



# Enhancing the provision of livestock marketing information in Somaliland



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Danida



Chamber of Commerce, Industries and Agriculture, Hargeisa, Somaliland



Terra Nuova

# Enhancing the provision of livestock marketing information in Somaliland

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## Disclaimer

The contents of this report are the sole responsibility of Terra Nuova and ILRI and can under no circumstances be regarded as reflecting the position of the Danish government.



# Abstract

The economy of Somaliland depends on livestock, which employs about 70% of the population and contributes approximately 60% of GDP and 85% of export earnings. The principal export markets are the Kingdom of Saudi Arabia, Yemen, Oman, Egypt and the United Arab Emirates. Exports to these markets have shown a steady growth in the last four years.

Despite recent growth in export volumes, livestock trade takes place in an environment characterized by an underdeveloped legal framework, contract uncertainty and high information costs among other factors. Trade is guided by informal traditional institutions, customs and religious practices that serve as alternatives to formal contracting. The Livestock Marketing Information System (LMIS) was initiated in 2007 to address the constraint of high market information cost. The purpose of the LMIS is to provide timely current information to livestock producers, traders, government officials and other development partners. It collects and disseminates data from three livestock markets (Hargeisa, Burao and Tog Wajaale), the port of Berbera and crossborder market of Lowya Caddo. It is implemented by the Somaliland Chamber of Commerce, Industries and Agriculture, in collaboration with the Ministry of Livestock, Ministry of Commerce, Ministry of Finance, the municipalities of Hargeisa, Burao and Tog Wajaale, with the technical support of Terra Nuova and funding from Danish Government.

Although several agricultural market information systems exist in developing countries, the validity, reliability and impact of information they generate vary and depend on a number of factors. Some of these include technology used, technical capability of personnel, protocol employed in data capturing, management and transmission among others. Despite the Somaliland LMIS being in operation for eight year, there has been no attempt to evaluate its validity and reliability.

To redress this concern, this study provides an appraisal of the validity of the Somaliland LMIS as a decision making tool for stakeholders, identifies its strengths and weaknesses and offers recommendations for improvement. The validity of the system was assessed by focussing on three areas. First, by evaluating the proportion of total Somaliland livestock exports that are traded through the monitored markets. This enabled understand how the LMIS covers the target population. Second, by analysing the extent to which the trends in volumes of livestock traded in monitored markets is explained by shocks and opportunities in both local and international markets; and third by evaluating the type of trends that exist in livestock prices and the main drivers of these trends. Data used were obtained from the LMIS database, comprising weekly traded volumes, weekly price data for different grades of small ruminants, cattle and camels, and weekly export trader numbers for a period 2007–12.

The study shows that the LMIS has provided valid data and information over time, noting that the data series exhibited direct and strong relations with shocks and opportunities that have occurred in local and international markets. The LMIS's coverage has been high and consistent for small ruminants, although modest for cattle and camels. A vector autoregressive model applied to quantify the effects of seasonal and occasional factors on price revealed that whereas prices of small ruminants and camels have exhibited secular and upwards trends over time, those of cattle have remained the same. In addition, market structure, seasonal effects as well as shock events were found to only affect the prices of small ruminants. The report presents preliminary recommendations for public and private sectors, with some predicated on further study.

# Introduction

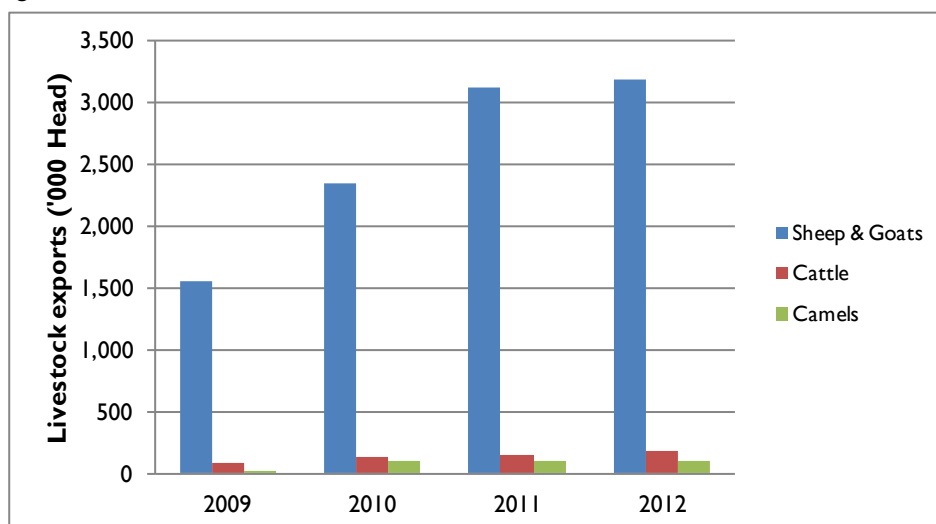
## Background information

Livestock has historically and culturally been the main source of livelihoods for the majority of Somalis. The livestock sector employs over 70% of the population, contributes about 60% of the gross domestic product (GDP) and 85% of export earnings. Proceeds from livestock exports are used to finance the import of food, medicines, building materials, fuel, among other commodities (MoP 2011).

Livestock of various grades is procured by market actors through trade routes comprising networks of primary and secondary markets linked to the port of exit. The market actors include the small-scale traders (*Gedisley/Gadley* in Somali language), the agent of exporters (*Wakil*), and exporters (*Ganacsato*) and brokers (*Dilaal*). A detailed description of the functions of each of these actors has been provided by Negassa et al. (2008).

On the other hand, Negassa et al. (2008) and Mugunieri et al. (2012) have documented the informal livestock grading and pricing system as applied in Somalia. In summary, three grades of cattle, sheep and goats (i.e. I, II and III) and two grades of camels (i.e. I and II) are exported to a number of countries. In order of importance these are the Kingdom of Saudi Arabia (KSA), Yemen, Oman, Egypt and the United Arab Emirates (SLCCIA 2012). Exports have shown a steady growth in the last four years (Figure 1).

Figure 1. Trends in livestock FoB volumes from Berbera Port, Somaliland.



Source: SLCCIA 2010–13.

The grading of animals is based on levels of a number of important traits: age (adults v/s young), conformation (excellent, good, and fair), body condition (fat, normal, and thin), and sex (only male animals are exported). Grade I represent the highest quality animals and these fetch the best price. Lower grades are discounted. Both Negassa et al. (2008) and Mugunieri et al. (2012) have observed that the grading system presents an opportunity for livestock

producers and other market intermediaries to realize higher profitability through improvement of the quality of animals marketed.

The growth in export volumes can be attributed to three key developments in local and export markets in the recent past. First is the adoption of a livestock certification system and establishment of quarantine stations<sup>1</sup> at the tail end of the market chain in Somaliland. These factors have enhanced the confidence of importers in the safety and quality of livestock from Somaliland (Khadijah and Kabue 2012). Prior to September 2009, exports to KSA transited through the livestock quarantine facilities at the port of Djibouti. This not only increased the marketing costs for Somaliland traders, but also constrained export volumes due to the limited handling capacity of the facilities at the port of Djibouti at the time.

The second key development is the fact that the procurement of livestock from primary markets has been facilitated by a robust investment in infrastructure supporting animal welfare (loading and unloading ramps, watering points, livestock shades and modern vaccination pens) in key district and regional markets across the country. These infrastructures have not only reduced livestock transportation costs, but have also increased livestock numbers dispatched from markets.

Lastly, the enactment of tighter animal welfare regulations for animals in sea transit and in destination markets from Australia (i.e. the Exporter Supply Chain Assurance Scheme, ESCAS)<sup>2</sup> has led to a significant reduction in exports of live animals from that country, and to some extent eased competition in international markets in favour of Somaliland (USAID 2013). The ESCAS stipulates that exporters of Australian livestock must provide evidence that the livestock will be handled in accordance with internationally accepted World Organization for Animal Health (OIE) standards up to and including the point of slaughter. Therefore, exporters must demonstrate that they have control of the supply chain to enable the ESCAS to be successfully managed (DAFF 2013). By the end of 2012, KSA had not put in place end-market regulatory arrangements as envisaged under the ESCAS. Consequently, exports of livestock from Australia to KSA were reduced significantly: sheep exports dropped from 1.03 million head in 2007 to 69,000 in 2012. Countries that have met ESCAS requirements include Kuwait, Qatar, Jordan, Bahrain and Turkey.

The impact of the ESCAS on Australian live animal exports is demonstrated in Figure 2. Although this scenario has led to an increased foothold of Somaliland sheep and goats exports in the Middle East, and in particular the KSA, this may be short-lived as most countries in the Middle and Far East are at one stage or another in compliance with the ESCAS.<sup>3</sup>

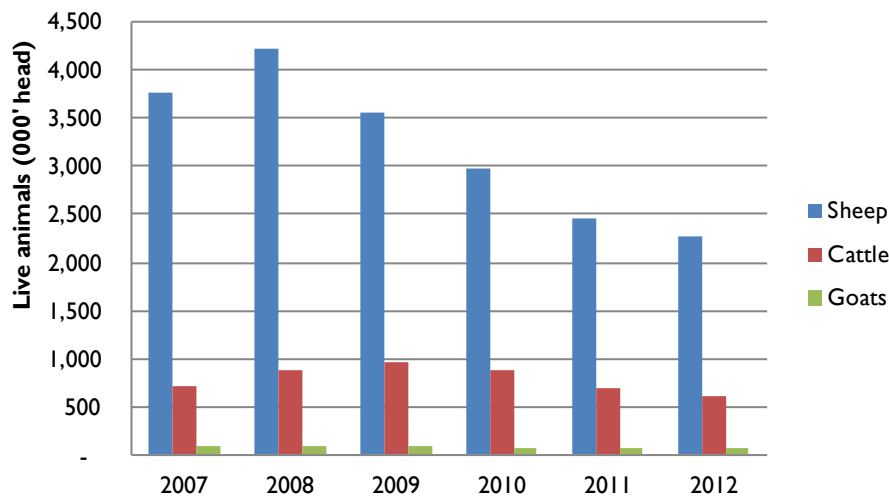
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1. There are three quarantine stations in Somaliland. The first station started operations in September 2009, the second a year later in October 2010, and the third in 2012. The first station is a joint public-private partnership, while the other two are private. They all have a joint holding capacity of above 2 million shoats.

2. See details: <http://www.daff.gov.au/biosecurity/export/live-animals/livestock/escas#overview>

3. However, the recent capital investments by Saudi traders in the Somaliland livestock sector may be an indicator of strengthening and stabilizing of the Somaliland-Saudi livestock trade.

Figure 2. Trends of live animal exports from Australia (2007–12).



Source: MLA (2013).

## Features of Somaliland's livestock export trade

Despite the recent growth in export volumes, livestock trade in Somaliland takes place in an environment characterized by an underdeveloped legal framework, transactional uncertainty and high information costs, among others. Trade is guided by traditional institutions, and religious practices that include kinship and ethnic groupings, clan affiliations, symbols of group identity and religious leaning; all which serve as alternatives to formal contracting (Carr and Landa 1983).

