Journal of the Saudi Society of Agricultural Sciences (2011) **10**, 25–32

King Saud University

Journal of the Saudi Society of Agricultural Sciences

www.ksu.edu.sa
www.sciencedirect.com

ORIGINAL ARTICLE

Sudanese live sheep and mutton exports competitiveness

Babiker Idris Babiker [a], Abdul-Jabbar Mohammed Abdullah [b], Mohamed Ahmed Al-Feel [a,*]

[a] *Department of Agricultural Economics, Faculty of Agriculture, University of Khartoum, Khartoum, Sudan*
[b] *National Cooperative Corporation, Khartoum North, Sudan*

Received 14 April 2010; accepted 12 June 2010
Available online 17 December 2010

KEYWORDS

Livestock;
Sheep;
Marketing;
Policy analysis matrix;
Mutton;
Coefficient of competitiveness

Abstract The livestock sector of Sudan provides livelihood for about 17% of the population. Sudanese livestock products meet the domestic demand for meat in addition to a substantial excess for export amounting to about 22% of total country exports. It contributes about 19% of GDP. Sheep marketing in Sudan is characterised by traditional operations and is informally organised, although, recently there are great efforts by the formal livestock authorities to organise some secondary and terminal livestock markets. These markets are deficient in basic infrastructures and systematic marketing research. The system as a whole is faced by various complex obstacles and constraints, which decrease the contribution of livestock in general, and sheep in particular, to the national economy, and suppress the optimum exploitation of this resource. These obstacles are represented in the lack of transportation networks that connect the production and consumption centres to break the seasonality of supply that creates shortages and high prices at the consumption centres. This paper employs the policy analysis matrix (PAM) technique to examine the Sudanese live sheep and mutton competitiveness in the international market. The results indicated that the market price was greater than the border price implying a positive incentive as an implicit subsidy to the live sheep exporter. The mutton exporters were found subsidised as well. The international value added (IVA) indicted a positive foreign exchange earnings or savings. Exported live sheep and mutton coefficient of competitiveness (CIC) implied that sheep and mutton exports are profitable and internationally competitive.

* Corresponding author.
E-mail address: mohamed.alfeel@yahoo.com (M.A. Al-Feel).

Peer review under responsibility of King Saud University.
doi:10.1016/j.jssas.2010.06.004

Production and hosting by Elsevier

1. Introduction

Price differences are the immediate bases of international trade. Prices differ because countries producing goods have different comparative cost structures and because different goods require different mix of factors, the supply of which differs among countries. The principle of comparative advantage implies that a country will tend to produce and export those goods and services in which it has the greatest comparative

advantage, and import those goods or services in which it has the least comparative advantage.

The term "competitiveness" is often used to refer to an advantage of firms or industries *vis-à-vis* their competitors in domestic or international markets. Others have extended the meaning to entire economies. In this context, competitiveness is equivalent to strong performance of economies relative to other countries, where strong performance can mean economic growth, success in exports and improved welfare (Cockburn et al., 1998).

Siggel (2003) stated that microeconomic concepts and indicators of competitiveness have a more solid theoretical base because they focus on the essential characteristics of producers in competition for market share and profits or the ability to export internationally. This ability is measured by the size or increase of market share. An economy may be considered competitive if it harbours a large number of internationally competitive enterprises and industries. In other words, it must perform strongly in export markets.

According to Cockburn et al. (1998), the definition which best corresponds to competitiveness as used by policy makers, businessmen and the general public, reads as: competitiveness is the capacity to sell one's products profitably. To be competitive, a firm must undercut the prices or offer products of better quality (or with better service) than its competitors.

Wignaraja (2000) defined competitiveness as the degree to which a country, under open market conditions, can produce goods and services that meet the taste of foreign consumers while simultaneously maintaining and expanding domestic real income.

The economic concept of competitiveness of industry and/or firm is based on four abilities, namely, ability to sell, ability to adjust, ability to earn and ability to attract. The ability to sell is defined as the ability of the industry or firm to sell products in domestic and/or foreign markets. The ability to attract refers to the ability of the industry or firm to attract domestic and foreign production resources including investments. The ability to adjust means above all the ability to adjust quickly and adequately to changes in international and domestic economic environment. The ability to earn refers to the income level of the investigated subjects; it includes the synthesis of all other three abilities – ability to sell, adjust and attract (Reiljan and Tamm, 2006).

