

# Terms of Trade and Food Security Analysis

## FEWS NET Markets Guidance, No 5

October 2009

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### INTRODUCTION

Assessing and monitoring the value of assets against what they can purchase in the market is an important component of food security analysis. On its own, the price of an asset is just a number. For example, the price of a goat is currently worth 15,000 CFAF at the Abalak market in Niger. Someone unfamiliar with Abalak would wonder: is this expensive for the local population? Only when an asset is viewed in relation to other goods, services or household income, does it become possible to assess the asset's exchange value, and it is the exchange value of the asset that affects the purchasing power and food access of the owner of the asset.

For households that rely on markets for a significant portion of their food needs, the exchange value is of critical importance, and provides an indicator of purchasing power<sup>1</sup>. The terms of trade (TOT) is a measure of

the relative value of one commodity to another (or the inverse of their relative prices) and thus a measure of the exchange value of the good or service to be traded.

The value of goods and assets, such as livestock, and the amount of cash or income that a household has, change over time and often follow a regular seasonal pattern. Wages, incomes, livestock and other commodity prices all tend to fluctuate over the season. Prices for a particular commodity will be highest when demand is high and supply is low; likewise, prices will be at their lowest point when demand is low and supply is high. The timing of harvests, degree of active marketing, and consumption of a particular commodity in a particular area influence the seasonal variability of prices.

Most poor or food insecure households maintain very few stores of wealth or savings at any given time. The value of exchange for those limited assets is a key determinant of their ability to acquire their basic needs. Therefore, their ability to exchange their product, assets or labor and the relative value of that exchange is a critical indicator of their food security and thus typically an important component of food security analysis.

The objective of this guidance is to provide a systematic and complete overview of terms of trade and its application to food security analysis and reporting. Instead of looking at price levels and trends of discrete commodities, the terms of trade allows analysts to look at these prices and trends in relation to the power of exchange. More specifically, the guidance will:

1. Describe the different types of TOT that can be used in food security monitoring and reporting and the utility of each.
2. Provide examples of TOT analysis that can be used in reporting.
3. Describe how to calculate TOT.
4. Discuss the limitations of using TOT as a purchasing power indicator.

<sup>1</sup> Purchasing power is a measurement of the relative value of money in terms of the quality and quantity of goods and services it can buy. It represents the ability of a household to acquire goods and services based on its access to money or other forms of wealth.

5. Describe best practices in presenting TOT in reporting, both in text and through graphs.

References to other market guidance materials are made throughout the guidance. These other guidance materials go into considerably greater depth on a particular topic.

For a quick reference or review of market and trade terms used in this guidance, see the glossary at the end of this document or refer to [→FEWS NET Markets and Trade Glossary](#).<sup>2</sup>

## TERMS OF TRADE AND FOOD SECURITY MONITORING

Terms of trade is the rate at which one good or service can be exchanged for another and is typically expressed as a ratio or relative prices. It is an indicator used to measure the purchasing power of households. Food security analysts often use it to assess current food access or make projections about future purchasing power. Looking separately at wages, income, assets and prices of staple foods is important, but making comparisons provides a more specific meaning and is thus a more useful measure for food security and early warning. TOT can help answer questions such as:

- How are wage rates moving in relation to food prices at the market?
- Will households be able to purchase more or less over time?
- How is the value of livestock changing relative to cereals and will pastoralists face improved or deteriorated access to food?
- Are coffee producers becoming relatively more or less wealthy relative to their own consumption needs (food costs)?

Calculating terms of trade is simple, but selecting the two components of the ratio to use for comparison can be a challenge – which asset, what quality or specification of the asset (e.g. age and sex of animal), which staple food? Quantifying or measuring the selected components can be a challenge – the condition of animals, variation in wage rates. Knowing what foods the target households prefer and what assets they typically possess and accumulate is integral to defining the most appropriate TOT indicator. Do households in a particular area rely on the sale of livestock to purchase food? What are the foods that households purchase at the market? Knowledge of household livelihoods and consumption patterns is imperative.

Because livelihood opportunities and consumption preferences vary, the appropriate definition of the terms of trade (i.e., ratio) will differ across areas and populations. The four basic types of terms of trade are:

1. Food crop to food crop
2. Livestock to cereal
3. Wage to cereal
4. Cash crop to cereal

In each section below, the utility and limitations of each of these four types of TOT indicators are explained. Examples from FEWS NET work are provided to help illustrate how to go through the process of identifying the corresponding ratio parts and making meaningful food security observations.

### Food crop to food crop terms of trade

The importance of food crop to food crop comparative prices in food security monitoring almost goes without saying; the price of food is a determinant of how much food households can buy. In many areas, households consume more than one cereal or food commodity and typically more than one commodity will be found in the market, depending on what producers and traders have to offer at a particular time of year. In this case, an analyst would look at the relative prices of two or more commodities to gauge which commodity is relatively less expensive and thus inclined to be preferred by most

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<sup>2</sup> Available online at <http://www.fews.net/docs/Publications/FEWS NET MT Glossary June 2009.pdf>.

consumers who aim to keep their food expenditures down<sup>3</sup>. The cereal TOT measure helps to compare pairs of commodities and determine if and how households would likely substitute one commodity for another. Sometimes this is referred to as a “barter terms of trade:” how much of one commodity would need to be exchanged for another given the current market prices of the two commodities.

Additionally, producers and farmers derive their income from the sale of commodities and cereals. For these households, the producer price would be indicative of their income, while consumer price would represent the cost of the food they purchase for consumption. This ratio would give an indication of the purchasing power of farming households selling one cereal or commodity and purchasing another for consumption, which is slightly different from the ratio of consumer prices previously described.

There are a number of reasons this definition of TOT is very relevant and useful in food security analysis.

- For households that tend to substitute between different cereals due to scarcity or in times for hardship, the terms of trade can provide an indication of how households are likely changing consumption or their purchases given relative market prices. If there are particular foods that households tend to substitute towards in a time of deficit or hardship, monitoring terms of trade (relative prices) between these commodities can be a useful early warning indicator. Understanding consumption preferences and elasticity of demand<sup>4</sup> is critical to using and understanding this type of terms of trade indicator. *For more information on elasticities, →Bonnard “Markets Assessment and Analysis.”<sup>5</sup>*
- For households that produce one type of commodity and purchase another, analysts can also look at producer prices of one commodity (asset) versus the retail price of another used for consumption by the same household. This will provide an indication of the purchasing power of farmers. It is important to correctly match the commodity for sale with the producer price and the purchased commodity (preferred staple food) with the price at the relevant level.

Terms of trade with cereal prices can provide analysts with good information on how consumer prices are moving in relation to each other and provide insight on the purchasing power of producing households. Despite the utility in food security analysis, there are **limitations** to its use that should be understood before using in reporting.

- Some households substitute among more than two commodities. Terms of trade ratios are limited to looking at prices of two commodities, making the ratio an incomplete comparison and indicator of purchasing power for these households. An analyst can work around this problem by looking at several different terms of trade ratios for comparison (see Guatemala example) or creating a food price index with a basket of relevant commodities for comparison.
- Relatively lower prices for one commodity compared to another does not necessarily mean households will switch consumption towards the lower priced commodity. Households normally have a set of preferences expressed by the elasticity of demand that determines how relative prices will affect consumption patterns. For this reason, the terms of trade indicator does not absolutely dictate what households are or will be consuming; more information

<sup>3</sup> Of course consumer preferences will influence how willing consumers are to substitute one commodity for another. While preferences tend to be relatively constant over time, there can be seasonal variation reflecting cultural norms (i.e., certain cereals and animal products are typically served on specific holidays.)