In Somaliland, ethnic identity is based on a highly segmented patrilineal clan system through which people trace their descent from common male ancestors (Mahmoud 2010). The trade corridor through Somaliland, known as the Berbera corridor, is dominated by the *Isaaq* clan, although the *Ogadeni* and other clans also form part of the supply chain. Specific livestock supply networks in this corridor include: (i) Harar–Jijiga–Hargeisa–Berbera; (ii) Hartisheikh–Hargeisa; (iii) the Haud route; (iv) Kebri Dahar–Burao; and, (v) Gode–Burao (Umar and Baulch 2007). The main markets within the corridor are Burao, Hargeisa and Tog Wajaale.

Livestock trade routes are related to these age-old ethnic and cultural links that are maintained across international boundaries, which facilitate livestock procurement and trekking, and eventual shipment to importing countries. A previous study (Negassa et al. 2008) has shown that high information costs within the Berbera corridor had contributed to information asymmetry along the market chain in favour of exporters and to an extent increased transaction costs for producers.

## The Livestock Market Information System (LMIS) in Somaliland

The Livestock Marketing Information System (LMIS) was initiated in 2007 to address the constraint of high market information costs in Somaliland. LMIS collects and disseminates data from three livestock markets, namely, Hargeisa, Burao and Tog Wajaale, and at the port of Berbera. It is implemented by the Somaliland Chamber of Commerce, Industries and Agriculture, in collaboration with the Ministry of Livestock, Ministry of Commerce, Ministry of Finance, the municipalities of Hargeisa, Burao and Tog Wajaale, and with the technical support of Terra Nuova.

The purpose of the LMIS is to provide timely and current information to livestock producers and traders about the market prices of different grades of export quality livestock. The objective is to disseminate up-to-date market information to producers and traders, and historical data to local institutions, international organizations and donor agencies for efficient decision making. It is envisaged that this information will lead to two outcomes. First, it will lead to reduction of transaction costs for livestock producers, increase their efficiency and minimize uncertainty in marketing activities; and second it will minimize information asymmetry along the marketing chain by disseminating to producers information on grades and standards for export quality livestock and in turn enable them increase incomes through production of higher quality livestock that fetch premium prices in the market.

The data captured by the LMIS are collected twice a week, on Mondays and Thursdays; on sheep, goats and camels in Hargeisa and Burao markets; and cattle and camels in Tog Wajaale. In each market, the data are collected by a team of LMIS staff comprising two brokers, a price collector and a municipality clerk. The data are then sent by email or SMS to the Data Management team, based in the Chamber of Commerce headquarters in Hargeisa, for entry into a central database hosted by the chamber. They are then analysed to provide weekly summaries and disseminated to various stakeholders (producers, traders, public sector, among others) by SMS, radio broadcasting, newspapers, price brochures (distributed by livestock transporters to over 300 villages along the marketing routes), the Chamber of Commerce website, and in monthly reports. Annual and 4-monthly bulletins are also produced with statistically validated data and trend analysis. At the port, data are collected from export manifests and other records by the Berbera Port Authority (BPA). A data collector then summarizes BPA data related to shipments on a monthly basis and sends these to the data management team in Hargeisa at the end of each month.

## The LMIS data collection protocol

Data are collected at the market level as follows:

- *Prices of Export Quality Small Ruminants, Cattle and Camels:* Average market prices of export quality livestock are calculated by the two appointed brokers in each selected market on the basis of prices reported by at least 20 selected brokers engaged in export transactions. Prices are collected by the price collector at 10am in Hargeisa and Burao and 8am in Tog Wajaale. For small ruminants (sheep and goats) and camels, a single price is collected for each of the different grades while for cattle (due to greater variation) an average of price range (minimum and maximum) is collected for each grade.
- *Number of exporters active in the market:* The number of export traders (represented by the exporters or their agents) active in the market on the data collection day, is provided to the price collector by the 2 brokers in charge. This is used as a proxy for the demand for export quality animals.
- *Exchange rate:* The average exchange rate (Somaliland Shilling and Birr versus USD) applied in the market on the data collection day is provided.
- *Number of animals marketed (export and domestic quality):* The daily number of animals traded in each market for the previous week (Saturday to Friday) is provided every Saturday by the Municipality Clerk for all species. Information is extracted from tax receipt records. Different receipts are issued for domestic and export purposes.
- *Retail prices of key staple food commodities:* Average retail prices of selected staple food commodities are gathered by the price collector after consulting at least 4 retail outlets located in different parts of town and the main market where grains and flour are sold. This is considered representative since usually commodity prices show little variation within each area of town. Prices for sorghum, maize, wheat grain and wheat flour are taken for 1 'galan', a traditional unit of measurement used in the markets in Somaliland for cereals and flour equivalent to 1.2 kg. Prices refer to key food commodities purchased by livestock producers when trading livestock in the market. Therefore they refer to the most common brands available in the market at that particular time. Food commodity retail prices are used to calculate the terms of trade between export quality livestock and key food commodities to monitor the purchasing power of producers.

At the port, data collected from the Berbera Port Authority (BPA) include: vessel name, vessel capacity (in tons), number of livestock loaded (disaggregated by species), country of destination and date of shipment. This is provided for each vessel shipping livestock departing from the port of Berbera. Livestock exports through the Djibouti–Somaliland crossborder market of Lowya Caddo are also recorded.

## Purpose, objectives and research questions

Shepherd (1997) and Ferris et al. (2008) have observed that although several agricultural market information systems (AMIS) exist in developing countries, the validity, reliability and impact of data and information they generate vary and depend on a number of factors. Some of these include technology used in data collection, technical capability and training of personnel involved, protocol employed in capturing data, data management and transmission methods among other factors. Despite the Somaliland LMIS being in operation for eight year, there has been no attempt to evaluate its validity and reliability bearing. This continues to exist despite the fact that the system was put up in a post-conflict environment with nascent public and private institutions. However, preliminary analysis have shown that the LMIS has reduced transaction costs of producers and traders, and has also enabled them make better marketing decisions by reducing uncertainty (Braidotti 2008; Abdullahi et al. 2009). The purpose of this study was to provide an empirical appraisal of the validity of the Somaliland LMIS as a decision making tool by relevant stakeholders, and to offer recommendations for its improvement to enhance the provision of livestock marketing information in Somaliland. The specific objectives were:

1. Evaluate proportion of Berbera Port Free on Board (FOB) livestock volumes (cattle, sheep, goats and camels) that are captured by the LMIS in monitored markets;
2. Assess trends in market and FOB livestock volumes and delineate their relationship to both local and international drivers;
3. Assess the trends in market prices of different grades of livestock and identify determinants for such trends; and,
4. Identify the strengths and weaknesses of the system and suggest remedial measures to enhance its effectiveness as a decision making tool.

In pursuit of these objectives, the weekly LMIS data were summarized into monthly averages and subjected to descriptive and econometric analyses to decipher appropriate information. The validity of such information was appraised as stipulated by Jary and Jary (1995; p. 714); where a special meaning of validity is stated as ‘the extent to which a measure, indicator or method of a data collection possesses the quality of being sound or true as far as can be judged by the relationship between indicators and measures and the underlying concepts they are taken to measure’. Hence, in this study, the validity of information was taken as its relevance and appropriateness to explain phenomena in markets, and the strength and direction of its association with such phenomena.<sup>4</sup>

The following research questions were addressed:

5. What is the proportion of Berbera FOB offtake of cattle, sheep, goats and camels that is captured in the monitored markets?
6. To what extent can the trends in volumes of livestock traded in monitored markets be explained by market shocks and opportunities both at local and international level?
7. What type of trends exist in prices of sheep, goats, camels and cattle in monitored markets and what are the main drivers of these trends?

4. It is important to clarify that this study did not assess the impact of the LMIS in order to generate policy recommendations for improved livestock markets, but rather, the focus was on evaluating whether the information generated by the LMIS can be relied upon for decision making.

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The remaining sections of this report are organized as follows. The next section presents the research methodology used for the study. This is followed by the presentation of results. The results of descriptive and econometric analyses related to delineation of market price determinants are discussed in this section. Discussion of the major research questions of the study is also made in light of the results of descriptive and econometric analysis. Finally, the way forward and recommendations of the study are presented in the last section.

# Methodology

## Data

Weekly market level livestock traded volumes, Berbera Port FOB volumes and Lowya Caddo crossborder market volumes collected as described in the LMIS data collection protocol (subsection above) were summed to obtain monthly totals. Weekly livestock price data (for Grades I, II and III) in three markets Hargeisa, Burao and Tog Wajaale were averaged to get monthly means. Weekly export trader numbers were summed up to obtain total monthly export trader presence in each market. All the data sets spanned 2007 to 2012 (except for camel data which was for 2008–12 period).

## Identifying the components of time series data

Monthly market level livestock traded volumes, monthly Berbera Port FOB, monthly market level price data and monthly export trader market presence were graphed and the time series graphs checked for three features:

- i) Secular trend—a long-term trend which was either an increase, decrease or plateau
- ii) Periodic movements that included both seasonal and cyclic effects
- iii) Erratic variations—which were variations that remained after taking into account the secular and periodic movements.

Further analysis for determining the secular trend was done by smoothing the data using moving average. This entailed the computation of the mean of consecutive prices using order-three, which is related to the climatic seasonal calendar of Somaliland. These analyses provided an initial view of the type of trend in the price data sets, and by extension provided insight into potential influence of both seasonal and market shocks on identified trends.



## Using regression models to analyse price trend

The long-term trend of the livestock price series, assumed to approximate a straight line, was estimated as:

$$Y_{it} = a_i + b_i T \quad (2.1)$$

here

$Y_{it}$  is the price of  $i$ th livestock species, i.e. sheep, goat, camel or cattle at time  $t$ .

$a_i$  is the Y-intercept.

$b_i$  is the slope of the line, or the average change in  $Y_{it}$  for a unit change in  $t$ .

$T$  is month of each year between 2007 and 2012.

Ordinary Least Squares was used to estimate equation (2.1). Time was the independent variable while price was the dependent variable. The independent variable,  $T$  (trend/time) was coded to make the equation easier to interpret: that is,  $T$  for the first month of study in year 2007, for the second, and so on, until the close of 2012.

The cyclic, seasonal and irregular/shock variables (denoted respectively as  $C_{it}$ ,  $S_{it}$  and  $I_{it}$ ), were included in the linear model as dummy variables to delineate their impact on price movement. Similarly, an additional set of determinants, comprising supply and demand indicators were also included to expand the linear model to:

$$Y_{it} = a_i + b_i X_{it} + \alpha_i T_{it} + \beta_i C_{it} + \theta_i S_{it} + \phi_i I_{it} + \varepsilon_i \quad (2.2)$$

where

- $Y_{it}$ ,  $t$  and  $a$  are as previously defined.
- $X_{it}$  is a set of supply and demand variables influencing price of each species ( $i$ ) in time. These were the number of exporters in the market, rainfall, and location of market.
- $T_{it}$ ,  $C_{it}$ ,  $S_{it}$  and  $I_{it}$  are the Trend, Cycle, Season and Irregular factors affecting each species in each year, respectively. Seasonal variables included the four seasons of Somali ecosystem (*Jilaal*, *Gu*, *Hagaa* and *Deyr*), Cycle variables included religious festive seasons, while irregular/shock variables included trade shocks included the import bans.
- $b_i$ ,  $\alpha_i$ ,  $\beta_i$ ,  $\theta_i$  and  $\phi_i$  are the estimated coefficients for  $X_{it}$ , Trend, Cycle, Season and shock factors for each species, respectively.