The broader concept of competitiveness has been defined as the favourable business environment (i.e., competition of the systems). The indicators describing the level of competitiveness in this case are: the country's economic policies, infrastructure, level of education, etc. With the help of the international agreements and differences in national laws, the international competitiveness is created.

The narrower concept of competitiveness is defined as the possibilities and means accessible by the firm. It used to include, for example, the international cost or price competitiveness, which is measured by comparison of the costs and prices of goods in different countries, industries and firms (Siggel, 2003).

Siggel (2003) stated that the variety of concepts of competitiveness proposed in the economic and business literature is large and much greater than that of comparative advantage. This owes to the fact that competitiveness has not been defined as rigorously as is the case of comparative advantage. Some authors use the concept as synonym of comparative advantage; others conceive it as an economy-wide characteristic.

This paper distinguishes between microeconomic and economy-wide (macroeconomic) concepts. This distinction is most fundamental because, first, the simple expansion of micro concepts into macro level generates problems, as is obvious in the case of comparative advantage. Second, the one dimension that the various concepts of competitiveness integrate and measure is distinguished from the multi-dimensional concepts. A further criterion for distinction is the number of countries or competitors, with which a particular country is being compared. Unilateral concepts are distinguished from bilateral and multi-lateral concepts, where bilateral and multi-lateral concepts always require data from one or more foreign countries, whereas unilateral concepts are based on the data of a single country. Lastly, characteristics that are important for the interpretation of concepts are the distinctions between static and dynamic approaches, positive and normative ones, deterministic and stochastic ones and, finally, ex-post and ex-ante-type concepts.

Hence, the concept of competitiveness has different aspects. It is possible to differentiate between macroeconomic and microeconomic concepts. Microeconomic competitiveness is generally defined as the ability of a firm to increase in size, market share and profitability. Macroeconomic concept is cohered with competitiveness of a country or economy. At the same time, we have to bear in mind that enterprises and industries are selling their products in the world market not countries.

Export competitiveness of a firm is connected with several factors that include, among others, labour cost, production costs, productivity, price, quality of factors and/or products, innovations and economic and political environment (Reiljan and Tamm, 2006). Some research stresses the role of labour costs and/or production costs, in general, in the process of gaining export competitiveness. The price of labour differentiates between countries more than the price of capital and materials since labour is considered to be more immobile than capital and materials. Other factors of export competitiveness such as productivity, innovations and/or, quality of the products are becoming more important, since exports based only on low labour and/or production costs is not sustainable.

Bartels and Pass (2000) stated that "To achieve the sustainable competitiveness, important aspects besides production costs are also important as adequate reaction to market changes, increasing the productivity and exploitation of innovations in production and in marketing. Important preconditions are research and development programs and human capital. In developing countries firms are usually internationally competitive due to low level of production costs. The

Table 1 Factors influencing the sustainability of export competitiveness. Source: Modified from Reiljan and Tamm (2006).

Factor	Developmental stage		
	Low	Medium	High
Innovation	X	XX	XXX
Productivity	XX	XX	XX
Production costs	XXX	XX	X

XXX = very important factor. XX = important factor. X = less important factor.

competitiveness of more developed countries is not based only on cost advantage, as enterprises and industries are internationally competitive because of the low unit costs of production input, higher productivity and/or innovations''.

Table 1 illustrates factors influencing the sustainability of export competitiveness for different levels of countries developmental stages.

2. Methodology

Many methodologies and indicators are used to examine competitiveness. Based on the unilateral concept, this paper employs the policy analysis matrix (PAM) technique to examine the competitiveness of the Sudanese live sheep and mutton exports.

PAM is designed to reflect the existing situation and to demonstrate empirically the relationships among different policies and market failures. According to Pearson and Monke (1987), PAM is an accounting framework which disaggregates the economics of the commodity into its sources of private and social profitability. Since policies can affect both input and output markets, PAM can be used to detect sources of policy transfer and resource allocation inefficiency and measure their cumulative effect on the commodity systems; production, marketing, processing, domestic consumption and export. Thus, some PAM coefficients are used as competitiveness indicators, namely the international value added (IVA) and the coefficient of international competitiveness (CIC).

The first task in constructing PAM is to select the representative agricultural system (production or marketing) to be investigated. Then the budget data on each activity of the system are collected. The budget data consist of all activity input cost and output revenue. These inputs and outputs are evaluated at actual market prices (at private prices as called in PAM) to yield actual private profit. The same variables are then re-evaluated using social prices (world prices for tradable inputs and outputs, and accounting prices for domestic factors) to yield social cost and profit. The comparison between private and social costs on the one hand and between private and social profits on the other yields the basic result of PAM. In other words, there are two main activities in constructing a PAM data base:

1. Establishing the production, or, marketing system budget at private prices.
2. Social valuation of output and inputs.

Production and marketing system budget activities require that the data, on revenues and costs for all stages of the commodity system, can be collected from primary or secondary sources. Estimates are needed for inputs, outputs, costs and revenues for all stages. The costs and revenues must be expressed on the same per unit bases.