<sup>4</sup> Elasticity of demand – is the percentage change in quantity demanded relative to the percentage change in the price. When the change in quantity demanded is related to the price of the commodity, we use the term “own price elasticity” of demand. When the change in quantity demanded is related to the price another commodity, we use the term “cross price elasticity” of demand.

<sup>5</sup> *Bonnard, Patricia (2008) “Markets Assessment and Analysis.” In FAO Food Security Information for Action Distance Learning Module. [www.foodsec.org/DL](http://www.foodsec.org/DL). The learner’s notes are available at [www.fews.net](http://www.fews.net) or [http://www.fews.net/docs/Publications/Market Assessment and Analysis Training Module.pdf](http://www.fews.net/docs/Publications/Market%20Assessment%20and%20Analysis%20Training%20Module.pdf)*

on preferences and demand elasticities are necessary to make more educated assumptions about current consumption and food security conditions.

- Setting the TOT definition and thus using producer prices of one commodity compared to the retail prices of a different commodity, does not capture the producer's real choice among a number of commodities. Many producers grow more than one crop, and purchase a variety of foods and other goods. Therefore, an analysis based on one TOT indicator is to some extent incomplete and could be potentially misleading. Again, creating multiple ratios or a food price index can be useful to incorporate more and different commodity price information relevant to purchasing power.

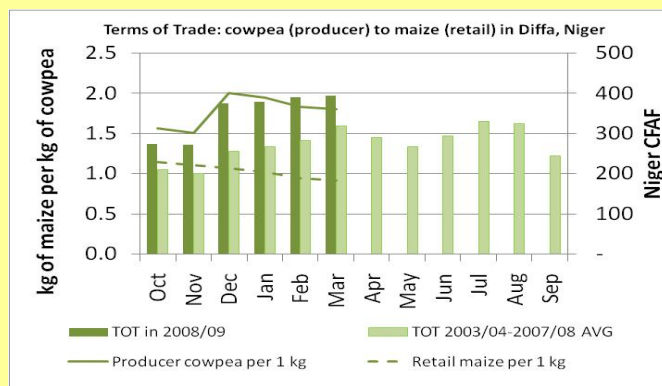
Choosing which commodities to include in the ratio requires an understanding of consumer preferences. How do households make choices about which commodities to consume? Do preferences change over the seasons? Livelihoods information is generally a useful resource for identifying the commodities to compare. This is true both for consumers (choosing between two commodities purchased at the market) and producers (what is sold and what is purchased). Production and market flow maps can also help identify major areas of a country where a commodity is produced in surplus.

#### Example: Niger – Cereal to grain TOT - cowpea/niebe producers and maize consumers

In the northern region of Niger, niebe (cowpea) is produced and sold as a crop mostly for sale. This year, there was an unusually good harvest of niebe, and the government sought to take advantage of this by initiating a buying program wherein farmers could sell their crop directly to the government for a guaranteed price immediately after harvest (between December and February). Farmers benefited from the government program by having a consistent buyer, but a food security analyst would be interested to understand how this affected purchasing power and food security, especially given that food prices are still high for other crops. Did the government policy truly improve the purchasing power of niebe producing households in Niger?

In order to answer this question, an analyst needs to determine the staple and preferred food of niebe producers. For this analysis, the farming areas around Diffa will be the focus. Using livelihoods information, one can determine that maize is the main staple in the area. If households are selling niebe and purchasing maize, this is the terms of trade ratio that should be used.

Producers normally sell directly to traders here, but for this analysis, retail niebe prices at the Diffa market will be used. Generally, using producer prices is preferred, but producer prices are not collected for this area, meaning an analyst will need to find a reasonable substitute, but note the limitations of doing so. Traders, though, confirm that these two prices (e.g., niebe producer prices in Diffa and niebe retail prices at Diffa market) are generally about the same and follow the same trends.



A graph of the terms of trade trends for niebe producers in the Diffa area shows how many kilograms of maize can be purchased with one kilogram of niebe, meaning the trend indicates the changing amount of maize a producer can purchase by selling the same amount of niebe each month.

Notice that between the months when the government niebe buying program was in place (December-February) the terms of trade between niebe and maize steadily increased in favor of niebe producers. Niebe producers were able to purchase more maize with their returns from niebe than ever before (especially compared to the five year

average). The analyst also noted that these producers were stocking maize for future months in order to hedge against potentially higher prices later in the season.

Source: Niger Food Security Update April 2009, FEWS NET

### Livestock to cereal terms of trade

Livestock assets and sales are important to many households, particularly pastoralists. Not only is livestock used for meat and milk production, but also for skins, fertilizer, fuel, transportation, and capital accumulation. Many poor households keep livestock as a form of “savings” to sell when other forms of income are insufficient to meet basic needs. Other households or population groups, like pastoralists, might use livestock production as their main source of income and livelihood year round, no matter the market conditions.

When most households sell their livestock, it is in order to acquire cash for purchases of basic necessities at the market. Most of these necessities are staple foods, particularly for poorer households. For this reason, it is necessary to determine which staple foods livestock producing households are purchasing in order to correctly define the terms of trade ratio relevant to the households of focus. Commodities can vary across one group; pastoralists in one part of the country may be largely purchasing maize while pastoralists in another part of the country have ready access to maize and sorghum. Livelihoods information is generally useful for making these determinations.

The livestock to cereal ratio gives an indication of the purchasing power of households selling livestock and purchasing staple foods. A livestock producer may sell directly to consumers or to a trader who will then market the product. For this reason, livestock prices should be those that producers/pastoralists receive when selling their animals or animal products (e.g. producer prices, which could be different from or the same as retail prices depending on to whom they sell their animals or products).

“Livestock” is a very broad category encompassing pigs, goats, sheep, cattle, etc. Within any species of animal, there are also different types of animals – breeds, ages, sexes, etc. It is important to choose and monitor prices that best reflect the target population group. Monitoring data should be collected and reported with both the type of animal being monitored (e.g., goat, sheep, cattle) and the size/unit of sale (e.g., medium size goat or 30kg goat). Again, price information should be acquired in the same unit and form in which producers are making sales (or consumers making purchases, if this is the population group of focus). If livestock producers normally sell their product by volume, then collect prices by volume (e.g., 30 kg sheep). If producers normally sell by relative size of the animal (e.g., medium goat), then collect and report prices accordingly. Consistently measuring and monitoring animals can be extremely difficult given all this classification and variation. In most cases, it will be impossible to employ best practices. However, it is critical to aim for best practices and recognize and account for the potentially large degree of error in the resultant measurement of TOT and thus interpretation of the indicators’ behavior and implications for food security.

Livestock to cereal terms of trade is very important to monitor for food security and early warning analysis for a number of reasons.