In fitting equation (2.2), the monthly mean price for month for export quality sheep and goats and camels,  $Y_{it}$ , was obtained for grades I, II and III. The determinants of the trend of the nominal values<sup>5</sup> of  $Y_{it}$  were assessed through a vector autoregression approach.<sup>6</sup>

5. Absence of CPI values for Somaliland constrained the use of real prices.

6. The choice of VAR models over other was influenced by the understanding the VAR modeling does not require as much knowledge about the forces influencing a variable as do structural models with simultaneous equations: The only prior knowledge required is a list of variables which can be hypothesized to affect each other inter-temporally (Gujarati et al. 2009).

Prior to fitting the equation (2.2) into the data, the Phillips-Perron test (Phillips and Perron 1988)<sup>7</sup> was performed on, to test for non-stationarity.<sup>8</sup> Where appropriate,  $Y_{it}$  was stationarized by differencing before fitting the regression model. This means that instead of regressing  $Y_{it}$  on  $X_{it}$  on ,  $\text{DIFF}(Y_{it})$  was regressed on  $\text{DIFF}(X_{it})$ , with the regression equation transforming to:

$$Y_{it} - Y_{i(t-1)} = a_i + b_i(X_{it} - X_{i(t-1)}) \quad (2.3)$$

which is equivalent to:

$$Y_{it} = Y_{i(t-1)} + a_i + b_iX_{it} - b_iX_{i(t-1)} \quad (2.4)$$

The Schwarz' Bayesian Information Criterion (SIC/BIC/SBIC) and the Akaike Information Criterion (AIC) were used to determine how many lags ( $Y_{t-i}$ ) to use in Equation 2.4. The final estimated model thus became:

$$Y_{it} = Y_{i(t-1)} + \dots + Y_{i(t-l)} + a_i + b_iX_{it} - b_iX_{i(t-1)} - \dots - b_iX_{i(t-l)} + \alpha_iT_{it} + \beta_iC_{it} + \theta_iS_{it} + \phi_iI_{it} + \varepsilon_i \quad (2.5)$$

7. Although the Augmented Dickey-Fuller is the most commonly used test (Dickey and Fuller 1979), it at times behaves poorly, especially in the presence of serial correlation. Dickey and Fuller correct for serial correlation by including lagged differenced terms in the regression; however, the size and power of the ADF has been found to be sensitive to the number of these terms. The Phillips and Perron (P&P) test are non-parametric unit root tests and are considered more powerful as they produce consistent estimators of the variance (Rapsomanikis et al. 2003). Besides, P&P tests correct for serial correlation and heteroscedasticity in the error term and that when using these tests one does not have to specify a lag length for the test regression.

8. The standard errors of non-stationary processes do not have the same properties of stationary times series; that is, the F-tests and t-values are not reliable for hypothesis testing. For example, if one tries to estimate the relationship between two non-stationary variables, and the t-statistic indicates that the relationship between them are highly significant, this might as well be spurious. However, if you first stationarize the two variables the true relationship between them is revealed (Dahlhaus 1997).

## Results and discussion

### Proportion of exports captured by the LMIS

Traditionally, all export-quality livestock traded in secondary markets in Somaliland are exported through the ports of Berbera or Djibouti. Exports through the port of Djibouti are moved from Somaliland through the crossborder market of Lowya Caddo into Djibouti. Table 1 summarizes the number of livestock traded in the monitored markets against the export volumes through Berbera and Lowya Caddo.

Table 1. Trends in volumes of export-quality livestock traded in Hargeisa, Burao and Tog Wajaale markets versus total export volumes

Species	Year	Market			Market totals	Berbera FOB	Lowya Caddo Crossborder	Total exports	% market volume of exports passing through the markets in the study
		Hargeisa	Burao	Tog Wajaale					
Sheep and Goats	2008	456,858	644,287		1,101,145	–			
	2009	367,810	1,001,933		1,369,743	1,550,554	90,111	1,640,665	83.50
	2010	666,888	1,233,098		1,899,986	2,352,217	194,298	2,546,515	74.60
	2011	978,593	1,552,107		2,530,700	3,116,978	27,374	3,144,352	80.50
	2012	1,074,367	1,600,894		2,675,261	3,191,434	72,326	3,263,760	82.00
Cattle	2008			67,480	67,480	–			–
	2009			81,120	81,120	88,810	33,035	121,845	66.60
	2010			45,336	45,336	134,934	9399	144,333	31.40
	2011			62,519	62,519	150,905	5243	156,148	40.03
	2012			105,698	105,698	190,606	0	190,606	55.50
Camels	2009	1363	13,903	4187	19,453	19,047	15,227	34,274	56.80
	2010	2796	26,345	4469	33,610	98,188	14,830	113,018	29.70
	2011	8340	27,683	5138	41,161	106,167	4161	110,328	37.30
	2012	5718	44,159	8544	58,421	101,686	3779	105,465	55.40

Source: LMIS data (2007–12).

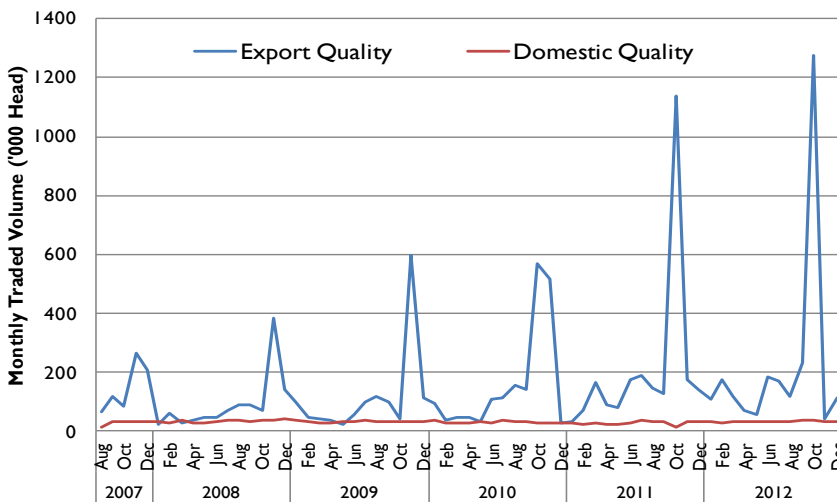
In 2012, approximately 82% of small ruminants and 55% of cattle and camels exported from Somaliland were traded through the monitored markets and thus covered by the LMIS. It is important to note that at the time of designing the LMIS, it captured data for about 84%, 67% and 57% of small ruminants, cattle and camels respectively. This implies that the LMIS has maintained a stable degree of coverage over time, except for cattle for which the proportion covered has declined to some extent. The apparent decline in the proportion of cattle captured can be attributed to the fact that only one cattle market is monitored, and that the market has been beset by several shocks in the recent past (as discussed below).

# Trends in traded volumes

## Small ruminants

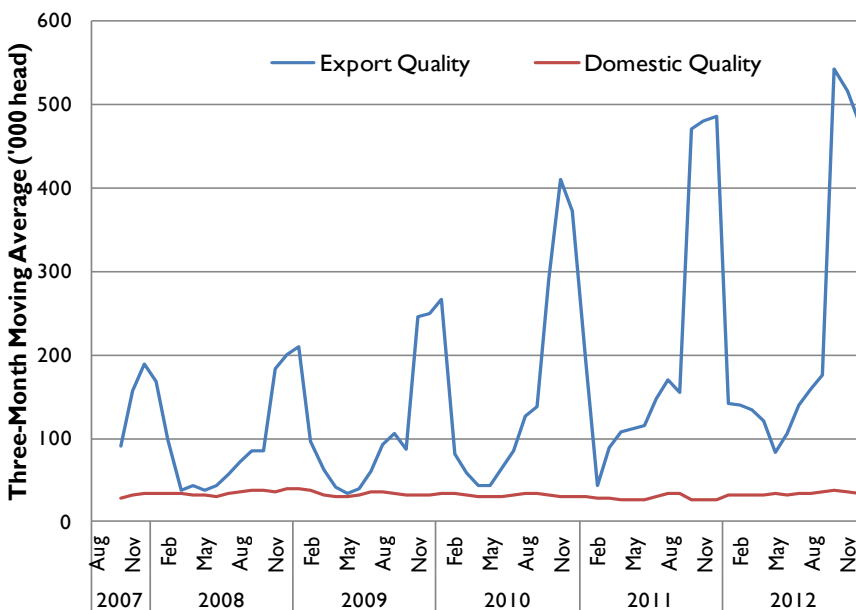
About 80% of sheep and goats exported from Somaliland are traded through Hargeisa and Burao markets (Table 1). Monthly traded volumes of export and local quality sheep and goats, and trends in these volumes in these markets, are shown in Figures 3 and 4. There is an apparent steady increase in the number of export quality small ruminants traded in these markets, ostensibly in response to increasing demand in export markets following the lifting of import trade restrictions by the major importers and easing of competition in live animal trade in the international markets. Shipment data for 2012 from the port of Berbera indicated that the major importers of sheep and goats from Somaliland were the KSA (88%), Yemen (11%) and other countries like Egypt and Oman accounting for less than 1%. Approximately 50% of the annual export quality sheep and goats traded occur during the *Hajj* season, explaining the spikes in Figure 3. Overall, traded volumes of export quality small ruminants in Hargeisa and Burao have shown an increasing trend in the last five years, while volumes of domestic quality have remained the same (Figure 4).

Figure 3. Monthly traded volumes of small ruminants in Burao and Hargeisa markets (2007–12).



Source: LMIS data (2007–12).

Figure 4. Three-month moving average of traded volumes of small ruminants in Burao and Hargeisa markets (2007–12).



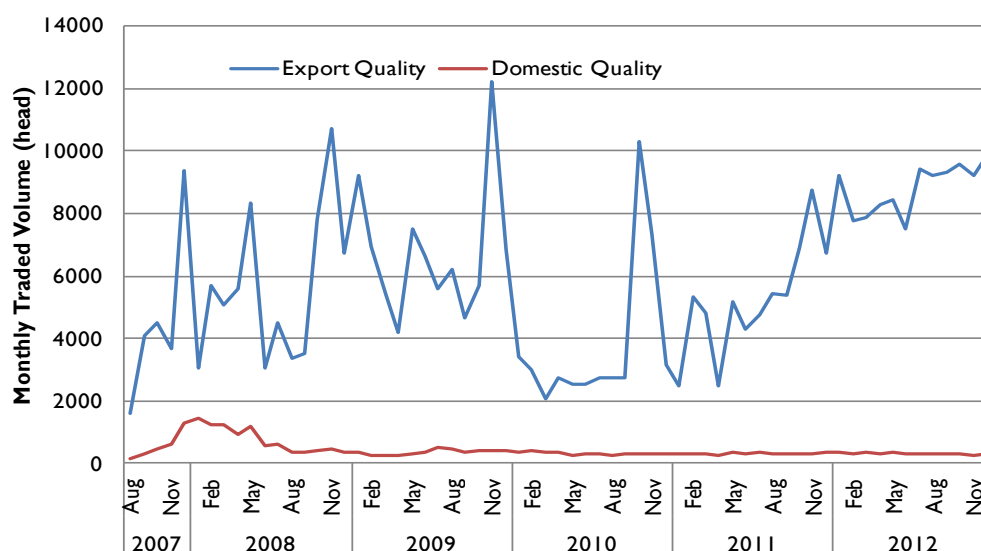
Source: LMIS data (2007–12).

