprice_{i,r}) * (1. + 0.01 * TariffA_{i,r}^{eff})) + TariffS_{i,r}^{eff}$
Equivalent variation ¹	$EqVar_r = \left(\frac{\sum_j \sum_k B_{j,k}^r \sqrt{PD_{r,b_j} PD_{r,b_k}}}{\sum_j \sum_k B_{j,k}^r \sqrt{PD_{j,k} PP_k^r}} \right) (PCI - \sum_i D_i^r PD_i^r) - (PCI - \sum_i D_i^r PD_{b,r,i})$

PP_r^{ip} is endogenous producer price of primary commodity ip in region r . PD_r^{is} is endogenous consumer price of secondary commodity is in region r . as_{ip}^r and $bs_{i,j}^r$ is the intercept and slope coefficients respectively for the supply function of primary commodity ip in region r . ac_{is}^r and $bc_{i,j}^r$ is the intercept and slope coefficients respectively for the supply function of primary commodity ip in region r . $TariffA_{i,r}^{eff}$ is effective ad valorem tariff; $TariffS_{i,r}^{eff}$ is effective specific tariff. $TARR_i^{eff}$ is effective tariff (ad-valorem or specific); $TARR_i^{pref}$ is preferential tariff; $TARR_i^{MFN}$ is MFN tariff; $QIMP_i$ is gross import quantity; TRQ_i is tariff rate import quota; α is positive parameter; as_{ip}^r is intercept coefficient for the supply function of primary commodity ip in region r ; ac_{is}^r is the intercept coefficient for the demand function of secondary commodity is in region r ; $p_to_f_{ip}^{is}$ is conversion factor from primary to secondary products; PCI is per capita income in region r . $D_i^r, B_{j,k}^r, F_i^r, G_i^r$ are parameters of the demand system. $Domprice_{i,r}$ is average domestic price.

¹Oyewumi et. al., 2007 has complete model parameters and equations

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. Therefore, using available data from the National Department of Agriculture 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 tariff, a scenario combining the two reforms described above, and a full liberalization scenario with all tariffs set to zero.

Results and Discussion

The objective of the scenarios was to examine how regional domestic prices would respond to policy changes under alternative policy reforms. The model involves two shift factors. Firstly, the policy instruments are altered for creating the scenarios. Secondly, the parameters of the demand, supply and conversion functions are changed based on the effects of the scenarios on border price. Table 1 shows some findings of the study. 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. In Table 2 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. 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 these results therefore, is that the development efforts aimed at commercializing the small-scale production which has already begun and of importance in government's programme of equity and poverty alleviation may be slowed down with further trade liberalization in the livestock industry especially if tariffs are lowered.

It is worthy of mention that the agricultural sector has been identified as a key sector in achieving the Accelerated and Shared Growth Initiative of South Africa (ASGISA). The livestock industry is important in achieving this objective, since about 80% of South Africa's 1 million km² agricultural land is suitable only for animal husbandry due to climatic and natural resource constraints. Moreover, livestock farming forms the core of agriculture for both commercial and emerging commercial farmers. Given the aforementioned, it is important to assess the impact of trade policies applicable to this sector. The impact of trade policy on rural livelihoods is well documented (Hoekman, Michalopoulos, Schiff and Tarr, 2001).

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Table 2. Welfare effects of the four trade liberalization scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Region	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

Table 1. 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