Social valuation of outputs is made by replacing market prices by efficiency accounting prices to correct for the distortions created by government interventions and market failure. As efficiency is the major factor in determining the performance of the economy, the first principle of efficient pricing is the use of world prices as social valuation of tradable commodities and inputs. The social valuation is divided into social valuation of tradable and non-tradable inputs and outputs. For tradable goods, the accounting price is the border price, the marginal import cost, or marginal export revenue as appropriate, converted into local currency at the shadow exchange rate (Idris, 1993). The accounting price for imports is estimated directly as the CIF value converted into local currency plus additional internal cost items, valued at accounting prices to get the import parity price. For exportable commodities the accounting price is the FOB value converted into local currency. The internal marginal cost items indicate decreased revenue to the producer. Hence, they are deducted from the FOB value after being decomposed and converted into accounting prices to get the export parity price. Figs. 1 and 2 are schematic diagrams for calculations of import and export parity prices. Unlike taxes, subsides represent a decreased cost in case of imports and increased revenue for exports.

The straight forward method that directly applies border prices is not common in practice; instead, it is recommended to calculate the accounting ratios for basic commodities and inputs first and then apply them directly to transform market prices into accounting prices.

$$\text{Accounting price} = \text{market price} \times \text{accounting ratio}.$$

Social prices for non-tradable goods and factors are equal to the sum of social costs of producing the non-tradable goods, and the social prices for domestic factors. Social prices for

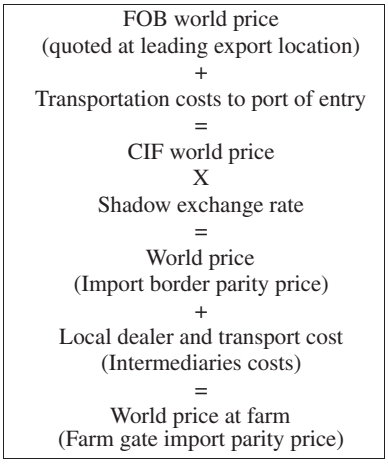

Figure 1 Calculation of the import parity price. Source: Idris (1993).

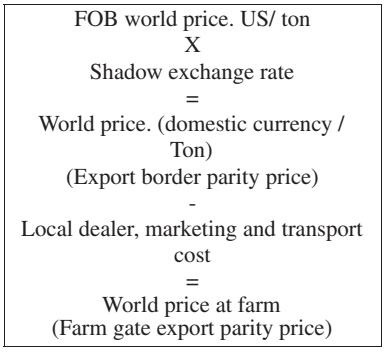

Figure 2 Calculation of the export parity price. Source: Idris (1993).

domestic factors could be calculated by direct valuation of the marginal physical products at world prices.

The labour accounting ratio is estimated for each labour group; where the common groups in developing countries are skilled urban, unskilled urban and unskilled rural labour. The accounting wage rate (AWR) is then calculated as follows:

$$\text{AWR} = \text{market wage rate} \times \text{accounting ratio (Gittinger, 1982)}.$$

The accounting price of land is the opportunity cost given by its marginal product in the best alternative use valued at border price plus a component reflecting its function as a depository of value.

The accounting price of capital is estimated by the social rate of return. The appropriate rate may be fixed by the central financial or planning authorities.

The private or financial profitability measures the actual competitiveness at the actual market prices. Foreign exchange earnings and imported inputs are converted into local currency by the actual exchange rate at which the market operates.

Private profitability from the government perspective is the border price of the commodity less production and marketing costs. Whereas for the producer it is the farm gate price less the production cost.

The social or economic profitability is an indicator of efficiency or comparative advantage from the economy point of view. It equals the border value of the commodity less the production and marketing costs. If the revenue exceeds costs measured in efficiency or accounting prices the commodity is economically profitable, and the country is competitive in producing it. Table 2 shows the PAM structure.

Many coefficients could be drawn from the PAM results. These include the international value added (IVA), nominal protection coefficient (NPC), domestic resource cost (DRC) and coefficient of international competitiveness (CIC). In these contexts, IVA and CIC are used as competitiveness indicators.