- Livestock sales are often a signal of distress (households tapping into their savings). Households may try to sell their livestock holdings when cereal and other prices are high in order to improve their cash flow and subsequently food access. When many households begin to sell stock, the livestock market supply increases relative to demand, and livestock prices fall, all else being equal.
- Pastoralist communities are often the first to exhibit signs of hardship in drought conditions. At the onset of drought, pastures brown, meaning less food for livestock, contributing to deteriorating livestock body conditions. With less robust animals, livestock producers often are forced to lower prices at the market. Demand might also decrease given less desirable livestock (poor quality), further depressing prices.

Despite its usefulness as a purchasing power indicator and pervasiveness in food security monitoring, there are several **limitations** to livestock to cereal terms of trade that make the indicator hard to accurately interpret.

- Livestock is not a homogeneous commodity. There are typically more than one type of livestock being raised and sold such as sheep and cattle. An analyst needs to decide which type of livestock should be used as the indicator

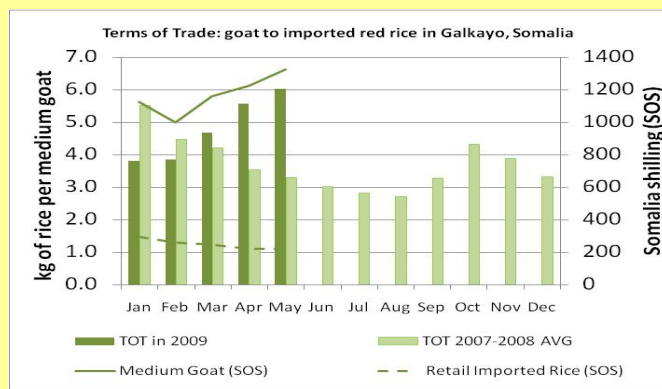
for all livestock holders. Within one species, there are animals of different ages, sexes, sizes, body conditions, etc. Which one should be used and how will an animal be assessed or measured consistently for monitoring purposes?

- Higher or rising prices of livestock and thus high terms of trade ratios (greater quantities of cereal exchange per animal) do not necessarily translate to improved conditions for livestock owners or pastoralists. Prices are often high when livestock owners are not selling animals. If there is a specific time of year when poor and vulnerable livestock producers are selling, this is the most important time of year to monitor.
- Many factors can result in the variability of livestock prices (e.g., livestock supply on the market<sup>6</sup>, livestock demand, livestock body conditions, etc.). High prices could be as a result of some combination of good body condition, low supply, and high demand. Likewise, low prices might result from poor body conditions, high supply, or low demand. For this reason, it is difficult to provide an adequate context for the movement in livestock prices without a good understanding of the normal market setting at a particular time of year and how those conditions compare to the current year that is being monitored. Some analysts may choose to regularly count livestock available at the market as a complementary indicator.

#### Example: Somalia – livestock and cereal prices in Galkayo pastoral district

Looking simply at terms of trade without understanding the local context and current situation can be very misleading. This is the case in certain pastoral districts of Somalia, currently experiencing widespread food insecurity as a result of failed *gu* rains, persistent conflict, and civilian displacement. High food insecurity is especially prevalent in central and northern Somalia.

Given the failure of the rains, pasture conditions are poor and feed for livestock is extremely limited. As a result, livestock are dying off in large numbers in pastoral districts, where the population depends on livestock sales for purchases of staple foods, including sorghum and imported rice. Despite widespread death among livestock, prices at the market are relatively high given the very low supply and same level of demand. Therefore, when looking at the terms of trade for pastoralists, it may look as if terms of trade between livestock prices and imported red rice prices (the preferred cereal) are very favorable for pastoralists. An analyst may arrive at poor predictions or assumptions about food security in this pastoral area if just relying on the terms of trade as an indicator. Having an understanding of supply is critically important. In this case, analysts were able to physically count the livestock at the market and compare it to the supply at different points in the past. Noticing the very low numbers helped point to the problem.



Here is an example of a misleading graph. Notice that the terms of trade over the last few months has been increasing and appears more favorable to goat producers than over the last two years. Goat prices are steadily increasing and imported red rice prices remain steady. But, as mentioned, livestock supply is very limited due to poor pastures, drought-induced livestock disease, and high mortality rates, and livestock producers are not selling what little remains of their goat stock. Without an understanding of what is actually happening on the ground, this graph would provide an analyst with incomplete and contradictory information. When a terms of trade graph does not show trends

congruent with the current situation, feel free to leave them out of analysis or include them but be explicit in the text of your report about what the trends are showing, why they are misleading, and what should be monitored instead or additionally.

Source: Somalia Food Security Update May 2009, FEWS NET

<sup>6</sup> Note that supply on the market is very different from supply of livestock more generally.



### Wage to cereal terms of trade

Wages are a principle means of earning income for many households, particularly for landless households in urban areas, and those relying on seasonal migratory labor. For these households, which also tend to be net-food-purchasing households, wages are particularly important for food access and food security. With their wage income, most households purchase food staples either immediately for consumption or will store food for months when labor opportunities are scarce or less lucrative.

Wages and income can be difficult to accurately define and even harder to measure, particularly for some population groups. How exactly do households acquire wages? Do they tend to earn wages through multiple means with multiple households members employing different employment strategies? In what form are they paid (e.g., cash or in-kind)? Are these wages regular (meaning easier to monitor over the course of a year) or varied and seasonal? Are there certain times of year when wages are particularly important to monitor (e.g., picking season, seasonal migration)?

Wage to cereal terms of trade is a standard indicator for purchasing power. It is important for a number of reasons.

- Households relying on wage labor often tend to be the most vulnerable to shocks in labor markets (e.g., less demand for labor or a fall in wages due to a poor production season). If wages are low or labor opportunities are scarce, these households will have a particularly difficult time accessing food. If labor opportunities are scarce due to a poor production year, it may coincide with a food availability problem that exacerbates food access through higher consumer prices. In this instance using the TOT indicator and its component parts will allow an analyst to better understand the impact on households.
- Wage laborers are often in urban areas and are unable to supplement wage income with own-production, making food purchases at the market a necessity. For urban wage earners, rises in the food translate into a need to supplement their current sources incomes, especially if wages are holding constant.

Despite its utility, wage to cereal terms of trade has many obvious **limitations** as well.

- If labor opportunities are few but wages high, the terms of trade look favorable for wage laborers and suggest good food security conditions for wage laborers when, in fact, the laborers may not be able to find work. Even where women are wage earners, they are often kept from taking on certain jobs due to cultural norms or personal security. In some instances, one ethnic group may block the employment of another. For this reason, monitoring labor opportunities (labor demand) is a useful complementary indicator.
- Households dependent upon wages for income might not purchase just one staple food, but instead a bundle of foods at the market depending on availability, preferences, and price. With only one cereal represented in the ratio, the indicator may over or under-estimate the actual purchasing power of a household.
- Households may garner wages and income from a variety of sources, not just one. In this situation, the problem becomes aggregating the generally imperfect data and information to understand the total income level of a household. Looking at the trend of one type of wage often will not tell a complete story for most households.