The volumes traded in the *Hajj* season have been increasing in line with the increase in the number of pilgrims attending *Hajj* in KSA.<sup>9</sup> In addition, the significant increase in traded volumes after 2009 corresponds to the lifting of the import ban on Somaliland livestock by KSA and diminished competition from Australia in the Saudi market. The KSA's imports from Australia have steadily declined from 1,032,395 sheep in 2007 to 69,000 in 2012 partly driven by the enactment of ESCAS, for which KSA is yet to fully adhere to. Key destinations for Australian sheep in the Middle East are Kuwait (31%), Qatar (23%), Jordan (14%), Bahrain (11%) and Turkey (11%) (MLA 2013). It is important to note that even with the existence of ESCAS, Australia's export market is spread across a number of countries, unlike that of Somaliland.

## Cattle

The trends in cattle volumes traded in Tog Wajaale market is shown in Figure 5.

Figure 5. Monthly traded volumes of cattle in Tog Wajaale market (2007–12).



Source: LMIS data (2007–12).

An analysis of Tog Wajaale market volumes compared with Berbera and Lowya Caddo exports indicates that the market transacted about 41% and 55% of export-quality cattle in 2011 and 2012 respectively. The shipment data reveal that the key destination markets were Yemen (about 62%), Oman (34%) and KSA, UAE and Kuwait jointly at about 4%. It is important to note that unlike the small ruminant case where both Somaliland and Australia compete for markets in the Middle East, the main destinations for Australian live cattle are Indonesia (45%), China (9%), Israel (8%), Turkey (8%), Russia (6%) and Egypt and Malaysia at 5% each (MLA 2013).<sup>10</sup> It is apparent that just as for sheep and goat exports, Somaliland cattle exports rely heavily on a narrow range of markets.

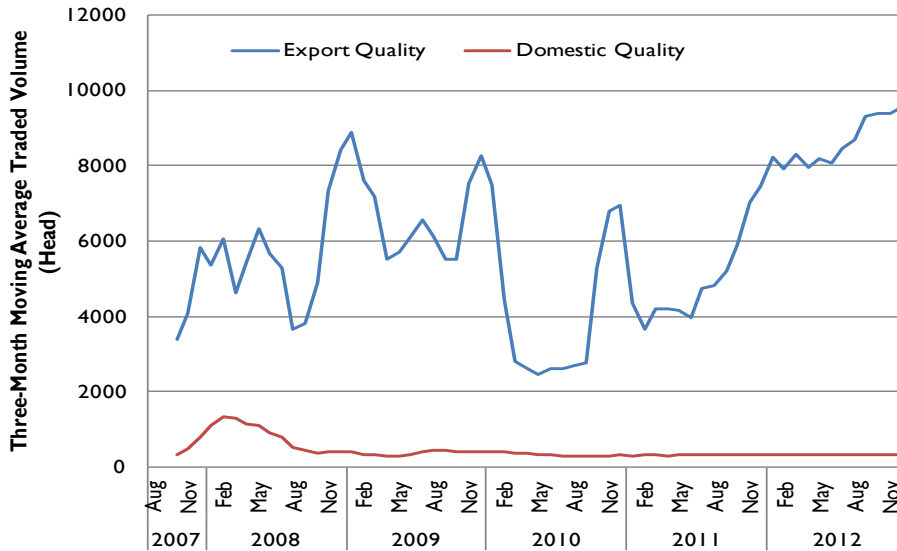
Livestock sales in Tog Wajaale seem to peak towards the end of the wet seasons (*Deyr* and *Gu*), specifically in the months of November–December and May–June (unlike sheep and goats that peak during the *Hajj* season). At this time, most cattle are usually in good body condition and likely to fetch better prices. Unlike the volumes of sheep and goats traded in Hargeisa and Burao that have shown an upward trend over the last five years, the number of cattle traded in Tog Wajaale have levelled off, albeit with observable decreases in some years (Figure 6). The plateau trend

9. The number of pilgrims to hajj have increased from 2.5 million in 2009 to about 3.16 million in 2012 (<https://en.wikipedia.org/wiki/Hajj>)

10. In 2012, Somaliland exported about 191,000 head of cattle, compared to about 625,000 exported from Australia (SLCCIA 2013). As for sheep and goats, exports of cattle from Australia have been constrained by tighter export animal welfare requirements, with live cattle exports falling from decade highs of about 990,000 in 2008 (MLA 2013).

in traded volumes may be attributed to the relatively small size of the major export market (Yemen) compared to the bigger market for small ruminants. On the other hand, the decreases in exported volumes observed in 2008, 2010 and 2011 can be attributed to both local and international market shocks.

Figure 6. Three-month moving average of traded volumes of cattle in Tog Wajaale market (2007–12).



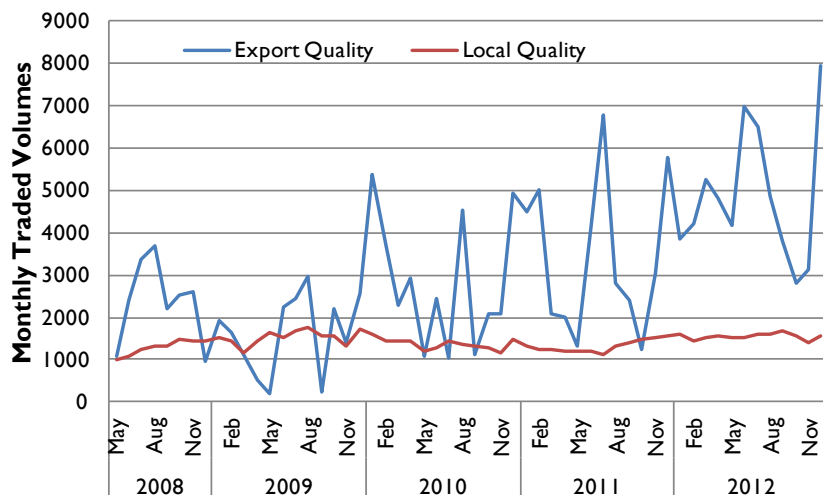
Source: LMIS data (2007–12).

On the local front, flooding that occurred in Tog-Wajaale and adjacent districts during the *Gu* season (April–June) in both 2008 and 2010 contributed to the reduction in traded volumes in the *Gu* season. The floods were associated with loss of livestock as well as limited access to markets (Lemma and Sugulle 2011). The floods also led to destruction of homes and displacement of communities; the impacts of the 2010 floods were more severe than those of 2008. On the other hand, in the terminal market in Yemen, the events of the Arab Spring in the first half of 2011 disrupted trade and this in turn translated into lower than normal sales in Tog Wajaale during the same period. However, the numbers recovered quickly in the second half of 2011.

### (c) Camels

Figure 7 presents trends in traded volumes of camels in the three study markets. Inspection of 2012 shipment data reveals that the export markets for Somaliland camels are the KSA (70%), Egypt (28%) and Oman and Yemen (2%). The recent political instability in Egypt starting with their Arab Spring of 2012 led to a significant reduction of its trade share to below 10%, all of which has been taken up by KSA. The trade in export quality camels seems to reach modest peaks during dry seasons, namely *Jilaal* (January–March) and *Hagaa* (July–September), in contrast to cattle that are largely traded during the wet seasons. Volumes of local camels traded have remained stagnant in the last five years, reflecting a similar trends as that observed for cattle.

Figure 7. Monthly traded volumes of camels in Burao, Hargeisa and Tog Wajaale markets (2008–12).



Source: LMIS data (2007–12).

Figure 8. Three-month moving average of camels traded in Burao, Hargeisa and Tog Wajaale markets (2008–12).



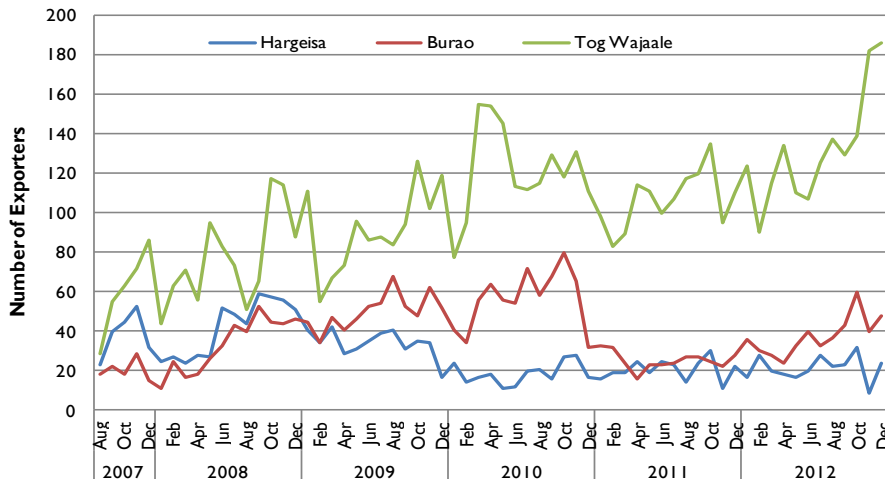
Source: LMIS data (2007–12).

Like in the case of small ruminants, trade of camels in Burao and Hargeisa shows an increasing trend with periodic seasonal effects over the last 5 years (Figure 8).

### Trend in export trader participation

Figure 9 shows the trend in monthly totals of the number of export traders active in the study markets. There were more traders in Tog Wajaale which specializes in cattle, than in Burao and Hargeisa markets that handle small ruminants and camels. The large export trader participation in Tog Wajaale could be due to the easier of entry into cattle export trade than the sheep and goat or camel trade.

Figure 9. Monthly totals of export traders active in the study markets on Mondays and Thursdays (2007–12).



Source: LMIS data (2007–12).

In this instance, whereas cattle are mainly exported to Yemen, small ruminants and camels are predominantly exported to KSA which has more stringent health certification requirements than Yemen. Small ruminants and camels are thus quarantined for a period of up to 21 days prior to export putting extra costs on exporters. This does not apply to cattle exports to Yemen. Besides, the proximity of Yemen to Somaliland does not require investment in large sea vessels as is the case for the distant KSA. Cattle are loaded on smaller vessels (*dhow*s) for a one-day voyage to Yemeni ports across the Gulf of Eden, an arrangement that is disrupted only by the monsoon season.<sup>11</sup> The apparent high costs faced by exporters of small ruminants and camels to KSA act as a structural characteristic of a market that protects the market power of incumbents deterring entry (see Church and Ware 1999). The larger traders have thus continued to consolidate their market share, which can be observed through the declining number of traders in Hargeisa and Burao markets.

