# REVISIONS TO THE FAO FOOD PRICE INDICES

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## Introduction

Since the **FAO Food Price Index (FFPI)** was introduced in 1996, global food markets have changed radically.[2] While the global population grew by 34 percent from 1996 to 2020, global net agricultural production increased by almost 70 percent as measured in constant value terms.[3] The volume of commodity trade in cereals, vegetable oils, sugar, meats and dairy products increased by 66 , 240, 220, 130, and 190 percent, respectively, over the same period. Prices of food commodities traded in international markets as measured by the FFPI have risen relative to unit prices of traded manufactured goods (measured by the World Bank's manufactures unit value index, or MUV) by about 10 percent since 1996. However from 1996 they fell to near 60-year lows in 2000, and then surged to 45-year highs in 2011. Nominal prices have displayed high variation on a monthly basis. In this context of change and uncertainty, the FAO Food Price Index has become a critical and timely monthly indicator of the state of international food markets, gauging the change in food commodity prices over time in nominal and real terms. The index is widely quoted following its release on the first Thursday of each month (always featuring in top-tier media) and is an essential reference in global policy discussion.

This feature article documents the principal changes to the FFPI due to take effect from July 2020, and outlines their implications. The revisions reported here concern the rebasing of the FFPI from the current base period of 2002–04 to 2014–16, and various necessary changes to several prices used in the construction of the index. The article also includes revisions to the **FAO Global Food Consumption Price Indices (FGFCPI)**, which include the same prices as the FFPI, while also incorporating fish and oilseed prices. The FGFCPI are based on reference weights calculated using average per capita calorie and protein availability, as opposed to trade weights used for the FFPI.

## Revision of the FAO Food Price Index

The FFPI is a Laspeyres price index, which is calculated as the trade-weighted average of the prices of food commodities spanning the key agricultural markets for cereals, vegetable oils, sugar, meat and dairy products.[4] While these commodities represent about 40 percent of gross agricultural food commodity trade (FAOSTAT), they are chosen for their high and strategic importance in global food security and trade. The Laspeyres price index is used because it facilitates timely updates. Prices are combined in the various sectors using trade weights calculated from average export values over a chosen three-year base period, when the trade wweights appear most stable relative to their trend values. A three-year period is chosen to minimize the impact of variation in both internationally traded prices and quantities. The base period 2014–16 was chosen as the new base as it was considered the most representative period for most markets in the past ten years. Over time, it is important to review price inputs when new conditions affect their availability, representativeness and timeliness. As trade patterns evolve, it is imperative to update the base period to ensure that the weighted basket remains relevant.

### *Revision to commodity prices and their sectoral indices*

The current FFPI comprises separate sub-indices for five major food commodity groups. Table 1 outlines the construction of these sub-indices and notes the revisions that have been made to each. After revision,

[2] It is important to clarify that the FAO food price indices are formed from prices of bulk food commodities in international trade. The indices do not portend to indicate prices paid directly by retail consumers of food. Consumer price indices for food can be found at www.ilo.org.

[3] Estimates for the real value of net agricultural production are from FAOSTAT, and the real value of trade is from the OECD-FAO Agricultural Outlook 2019–2028.

[4] For a mathematical description of the index and its components, refer to Food Price Index Revisited in Food Outlook, November 2013. Food and Agriculture Organization of the United Nations [online]. Rome. [Cited 20 May 2020]. www.fao.org/fileadmin/templates/worldfood/Reports_and_docs/FO-Expanded-SF.pdf.

