

**INFORMATION NOTE ON THE REVISION**

OF COST INDICES FOR THE FACTORS OF AGRICULTURAL –  
LIVESTOCK PRODUCTION

**Base year 2010 = 100.0**

*Piraeus, June 2014*

## **Revision of Cost Indices for the Factors of Agricultural and Livestock production**

(2010=100.0)

### General notes

The compilation of the cost indices for the factors of agricultural and livestock production started in 1975 with base year 1976=100.0. The overall cost index for the factors of the production, is subdivided into the following groups and subgroups:

1. Labour (agricultural wages)
2. Land (land rents)
3. Capital (capital charges)
  - a) Loans interest
  - b) Machinery rents

### Compiled indices - Weighting coefficients

The overall cost index for the factors of agricultural and livestock production calculated as a weighted average of the three categories of the indices for the factors of production.

The categories of the indices for the factors of production are the following:

- Labour remuneration index (labour)
- Rent remuneration index of utilized land (land)
- Capital remuneration index (capital)

The annual weighting coefficients have been calculated on the basis of the expenditures of National Accounts in Agriculture (EAA) for the year 2010, taking into account the available 2009 census data in agriculture, for each category of individual indicators.

### Purpose of the indices - Base period - Sources of data collection

The purpose of the cost indices for the factors of the agricultural and livestock production is to measure the changes in the prices paid by producers for the agricultural wages (Labour), for the land rents (Land) and for the capital remuneration (Capital), which are the machinery rents and the loans interest, necessary for the productive function of the agricultural and livestock holding.

The Cost indices for the factors of agricultural and livestock production are annual indices and covers the whole of the country. These indices are fixed base year indices and are updated every five (5) years in years ending in 0 or 5. The most recent revision is with base year 2010=100.0, with year 2013 as first reference year.

The price data for the cost indices for the factors of agricultural and livestock production are collected for the agricultural wages (Labour), land rents (Land) and machinery rents from Municipal / local communities. For the capital remuneration (Capital), as the loans interest, data are collected from Piraeus Bank (previous

Agricultural Bank). The total number of sources for price data collection is approximately 155 sources.

The methodology for the compilation of the cost indices for the factors of production is outlined in details in the following paragraphs. The data entry, editing and calculation of the indices is done via the integrated information system (IIS).

## **1. Labour**

A representative sample of wages in agriculture is the wage of seasonal workers, since the number of permanent workers in agriculture is very limited (according to the census of agriculture-livestock in year 2009 and agricultural structure surveys and holdings). The type of seasonal work and, consequently, the corresponding remuneration depend on the type of crops and the period of the year when this job is offered. Furthermore, the wages of seasonal workers vary from geographical area to geographical area (since moving of seasonal workers is not easy) but without significant changes. Note, that depending on the type of the crops, or depending on the geographical area, seasonal workers may work and be paid on a piece rate or on an hourly basis. In several cases, beside their wages, seasonal workers are also provided with food or housing, while in others only the wage.

Finally, wages paid to men seasonal workers differ from wages paid to female workers (men usually offer more specialized services). As a consequence, for the main crops employing seasonal workers, selected representative areas cultivated the specific kinds (according to the size of areas cultivated per specific kind-product, with data from the census of agriculture-livestock in year 2009). Besides, after suggestions of experts-agriculturists, the time periods of seasonal work were chosen e.g., for apple trees crops, the periods for seasonal works are: a) February (pruning), b) May-June (spraying), c) September-October (harvesting).

Main crops in specific kinds where seasonal workers are employed, are: cotton, tobacco, vegetables, citrus fruits, olives, vines and other trees, while, main types of work where prices are recorded, are: ploughing, milling, planting, spraying, carving, collecting, loading-unloading, etc.

For each geographical area and for each crop, a detailed description of the type of employment was done, such the gender of the seasonal worker, the method of payment as described above, so that the collected data be comparable over time.

In ELSTAT two agricultural wage indices are compiled. The agricultural wage index for men and the agricultural wage index for women. **The overall wages index** (Labour remuneration index) is the weighted mean of the above individual indices (with data according to the census of agriculture-livestock in year 2009):

$$H = \sum_{s=1}^2 H_s * W_s$$

$H$  the overall wage index and  $W_s$  is the weighted coefficient per gender  $s, s = 1, 2$ .