The international value added (IVA) which is an absolute measure of international competitiveness is defined as:

$$\text{IVA} = \frac{\text{Revenue-cost of tradable inputs}}{\text{shadow exchanged rate}}$$

A positive IVA means positive foreign exchange earnings or saving. In the PAM language, IVA = E–F.

The CIC is defined as the ratio of domestic resource costs measured in economic prices to international value added expressed in foreign currency. In other words, $\text{CIC} = \frac{G}{\text{IVA}}$. If the CIC is less than the exchange rate, the commodity is economically profitable.

Table 2 PAM structure. Source: Pearson and Monke (1989).

Item	Revenue	Total cost		Profit
		Tradable inputs	Non-tradable inputs	
Private prices	A	B	C	D
Social prices	E	F	G	H
Transfers	I	J	K	L

1. Private or financial profit; D = A–B–C.
2. Social or economic profit; H = E–F–G.
3. Output transfer; I = A–E.
4. Input transfer (imported); J = B–F.
5. Factor transfer (domestic); K = C–G.
6. Net transfer; L = D–H = I–J–K.

Many coefficients could be drawn from the PAM results. These include the international value added (IVA), nominal protection coefficient (NPC), domestic resource cost (DRC) and coefficient of international competitiveness (CIC). In these contexts, IVA and CIC are used as competitiveness indicators.

The international value added (IVA) which is an absolute measure of international competitiveness is defined as:

$$\text{IVA} = \frac{\text{Revenue-cost of tradable inputs}}{\text{shadow exchange rate}}$$

A positive IVA means positive foreign exchange earnings or saving. In the PAM language, IVA = E–F.

The CIC is defined as the ratio of domestic resource costs measured in economic prices to international value added expressed in foreign currency. In other words, $\text{CIC} = \frac{G}{\text{IVA}}$. If the CIC is less than the exchange rate, the commodity is economically profitable.

3. Results and discussion

Saudi Arabia is the largest importer of live sheep and mutton in the world. It imports about 4.3 million heads of live sheep, 47,300 metric tons of sheep meat and 44,538 metric tons of mutton and lamb, annually (FAO, 2005). It is also the main importer of Sudanese live sheep and mutton absorbing about 95% of the Sudanese live sheep and mutton exports.

Other countries that import live Sudanese sheep are Qatar and United Arab Emirates. Table 3 shows the exports of live sheep from Sudan during 1995–2004 while Table 4 shows the exports of live sheep by country of destination during 2000–2004.

The Sudanese livestock is characterised by its dependence on natural grazing and its purity from industrial and chemical components. This makes it highly demanded in the international markets.

A marked improvement was made in exports of mutton in the period 1995–2004. About 172% growth in mutton exports was recorded during that period. In fact, a higher growth rate was achieved in 1996, 1997 and 1998 (Federal Ministry of Animal Resource, 2005). Table 5 shows mutton exports in tons during 1995–2004. Main mutton export destinations are Saudi Arabia, United Arab Emirates, Kuwait and Oman. Table 6 shows Sudanese mutton exports by country of destination during 2001–2004.

To ensure compatibility of exported meat and other livestock products with international standards and to meet the imported countries stipulations, Sudan has six export slaughterhouses which perform all the operations regarding the preparations of the exported product. The operating abattoirs have a combined capacity of processing about 17,000 head of sheep and or goats per day. Meat exports are mostly in the form of chilled carcasses.

Table 3 Live sheep exports from Sudan during 1995–2004 (heads). Source: Federal Ministry of Animal Resource (2005).

Year	1995	1996	1997	1998	1999
Sheep heads	617,004	1001,705	1074,576	1584,858	1616,363
Year	2000	2001	2002	2003	2004
Sheep heads	731,242	15,417	1602,638	1315,399	1703,562

Table 4 Sudan live sheep exports by country of destination during 2000–2004. Source: Calculated from different sources (2005).

Year	Export destination	Number (head)	Percentage (%)
2000	Saudi Arabia	751,633	99.91
	United Arab Emirates	699	0.09
	Total	752,332	100.00
2002	Saudi Arabia	17,95,629	99.90
	United Arab Emirates	1114	0.06
	Qatar	634	0.04
	Total	17,97,377	100.00
2003	Saudi Arabia	18,51,428	99.71
	United Arab Emirates	5348	0.29
	Total	18,56,776	100.00
2004	Saudi Arabia	17,00,632	99.85
	United Arab Emirates	2003	0.12
	3\Qatar	537	0.03
	Total	17,03,172	100.00

Table 5 Sudanese mutton exports in tons during 1995–2004. Source: Federal Ministry of Animal Resource (2005).