## Price-trend analysis

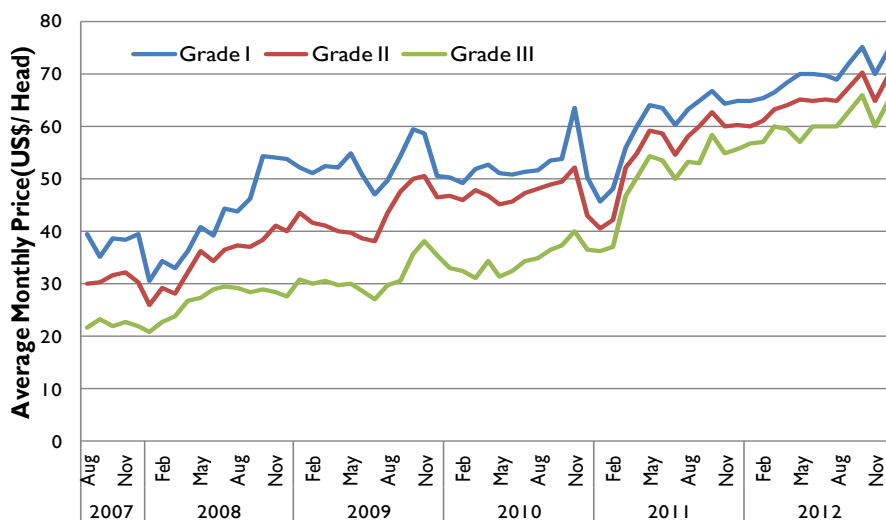
### (a) Small ruminants

Figures 10 to 13 show the trend in the average monthly prices and the corresponding three-month moving average prices of different grades of small ruminants in Burao and Hargeisa markets respectively. The prices show a general long-term increasing trend for all the three grades, with a cyclic upward pattern occurring every *haji* season. The magnitude of the annual price movements is summarized in Table 2.

11. There seems to be fewer exports during the monsoon season (March and April) as participation of smaller exporters is curtailed by high sea tides that limit sailing of smaller vessels across the Red Sea to Yemen.

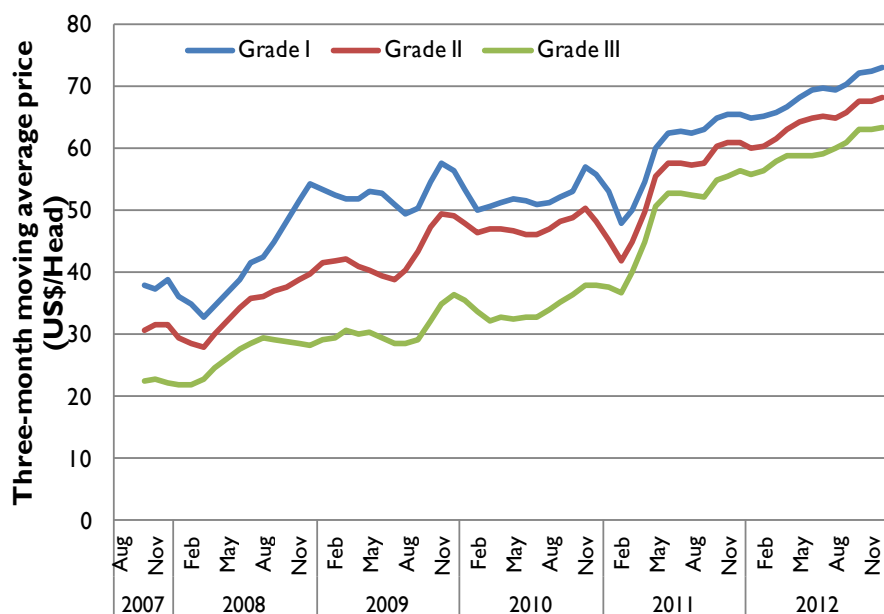


Figure 10. Mean monthly prices of small ruminants in Burao market (2007–12).



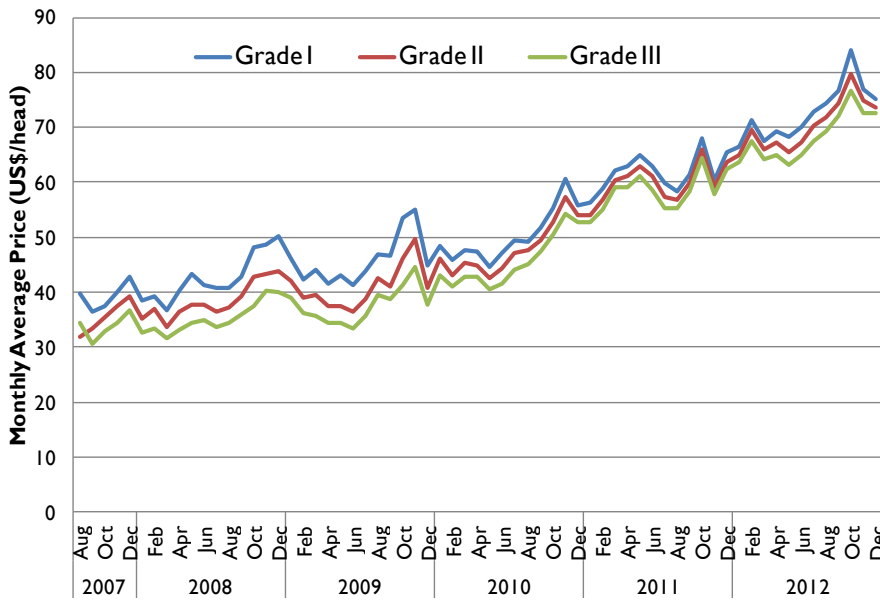
Source: LMIS data (2007–12).

Figure 11. Three-month moving average prices of small ruminants in Burao market, (2007–12).



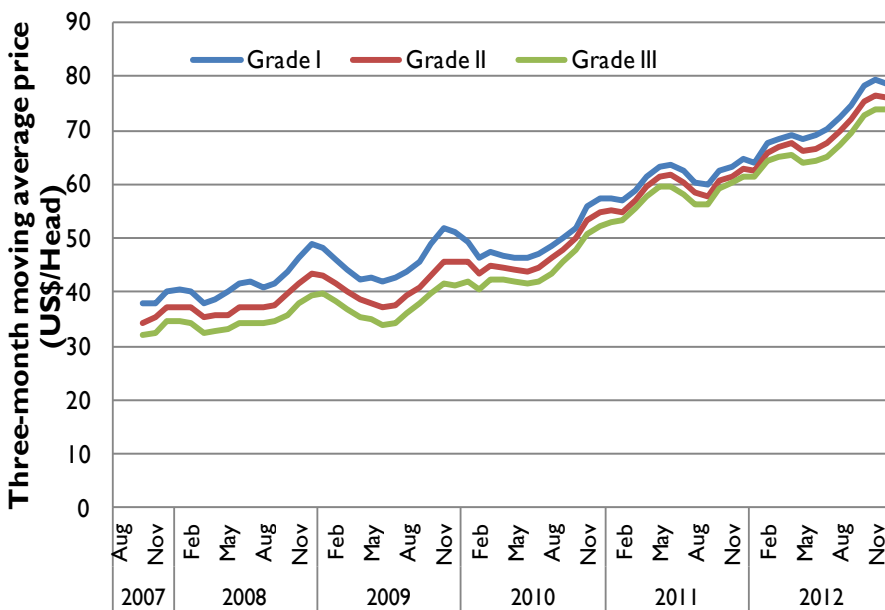
Source: LMIS data (2007–12).

Figure 12. Mean monthly prices of small ruminants in Hargeisa market (2007–12).



Source: LMIS data (2007–12).

Figure 13. Three-month moving average prices of small ruminants in Hargeisa market (2007–12).



Source: LMIS data (2007–12).

The mean annual price increases have ranged from about 3 to 16% for grade I, to 17% for grade II and 10 to 26% for grade III (Table 2).

Table 2. Changes in prices of sheep and goats in Burao and Hargeisa markets (2008–12)

Year	Grade I			Grade II			Grade III		
	Mean price (USD/hd)	Std. Dev.	Annual change (%)	Mean price (USD/hd)	Std. Dev.	Annual Change (%)	Mean price (USD/hd)	Std. Dev.	Annual Change (%)
2008	41.7	5.1		36.0	3.2		30.6	2.1	
2009	49.4	2.7	15.58	41.9	3.3	14.1	34.1	2.4	10.3
2010	51.0	2.9	3.14	47.2	2.4	11.3	39.5	2.9	13.5
2011	60.3	4.2	15.52	56.8	4.6	16.8	53.3	4.8	25.9
2012	70.4	3.9	14.26	66.9	3.5	15.2	63.5	3.3	16.1

Source: LMIS data (2007–12).

The increase in local market prices may partly be attributed to drivers both within the local and international markets. On the international front, increasing demand for small ruminants has contributed to increased prices in most producer countries (CDSI 2012). For example, as in Somaliland where local market prices have risen cumulatively by up to 41% between 2008 and 2012, FOB prices for Australian live sheep have showed a similar marked increase. Australia's FOB prices for the shipment of live sheep to Kuwait increased by 85% from about USD 60 per head in 2007 to USD 111 in 2012 while the FOB for shipments to KSA increased by 77% from USD 70 to USD 124 during the same period (MLA 2013).

At the local level, the construction of quarantine facilities in Berbera port and the subsequent removal of exclusive export rights of a single exporter partly contributed to price increases. Between 2007 and 2008, livestock were shipped through Djibouti and exported by one trader. This window had a largely monopolistic export sector with high marketing costs. In 2009, the first quarantine facility in Berbera started to operate, reducing some costs, but the sector remained monopolistic until the end of 2010 when the second quarantine station was opened. This led to an opening up of the export sector to other traders, and increased competition, which may have partly contributed to the observed trend of increasing prices in Somaliland's markets.