Identifying what wage is appropriate is problematic. Should skilled or unskilled labor wage rates be used? Typically, there isn't just one skilled or unskilled wage rate. Which one should be used? More generally, collecting wage rates is regrettably difficult in many countries and regions within countries. If wage data are available, they tend to be for the capital city and other larger urban areas. Sometimes all that is available are data on minimum public sector salaries. In a limited number of cases casual labor wage rates are available for a few areas or employment categories. Generally, the available wage data will only serve as a gross estimate and will need to be interpreted with a great deal of care and circumspection. The challenge, then, is determining which population groups are associated with that wage and income information. Some analysts use market enumerators to collect daily, weekly, or monthly wage information (e.g., Somalia) and others conduct periodic field trips to get a sense of current wages. In still other cases, rural laborers work for in-kind payments and these wages can sometimes be monitored with regular commodity price monitoring. Despite the challenges, analysts still need to

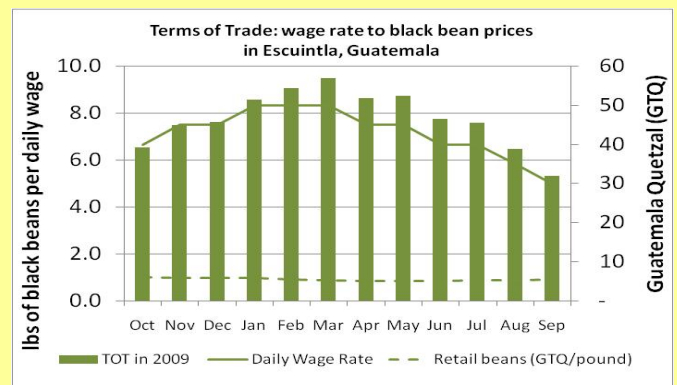
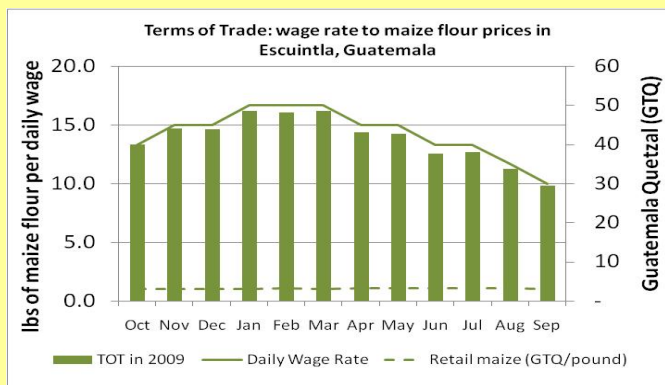
be sure to accurately couple wages and cereal prices with the populations they represent and be clear about the limitations of the indicator.

### Example: Guatemala – wage laborers and staple food prices in Escuintla

Guatemala produces a lot of cash crops for export, including coffee and sugar cane. Many households not only rely on the production of these commodities for sale, but also the labor that the harvest provides for wages. Along the southern coast of Guatemala, the industry is dominated by production of crops for export, making this a major destination for both year-round and seasonal wage laborers. For example, in Escuintla, sugar cane production is very important for wage laborers, comprising a majority of income earnings for the year. Given the seasonal variability of wages (highest during peak harvest months), a food security analyst may be interested in looking at the purchasing power of wage laborers as an indicator of food access.

In order to complete this analysis, an analyst would need to determine the staple foods preferred by the households of focus. When referring to livelihoods information, an analyst will learn that maize and beans are the main staples of most households in Guatemala, consumed together as complementary goods. For this reason, an analyst may choose to look at terms of trade of wage rates versus both maize and beans, given their similar level of importance for consumption.

Wage rates in Guatemala are collected by partner organizations in the market centers where wage laborers gather. Similarly, local market prices are collected for main staple foods. Unfortunately, no historic data is available for comparison. The current year's data, though, can be used to arrive at the following graphs.



These graphs show that terms of trade between wage rates and staple foods (both maize flour and black beans) are most favorable to wage laborers between April, May, and June. During these months, wages are able to purchase more maize and beans in order to store for other months, particularly when wages are lower through the winter months. Interestingly, prices for both maize and beans follow relatively the same seasonal variability, at least during the 2009 season. Given the importance of wages for food purchases, following wage rates in subsequent years will be important to determining if and when wage laborers may be unable to restock on staple foods during the harvest months (due to a poor harvest). Without adequate staples to carry over into other months, sugar cane wage laborers in Escuintla may face food access problems.

*Source: some data from the FAO and the Ministry of Agriculture, mostly illustrative example*

### Cash crop to cereal

Cash crops (e.g., coffee, tea, cotton, cocoa, tobacco, etc.) are grown and sold as a means of acquiring income for households in many countries. In many cases, these households may rely solely on cash crop production and sale for income. The price paid for cash crops will depend on where the final product will end up: an international market or for sale in a local market. This terms of trade indicator is very similar to the food crop to food crop indicator from the producer perspective, only here the commodity being sold is a cash crop.



For many households, the cash crops produced are exported to other countries for consumption. In a volatile world market where conditions are often very removed from local production, smallholders are generally price takers, i.e., they take the price as a given with little or no information about the world market forces. Because aggregate world supply and demand determine international cash crop prices, it often takes longer for local producers to respond with lesser or more production based on these trends.

Cash crop producing households face a buying price from a “middle man” (e.g., collector or trader). This individual sets the buying price based on international market prices and/or the price that s(he) will receive when selling to the next level of the supply chain (plus some margin of profit). For most countries, the local buying price tends to follow the same trends as the international market price. This may not be the case in some areas, particularly those with specialty or higher quality products or where the government regulates commodity prices. Because of the greater complexity of these market chains, it is necessary to have an understanding of how closely local cash crop buying prices follow international prices in order to choose the best data set possible for analysis.

In other instances, households may sell cash crops at local markets where price trends tend to follow the local market supply and demand conditions. If other households in the area purchase the crop, local market demand is especially important to monitor. These farmers may have the ability to sell either to a middle man or sell directly at market, depending on the local market structure.

Cash crops to cereal terms of trade is an important purchasing power and food security indicator for a variety of reasons.

- Many cash crop dependent areas may not produce their own food for production and rely on markets for the purchase of their staples. Terms of trade then provide a good indication of purchase power and the exchange value of the cash crops sold.
- When cash crops fail, own-produced food in the same areas may fail as well, making market purchases even more important during these times. Terms of trade will help an analyst understand the impact of both the loss of income from selling cash crops, and the hardship associated with higher food prices at the market.
- Areas producing and selling cash crops may be particularly vulnerable to shocks in the international market. Given the increased volatility of international prices, cash crop dependent households will likely experience greater variability in income source over time. Terms of trade will help analysts understand the purchasing power ramifications of changes international prices on cash crop dependent households.

Like the other types of terms of trade, cash crop to cereal has its own **limitations** in food security analysis.

- Cash crops (like other crops) normally have a seasonality associated with them, meaning producers harvest and sell at one particular time of year and save their earnings to smooth consumption over other times of the year; therefore, the utility of monitoring the TOT indicator is limited to a short time frame during the year.
- Households dependent on income from cash crops might not purchase just one staple food, but instead a bundle of foods at the market depending on availability, preferences, and price. Since only one food price enters into the TOT calculation, the indicator may over or under-estimate the actual purchasing power of a household.
- A failed local harvest will typically not influence the international price, assuming the country is a small-scale supplier. If the international commodity price is used, the poor local conditions will not affect the indicator values and a potentially large food security problem could be overlooked. For this reason, it is also important to consider the production and harvest conditions of cash crops, especially those sold for export.