Year	1995	1996	1997	1998	1999
Mutton ton	2143	7897.9	7943.4	9324.6	5826.6
Year	2000	2001	2002	2003	2004
Mutton ton	6157.8	4855.2	7113.8	700,216	510,673

Table 6 Sudanese mutton exports by country of destination during 2001–2004. Source: Calculated from data collected Federal Ministry of Animal Resources (2005).

Year	Export destination	Net mass (ton)	Percentage (%)
2001	Saudi Arabia	1.000	58.4
	United Arab of Emirates	.713	41.6
	Total	1.713	100.00
2003	Saudi Arabia	156.547	100
2004	Saudi Arabia	4911.285	88.16
	Qatar	302.195	5.42
	Jordon	233.472	4.19
	Libya	88.027	1.58
	United Arab of Emirates	28.835	0.52
	Bahrain	7.095	0.13
	Total	5570.909	100.00

Table 7 shows the processing capacity of the export slaughterhouses per day. In either case, the slaughterhouses operate at 50% capacity or below for most of the year except during ''Ramadan'', the season of peak demand. The level of operations is dictated by a number of primary reasons. For example, the daily demand for Sudanese lamb and mutton in Saudi Arabia does not exceed 10 tons. This is because Sudanese lamb and mutton are expensive compared to that of Australia or New Zealand. Furthermore, the big importers and distributors give greater promotion to the latter countries to realise better margins. Margin levels are said to be double the level of Sudanese lamb and mutton (Akliliu, 2002). Furthermore, Sudanese sheep meat carcasses packaging (cloth wrapping) is inappropriate. This kind of wrapping decreases the meat shelf life to about two weeks, compared to Australian or New Zealand air-tight packaging of shelf life extended to about three months.

Table 8 shows the live sheep export budget. The data were collected from El Khewi city, which has recently become an important sheep export market, particularly after the construction of the paved road and the availability of quarantine services. Many exporters truck their sheep directly from there to Port Sudan, the export outlet. The purchase price is about 79% of the total cost and the marketing and transportation

Table 7 Working export slaughterhouses and processing capacity per day. Source: Federal Ministry of Animal Resources (2004).

Slaughterhouse	Processing capacity	
	Sheep	Cattle
El Kadaro	4500	775
JIMCO	4000	200
Nyala	3000	500
Ghanawah	3000	400
Sabaloga	2500	350
Total	17,000	2220

Table 8 Live sheep exports budget 2004.

Item	SD/Head	Percentage
(a) El Khewi costs		
1-Purchase price	17,000	78.96
2-Middlemen commission	100	0.46
3-Labour (shepherd, shepherd-guide men)	210	0.98
4-Local government fees	250	1.16
5-Sheep watering	75	0.35
6-Medicines	18.18	0.08
7-Quarantine fees and expenses	287	1.33
8-Wounded stamp	25	0.12
9-Business profit tax	50	0.23
10-Transportation to Port Sudan	1225	5.69
11-Exporter managerial expenses	22.73	0.11
(b) Port Sudan costs		
1-Quarantine fees	50	0.23
2-Local government fees	50	0.23
3-Feeding and watering	718	3.33
4-Labour costs	43.4	0.20
5-Sea Ports corporation fees	320	1.49
6-Custom-clearance commission	20	0.09
7-Ship agent commission	15	0.07
8-Other official expenses (export endorsement, documentation, Bank of Sudan fees, MAR* fees, etc.)	650.15	3.02
9-Insurance	300	1.39
10-Comercial bank (accept letter of credit) expenses	40	0.19
11-Exporter managerial expenses	60	0.28
Total cost	21529.46	100.00
(c) Sale price (FOB price Port Sudan)**	22016.00	
Net revenue	486.54	

* MAR = Ministry of Animal Resource.
** 86 US$, exchange rate 256 SD/US$.

costs constitute collectively about 21% of the total cost. The official government expenses constitute about 6% of the total costs followed by transportation cost of about 5.7% and feeding and watering costs of about 3.7% and miscellaneous of about 5.53%. The average Port Sudan (FOB) price is about 21,529 SD (=86 US$) per head [1 SD = 0.1 Sudanese pound (SDG)]. The net margin is about 486SD per head (=2.25%) of the total cost or about 2.86% of the purchasing price.