## (b) Cattle

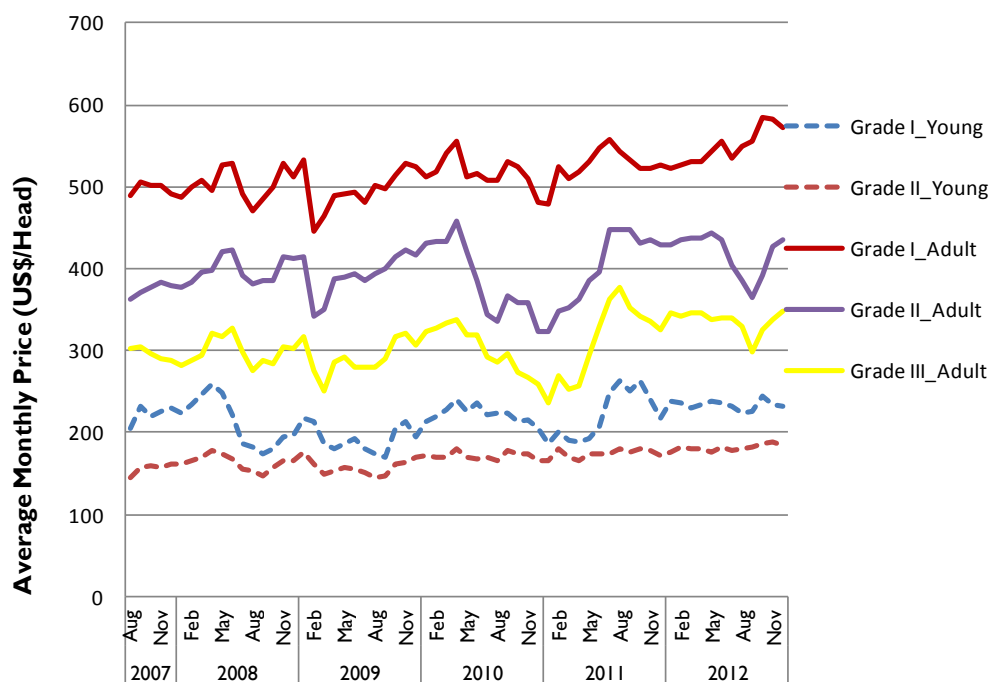
Unlike the more marked increasing trend in prices of sheep and goats, cattle prices showed mixed trends, with annual growth ranging between –1% and 4% between 2008 and 2012 for grade I, –1 to 6% for grade II, and –2 to 9% for grade III (Table 3; Figures 14 and 15). Overall, the cumulative price increase was about 9% for grade I cattle, 6% for grade II, and 13% for grade III.

Table 3. Changes in cattle prices in Tog Wajaale market (2008–12)

Year	Grade I			Grade II			Grade III		
	Mean price (USD/hd)	Std. Deviation	Annual Change(%)	Mean price (USD/hd)	Std. Dev	Annual Change (%)	Mean price (USD/hd)	Std. Dev	Annual Change (%)
2008	500.7	11.5		394.6	11.7		297.1	12.8	
2009	496.6	17.2	–0.8	391.8	17.8	–0.7	290.3	14.3	–2.3
2010	520.8	9.8	4.7	394.5	39.6	0.7	306.6	22.5	5.3
2011	523.3	19.0	0.5	392.4	45.3	–0.5	305.3	46.0	–0.4
2012	544.4	18.9	3.9	418.4	21.2	6.2	334.8	9.9	8.8

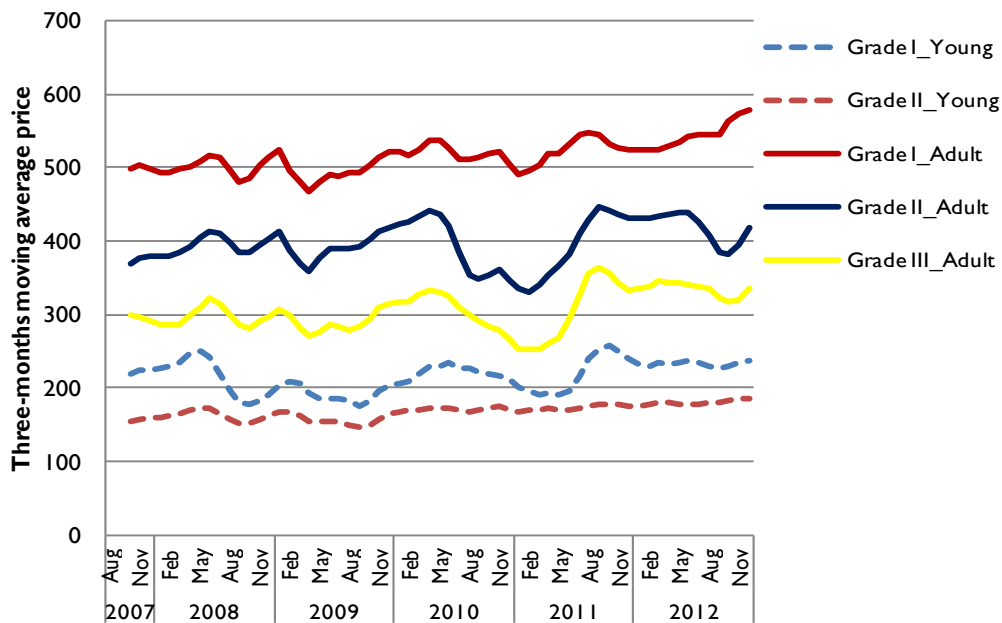
Source: LMIS data (2007–12).

Figure 14. Mean monthly cattle prices in Tog Wajaale market (2007–12).



Source: LMIS data (2007–12).

Figure 15. Three-month moving average cattle prices in Tog Wajaale market (2007–12).



Source: LMIS data (2007–12).

### (c) Camels

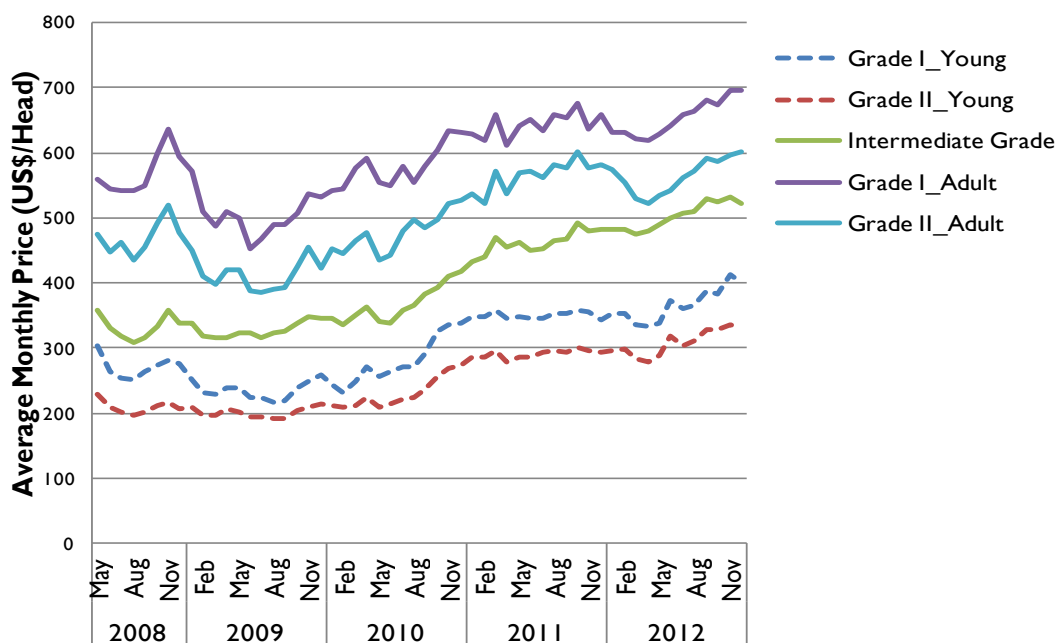
Like in the case of sheep and goat prices, camel prices showed a sustained year-on-year increase following the lifting of the import ban by KSA in September 2009 (Table 4; Figures 16 and 17). The price increase was larger for young stock compared to that for adults, due to the higher demand for the young stock in Saudi Arabia compared to that for older animals. Similarly, as in the case of sheep and goats, there was a more marked increase in the price of camels between 2010 and 2011 following the cessation of sole export rights that had been conferred on a single exporter in Somaliland.

Table 4. Changes in camel prices in Burao, Hargeisa and Tog Wajaale markets (2009–12)

Year	Adult Grade I			Adult Grade II			Young Grade I			Young Grade II		
	Mean price (USD/hd)	Std. dev.	Annual change (%)	Mean price (USD/hd)	Std. dev.	Annual change (%)	Mean price (USD/hd)	Std. dev.	Annual change (%)	Mean price (USD/hd)	Std. dev.	Annual change (%)
2009	498.7	25.0		412.6	24.4		233.3	11.6		199.6	6.4	
2010	578.4	31.9	16.0	469.1	30.0	13.7	272.5	31.3	16.8	225.2	19.6	12.9
2011	644.1	18.7	11.4	561.3	25.0	19.6	350.3	5.8	28.6	289.8	8.0	28.7
2012	653.6	28.6	1.5	562.4	25.7	0.2	361.6	24.1	3.2	305.9	18.7	5.6

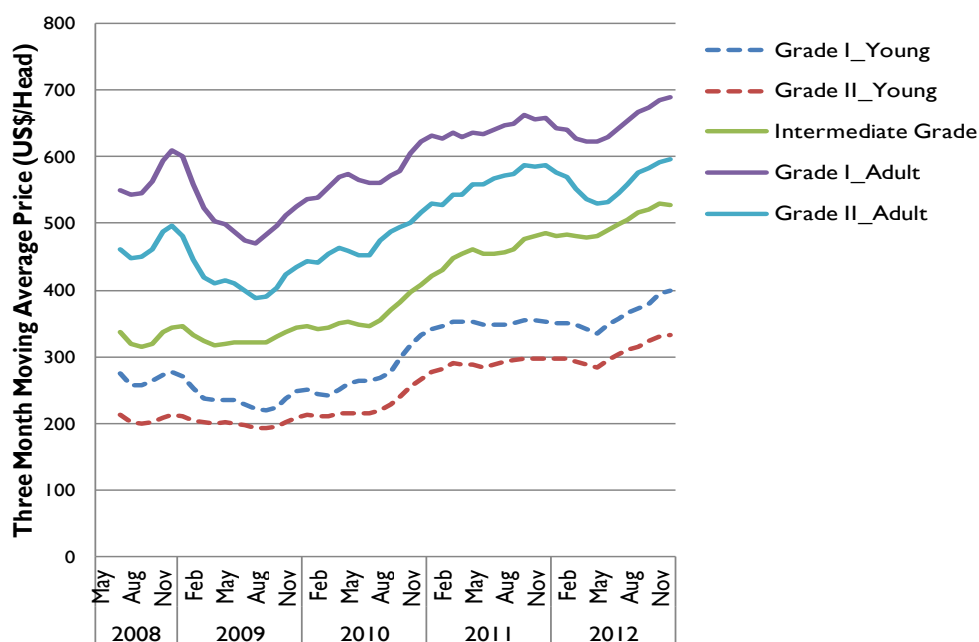
Source: LMIS data (2007–12)

Figure 16. Mean monthly camel prices in Burao, Hargeisa and Tog Wajaale markets (2008–12).



Source: LMIS data (2007–12).

Figure 17. Three-month moving average camel prices in Burao, Hargeisa and Tog Wajaale markets (2008–12).



Source: LMIS data (2007–12).

## Trend in proportion of livestock exported to different countries

The annual trends in the proportion of livestock exported to different destinations is summarized in Table 5. Saudi Arabia is the principal market for sheep, goats and camels, while cattle are exported mainly to Yemen and Oman. The importance of Egypt as a destination for camels is declining partly driven by increasing importance of Saudi Arabia which prefers younger stock (Egypt prefers older stock) and more importantly, proximity to Somaliland. The limited exports to U.A.E, Bahrain and Kuwait (which are dominated by exports from Australia) may be attributed to lack of trading partners in those terminal markets that are known to Somaliland's exporters, and to physical distances.