**Table 1. Summary of revisions to sectoral indices and component commodity prices.**

| DESCRIPTION BY SECTOR | REVISIONS TO BE IMPLEMENTED IN JULY 2020 |
|---|---|
| ***Cereal price index***<br>Compiled using the International Grains Council (IGC) Wheat Price Index of 10 quotations, 1 US maize quotation and 16 rice quotations. The rice quotations are combined into groups consisting of higher quality Indica, lower quality Indica, Japonica and Aromatic rice. Within each group, a simple average of the relative prices of appropriate quotations is calculated; then the average relative prices of each of the three varieties are combined by weighting them with their trade shares. Indices for wheat, coarse grains and rice are combined using export value weights of the base period 2002–2004. | In the grains sub-index: no change to the wheat subcomponent; the US maize quotation replaced by the IGC Maize Price Index (an average of 4 different maize price quotations); the barley subcomponent based on the IGC Barley Price Index (an average of 5 different barley price quotations); and 1 (new) sorghum quotation added.<br><br>In the rice sub-index, a glutinous subcomponent was added based on two price quotations; Indica components are no longer differentiated by quality, with quotations instead grouped under a single Indica component; Australian Japonica prices have been replaced with Vietnamese Japonica quotations; Vietnamese (new) quotations are added to Aromatic subcomponent; Indian (new) quotations have been added to Indica subcomponent; and sub-index weights have been redefined based on analysis of varietal structure of trade during revised base period.<br><br>Trade weights for 2014–16 used to aggregate prices. |
| ***Vegetable oil price index***<br>Based on 10 quotations for soybean, sunflower, rapeseed, groundnut, cottonseed, copra, palm kernel, palm, linseed and castor oil. Prices are weighted by trade shares of the base period 2002–04. | No change in the commodity composition. Trade weights for 2014–16 used to weight quotations. |
| ***Sugar price index***<br>Calculated from International Sugar Agreement prices using 2002–2004 average as base. | No change in terms of price coverage. Index only rebased to 2014–16. |
| ***Meat price index***<br>Computed from average export unit values/market prices of bovine, pig meat, poultry meat and ovine meat, weighted by world average export trade shares for 2002–2004. Includes two poultry, three bovine, three pig, and one ovine meat products, with 27 quotations in total used in the calculation. | US and Brazilian export unit values for various meats have been revised to include fresh and chilled products, in addition to frozen, effectively adding 8 (new) quotations to the index defined by the Harmonized System (HS) codes, resulting in a more comprehensive and representative view on the unit prices of the most traded meat products. Australian lamb prices added to the ovine subcomponent.<br><br>Trade weights for 2014–16 used to weight quotations. |
| ***Dairy price index***<br>Computed from two price quotes each (one for Europe and one for Oceania) for butter, skim milk powder (SMP) and whole milk powder (WMP), and one price quote for (Oceanian) cheese. The average of quotes is weighted by world average export trade shares for 2002–2004. | European Union (EU) cheddar prices has been added to the cheese subcomponent starting 2008; butter, SMP and WMP subcomponents were redefined to include European Commission-reported EU prices for these products, starting from 2008.<br><br>Trade weights for 2014–16 used to weight quotations. |

24 commodities will be covered by the FFPI. With additional commodity and market coverage, the new index will be based on 95 price quotations, compared to 73 in the current one.

The effects on the commodity price indices are illustrated by sector in Figures 1–5, which, with the current and revised indices normalized to 100 for January 1990, depict the cumulative impact of the revisions between the respective series. Table 2 provides summary statistics comparing the current and revised indices.

For cereals, the cumulative impact of the revisions is less than 1 percent by March 2020. While the trade share of wheat falls, the shares of maize and rice rise. The high correlation of price movements helps to keep the index resilient to these changes. A simple ordinary least squares (OLS) prediction explains the movements in the current index, with a standard error of only 1.1 (that is the standard deviation of the distance between predicted and actual values). This implies that the revised cereal index conveys the same information regarding price variations as the current index. However, an analysis of turning points indicates that in 5 percent of the monthly observations, the current and revised indices are moving in opposite directions. Given the very high degree of fit between the revised and current indices, these turning point differences are not considered as a significant issue.

The current and revised vegetable oil indices show little visual differences, given no changes to the component price series. The revised index predicts movements in the current index with a standard error of 0.3, and only 0.8 percent turning point differences between the series. While the input prices remain unchanged for this index, it may be noted that the trade weights of these input series have changed substantively compared with the base period; the share of soybean oil fell from 25 percent in 2002–04 to 15 percent in 2014–16, while the share of other oils rose, in particular those of sunflower, palm and rapeseed oils.

As there has not been any change in the composition of the sugar index, there is no difference in movement shown in the figure for sugar. The sugar index continues to have the highest monthly variation among the sectoral indices.

By contrast, there are considerable changes in the dairy and meat indices. For dairy, the main revisions are due to the inclusion of the European Union cheddar prices in the index, starting in 2008, and the removal of EU export prices of other dairy products prior to 2008. Review of the dairy price index found that including EU export prices is critical given the EU's large export share in global markets; however, EU export prices before 2008 were found to be heavily influenced by the intervention regime for butter and skimmed milk powder, and it was decided to remove them from the index. The cumulative impact of the revision, as measured from 1990, indicates a reduction of 12 percent compared with the current dairy index by March 2020. While the coefficient of variation in these indices is largely the same, the correlation of monthly changes between the two is weaker than for cereals or vegetable oils, at 87 percent. The revised index for dairy has the largest OLS prediction (standard) error at 3.7 and, in almost 12 percent of the observations, turning points do not correspond. While these statistics indicate a somewhat lower correspondence between the current and revised index, it is believed that the revised index is more representative of market and trade conditions than the current index.

