

Guide 2: How to interpret time series data

This guide explains how to collate and graph time-series market price data in order to get an idea how markets have historically functioned for particular commodities. Secondary data is usually available at government regional or district offices, and very often extension officers at community level may have records of prices they've been recording in weekly markets. This information is useful in giving you an immediate impression of how prices fluctuate across seasons, and from one year to another, and provides a good starting point for asking key informants more about price trends. They will tell you why the prices of cereals drop after harvest, why the price of milk goes down after the rains start; about the fluctuation of local production and supply from outside when local production runs out; and about how prices for imported goods respond to demand.

The **basic steps** in the process are listed below:

(1) Finding and collating the data. In most district offices price data is collected on a regular basis. Even if there is no formal early warning system it is likely that such data is being collected, even if it is not locally analysed. The data might be collected by the ministry of agriculture, the bureau of trade, or perhaps the statistics office (if there is one), or it might be collected by national or international NGOs as part of their programme monitoring system. This information is important in order to find out about how markets function – particularly when analysed in conjunction with production statistics for each year – which is another critical set of information that you should collect from the district offices (See [Interview Form 2](#) in [Annex A of Chapter 3](#)). The data is used to cross-reference the information gained from villagers and community leaders in the field, and it is also useful for highlighting seasonality of prices for items sold and items purchased, and the year on year variation.

(2) Data entry: A suggested format for inputting the data into the computer is provided in [Chapter 3, Annex B, Form 2F](#).

(3) Making graphs: It is virtually impossible to detect trends looking at pages of data, no matter how clearly the data are presented. Graphing the data makes the trends and patterns clear. [Form 2F](#) is an excel file which has been set up to automatically graph time series data input into the relevant cells. It has sufficient space for 5 years of data for 12 commodities. For those who are not proficient in using spreadsheets to graph time series data the file provides a useful starting point, and the Help function should be used to develop spreadsheet skills. The time period can be extended and more data can be added. Graph paper can also be used if people are not familiar with excel or they lack a computer.

(4) Interpreting time series price data.

The graphs used in this section are taken from time series data from Somalia (collected by the FSAU Somalia).

When looking at graphs of time series data we are basically looking for trends and patterns that tell us something about livelihoods. For instance, if we see that prices of labour have a downward trend whereas prices for cereal have an upward trend then we can infer that labourers might be finding it difficult to secure adequate food with their labour income. If we note however at the same time that the prices of goats are generally increasing, and we know that labourers usually sell 2 or 3 goats every year, then we might be wrong to jump to the conclusion that they will be facing a food deficit on the basis of the wage data alone. Some things will be very clear and need

little explanation, whereas some patterns might be difficult to interpret – and warrant further enquiry.

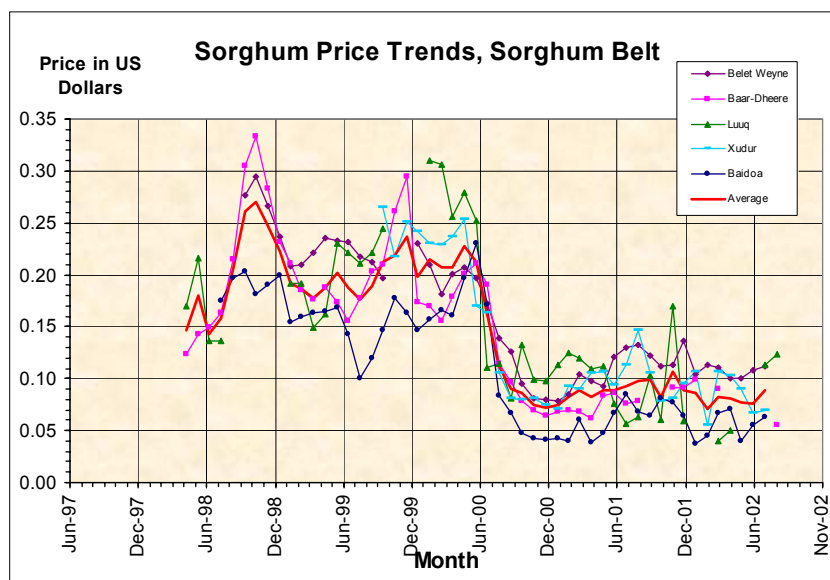
Deciding what information to present and how to present it is a skill learned over time. The basic rule is to first be clear about the message you want to convey and second choose the information you need to make that point. Presenting lots of graphs without interpretation is meaningless and creates confusion for all. Some possible choices and options you might be faced with include:

- Graphing the data using the local currency or using a convertible currency
- Comparing price trend for one commodity in different markets
- Comparing price trends for several commodities in one market
- Presenting the market prices or presenting terms of trade (a ratio which represents the change in the ratio of the amount of cereal that can be purchased with one unit of an important commodity sold to get income (e.g. labour, milk, cash crops, live animals).
- Grouping together commodities representing key income sources for particular wealth groups
- Grouping together commodities which represent different categories of expenditure (e.g. basic needs; inputs; food/non-food items)
- Items sold for local consumption vs items sold for export
- Commodities produced and purchased locally vs items imported