Table 5. Trends in the proportion of livestock exported to different destinations

Livestock Species	Year	Total number exported	Proportion (%) shipped to key importing countries						
			Saudi Arabia	Yemen	Egypt	Oman	U.A.E	Bahrain	Kuwait
Sheep and goats	2009	1,640,665	60%*	36%	4%	<1%	<1%	–	–
	2010	2,546,515	82%	17%	<1%	<1%	–	–	–
	2011	3,144,352	88%	11%	–	<1%	<1%	–	–
	2012	3,263,760	88%	11%	–	<1%	<1%	<1%	–
Camels	2009	34,274	13%*	10%	77%	<1%	–	–	–
	2010	113,018	70%	3%	27%	<1%	–	–	–
	2011	110,328	73%	<1%	26%	<1%	–	–	–
	2012	105,465	90%	–	9%	–	–	–	–
Cattle	2009	121,845	11%*	86%	–	3%	–	1%	–
	2010	144,333	9%	78%	1%	12%	–	–	–
	2011	156,148	2%	62%	–	34%	<1%	–	–
	2012	190,606	<1%	57%	–	42%	<1%	–	<1%

Source: LMIS data (2007–12).

\*Exports prior to September transited through Djibouti.

## Determinants of price trends

The results of the Phillips-Perron test on the monthly mean price for export quality sheep and goats and camels are given in Table 6. In all the series, the null hypothesis of absence of unit roots was rejected. This implies that the price series for small ruminants, camels and cattle in the three study markets are non-stationary.

Table 6. Results of Phillips-Peron test for non-stationarity of monthly mean price of export quality livestock in Somaliland

Variable	t- statistic	1% critical value	5% critical value	10% critical value
Hargeisa sheep and goats	-3.168	-4.119	-3.486	-3.172
Burao sheep and goats	-3.242	-4.119	-3.486	-3.172
Hargeisa camels	-2.632	-4.139	-3.495	-3.177
Burao camels	-3.036	-4.139	-3.495	-3.177
Tog Wajaale camel	-2.632	-4.139	-3.495	-3.177
Tog Wajaale cattle	-2.466	-3.560	-2.919	-2.594

Source: LMIS data (2007–12).

The series were therefore stationarized by differencing before fitting the regression model from Equation 2.5. Two lags were found appropriate for all price series based on the results of the Schwarz' Bayesian Information Criterion (SIC/BIC/SBIC) (Schwarz 1978; Kass and Raftery 1995). The variables used as envisaged in Equation (2.5) are given in Table 7.

## Small ruminants and camel prices

It is important to note that prices of small ruminants and camels exhibited similar increasing trends between 2009 and 2012. The regression results with robust standard errors for determining the trends in small ruminants and camel prices are given in Table 8.<sup>12</sup> The small ruminant price trend model had a good fit ( $F = 321.04$ ;  $p = 0.00$ ) and explained about 95% of the variation in the price, compared to 90% in the camel one ( $F = 126.54$ ;  $p = 0.00$ ). Prices of both small ruminants and camels exhibited an upward secular trend, but seasonal and shock factors seem to have had more effect on market prices of small ruminants than of camels.

Table 7. Variables used in the regression analysis

Variable	Name	Type	Description
Dependent	Price(t)	Continuous	Month $t$ price for export quality (i) sheep and goats; (ii) cattle; and, (iii) camels derived by obtaining the mean for grades I, II, and III
Independent	RFE	Continuous	Rainfall Estimates (RFE) of accumulated rainfall generated using METEOSAT 5 satellite data, Global Telecommunication System (GTS) rain gauge reports, model analyses of wind and relative humidity, and orography.
	Trend	Continuous	Time coded to make interpretation of the equation easier: $t = 1$ for month 1, $t = 2$ for month 2 etc.
	Exporters	Count	Number of export traders present in the market during the month
	Market	Dummy	Dummy for markets being monitored including: Hargeisa and Burao for sheep and goats; Hargeisa, Burao and Tog Wajaale for camels
	Ban	Dummy	Dummy for import ban: No import ban = 0 vs. Import ban in place = 1
	Season	Dummy	Dummy for season including: Jilaal, Gu, Hagua and Deyr
	Price(t-1)	Continuous	Month $t-1$ price for export quality (i) sheep and goats and (ii) camels
	Price(t-2)	Continuous	Month $t-2$ price for export quality (i) sheep and goats and (ii) camels

12. Individual market level models were estimated in the first instance and tested for serial correlation and multicollinearity using the Durbin-Watson statistic and Variance Inflation Factors, before estimating the joint model.

As shown in Table 8, camel prices were significantly higher in Tog Wajaale compared to Burao, by about USD 19. Tog Wajaale camel price did not differ from those in Hargeisa in a significant way. The prices of camels were also significantly higher in the *Deyr* and *Hagaa* by about USD 22 and USD 14 respectively when compared to the wet season of *Gu*. *Jilaal* prices were not significantly different from those observed in the *Gu* season.

The average monthly prices for grades I, II and III of sheep and goats was significantly higher in Hargeisa compared to Burao by an average of USD 4 per head. Although *Deyr* season prices tended to be higher than those in *Gu*, while those of *Jilaal* and *Hagaa* were lower, these differences were not statistically significant. It was however anticipated that *Deyr* prices would be significantly higher as this season corresponds with the Muslim *Hajj* pilgrimage period which is associated with a high demand for sheep.

The import ban by KSA seems had a negative and significant effect on the prices of small ruminants, but not for camels. Similarly, camel prices seem not to be significantly influenced by the number of export traders available in the market.

Table 8. Trends and market price determinants for small ruminants and camels in Somaliland

Variable	Sheep and goat prices model		Camel prices model	
	Coefficient	t-value	Coefficient	t-value
Trend	0.420 (0.076)	5.51***	0.627 (0.311)	2.01**
RFE	-0.014(0.012)	-1.15	0.138 (0.134)	1.02
Exporters	0.054 (0.021)	2.47***	0.101 (0.139)	0.73
Market_Burao	-3.852 (0.979)	-3.94***	-19.06 (9.650)	-1.98**
Market_Hargeisa	(dropped)	-	4.174 (12.600)	0.33
Market_TWajaale	-	-	(dropped)	
Import Ban	-2.522 (0.974)	-2.59***	7.328 (8.813)	0.83
Jilaal_Season	-0.551 (0.772)	-0.71	3.652 (7.413)	0.49
Gu_Season	(dropped)		(dropped)	
Hagaa_Season	-0.838 (0.680)	-1.24	14.361 (6.391)	2.25**
Deyr_Season	1.012 (0.790)	1.29	21.975 (7.656)	2.87***
Price(t-1)	0.403 (0.127)	3.16***	0.677 (0.102)	6.60***
Price(t-2)	0.028 (0.061)	0.064	0.134 (0.088)	1.52*
Constant	17.15 (3.500)	4.90***	72.228 (29.142)	2.48***
	n = 128; F(10, 117) = 321.29; Prob.>F = 000 R-squared = 0.950		n = 162; F(11, 150) = 126.54; Prob.>F = 000 R-squared = 0.903	

Source: LMIS data (2007–12).

Key: Coefficients \*\*\*p<0.01; \*\*p<0.05; \*p<0.10 (figures in parentheses are robust standard errors).

## Cattle prices

Results of estimates for trends in cattle prices and determinants of market prices are given in Table 9. Unlike the sheep and goat and camel prices that showed an upward secular trend between 2007 and 2012, cattle prices remained stable over the same period, reflecting similar findings as shown in Figures 14 and 15.



Table 9. Trends and market price determinants for cattle in Somaliland

Variable	Coefficient	t-value
Trend	0.827 (0.159)	0.52
RFE	-0.024 (0.138)	-0.18
Exporters	0.176 (0.114)	1.56*
Jilaal_Season	(dropped)	
Gu_Season	4.615 (6.764)	0.68
Hagaa_Season	-3.560 (6.655)	-0.53
Deyr_Season	-2.13 (6.686)	-0.33
Price(t-1)	0.839 (0.166)	5.05***
Price(t-2)	0.168 (0.131)	1.29
Constant	114.44 (41.864)	2.73***

n = 63; F(8, 54) = 34.86;  
Prob.>F = 0.000; R-squared = 0.711

Source: LMIS data (2007–12).

Key: Coefficients \*\*\*p<0.01; \*\*p<0.05; \*p<0.10 (figures in parentheses are robust standard errors).

## Delineating the genesis of secular and irregular trends in livestock prices

The information generated from the LMIS data indicates that prices and traded volumes of small ruminants, camels and cattle exhibited different trend patterns between 2007 and 2012. While prices of small ruminants and camels had an upward secular trend, those of cattle stayed the same over the study period. In addition, trade and prices of small ruminants appear to have been affected more by seasonal and shocks than have those variables for camels and cattle. Further interpretation of these results requires a consideration of events on international and domestic markets over the relevant period.

In 1998, the occurrence of Rift Valley Fever, affecting human and animal health in parts of northern Kenya and southern Somalia, led to the first round of livestock import bans imposed by Gulf States. The ban was lifted in 1999 by all countries. However, a later round of outbreaks that spread into parts of Yemen and Saudi Arabia that resulted in the deaths of about 66 people in Saudi Arabia and 121 in Yemen caused all the Middle East countries to impose a ban on livestock imports from the Horn of Africa in 2000 (CDC 2000a, b).

By 2002, most Gulf States, with the exception of Saudi Arabia, had restored livestock imports from the Horn of Africa, including Somaliland. However, Saudi Arabia accounted for about 95% of the market for small ruminants and camels imports from Somaliland at that time. The continued Saudi Arabian ban led to the emergence of Djibouti port (in 2003/04), where export livestock holding (quarantine) facilities were built. The ban was lifted on animals from these facilities and Djibouti became an important regional exit port for sheep, goats and camels heading to Saudi Arabia. Therefore, small ruminants and camel traders from Somaliland were subjected to longer export routes (via Djibouti) leading to reduced prices and incomes, and increased size of the livestock herd (Fewsnet 2010).

While most small ruminants were transported to Djibouti by sea, camels were transported on foot, facing much lower transportation costs. This perhaps explains why the impact of the import ban was more pronounced for small ruminant trade and prices than those for camels. During the same period, cattle trade continued unabated to Yemen, which is generally be known to exhibit a lower demand and purchasing power compared to the other Gulf States.<sup>13</sup>

13. According to the United Nations (2011) report, Yemen is one of the poorest and least developed countries in the Arab World, with a formal 35% employment rate and weak economy compared to most countries in the Middle-East.

Pursuant to the wishes of Somaliland's government to reinstate trade opportunities with Saudi Arabia, it continued to pursue approaches aimed at re-establishing the Saudi market. This constituted the signing of a trade agreement with a specific Saudi trader. That trader was to invest in the construction of modern livestock quarantine facilities in Berbera (similar to those in Djibouti) in exchange for exclusive rights to export Somaliland livestock to Saudi Arabia. Construction of the facility began in 2007. The agreement resulted in traders receiving a price of USD 34 per head of small ruminant in 2007 (which was USD 7 higher than the average unit price over the previous five years, i.e. 2002–07). However, this was perceived as a monopsonistic market arrangement, and it lasted until 2010, following the completion and commissioning of the second quarantine facility in Berbera.