**Figure 1. Current and revised price index for cereals (1990 Jan = 100)**

For the meat index, the redefinition of HS codes results in a cumulative and steady reduction in the trend in the revised series from 1990 to 2020 of 13 percent from the current index. The correlation of monthly changes in the two indices is lowest at 84 percent, and turning points do not correspond in 18 percent of observations. These statistics indicate somewhat lower correspondence between the current and the revised index, but the revisions have improved the coverage of the sector and reduced the number of datapoints that must be estimated each month. Nevertheless, the revised series predicts the current series with a standard error of only 1.4.

**Table 2. Statistical comparisons between the current and revised Food Price Indices**

| Index | Coefficient of variation % | | Correlation % (monthly changes) | Turning point differences % | Prediction error |
|---|---|---|---|---|---|
| | Current | Revised | | | |
| Cereals | 26.5 | 26.3 | 97.2 | 5.0 | 1.5 |
| Vegetable oils | 29.8 | 29.9 | 99.7 | 0.8 | 0.5 |
| Sugar | 34.2 | 34.2 | 1 | 0 | 0 |
| Meat | 15.9 | 15.3 | 83.8 | 18.2 | 2.0 |
| Dairy | 24.2 | 25.4 | 86.8 | 11.6 | 3.7 |
| FFPI | 20.3 | 20.6 | 95.4 | 13.5 | 1.1 |

Note: The coefficient of variation is computed from differences from the linearly detrended series. Turning point differences are measured by instances where monthly changes of the current and revised series move in opposite directions. Prediction error refers to the standard error from a simple ordinary least squares fit of the current index by the change in the revised index and the previous value of the current index.[4]

[4] The statistics reported are noted in the table. The OLS model used for predictive performance is $CI_t = A0 + A1*(RI_t - RI_{t-1}) + A2*CI_{t-1}$ where CI is the current index value and RI is the revised index value