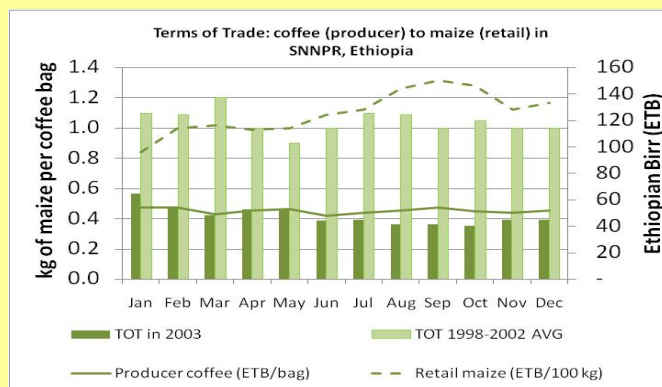
**Example: Ethiopia – coffee producers in the SNNPR and the 2003 crisis**

2003 was a difficult year for coffee producers around the world. With a large influx of Vietnamese robusta coffee onto the world market, international coffee prices were depressed to levels never seen before. Coffee producers around the world suffered as a result.

Coffee is a main cash crop and source of livelihood for many Ethiopians. Ethiopia is debatably the birthplace of coffee and still produces some of the most well-regarded coffee in the world. Given its significance, 2003 was undoubtedly a very hard year for many Ethiopian coffee producers. To understand the magnitude of the impact, approximately 5 million people in the SNNPR alone were affected.

A FEWS NET report stated “[In the] SNNPR earnings from coffee sales to the central market declined by 28 percent between 1998/99 and 2002/03 with the unit price collapse of 64 percent. The failure of other cash crops, including *chat*, pepper, and root crops, have had similar detrimental impacts on people’s livelihoods.” In order to conceptualize the impact of very low prices on the purchasing power of coffee producing households in the SNNPR, a food security analyst would want to look at the terms of trade ratio between coffee prices and maize, the staple food consumed in this area.

For this example, local producer coffee prices are used, not international prices. Maize is imported into the SNNPR from surplus production areas, meaning markets are very important for purchases of key staple foods. Local maize prices at the market in Sidama are used.



The terms of trade graph produced uses coffee and maize prices from 2003, and compares them to the terms of trade over the five previous years. Terms of trade for the current year are steady, but far lower than what they were over the five year average. In some cases, a bag of coffee can purchase half of what it did over the past five years, showing significant hardship for coffee producers. Given the reliance on markets for food purchases, coffee producers in the SNNPR have little alternative means of acquiring necessary food. Purchasing power has been substantially diminished given few alternatives for income and staple foods, meaning food security is severely threatened in this

area. A food security analyst would want to continue to monitor prices and forecasts for coffee prices in order to provide readers with some indication of possible recovery.

Source: “Special Report on Southern Nations, Nationalities, and People’s Region” September 2003, FEWS NET; some illustrative data

**CALCULATING TERMS OF TRADE AND USE IN ANALYSIS**

As the examples above indicate, calculating the ratio is generally the easiest part of the monitoring and analyzing terms of trade. What is more difficult is clearly defining the numerator and dominator of the indicator in a way that is relevant to food insecure populations and then accurately measuring each. In addition, interpreting food security implications is sometimes difficult given the existence of confounding factors. Steps for correctly calculating the terms of trade are provided below, followed by a list of questions to consider when analyzing terms of trade for food security and early warning work.

**Steps for calculating terms of trade**

No matter the type of terms of trade ratio, the steps are simple and straight-forward. These six steps below provide a solid but flexible approach. Annex 1 of this guidance will also be useful to determine if all of the necessary components are included in calculating, analysis, and presentation.

1. **Choose the target group:** What is the target group of interest (e.g., producers, consumers, traders, pastoralists, laborers, livelihoods group in a specific area, etc.)? This is especially important when disaggregating an analysis by population group and answering questions about the food security situation of a given group of people or a specific geographic area of a country. It's important to clearly state the population target group represented.
2. **Choose the asset:** What is the main cash or income source of this group (e.g., wages, livestock sales, cash crop sales, cereal sales, etc.)? Be sure to choose the main source of "income" that is used to purchase food.
3. **Choose the consumption commodity:** What is the main staple consumed by this group? For some households there may be more than one commodity, meaning multiple terms of trade indicators might be useful to calculate.
4. **Select the data:** The data should be in the form of a time-series and monitored regularly. Be sure to choose data with units relevant to sale or form of earnings (e.g., medium goat, one day of labor, etc.) and how purchases of staple foods are made (e.g., kilograms, 10 pound bags, etc.).
5. **Set up the ratio:** The terms of trade indicator is simply the unit of the product or service being sold or offered over the unit of a staple food being purchased. For food security purposes, one can refer to the product being sold or service being offered as the asset (e.g., livestock, wages, cash or food crop sold, etc.). The commodity being purchased can be referred to as the commodity. Livestock price and wage rate are typically in the numerator. Regardless, the definition should be clear to the analyst and his/her audience.

$$\text{Terms of trade} = 1 \text{ unit of asset} / x \text{ unit of commodity}$$

Think of the "asset" as what is being sold and the "commodity" as what is being purchased for consumption.

6. **Interpret the significance of the TOT indicator:** It is often useful to think of terms of trade as how much of a commodity one unit of an asset can purchase. This demonstrates how much food can be procured given a unit of asset/income/wage. To truly understand the significance of the ratio, an analyst should ask him or herself a few more questions, explained in the next section. Be cognizant of, and transparent about, the limitations of each of the types of TOT indicators.

### Use in analysis

To understand the meaning of the terms of trade, it's important to place the indicator in context. Here is a set of questions to help an analyst interpret and convey the meaning of the indicator:

1. **How does the current value of the indicator compare to the normal value?** In order to understand the current situation, put the indicator in the context of what is normal given historic averages (using a five-year average). Note that this requires historic data for both the asset and the commodity. Comparisons with a norm add meaning to the current figure. For example, if a terms of trade ratio is normally 1:10 (e.g., one animal is equivalent to 10 sacks of cereal) but for the past few months it has been about 1:20, there has been an improvement in the terms of trade of that population. This group is able to purchase twice as much (20 sacks) of the given commodity.
2. **How has the TOT changed over time?** The trend in TOT is also important and generally even more informative. Declining terms of trade generally mean declining access to food. "Collapsing" terms of trade for pastoralists typically imply distress sales and potential for an impending food crisis.<sup>7</sup> However, determining the threshold where terms of trade move from declining to collapsing can be difficult. For

<sup>7</sup> "Market Analysis in Emergency Food Security Assessments." World Food Programme. August 2007. [http://documents.wfp.org/stellent/groups/public/documents/manual\\_guide\\_proced/wfp142137.pdf](http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp142137.pdf)

example, if the livestock cereal terms of trade normally hovers around 1:15, but has been moving downward over the season (hitting a low of 1:8 last month), it signals that pastoralists and livestock producers are trading livestock for cereal at a less favorable rate, possibly signaling significant hardship (able to acquire insufficient quantity of cereal to meet their needs). However, it could simply signal a typical seasonal pattern. Knowing the context is critical (see next point).