Table 9 shows the live sheep export parity price. The nominal protection coefficient (NPC) which is the ratio of the private price to the social price is about 0.97 (less than one).

This means that the trader is highly taxed as El Khewi price was about SD 17,000 while the calculated world farm price, at El Khewi, was about SD 17,486 per head. Thus, the trader is taxed by about 2.8% of the world price.

Table 10 shows the live sheep financial and economic valuation. One feature in Sudan economy, after the implementation of the economic liberalisation policy, is the balance of the official and shadow exchange rates. The valuation of the foreign components of the items is to some extent subjective as it is determined according to the perspective of the researcher to estimate the proportions of the local (non tradable) and the imported (foreign) components within the item. As Table 10 reads, the financial and the economic values are equal, because the conversion factor is equal to one, which implies that the official and the shadow exchange rates are identical. The financial valuation usually includes the private valuation of the tradable and non tradable components of the items. The gross revenue is the average Port Sudan FOB price which is about 86 US$ per head (22,016 SD [1 SD = 0.1 Sudanese pound (SDG)]). Insurance, about SD 300 per head, is regarded as a tradable item. It covers risks like accidental disabilities or death that could occur while enroute to the importer. Government fees are assumed to embody foreign components e.g. quarantine fees, garbage fees, wounded fees etc. unlike taxes which are assumed as non tradable or zero foreign component. The total average values of government fees and business profit tax are about SD 562 per head, out of which 75% is tradable, and about SD 50 per head, respectively. Port Sudan expenses include quarantine fees, port fees, garbage fees and local government fees which collectively constitute about SD 1927 per head; 10% of it is assumed to be foreign component. The middlemen commission, handling in local markets – labour and feeding – exporter own expenses and bank expenses are all regarded as non-tradables. Medicine, watering and transportation costs are assumed to be 50%, 40% and 70% foreign components, respectively.

The total financial or private cost component of tradables and non tradables is about SD 1811 and SD 19,719 per head, respectively. The high government fees and the transportation cost are blamed for the high tradable financial value. The net revenue financially and economically (socially) are equal which is about SD 487 per head.

Table 11 presents the live sheep PAM structure and it proves what was said in the financial and social valuations that private costs equal social costs. The private profit – as PAM shows – is about SD 486.54 per head which equals the net transfer, as the social profit is regarded as zero.

Table 9 Live sheep export parity price 2004.

Port Sudan FOB price	86 US$
	×
Exchange rate	256 SD/US$
	=
World price or export border parity price	22,016
	–
Local trader expenses, marketing cost, labour cost and transportation cost	4529.46
	=
World price at El Khewi	17486.54

Trader NPC = 17,000/17486.54 = 0.972 i.e., NPC < 1.

Table 10 Live sheep financial and economic valuation 2004. Source: Field survey (2004).

Item	Foreign comp. (%)	Financial value		Total	Conversion factor*	Economic value		Total
		Tradable	Non tradable			Tradable	Non tradable	
(a) Gross revenue	1.0	22,016	0	22,016	1	22,016	0	22,016
(b) Less export costs								
1-Insurance	1.0	300	0	300	1	300	0	300
2-Business profit tax	0.0	0	50	50	1	0	50	50
3-Port Sudan costs	0.1	192.655	1733.895	1926.55	1	192.655	1733.895	1926.55
(c) Less marketing costs								
1-Purchase price	0.0	0	17,000	17,000	1	0	17,000	17,000
2-Middlemen commission	0.0	0	100	100	1	0	100	100
3-Government fees	0.75	421.5	140.5	562	1	421.5	140.5	562
4-Handling in local market	0.0	0	210	210	1	0	210	210
5-Managerial expenses	0.0	0	22.73	22.73	1	0	22.73	22.73
6-Medicines	0.5	9.09	9.09	18.18	1	9.09	9.09	18.18
7-Banks expenses	0.0	0	40	40	1	0	40	40
8-Watering	0.4	30	45	75	1	30	45	75
(d) Less transportation cost	0.7	857.5	367.5	1225	1	857.5	367.5	1225
(e) Equals total cost		1810.745	19718.715	21529.46		1810.745	19718.72	21529.46
(f) Net revenue		20205.255	−19718.715	486.54		20205.255	−19718.7	486.54

* Official exchange rate equals the shadow exchange rate.