**Figure 2. Current and revised price index for sugar (1990 Jan=100)**

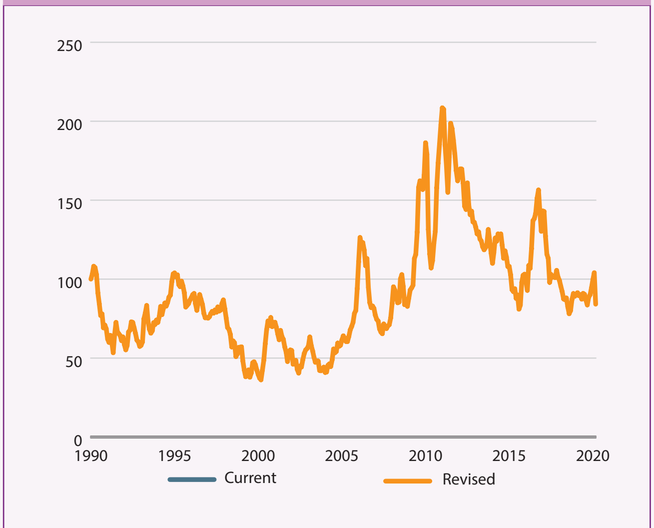



**Figure 3. Current and revised price index for vegetable oils (1990 Jan=100)**


**Figure 4. Current and revised price index for Meat (1990 Jan = 100)**

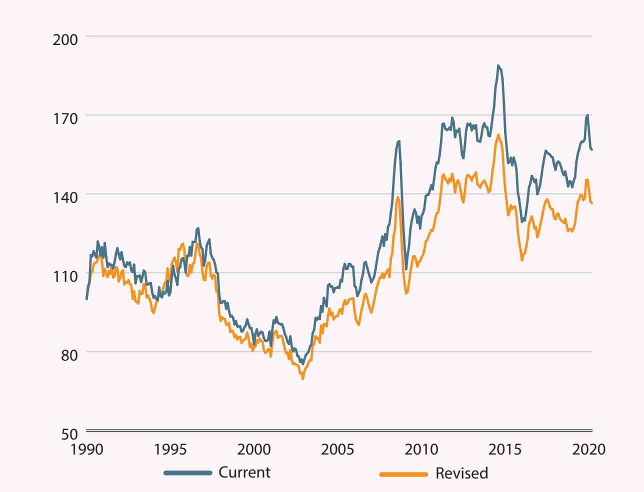
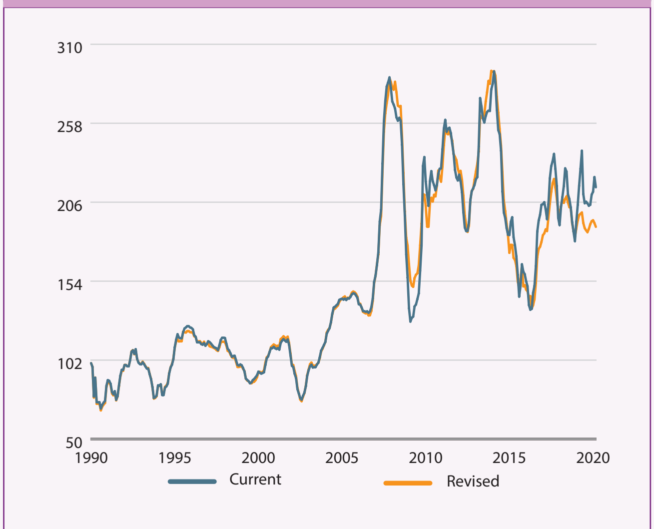



**Figure 5. Current and revised price index for Dairy Products (1990 Jan = 100)**



### *Revision of the base period*

Table 3 indicates the weights assigned to the major commodity sectors for the calculation of the Food Price Index for the 2002–04 and 2014–16 base periods. Changes in the weights reflect changes in both export volumes and prices. Despite volatile international markets, the weights for the various sectors did not change significantly. The weight for cereals rose 1 percentage point to 29 percent, largely due to small increases in the shares of maize and rice, more than offsetting reduction in the shares of wheat and other coarse grains. The share of vegetable oils rose the most, by 3 percentage points, largely due to a substantial increase in palm oil (offset somewhat by a decrease in the trade share of soybean oil). Livestock commodities lost trade share between these two periods, with the share of meat falling 2 percentage points, as trade in pig meat fell by more than the rise in the poultry and bovine meat trade. The share of dairy products also fell by 2 percentage points, with trade in SMP and WMP rising and that of butter and cheese falling.

### *Comparison of the current and revised FFPI*

Given the changes in the base period weights, and changes to the component prices, Figure 6 displays the current and revised FFPI, with axes aligned according to the change in base values. The revised FFPI has a slightly lower trend; this result is largely attributable to reduced price growth in the revised indices for meat and dairy products, with these being offset somewhat by a decline in the trade shares of these sectors between 2002–04 and 2014–16. The revised index is a good predictor of the current index, with a standard error of only 0.8 (Table 2). While turning points do not correspond in 14 percent of the cases, the revised index would not alter key messages stemming from food price variation from the current index.

**Table 3. Changes in base period trade weights summarized by commodity sector**

| Base | Food | Cereals | Oils | Sugar | Meat | Diary |
|---|---|---|---|---|---|---|
| **2002–04** | 1.00 | 0.28 | 0.14 | 0.07 | 0.35 | 0.16 |
| **2014–16** | 1.00 | 0.29 | 0.17 | 0.07 | 0.33 | 0.14 |

Note: Trade weights are calculated using average trade values from the FAOSTAT trade database.

### *The long-term annual FFPI*

The revised base period weights have also been applied to calculate the annual FFPI backwards to 1961 in order to facilitate a longer-term assessment of food price movements. In nominal terms, the revised annual index