3. **Is there seasonal variability in terms of trade that should be accounted for?** There may be specific times of year when terms of trade are generally declining or generally increasing. Accounting for seasonality is important when drawing conclusions about the food security implications of changes in TOT.
4. **Are terms of trade favorable to a specific population group?** The term “favorable” is often used to describe terms of trade, and generally refers to an improvement, e.g., pastoralists are able to acquire more sacks of cereal per animal sold. A word of caution is warranted. Earlier sections of this guidance discussed situations where the price of livestock and hence terms of trade could be improving at times when pastoralists are not actually selling animals and thus not gaining from the favorable terms.
5. **What are the limitations of using a particular terms of trade definition as a purchasing power indicator for the chosen population group?** While important to provide readers with what an indicator means, it is almost equally important to convey what it does not mean and suggest caution in drawing conclusions where necessary (see the cautionary notes above under each type of TOT indicator).
6. **What are the variables that might change the current trend in the terms of trade?** As with any early warning reporting, readers are concerned what may happen over the next few months. To the extent possible, identify how the TOT is likely to behave in the near future and what the food security implications are. Complementary indicators such as supply of livestock or other assets in the market, livestock condition, etc help clarify conditions and implications. It’s important to understand how both the asset and commodity will likely behave.

As mentioned throughout, including a narrative about terms of trade trends is very useful, especially when accompanying a graph (more on this in the next section). Be as descriptive as possible and do not use confusing or misleading adjectives or terms to describe terms of trade trends (e.g., “good terms of trade”). Mention the focus population groups, geographic area of reference, discuss the trend in the terms of trade, and the implications for food security. Here are some examples of good ways to write about terms of trade in reporting:

- “Terms of trade for pastoralists communities in eastern Kenya have been declining over the past few months, potentially signaling decreasing purchasing power for those pastoralists attempting to sell livestock. The livestock sale season is approaching, meaning terms of trade between livestock and maize will remain important to monitor closely.”
- “The terms of trade ratio between wage rates and millet in the northern region of Guatemala is normally about 1:3 (meaning one unit of currency can be exchanged for three units of millet), but his current TOT is approaching 1:6, allowing those with wages to purchase twice as much millet. Labor opportunities are also abundant with a good harvest, allowing for improved levels of purchasing power and food security for this population.”
- “Terms of trade (relative prices) between millet and cowpea have been moving anomalously over the season, given a poor cowpea harvest. While generally exhibiting a 1:1.5 ratio (millet: cowpea), the terms of trade have moved to 1:4 since February. For those consumers in the major urban areas in the south, cowpea has become prohibitively expensive, and households are substituting to millet exclusively.”

### Limitations in monitoring

As discussed alongside each type of indicator, using terms of trade as a food security indicator has limitations. The limitations noted here should not prevent analysts from using it, but should instead be used to identify shortfalls and help identify when other indicators should be used alongside or in place of terms of trade. The limitations described here are a summary of those stated above. Refer to those specific to each type of terms of trade for more information.

1. **Quantity/supply issues:** Terms of trade only show relative prices, not the quantity actually being purchased or sold. Quantity demanded could change as a result of price, or have no effect whatsoever. When using terms of trade as a food access or food availability indicator, consider that market supply level is difficult to imply from simply looking at a ratio of prices. For example, terms of trade may look favorable for pastoralists when livestock prices are very high, but the high prices may be due to low quantity on the market, meaning no one is actually selling. In this instance, terms of trade is not a useful indicator unless an analyst understands the quantity and supply constraints. An analyst can get around this limitation by monitoring market supply in addition to prices.
2. **Quality of products for sale:** The changing quality of a product can contribute to changes in price (apart from relative supply and demand). For example, if livestock body conditions are deteriorating, the price a livestock producer can receive for that animal at the market will be reduced. The quality of the product, in fact, may be an additional signal of deteriorating food security conditions. Monitoring quality through anecdotal accounts or market visits can help uncover potential problems or anomalies.
3. **Incomplete purchasing power indicator:** Terms of trade is not a perfect purchasing power indicator for households or population groups that either (1) have more than one way of acquiring income and assets and/or (2) rely on more than one commodity/cereal for purchase and consumption. Terms of trade ratios limit an analyst to choosing one of each (asset and commodity). To get around this problem, an analyst can look at more than one terms of trade ratio for comparison sake. Likewise, analysts can also choose to look at a basket of commodities (e.g., consumer price index) instead of just one cereal or commodity.

### GOOD PRACTICE IN GRAPHING

Graphing terms of trade trends is generally the preferred method of visually describing changes in purchasing power. As with retail prices, graphs quickly illustrate current trends and their relationship to other variables or points in time. Graphs, though, should not be used alone; terms of trade requires some explanation through narrative as well. It's not necessary to explain the trend in writing (e.g., terms of trade improved by 0.2 this month), but rather give reasons for, and the food security implications of, the trend(s) represented in the graph.

Terms of trade can be a tricky indicator to graph. It's informative to plot the TOT and two component parts (enumerative and denominator) on one graph. As can be said for good practice in all graphs, the challenge is including all of the necessary information without crowding the graph and making it too difficult to read. In general, try to stay away from using too many lines, bars, or colors. Using a combination can ease understanding and the burden on the reader's eye.

Below are three different types of terms of trade graphs, which become increasingly complicated as one moves through them. The first is the most basic, the second the preferred method, and the third adds an extra layer of information not necessary for most analysts. The following are common characteristics of all graphs below:

- **Prices of assets and commodities displayed as lines:** Primary variables with respect to time, like prices, should be displayed as lines. This describes the continuous nature of the variable, and the comparable relationship over months.
- **Computed terms of trade (current and average) displayed as bars:** Secondary or derived variables, like terms of trade, should be displayed as bars, even when there is a relationship to time. This shows that the data is comparable between months, but not directly.

No matter which level of graph is used, the following should be considered when graphing:

- Always state the definition of the terms or trade in the title of the graph.
- Be explicit about the units and type prices used for each component (e.g., producer prices, wholesale prices, retail prices, etc.).
- Provide units to all numerical values (both assets and commodities).
- Provide the currency used.

**1- First level graph: (1) current year/season terms of trade trends, (2) price of asset, (3) price of commodity**

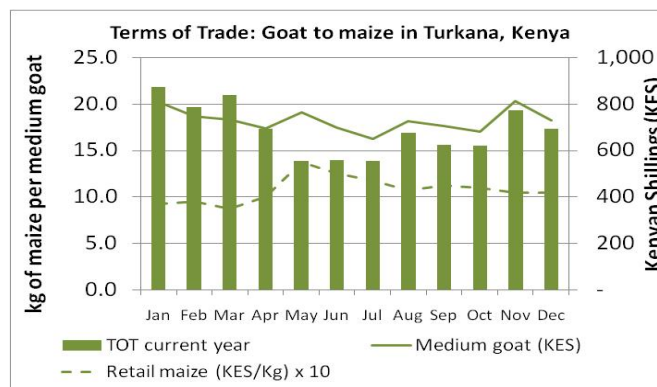
This graph includes the basic level of information needed to understand the current movement of terms of trade trends. Here the current prices of both the asset and the commodity are shown alongside the TOT trend. This allows a reader to quickly place the movement of the TOT within the context of changing prices of an asset and commodity. Moreover, this graph shows both variables and allows the reader to see which price(s) is (are) causing the movement of the ratio.