As the concern is on marketing level analysis, not on production level, of a commodity, DRC is not calculated. The most important determinant coefficients of the competitiveness at the marketing level are the nominal protection coefficient (NPC), the international value added (IVA) and the coefficient of the international competitiveness (CIC). In this study the exporter NPC is larger than one (1.023); indicating a market price greater than the border price and implies positive incentive i.e. implicit subsidy to the exporter. The IVA is about US$ 79 per head which shows a positive foreign exchange earning or saving. The CIC is about 250 which is less than the exchange rate (SD 256 to US$ 1) implying that this product is economically profitable and competitive.

Table 12 presents the mutton exports budget. The average mutton FOB price (Khartoum Air Port) is about 988,800 SD per metric ton (about 100 sheep carcasses); the by-products (sheep offal, heads and the hides) of the 100 slaughtered sheep are sold domestically at about 155,000 SD. The sheep by-products constitute an important part in the budget and together with the exported carcasses compose the exporter gross revenue which is about 1143,800 SD per metric ton. The marketing costs which include personal exporter expenses, marketing cost, labour cost, and transportation cost is about 35884.26 SD per metric ton which is equal to about 3.45% of the total cost. In return the total cost is about 1097603.26 SD per metric ton. The net margin is about SD 46,197 per metric ton.

Table 13 presents the mutton parity price. The domestic mutton trader was subsidised as he sold the metric ton at about SD 1011,250 at El Kadaro slaughter house compared to the calculated world price at El Kadaro of about SD 902,447 per metric ton, i.e. NPC is bigger than one. Usually the domestic mutton trader sold his "sheep" as carcasses on weight basis, not per head or live-weight. The by-products are not included and are regarded as the exporter's margin component.

Table 11 Live sheep (PAM) 2004.

Item	Revenue	Total cost		Profit
		Tradable inputs	Non tradable inputs	
Private	22016.00	1810.745	19718.715	486.54
Social	21529.46	1810.745	19718.715	0
Effects	486.54	0	0	486.54

Source: Calculated from Table 10.

Table 12 Mutton export budget 2004. Source: Field survey (2004).

Item	SD/metric ton	Percentage (%)
(a) Costs/MT		
1-Purchase price	10,11,250	92.13
2-Meat preparation	50,469	4.60
3-Government fees	4981.25	0.45
4-Air port fees	1000	0.09
5-Trade chamber fees	128.25	0.01
6-Custom fees	2500	0.23
7-Custom-clearance and export services fees	8775	0.80
8-Transportation costs	6229.13	0.57
9-Packing	4883.13	0.44
10-Exporter self-expenses	7387.5	0.67
Total cost	1097603.26	100.00
(b) Revenues		
Meat FOB price (Khartoum Air Port)/ MT	988,800	
By products (head, hide and offal) value	155,000	
Gross revenue	11,43,800	
Net revenue	46196.74	

FOB price = 3862.5 US$. Exchange rate 256 SD/US$.

Table 13 Mutton export parity price per MT of meat 2004.

Khartoum Air Port FOB price	3862.5 US$
(Multiplied by)	×
Exchange rate	256 SD/US$
(Equals)	=
World price or export border parity price	988,800
(Less)	−
Local trader expenses, marketing cost, labour cost and transportation cost	86353.26
(Equals)	=
World price at El Kadaro	902446.74

Trader NPC = 10,11,250/902446.74 = 1.12.
Source: Calculated.

Table 14 Mutton financial and economic values, 2004. Source: Calcuated from primary data collected from mutton exporters (2004).

Item	Foreign comp. (%)	Financial value		Total	Conversion factor	Economic value		Total
		Tradable	Non tradable			Tradable	Non tradable	
Exported carcasses value	1	988,800	0	988,800	1	988,800	0	988,800
By-products vale	0	0	155,000	155,000	1	0	155,000	155,000
Gross revenue		968,800	155,000	11,43,800	1	988,800	155,000	11,43,800
Less export cost								
1-Purchasing price	0	0	10,11,250	10,11,250	1	0	10,11,250	10,11,250
2-Meat preparation	0.4	20187.6	30281.4	50,469	1	20187.6	30281.4	50,469
3-Total export fees	0	0	17384.5	17384.5	1	0	17384.5	17384.5
4-Packing	0.4	1953.252	2929.878	4883.13	1	1953.252	2929.878	4883.13
5-Local trader expenses	0	0	7387.5	7387.5	1	0	7367.5	7387.5
6-Transportation cost	0.7	4360.391	1868.739	6229.13	1	4360.391	1868.739	6229.13
Equals total cost		26501.243	1071102.017	1097603.26		26501.243	1071102.017	1097608.26
Net revenue		962298.757	−916102.017	46196.74		962298.76	−9161,02,017	46196.74

Table 15 Mutton exports (PAM), 2004.