**Figure 6. Comparison of the current and revised FAO Food Price Index**

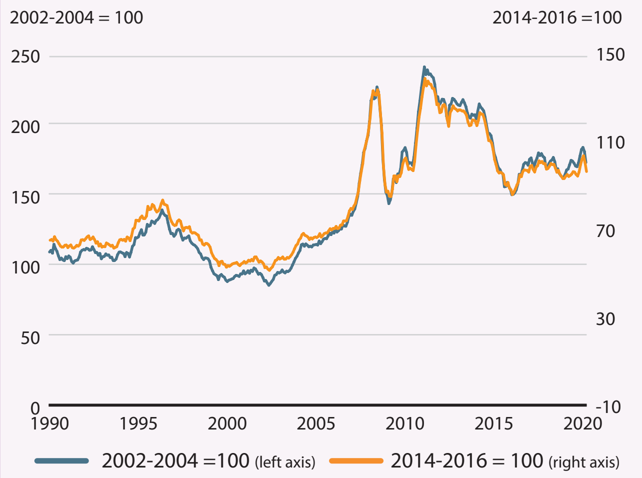
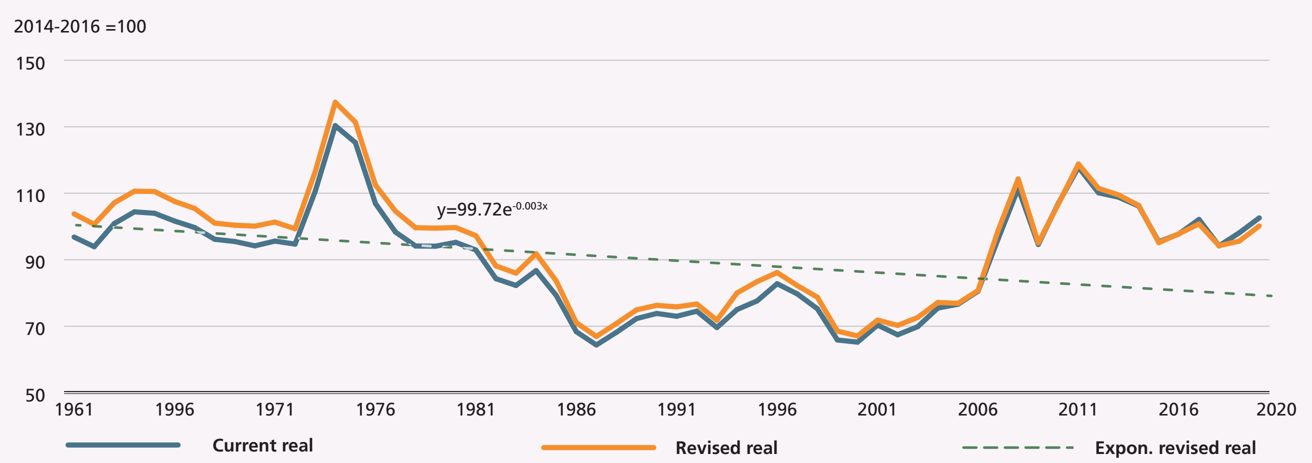



**Figure 7. The long-term real FAO Food Price Index**



displays a long-term trend rise of 2.9 percent per year over the period 1961-2020, as estimated by an exponential trend. When deflated by the World Bank index of the trade unit value of manufactures (MUV), the real FFPI displays a small negative trend of minus 0.3 percent per year over the same period (Figure 7). However, with a near historical low in 2000 the trend rise of the real FFPI of 1.6 percent per year between 2000 and 2020 is noteworthy, given interpretations that are often made concerning trend movements in real agricultural prices, as they reflect productivity improvements in agriculture relative to the wider economy. Looking at the whole period, food prices in real terms have trended downwards, implying higher relative productivity growth in agriculture. It would appear that the opposite may be true during the past two decades. Such assessments require further analysis and research as the choice of deflator itself may critically affect interpretation.

### *Revision of the FAO Global Food Consumption Price Indices for calories and protein*

The FAO Global Food Consumption Price Index (FGFCPI) tracks changes in the cost of a global food basket. Two alternative formulations of the FGFCPI have been constructed, one on a calorie and the other on a protein basis. As a measure of the changing costs of the calorie basket of primary food commodities, the FGFCPI may be useful in assessing food security implications of commodity price changes. When based on protein weights, the index captures the aggregate purchasing power for different sources of protein.

The formula follows the same construction methodology used for the FFPI, and the same prices, with the addition of the Fish Price Index and Oilseed Price Index to the formula.[5] Rather than trade weights, which are used to weight price series in the FFPI, calorie and protein content weights are used for the calculation of the FGFCPI-calorie and FGFCPI-protein, respectively. These weights are derived from the FAO Food Balance Sheets (www.fao.org/faostat/en/#data/FBS). The commodities included in these indices cover 80 percent and 77 percent of global daily average calorie and protein availability, respectively.

Tables 4 and 5 summarize the calorie and protein weights used in the current and revised FGFCPI indices. In general, for the calorie index, the weight for cereals declines in the revised index, while the weights for vegetable oils, oilseeds and meat rises. This is the result of higher incomes that spur changes in food consumption reflecting a ‘nutrition transition’ where, as incomes rise, people eat relatively less starchy staples and more nutrient dense meats, oils, sugars, fruit and vegetables. For the protein index, the decline in the weight for cereals is larger, while the weights for oilseeds and fish rise in the revised index. The revisions to the commodity price series as noted in Table 1 are also included in the revisions made to FGFCPI indices.