This graph is to be used when no historic data is available. It only considers current trends and the component variables, but does not allow for comparison to the past, which makes uncovering anomalies more difficult.

Positive	Negative
Helps identify which price is contributing to changes in terms of trade ratio	No historic average reference for comparison
Easy to read and understand	No specific reference year for comparison

Here is an example of a first level graph:

- Current year/season terms of trade trend: In **olive green bars**, here is the terms of trade for the current year.
- Current year price trends of “asset:” In an **olive green solid line**, here are the current year “asset” prices by month. In this case, the graph shows goat prices by month. Goats are traded or sold by this population in order to purchase maize for consumption.
- Current year price trends of “commodity:” In an **olive green dotted line**, here are the current year “commodity” prices by month. In this case, the graph shows maize prices by month. Maize is the preferred staple food for this population and is purchased at the market.



**2- Second level graph: (1) current year/season terms of trade trends, (2) five year average terms of trade trends, (3) price of asset, (4) price of commodity**

This is the preferred graph for analysis and reporting. It provides all necessary information about the current year (both prices and the terms of trade ratio) and some reference to a historic average. This added feature over the last graph allows an analyst to look for anomalies in the current year’s trends against a “normal” situation. If the trends start to deviate significantly from historic trends, an analyst may want to investigate the food security implications further.

For many places, having access to historic data is a luxury. In order to calculate a historic terms of trade, both the “asset” and “commodity” prices need to be available for a few years in the past. Five years is the preferred number of years, but a shorter average can be used. Consider, though, that the more data, the better the average becomes. Only having two years of historic data may not provide a proper “normal” situation. No matter the number of years represented, be sure to properly label your graph with the years used in the average.

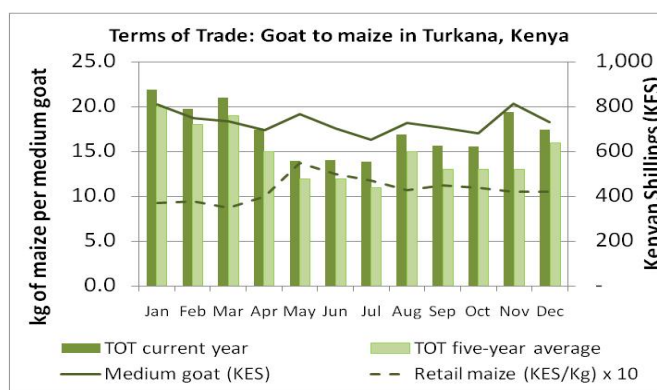


For these reasons, this graph is considered the ideal, realizing that many food security analysts will be unable to make it. If an inadequate level of historic data is unavailable, stay with the first level graph.

Positive	Negative
Helps identify which price is contributing to changes in terms of trade ratio	No specific reference year for comparison
Historic average reference included for comparison	
Somewhat easy to read and understand	

Here is an example of a second level graph:

- Current year/season terms of trade trend: In **olive green bars**, here is the terms of trade for the current year.
- Historic average terms of trade trend: In **light olive green bars**, here is the terms of trade as an average over the last five years. This allows comparison between the current year and those in the recent past.
- Current year price trends of “asset:” In an **olive green solid line**, here are the current year “asset” prices by month. In this case, the graph shows goat prices by month. Goats are traded or sold by this population in order to purchase maize for consumption.
- Current year price trends of “commodity:” In an **olive green dotted line**, here are the current year “commodity” prices by month. In this case, the graph shows maize prices by month. Maize is the preferred staple food for this population and is purchased at the market.



### 3- **Third level graph: (1) current year/season terms of trade trends, (2) five year average terms of trade trends, (3) reference year terms of trade trends**

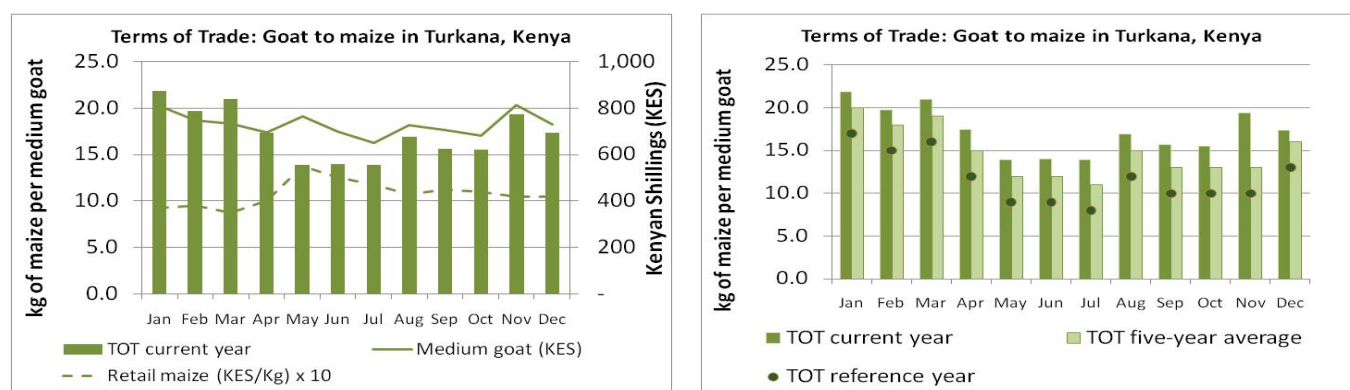
In some instances and countries, including a reference year, i.e., a period of time used to help explain or project into the future the performance and likely food security outcomes of the current period, is very important. For example, previous drought years provide an illustration of the potential progression and outcome of a current drought year. If there was a particular year or season when the terms of trade for a given population group told a very food security relevant story, it is important to use this trend as a comparison. Comparing against a reference year can help understand the potential severity of events or conditions in the current year.

Instead of simply adding another bar to the second level graph, it is recommended that those analysts who desire to use a reference year create two graphs for reporting: (1) the first level graph described above and (2) one comparing the terms of trade in the current year, the five-year historic average, and the reference year. Providing two graphs allows an analyst to show the moving components of asset and commodity prices and also compare to times in the past without crowding one graph.

Positive	Negative
Helps identify which price is contributing to changes in terms of trade ratio	Two graphs instead of one requires more space in a report
Historic average reference included for comparison	
Reference year included for comparison	

Here is an example of how the two graphs would be displayed together in a report. The graph on the left is the first level graph, while the graph on the right is the new graph comparing terms of trade in the current year, the historic average, and the reference year. The new graph includes the following:

- Current year/season terms of trade trend: In **olive green bars**, here is the terms of trade for the current year.
- Historic average terms of trade trend: In **light olive green bars**, here is the terms of trade as an average over the last five years. This allows comparison between the current year and those in the recent past.
- Reference year terms of trade: In **dark green dots**, here is the terms of trade of the reference year.



## CONCLUSIONS

Terms of trade are an important purchasing power and food security indicator. This guidance sought to provide a systematic and complete view of terms of trade and its application to food security analysis and reporting. Instead of simply looking at price levels and trends of discrete commodities, the terms of trade allows analysts to look at these prices and trends in relation to the power of exchange, in relation to the buyer's income or barter opportunities as well as other substitute goods.