The wage index by gender,  $H_s$ , is calculated according to the formula:

$$H_s = \frac{1}{n} \sum \left[ \frac{1}{m} \sum \left( \frac{1}{g} \sum \frac{T_{sijk}^{(1)}}{T_{sijk}^{(0)}} \right) \right]$$

Where, the index  $H_s$ , is calculated as the simple arithmetic mean of the wage indices for each crop kinds  $i, i = 1, 2, \dots, n, (n \leq 9)$ :

$$H_s = \frac{1}{n} \sum_{i=1}^n H_{si}$$

The wage index by crop is calculated as simple arithmetic mean of the individual wage indices by specialty  $j, j = 1, 2, \dots, m, (m \leq 12)$ :

$$H_{si} = \frac{1}{m} \sum_{j=1}^m H_{sij}$$

The wage index by speciality is calculated as simple arithmetic mean of the individual indices by geographical area (local communities)  $k, k = 1, 2, \dots, g$ :

$$H_{sij} = \frac{1}{g} \sum_{k=1}^g \frac{T_{sijk}^{(1)}}{T_{sijk}^{(0)}}$$

Where,  $T_{sijk}^{(1)}$  and  $T_{sijk}^{(0)}$  are the average wages for the current period (1), for the base period (0) for the specific gender  $s$ , crop kind  $i$ , specialty  $j$  and geographic area  $k$ .

## 2. Land

The most representative prices for the remuneration of land are the rents paid for utilize land by farmers. Since the rents of the farms depend on the type of the crops and the geographical area, a representative sample of farms were chosen for the main crops from various different geographical areas of the country. Main crops in specific types are: wheat, maize, cotton, sugar beets, potatoes, alfalfa, rice, tobacco

and vegetables. The Land cost Index is the weighted mean of the land rents indices per crop, according to the percentage of leased area cultivated in the Census of agriculture-livestock in year 2009.

The **Rent index of utilized land** (Land cost Index) is calculated by the formula:

$$L = \sum_{i=1}^n L_i W_i$$

Where,  $L_i$  is the land rents index by crop and  $W_i$  is the weighted coefficient for each crop  $i$ ,  $i = 1, 2, \dots, n$  ( $n \leq 10$ ).

More specifically, the land rents Index  $\Gamma$  is calculated by the formula:

$$L = \sum_{i=1}^n \left( \frac{1}{g} \sum_{k=1}^g \frac{Y_{ik}^{(1)}}{Y_{ik}^{(0)}} \right) * W_i$$

According to this formula, the land rents index for the crop  $L_i$  is calculated as the simple arithmetic mean of the indices of the average land rents for the geographical areas (local communities)  $k$ ,  $k = 1, 2, \dots, g$ :

$$L_i = \frac{1}{g} \sum_{k=1}^g \frac{Y_{ik}^{(1)}}{Y_{ik}^{(0)}}$$

Where,  $Y_{ik}^{(1)}$  και  $Y_{ik}^{(0)}$  are respectively the land rents for the current period (1), for the base period (0), for a specific crop  $i$  and geographical area  $k$ .

### **3. Capital**

#### **a. Interest**

The remuneration of the factor “Capital” is the loans interest. The funds loaned to farmers are usually used either for the means of agricultural production (short-term loans), or for the fixed capital formation (long-term loans). As a consequence, the interest paid depend on the interest rates on the expenditures pertaining to the purchase of the means of agricultural production, of goods and services which contribute to investment in agriculture (fixed capital formation).

If we assume that  $E_A^{(0)}$  is the interest rate of short-term loans for the base period (0) and  $E_A^{(1)}$  for the period (1), and  $I^{(0)}$ ,  $I^{(1)}$ , are the corresponding Price Indices of the means of agricultural-livestock production,  $E_B^{(0)}$  is the rate interest of long-term loans for the base period (0) and  $E_B^{(1)}$  for the period (1), and  $\Delta^{(0)}$ ,  $\Delta^{(1)}$ , are the corresponding Price Indices of fixed capital formation, then the index of loans interest  $T$  is:

$$T = \frac{E_A^{(1)} I^{(1)}}{E_A^{(0)} I^{(0)}} W_1 + \frac{E_B^{(1)} \Delta^{(1)}}{E_B^{(0)} \Delta^{(0)}} W_2$$

Where,  $W_{1,2}$  are the weights or else the ratio, of short-term loans and long-term loans.

At the initial compilation of the indices with base year 1976 = 100.0, in the factor Capital, only data for renting machinery was used, while from 1980=100.0 revision onwards, the index of loans interest is compiled, so, the capital remuneration index derived from the composition of the indices of loans interest and renting machinery.