The current and revised FGFCPI are displayed in Figures 8 and 9, and summary statistics are provided in Table 6. The revised food consumption price indices indicate very high correlation with the current indices and a strong prediction power that explains their movements. The revised series encompass, to a very high degree, the same information as the current ones and show near identical movements, even if the percentage of monthly turning point differences is high.

**Table 4. Changes in base period calorie weights summarized by commodity sector**

| Base year | Food | Cereals | Oils/ Oilseeds | Sugar | Meat | Dairy | Fish |
|---|---|---|---|---|---|---|---|
| **2002–04** | 1.00 | 0.58 | 0.13 | 0.11 | 0.09 | 0.07 | 0.02 |
| **2014–16** | 1.00 | 0.57 | 0.14 | 0.10 | 0.10 | 0.07 | 0.02 |

**Table 5. Changes in base period protein weights summarized by commodity sector**

| Base year | Food | Cereals | Oils/ Oilseeds | Sugar | Meat | Dairy | Fish |
|---|---|---|---|---|---|---|---|
| **2002–04** | 1.00 | 0.54 | 0.04 | 0.0 | 0.21 | 0.13 | 0.08 |
| **2014–16** | 1.00 | 0.51 | 0.04 | 0.0 | 0.22 | 0.13 | 0.09 |

**Table 6. Statistical comparisons between the current and revised Global Food Consumption Price Indices**

| Index | Coefficient of variation % | | Correlation % (monthly changes) | Turning point differences % | Prediction error |
|---|---|---|---|---|---|
| | Current | Revised | | | |
| FGFCPI-calories | 22.9 | 23.0 | 97.0 | 7.8 | 1.1 |
| FGFCPI-protein | 20.4 | 20.2 | 96.5 | 12.4 | 1.0 |

[5] Fish was included in the calculation of these indices for the first time in Food Outlook, November 2019. Oilseeds included in the index are soybean, sunflower, rapeseed, copra and linseed.

## Conclusions

The FAO Food Price Index is an important indicator of global food commodity price movements. Periodic revisions to price series and the base weights in the formulae of the FFPI, as well as the FGFCPI, are necessary to ensure their relevance. The revised FFPI and FGFCPI will replace current corresponding indices, starting in July 2020.

The evidence presented in this article supports the conclusion that the new revised series move in very close correlation with previous ones, and the revisions can be undertaken without concern that the interpretation of price movements could be altered. While trade and consumption of food commodities have changed considerably over time, with few exceptions, the commodity shares in both trade and consumption have not moved significantly. Furthermore, high commodity price variation has been strongly correlated within and across sectors, thus assuring that revised price indices continue to show very similar, if not identical, movements to their current counterparts. While turning point differences exist where price data have been changed or adjusted, the result is an important improvement in the timeliness and/or representativeness of the indices as measures of the movement in market prices. The very strong statistical correlation of the current and revised series will assure continuity of the FFPI as the revisions are implemented in July 2020.

**Figure 8. Current and revised FAO Global Food Consumption Index (Calorie basis)**

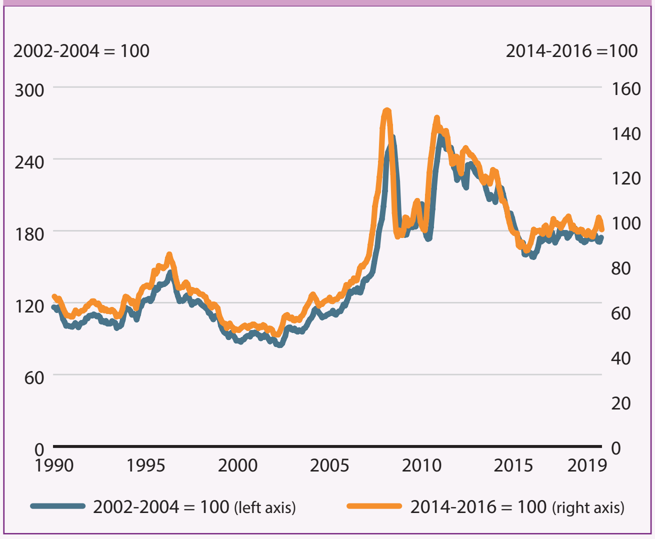



**Figure 9. Current and revised FAO Global Food Consumption Index (Protein basis)**