Item	Revenue	Total cost		Profit
		Tradable inputs	Non tradable inputs	
Private	1143800.00	26501.243	1071102.017	46196.74
Social	1097603.26	26501.243	1071102.017	0
Effects	46196.74	0	0	46196.74

Source: Calculated from Table 14.

The mutton financial and economic valuation is shown in Table 14. Important note should be considered herein, if only the value of the exported product (the carcasses) is calculated, the exporter will gain no profits. But exporters cover their costs, and save a margin of profit from domestically sold by-products (sheep skins, heads and the offal).

Meat preparation, packing and transportation composed a foreign component estimated to be about 40%, 40% and 70% of their costs, respectively. The conversion factor is assumed to equal one because the official and the shadow exchange rates are equal. Thus, the private and the social costs are equal.

The total private tradable and non tradable costs are about SD 26,501 and SD 1071,102 per metric ton, respectively. The total net margin is about SD 46,197 per metric ton.

Table 15 shows the PAM results of the exported mutton in 2004. It is clear that mutton exports are financially profitable if the carcasses and the domestically sold by-products are considered. Exporter's NPC is about 1.042 i.e. NPC is larger than one implying that the market price is higher than the border price, which means positive incentive to the mutton exporters. The IVA is equal to about UD$ 4365 per metric ton. Positive IVA means an absolute international competitiveness of Sudanese mutton exports. The CIC is equal to about 245 which is less than the exchange rate meaning that this product is economically profitable and competitive.

4. Conclusions

Besides their role in studying agricultural policies, the policy analysis matrix (PAM) coefficients are valuable competitiveness indicators. The PAM results of this study showed that live sheep exporter's nominal protection coefficient (NPC) was about 1.023 >1, which indicated that the market price was greater than the border (Port Sudan) price implying a positive incentive i.e. an implicit subsidy to the live sheep exporter. The mutton exporters NPC was about 1.042 >1, implying that mutton exporters were subsidised as well. The international value added (IVA) (absolute measure of international competitiveness) for live sheep was about 78.927 US$ per head; showing a positive foreign exchange earnings or savings. Mutton IVA was about 4364.45 UD$ per ton which means an absolute international competitiveness of Sudanese mutton exports. Exported live sheep CIC was about 249.83; less than the exchange rate (1US$ = 256 SD) implying that sheep exports are profitable and internationally competitive. Exported mutton CIC was about 245.42 which is less than the exchange rate. This indicates that the product is economically profitable and internationally competitive.

References

Akliliu, Y., 2002. An Audit of the Livestock Marketing Status in Kenya, Ethiopia and Sudan, vol. I. Nairobi, Kenya, web extracted 2004. <http://www.eastafrica.usaid.gov/(S(tcprounjiaczlc2p3l1q-tues))/proxy/Document.1066.aspx>.

Bartels, F.L., Pass, C.L., 2000. International Business: A Competitive Approach. Prentice Hall, Singapore.

FAO, 2005. Faostat Data Base Results. Web extracted 2005. <http://www.fao.org/site/342/default>.

Federal Ministry of Animal Resource, 2005. Department of Statistics, Khartoum Sudan.

Gittinger, J.P., 1982. Economic Analysis of Agricultural Projects, second ed. EDI Series in Economic Development, Johns Hopkins U. Press Baltimore.

Idris, B., 1993. The use of the policy analysis matrix in agricultural policy analysis. A case study of sorghum and sesame in Sudan. A FAO Training Manual for agricultural planning, no. 1, Cairo, Egypt.

Pearson, S.R., Monke, E.A., 1987. The Policy Analysis Matrix, a Manual for Practitioners. The Pragma Corporation Falls Church, Washington, DC.

Reiljan, J., Tamm, D. Differences in Indicators Related to Export Competitiveness: The Case of Estonian Wood Sector Firms. Web extracted 2006. <http://www.emselts.ec/konverentsid/EMS2003/4Etterthus/JannoReiljan.pdf>.

Siggel, Eckhard, 2003. Concepts and Measurements of Competitiveness and Comparative Advantage towards an Integrated Approach. Web extracted 2006. <http://www.iso.neu.edu/iioo2003/paper/siggel.doc>.

Wignaraja, G., 2000. Competitiveness in a Rapidly Globalizing Economy: Lessons of Experience. Web extracted 2006. <http://www.ilo.org/dyn/empent/docs/F111pub78.htm>.