### **b. Machinery**

A number of producers are hiring agricultural machinery either from other producers either from machinery rental companies. The rent for using the machinery rental represents:

1. The interest on the capital,
2. The depreciation,
3. The profit of the entrepreneur.

For the compilation of the rent index, the machinery used by type of crops was selected, and then, from the most representative geographical areas the machinery rental data are collected. Main crops in specific kinds where rented agricultural machinery are used, are: wheat, maize, cotton, sugar beet, alfalfa, rice, potatoes, vegetables, tobacco, citrus, while, main types of work where rented machinery are used and prices are recorded, are: soil preparation (plowing, harrow, cultivator), seeding, fertilizing, spraying, carving, cutting, harvesting, export and transportation, collection, baling, etc. The compiled machinery rent index is the weighted average of rent index by type and crop, according to the rental value of machinery per type and cultivation, with data calculated from technical and economic indicators and the size of cultivated areas in the agriculture-livestock census in year 2009.

The **rent index  $K$**  is calculated by the formula:

$$K = \sum_{i=1}^n C_i \Pi_i$$

Where,  $C_i$  the rent index by crop and  $\Pi_i$  is the weighted coefficient for each crop  $i, i = 1, 2, \dots, n (n \leq 10)$ .

More specifically, the machinery rent index is calculated by the formula:

$$K = \sum_{i=1}^n \left[ \sum_{j=1}^m \left( \frac{1}{g} \sum_{k=1}^g \frac{M_{ijk}^{(1)}}{M_{ijk}^{(0)}} \right) * P_j \right] * \Pi_i$$

According to this formula, the rent index by crop  $C_i$  is calculated as weighted average of the  $C_{ij}$  indices and  $P_j$  is the weighted coefficient for the different types of machinery  $j$ ,  $j = 1, 2, \dots, m$ , ( $m \leq 15$ ):

$$C_i = \sum_{j=1}^m C_{ij} P_j$$

The rent index by type of machinery  $C_{ij}$  is calculated as simple arithmetic mean of the indices by geographical areas (local communities)  $k$ ,  $k = 1, 2, \dots, g$ :

$$C_{ij} = \frac{1}{g} \sum_{k=1}^g \frac{M_{ijk}^{(1)}}{M_{ijk}^{(0)}}$$

Where,  $M_{ijk}^{(1)}$  and  $M_{ijk}^{(0)}$  are respectively the average rents for the current period (1) and for the base period (0) for a specific crop  $i$ , type of machinery  $j$  and geographic area  $k$ .

#### Announcement of the revised Cost Indices for the Factors of Agricultural and Livestock production and transmission of them to Eurostat

The revised cost indices are released 6 months after the end of the reporting year, with a planned press release (Greek and English) and are available from the website of ELSTAT at: [www.statistics.gr](http://www.statistics.gr).

The transmission of data of Rent index of utilized land (land cost index) to Eurostat, takes place annually in the month September of the next year of the reference year.

#### Back casting of time series

a) Backdated calculations for retrospective indices of the annual Cost Indices for the Factors of Agricultural and Livestock production, in the period 2005–2012, were calculated using the individual annual indices in 2010 year, according to the following type:

$$R_{i(2010)}^{(t)} = \frac{R_{i(2005)}^{(t)}}{R_{i(2005)}^{(2010)}} * 100$$

Where:

$R_{i(2010)}^{(t)}$  is the retrospective indices  $i$  in the current period (year)  $t$  with 2010 as base year,

$R_{i(2005)}^{(t)}$  is the compiled indices  $i$  in the current period (year)  $t$  with 2005 as base year and

$\overline{R}_{i(2005)}^{(2010)}$  is the mean compiled annual indices  $i$  in 2010, with 2005 as base year

In the following tables are presented the weighting coefficients and the annual cost indices for the factors of agricultural and livestock production for each category of the factors, for the period 2006– 2012, with base year 2010=100.0.

The methodology on the compilation of the Cost Index for the factors of agricultural and livestock production, which is available on the webpage of ELSTAT (in Methodology) at:

<http://www.statistics.gr/en/statistics/-/publication/DKT33/->

**Table 1. Annual cost indices for the factors of agricultural and livestock production: 2006 - 2012**  
**Base year: 2010=100.0**

| GROUPS  | Weights         | 2006        | 2007        | 2008         | 2009         | 2010         | 2011         | 2012         |
|---|-----------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|
| <b>Cost Index for the factors of production</b> | <b>10.000.0</b> | <b>93.8</b> | <b>97.4</b> | <b>101.4</b> | <b>100.7</b> | <b>100.0</b> | <b>102.1</b> | <b>104.9</b> |
| 1. Labour remuneration (wages)                  | 3.978.6         | 98.4        | 101.4       | 100.7        | 106.4        | 100.0        | 97.4         | 92.4         |
| 2. Rent remuneration (land rents)               | 2.210.7         | 103.0       | 103.8       | 106.4        | 101.3        | 100.0        | 98.6         | 99.1         |
| 3. Capital remuneration (capital)               | 3.810.7         | 84.9        | 102.8       | 101.3        | 94.8         | 100.0        | 108.6        | 120.1        |
| (a) Loans interest                              | 2.179.9         | 83.5        | 98.3        | 94.8         | 92.2         | 100.0        | 114.5        | 133.0        |
| (b) Machinery rents                             | 1.630.8         | 86.6        | 99.9        | 92.2         | 98.1         | 100.0        | 100.9        | 103.5        |

**Table 2. Annual remuneration indices of utilized land (land rents): 2006 - 2012**  
**Base year: 2010=100.0**

|           | GROUPS                         | Weights        | 2006         | 2007         | 2008         | 2009         | 2010         | 2011        | 2012        |
|-----------|--------------------------------|----------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|
| <b>AA</b> | <b>Rent remuneration index</b> | <b>10000.0</b> | <b>103.0</b> | <b>104.2</b> | <b>102.8</b> | <b>101.3</b> | <b>100.0</b> | <b>98.6</b> | <b>99.1</b> |
| 1         | Cultivation of wheat           | 4.427.7        | 104.5        | 107.1        | 107.1        | 104.9        | 100.0        | 96.3        | 97.6        |
| 2         | Cultivation of cotton          | 1.348.0        | 104.2        | 103.6        | 102.2        | 99.3         | 100.0        | 100.3       | 101.2       |
| 3         | Cultivation of sugarbeet       | 164.6          | 103.8        | 104.1        | 104.0        | 102.5        | 100.0        | 97.5        | 98.0        |
| 4         | Cultivation of alfalfa         | 2.124.1        | 102.6        | 104.3        | 103.1        | 100.2        | 100.0        | 100.1       | 99.1        |
| 5         | Cultivation of rice            | 281.7          | 104.8        | 111.6        | 109.7        | 106.9        | 100.0        | 98.0        | 100.8       |
| 6         | Cultivation of potatoes        | 164.3          | 89.5         | 91.0         | 90.3         | 93.8         | 100.0        | 102.1       | 109.8       |
| 7         | Cultivation of vegetables      | 442.7          | 97.4         | 98.6         | 96.2         | 98.3         | 100.0        | 99.0        | 98.9        |
| 8         | Cultivation of tobacco         | 95.2           | 112.0        | 109.5        | 101.5        | 101.3        | 100.0        | 100.1       | 93.6        |
| 9         | Cultivation of maize           | 951.7          | 97.8         | 100.4        | 101.2        | 97.2         | 100.0        | 97.8        | 99.0        |

**Table 3. Annual Labour remuneration index (agricultural wages): 2006 - 2012**  
Base year: 2010=100.0

| Weights | GROUPS                                   | 2006        | 2007         | 2008         | 2009         | 2010         | 2011        | 2012        |
|---------|--|-------------|--------------|--------------|--------------|--------------|-------------|-------------|
| 1,000   | <b>Overall Labour remuneration index</b> | <b>98.4</b> | <b>101.6</b> | <b>103.8</b> | <b>106.4</b> | <b>100.0</b> | <b>97.4</b> | <b>92.4</b> |
| 0,835   | Labour remuneration for Men              | 98.7        | 101.8        | 104.3        | 106.5        | 100.0        | 97.3        | 92.4        |
| 0,165   | Labour remuneration for Women            | 97.5        | 100.8        | 101.9        | 106.1        | 100.0        | 97.7        | 92.4        |

  