The lifting of an import ban on all livestock and livestock products from the Horn of Africa by the KSA in September 2009 resulted in an unprecedented increase in export volumes from Somaliland between 2009 and 2011 for small ruminants, cattle and camels. The new quarantine facilities also reduced the transaction costs in small ruminant and camel exports, translating to higher prices. It is not clear what caused increased exports of cattle, but available evidence indicates that the emergence of Oman as an alternative market could be one of the drivers. Apparently, the increased cattle exports have not translated to significant increase in prices, a phenomenon that requires further investigation. On the other hand, the fact that small ruminants and camels are exported to a larger economy with a higher per capita income partly explains the upward secular trend in small ruminant and camel prices.

## Are there differences in determinants of price trend for different grades within a species?

Realizing that there were significant differences in prices of different grades of livestock within each species, and that estimation of a joint model for each species could have confounded some useful differences between grades, equation 2.5 was estimated for every grade for each species. It was observed that models estimated with mean monthly prices of individual grades as the dependent variable matched those where the dependent variable was the mean of the averages for the different grades for all livestock species, viz., small ruminants, cattle and camels. However, the differences in the factors affecting prices for different grades of small ruminants are important to highlight (Table 10).

Table 10. Determinants of price trend for different grades of small ruminants in Somaliland

Variable	Grade I		Grade II		Grade III	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Trend	0.356 (0.059)	6.05***	0.279 (0.059)	4.76***	0.165 (0.051)	3.25***
RFE	0.002 (0.014)	0.15	-0.006 (0.010)	-0.059	-0.013 (0.011)	-1.18
Exporters	0.089 (0.029)	3.19***	0.055 (0.020)	2.77***	0.010 (0.020)	0.51
Market_Burao	-2.20 (0.969)	-2.27**	-2.48 (0.760)	-3.26***	-2.244 (0.887)	-2.53***
Market_Hargeisa	dropped		dropped		dropped	
Import Ban	-4.22 (1.304)	-3.24***	-2.17 (0.960)	-2.27**	-0.565 (0.840)	-0.67
Jilaal_Season	dropped		dropped		dropped	
Gu_Season	0.528 (0.815)	0.65	0.027 (0.712)	0.04	0.265 (0.678)	0.39
Hagaa_Season	-0.203 (0.781)	-0.26	-0.117 (0.715)	-0.16	0.176 (0.678)	0.26
Deyr_Season	1.880 (0.782) *	2.4*	0.570 (0.782)	0.73	0.763 (0.737)	1.04
Price(t-1)	0.499 (0.114)	4.37***	0.662 (0.102)	6.49***	0.666 (0.093)	7.16***
Price(t-2)	0.0004 (0.110)	00	-0.035 (0.101)	-0.35	0.127 (0.102)	1.24
Constant	16.221 (2.859)	5.67***	10.53 (2.687)	3.92***	5.311 (2.389)	2.22**
	n = 126; F(10, 115) = 198.73; Prob.>F = 0.000; R-squared = 0.931		n = 126; F(10, 115) = 318.50; Prob.>F = 0.000; R-squared = 0.956		n = 126; F(10, 115) = 509.54; Prob.>F = 0.000; R-squared = 0.970	

Source: LMIS data (2007–12).

Key: Coefficients \*\*\*p<0.01; \*\*p<0.05; \*p<0.10 (figures in parentheses are robust standard errors).

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First, even though the models estimated from the prices for the three grades of small ruminants showed an increasing secular trend (as was the case in the joint model), the rate of change tended to increase as one moved from grade I to III. It is difficult to speculate on the reason behind this result without information on the grading and pricing practices of Somaliland small ruminants in the Saudi end-market.

Another interesting result is that the trend in prices for grades I and II were influenced by the number of export traders present in the market, but not for grade III, with the effect on grade I being much stronger. For example, an additional exporter in the market is likely to put pressure on the price of a unit of grade I small ruminant to increase by USD 0.09 and that of grade II by USD 0.06. One may thus conclude that there is more competition among exporters for grades I and II relative to grade III. Alternatively, there may be more supply of grade III, compared to grades I and II, to the extent that increasing the number of buyers does not exert more pressure on their prices. As currently designed, the LMIS does not provide data on the number or proportion of grades I, II, III traded. This will be an important area to address in any future upgrading of the system.

It is apparent that the import ban that was imposed by the KSA government had a significant negative effect on prices of grades I and II, and not for grade III. The effect on grade I was similarly larger than on grade II. It is known that body condition of livestock is one of the key traits taken into consideration in grading of livestock (Mugunieri et al. 2012). Similarly, the body condition score can deteriorate rapidly during trucking, trekking or shipment of livestock, and also during quarantine, if appropriate welfare practices are not adhered to. During the import ban, livestock were shipped through longer routes, which increased the likelihood of deterioration of body condition. This may partly be the reason why livestock of superior grades (and by extension superior body condition) received discounted prices during the Saudi import ban.

## Conclusions and recommendations

Establishing market information services is seen as a means of increasing efficiency of marketing systems and promoting improved price formation (Shepherd 1997; Svensson and Yanagizawa 2009). Most basic market information products just like in the case of the LMIS in Somaliland include market news (e.g. information on prices, quantities), market analytical reports (e.g. reports that analyse factors that cause changes in market conditions and their effects on stakeholders), and business reports (e.g. providing information that can help stakeholders identify new opportunities).

Most researchers (i.e. see Tschirley et al. 1995) have clearly stated that market information as a public good should provide correct and reliable information on market conditions. This follows the realization that although many agricultural market information operate in developing countries, the quality of information they generate depends on a number of factor that range from technical capability of personnel involved to technology applied in data collection, transmission and management (Shephard 1997). Towards this end, Mawazo et al. (2014) observes that organizations setting up such information systems need to undertake studies to determine not only the reliability of information generated, but also the real impacts of such information.

Whereas validity is explored by examining how information generated fits well with market phenomena, impact evaluation is undertaken to determine the market efficiency effects, the reductions in transaction costs and the improved market integration that has undoubtedly occurred. This study was restricted to evaluating the validity of the LMIS established in 2007 in Somaliland.

An empirical appraisal of the LMIS in Somaliland was undertaken to determine the appropriateness of utilizing information it generate in decision making tool by various stakeholders (livestock producers, traders, public sector and development partners). Besides, the weaknesses of the system were identified and recommendations made for its improvement to enhance quality of information delivered. The validity of the LMIS was evaluated within the realms of the definition provided by Jary and Jary (1995), viz. 'the extent to which a measure, indicator or method of a data collection possesses the quality of being sound or true as far as can be judged by the relationship between indicators and measures and the underlying concepts they are taken to measure'. Therefore, information generated by the LMIS was adjudged valid by the extent to which it appropriately explained phenomena in markets (opportunities and shocks), and, by the directness and strength of its association with such phenomena. This was done by addressing the following three questions:

*(i) What is the proportion of Berbera Free on Board offtake of cattle, sheep, goats and camels is captured in the monitored markets?*

This question was investigated with the understanding that the validity of the information generated would be enhanced if most of the exported livestock were traded through the markets monitored by the LMIS. This was particularly important because where as a scientifically sound protocol is used in sampling subjects within the study markets, the same did not apply to the selection of the monitored markets, whose selection was based on local expert knowledge. Towards this end, the higher the proportion of the target population (all exported livestock) that is covered by the monitored markets, the more reliable would be the information generated by the system.

This study established that in 2012, the LMIS provided livestock-quality-segregated price data on about 84%, 56% and 55% of sheep and goats, cattle and camels, exported from Somaliland compared to 84%, 67% and 57% respectively at the inception of system in 2007. Although the proportion of exported sheep and goats captured by the system remains fairly high, the proportion for cattle and camels captured appears low, and declining for cattle. This can be attributed to a number of factors that may need to be redressed to improve coverage for camels and cattle.

First, in monitoring of camels prices and volumes, the system was designed during the period of Saudi import ban, and three markets, Hargeisa, Burao and Tog Wajaale were selected for data collection. With the lifting of the ban and rapid expansion of export volumes, it is most likely that additional secondary markets as defined by Negassa et al. (2008) with a direct linkage to the port of exit may have emerged. It is therefore recommended that a survey be conducted to review the key secondary market trading in camels in view of the lifting of the export ban. Any key market not currently covered should be evaluated<sup>14</sup> for inclusion in the information system.

Two, in cattle, only one market, Tog Wajaale, is monitored. The floods experienced in the market in 2008, and again in 2010 appear to have contributed to the reduction of the proportion of total exports handled by this market. Although the market appears to be regaining its prominence, the reliability of the LMIS in availing cattle price data is compromised by reliance on a single market. It is therefore recommended that additional markets be identified and evaluated for inclusion in the generation of cattle related data so as to increase the systems reliability in the face of shocks.

*(ii) To what extent can the trends in volumes of livestock traded in monitored markets be explained by market shocks and opportunities both at local and international level?*

The market level data from the LMIS show an increasing trend in traded volumes for all species of livestock. The increase was found to be in tandem with events taking place both in the local and international markets. At the local front, the setting up of a livestock certification system and investments in infrastructure supporting animal welfare contributed to growth in traded volumes. Whereas the certification system led to the lifting of the import ban by the Saudi government, investments in marketing infrastructure eased the marketing process by reducing livestock handling time and overall marketing costs.

At the international level, reduced competition from Australia, a major live animal exporter, has provided Somaliland with an opportunity to expand its share of exports. The enactment of tighter animal welfare regulations in the end-markets by the Australian government under the Exporter Supply Chain Assurance Scheme (ESCAS) has led to a significant reduction in exports of live animals from Australia, easing competition in international markets in favour of other exporters like Somaliland.

The reliance by Somaliland on a few markets (Saudi Arabia for sheep, goats and camels) and Yemen and Oman for cattle continues to make the live-animal export trade sector vulnerable to events in these markets. As more countries in the Middle and Far East become ESCAS-compliant, competition from Australia will re-emerge, constraining export volumes from Somaliland in its key export markets. There is need for the Somaliland government to engage in efforts to diversify its export market and product portfolio so as to stabilize the livestock export trade sector.

*(iii) What types of trends exist in prices of sheep, goats and camels in monitored markets and what are the main drivers of these trends?*

This study found that prices of sheep, goats and camels revealed an upward secular trend between 2007 and 2012. However, while external shocks (like the Saudi import ban) appeared to have had more effect on market prices of sheep and goats than of camels; seasonal factors were more decipherable in camel than small ruminant prices. Similar upward trend in prices of small ruminants has been reported by other live animal exporters, for example FOB Australia for prices for live sheep destined to Kuwait, increased by about 85% between 2007 and 2012, while those to Saudi Arabia increased by 77% during the same period.

<sup>14</sup>The evaluation should cover cost, accessibility and security.

Unlike the sheep and goat and camel prices that have shown an upward secular trend, cattle prices stayed the same over the study period. The same trend was reflected in prices of FOB prices of live cattle from Australia that increased by about 4% from USD 660 in 2007 to USD 690 in 2012. The trend in prices of cattle was explained only by events on the local market, key among them being the number of exporters available in the market.

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