This guidance has explained the utility, limitations, and how to calculate four types of terms of trade ratios: (1) food crop to food crop, (2) livestock to cereal, (3) wage to cereal, and (4) cash crop to cereal. The type of ratio used should be chosen based on the assets households use to purchase their staple foods at the market. Similarly, the type of cereal used in the ratio should be chosen based on the preferred staple food of the household of focus.

The steps to calculating terms of trade and the questions useful for analysis are then described, as well as best practices in graphing. Three different types of graph have been identified as good examples, including varying degrees of historic information, but always the current TOT trends and the asset and commodity constituents. A checklist on defining and interpreting TOT is provided in the annex and serves as a quick reference

Understanding terms of trade is critical to understanding the exchange value of acquired assets and the purchasing power of households given changing prices of assets and commodities. Without providing the context of how much of a staple food a household is able to afford given income or assets, monitoring prices can be meaningless. Calculating and analyzing terms of trade helps to uncover anomalies in purchasing power, make predictions about the current and predicted food security conditions of households, and provide better early warning to decision makers.

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**ADDITIONAL FEWS NET MARKETS AND TRADE GUIDANCE**

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## ANNEX 1: CHECK LIST FOR REPORTING ON TERMS OF TRADE FOR FOOD SECURITY ANALYSIS

Questions	Yes/No
<b><i>Livestock to cereal</i></b>	
Is it clear in the presentation (graph or narrative) to which population group the terms of trade indicator is relevant (e.g., livestock producer or consumer)?	
Have I chosen the correct price (e.g., producer or retail) with respect to the population group I am describing?	
Have I selected the cereal/commodity price that corresponds with the population group I am targeting?	
Do the units of livestock correspond with the way livestock is sold in the market? Are the units accurately explained on my graph or in the text of report?	
Do the units of cereal/commodity correspond with the way it is purchased in the market? Are the units accurately explained on my graph on the text of my report?	
Have I accurately explained what these trends mean and the implications on the food security situation of the chosen households?	
<b><i>Wage to cereal</i></b>	
Is it clear in my presentation (graph or narrative) to which population group this terms of trade ratio is relevant (e.g., to which population group these wages apply)?	
Have I chosen the correct wage rate with respect to the population group I am describing?	
Have I selected the cereal/commodity price that corresponds with the population group I am targeting?	
Do the units of wage/income correspond with the way wages are obtained? Are the units accurately explained on my graph or in the text of report?	
Do the units of cereal/commodity correspond with the way it is purchased in the market? Are the units accurately explained on my graph on the text of my report?	
Have I accurately explained what these trends mean and the implications on the food security situation of the chosen households?	
<b><i>Cash crop to cereal</i></b>	
Is it clear in my presentation (graph or narrative) to which population group this terms of trade ratio is relevant (e.g., to which population group these cash crop prices apply)?	
Have I chosen the correct cash crop with respect to the population group I am describing? Can I use an international cash crop price or is it more important to use local buying prices?	
Have I selected the cereal/commodity price that corresponds with the population group I am targeting?	
Do the units of cash crop price correspond with the way cash crops are sold? Are the units accurately explained on my graph or in the text of report?	
Do the units of cereal/commodity correspond with the way it is purchased in the market? Are the units accurately explained on my graph on the text of my report?	
Have I accurately explained what these trends mean and the implications on the food security situation of the chosen households?	
<b><i>Food crop to food crop</i></b>	
Is it clear in my presentation (graph or narrative) to which population group this terms of trade ratio is relevant (e.g., to which population group these cereal prices apply)?	
Have I made it clear whether I am looking at terms of trade for producers or net consumers? Are the prices chosen at the appropriate level?	
If looking at relative consumer prices, have I chosen two commodities that households in this area normally prefer, use as substitutes, or as complementary goods?	
If looking at producer prices of one commodity versus retail prices of another, have I chosen the producer price in line with what types of commodities are sold in this area?	
If looking at producer prices of one commodity versus retail prices of another, have I chosen the retail consumer price in line with what types of commodities are preferred and consumed in this area?	
Do the units of both cereals/commodities correspond with the way they are purchased and sold in the market? Are the units accurately explained on my graph on the text of my report?	
Have I accurately explained what these trends mean and the implications on the food security situation of the chosen households?	

**ANNEX 2: HOW TO USE LIVELIHOODS PRODUCTS TO CREATE A TERMS OF TRADE INDICATOR**

Livelihoods information is very useful in identifying the proper assets and commodities to use for specific populations in terms of trade analysis.

**Livelihood zones maps:** Accompanying each map should be a description of the zones, including information on the “Food Crops,” “Income,” and “Livestock” available in each zone. These three categories refer to what is produced in the zone, not necessarily what is consumed (although the two might be the same). Additional information may be available in the paragraph description which sometimes accompanies the three other categories. Analysts need to couple this information with local knowledge of what is consumed in the area of focus.

Here is an example of the livelihood zone descriptions for Mali: <http://www.fews.net/livelihood/ml/Zone.pdf>

**Livelihood profiles:** These are a good source of information on assets and commodities consumed by populations in predetermined livelihood zones. Within the descriptions of each zone, both the “Sources of Income” (asset) and “Sources of Food” (commodity) can be used to identify a terms of trade ratio for a given population in a given geographic area. Within the profiles themselves, “Sources of Food” are broken down by household type (poor, middle, better-off), adding an additional level of clarity for population-type disaggregation. There is the same type of household-type breakdown for “Sources of Cash” as well. Also, the seasonal calendar for each zone helps to identify at what times of year particular assets and/or commodities should be monitored for significance.

Here is an example of the livelihood zone profiles for Chad: <http://www.fews.net/livelihood/td/Profiling.pdf>

**Livelihood baselines:** Accompanying baseline spreadsheets is normally a “baseline report.” These reports provide similar content to the “profiles,” but with more clarity and depth. Again, within each zone, the “Sources of Income” and “Sources of Food” will be available as a description of the zone, then broken down by household-type. Baselines reports will have the most detail in their explanation that can then be used to identify components of the terms of trade ratio.

Here is an example of the livelihood baseline report for Ethiopia: <http://www.fews.net/livelihood/et/Baseline.pdf>



**ANNEX 3: GLOSSARY**

*Asset* – is anything of value that is owned by a household, individual, or company. Assets normally act as a store of value that can be later exchanged for cash or another asset. They can be tangible (e.g., goods or cash) or intangible (e.g., services or rights).

*Barter* – is the exchange of goods or services without involving money or currency.

*Exchange value* – is the current value of a product, commodity, or service if taken to market and exchanged or traded. The value can be represented as either a price or a quantity of something else that is considered equivalent. All commodities must have an exchange value, which normally changes over time relative to supply and demand.

*Purchasing power* – is a measurement of the relative value of money in terms of the quality and quantity of goods and services it can buy. It represents the ability of a household to acquire goods and services based on its access to money or other forms of wealth.

*Reference period/year* – is a period of time used to help explain or project into the future the performance and likely food security outcomes of the current period. For example, previous drought years provide an illustration of the potential progression and outcome of a current drought year.

*Terms of trade* – is the rate at which one good or service can be exchanged for another and is typically expressed as a ratio.