| AA | Indices per crop kinds             | 2006        | 2007         | 2008         | 2009         | 2010         | 2011        | 2012        |
|----|------------------------------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|
|    | <b>Labour remuneration for Men</b> | <b>99.5</b> | <b>104.0</b> | <b>107.2</b> | <b>106.5</b> | <b>100.0</b> | <b>97.3</b> | <b>92.4</b> |
| 1  | Cultivation of cotton              | 92.2        | 100.2        | 103.7        | 119.2        | 100.0        | 98.4        | 96.7        |
| 2  | Cultivation of vegetables          | 95.3        | 99.1         | 100.2        | 102.5        | 100.0        | 96.8        | 95.2        |
| 3  | Cultivation of tobacco             | 117.6       | 128.3        | 126.6        | 107.4        | 100.0        | 99.2        | 92.6        |
| 4  | Citrus trees                       | 92.7        | 96.4         | 102.2        | 103.3        | 100.0        | 96.8        | 91.8        |
| 5  | Olives trees                       | 105.6       | 108.7        | 111.3        | 109.5        | 100.0        | 97.1        | 92.7        |
| 6  | Cultivation of vines               | 104.4       | 106.3        | 111.5        | 106.4        | 100.0        | 97.8        | 93.9        |
| 7  | Other trees                        | 96.9        | 98.4         | 103.9        | 101.9        | 100.0        | 98.5        | 93.6        |
| 8  | Animal, sheep-goats                | 94.4        | 98.7         | 101.8        | 102.1        | 100.0        | 94.0        | 83.5        |

  

| AA | Indices per crop kinds               | 2006        | 2007         | 2008         | 2009         | 2010         | 2011        | 2012        |
|----|--------------------------------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|
|    | <b>Labour remuneration for Women</b> | <b>97.9</b> | <b>103.5</b> | <b>105.0</b> | <b>106.1</b> | <b>100.0</b> | <b>97.7</b> | <b>92.4</b> |
| 1  | Cultivation of cotton                | 97.4        | 111.5        | 114.5        | 122.2        | 100.0        | 101.2       | 100.1       |
| 2  | Cultivation of vegetables            | 96.0        | 98.1         | 99.3         | 102.0        | 100.0        | 97.4        | 95.9        |
| 3  | Cultivation of tobacco               | 103.3       | 110.2        | 105.6        | 103.0        | 100.0        | 99.2        | 92.9        |
| 4  | Citrus trees                         | 99.4        | 102.4        | 106.1        | 103.9        | 100.0        | 97.0        | 87.9        |
| 5  | Olives trees                         | 97.5        | 105.9        | 111.8        | 110.5        | 100.0        | 96.1        | 93.7        |
| 6  | Cultivation of vines                 | 96.5        | 100.4        | 101.6        | 103.1        | 100.0        | 95.4        | 92.3        |
| 7  | Other trees                          | 98.1        | 98.8         | 99.6         | 100.9        | 100.0        | 99.3        | 91.1        |
| 8  | Animal, sheep-goats                  | 95.2        | 100.6        | 102.1        | 103.2        | 100.0        | 96.1        | 85.1        |

**Table 4. Annual Indices of Machinery rents: 2006 - 2012**  
Base year: 2010=100.0

| AA | GROUPS                                  | Weights        | 2006        | 2007        | 2008        | 2009        | 2010         | 2011         | 2012         |
|----|---|----------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|
|    | <b>Overall index of Machinery rents</b> | <b>10000.0</b> | <b>86.5</b> | <b>89.5</b> | <b>95.7</b> | <b>98.1</b> | <b>100.0</b> | <b>100.9</b> | <b>103.5</b> |
| 1  | Cultivation of wheat                    | 2186.6         | 83.8        | 89.2        | 97.2        | 97.7        | 100.0        | 100.8        | 104.8        |
| 2  | Cultivation of cotton                   | 1861.6         | 89.6        | 87.3        | 93.6        | 99.0        | 100.0        | 100.9        | 104.8        |
| 3  | Cultivation of sugarbeet                | 205.8          | 86.1        | 89.9        | 94.6        | 98.7        | 100.0        | 100.1        | 106.1        |
| 4  | Cultivation of alfalfa                  | 2434.6         | 86.1        | 89.6        | 95.9        | 98.1        | 100.0        | 100.7        | 101.9        |
| 5  | Cultivation of rice                     | 338.1          | 72.0        | 79.1        | 90.3        | 96.5        | 100.0        | 102.5        | 112.2        |
| 6  | Cultivation of potatoes                 | 317.8          | 83.3        | 87.5        | 98.5        | 98.9        | 100.0        | 103.8        | 104.2        |
| 7  | Cultivation of vegetables               | 734.0          | 89.0        | 92.4        | 99.1        | 96.4        | 100.0        | 99.7         | 99.2         |
| 8  | Cultivation of tobacco                  | 260.1          | 93.5        | 96.3        | 98.8        | 104.7       | 100.0        | 99.2         | 102.5        |
| 9  | Cultivation of maize                    | 1096.7         | 84.7        | 90.7        | 94.1        | 95.8        | 100.0        | 101.7        | 104.3        |
| 10 | Citrus trees                            | 564.8          | 86.6        | 89.6        | 90.9        | 97.1        | 100.0        | 100.0        | 99.2         |