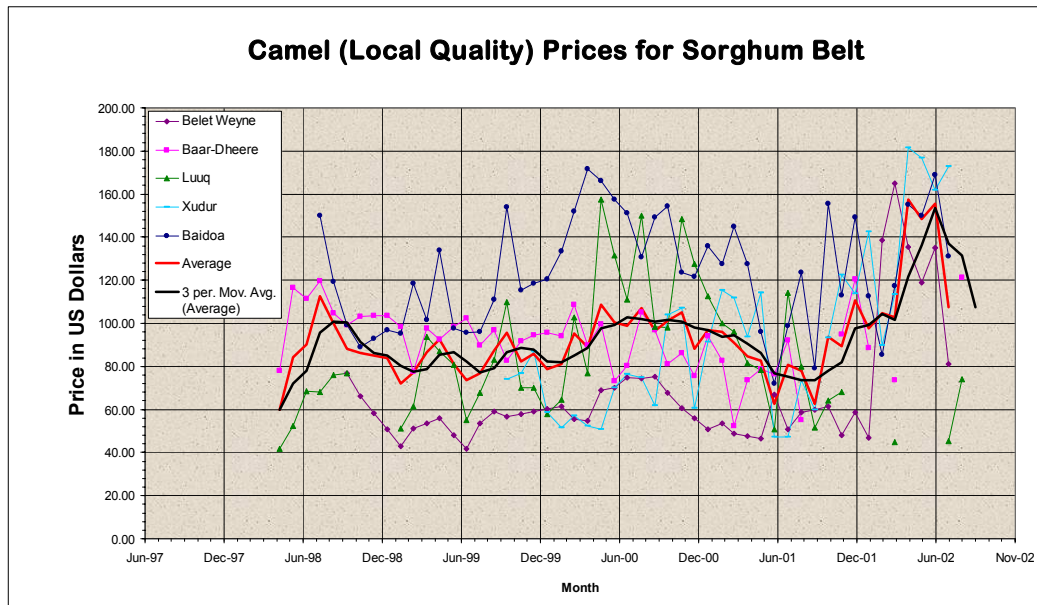
So, what do our graphs tells us about livelihoods?

Apparent trends:

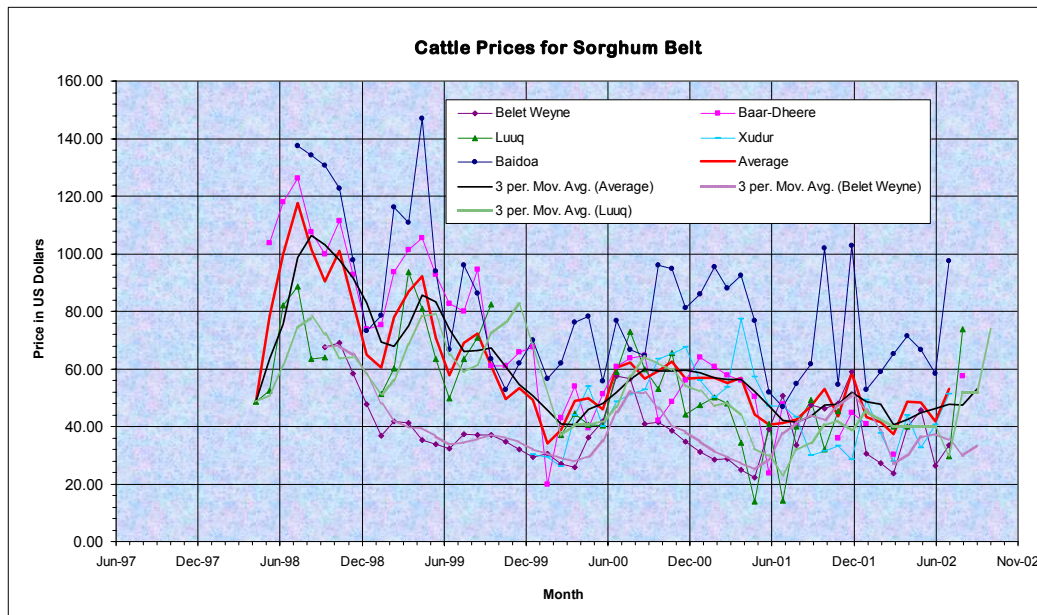
- Sudden drop in sorghum price, around June 2000 – to about half its previous price, and the low price continued for two years until the last price check in July 2002. What caused this sudden drop and why has the price not recovered? Was there a period of instability which affected the flow of grain within the region and outside?



- The price for camels appears to have gone up towards the end of the monitored period. What caused this? Was it a change in marketing opportunities?



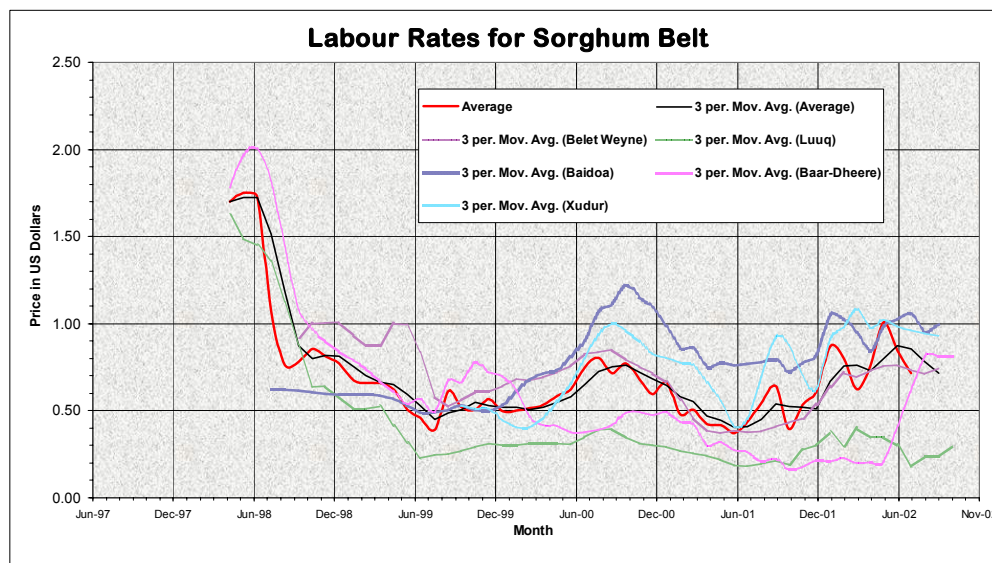
- Cattle prices deteriorated over the monitored period, reaching about around one-third the peak price at the start of the monitored period. Was this a problem with the quality of the cattle (e.g. a decline in body condition due to problems accessing grazing?) or was it a marketing problem?



- Labour rates were extremely high at the start of the monitored period. This is clearly not an error because the high initial price is reflected in all monitored markets. What led to the sudden drop in the price in daily labour?

We can also note interesting observations when we look at all the graphs together:

- There is clearly seasonal fluctuation in prices of all commodities



- There is clearly considerable difference in prices between the different markets in the same region. If we look at the difference in cattle prices when cattle are traded in Belet Weyne and Baidoa markets - \$80 per cow on average in Baidoa compared to \$40 on average in Belet Weyne. What are the constraints to cattle marketing in Belet Weyne that owners will sell their animals at low prices?

Additional points about interpreting historical price trends:

- Each commodity trend line for each market tells us a story about what was happening there. Looking at trends in market prices is a useful entry point for finding out about the trend and patterns in (particularly) productivity, marketing and the security situation.
- Market price trend analysis is made stronger by comparing information from households and other key informants. These sources of information explain what the graphs appear to be telling us or they may offer logical explanations for the price trends which hadn't occurred to us. For instance, in the sorghum belt, from where this data sets has been taken, farmers in the Bay-Bakool agropastoral zone depend on sorghum production, goats, and to a lesser extent cattle sales. The apparent increase in camel prices would not have helped our farmers in this zone then but the reduction in cattle prices would have reduced incomes. We only realize the importance of one price trend relative to another when we know how dependent different kinds of households are on that income source or commodity sold in the shops.
- Another point to recognize is that these farmers depend heavily on sorghum production. The fall in sorghum prices is disastrous for most of the larger farmers (the middle and better-off) as they have poor markets for their surplus. It is only the "net consumers" of sorghum (the very poor) who benefit from low sorghum prices.

Remember

Interpretation of trends in market prices is usually very difficult to do in an office in the capital city. Price trend analysis is easiest if the graphs are discussed with people who live in the area. They will be able to offer logical explanations for the trends you can't interpret, or which you might interpret wrongly. Moreover, knowledge of the

household economy is critical in order to interpret what the trends mean for the local population. Clearly whether one is a net producer or a net consumer of a particular item determines whether you are negatively or positively affected by a price increase. Moreover, the relative dependency of a household on a commodity influences the opportunities people have of avoiding trading at excessively high or low prices.

Projecting prices in the future

As explained in [Chapter 4 \(Outcome Analysis\)](#) of the **Practitioners' Guide**, it is necessary generate price predictions in order to create effective outcome scenarios. The household deficits vary according to the price predicted for the staple food and income sources in the current year. For planning purposes, it is necessary to estimate these scenarios before the outcome actually occurs. The easiest way of doing this is to graph historical trend data (taking the harvest price as 100%) and chart each successive month as the deviation from 100%. See the Malawi graph below for an example of this.

