



26 November 2015

## Total factor productivity of the UK agricultural industry 2014 – 2<sup>nd</sup> estimate

This release presents the second estimate of total factor productivity of the UK agricultural industry and volume indices for 2014. Total factor productivity of the agricultural industry in the United Kingdom is an indicator of how well inputs are converted into outputs giving an indication of the efficiency and competitiveness of the industry. Year to year variations in total factor productivity may be due to factors outside the farmer's control, such as, weather conditions or disease outbreaks.

There are revisions to data owing to further information becoming available. These are highlighted in the revisions section of this document on page 9.

### Key points:

- Total factor productivity of the agricultural industry in the United Kingdom is estimated to have risen by 5.6% between 2013 and 2014. This follows two years of poor productivity when bad weather conditions affected production. Compared to 2011 productivity is up by 1.5%.
- The volume of all outputs rose by 6.0% driven by a 12% increase in the volume of all crops, following a year of high cereal yields. There was a 0.3% increase in volume of all inputs
- Since 1973 total factor productivity has increased by 53% driven by a 32% increase in the volume of outputs and a 14% decrease in the volume of inputs. This is equivalent to a 1.2% increase per year during this period.

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## Productivity

While weather conditions or other factors such as disease outbreaks may have short term impact on agricultural productivity, it is developments in productivity over a longer period that constitute one of the main drivers of agricultural income. Productivity growth means that more value is added in production and more income is available to be distributed.

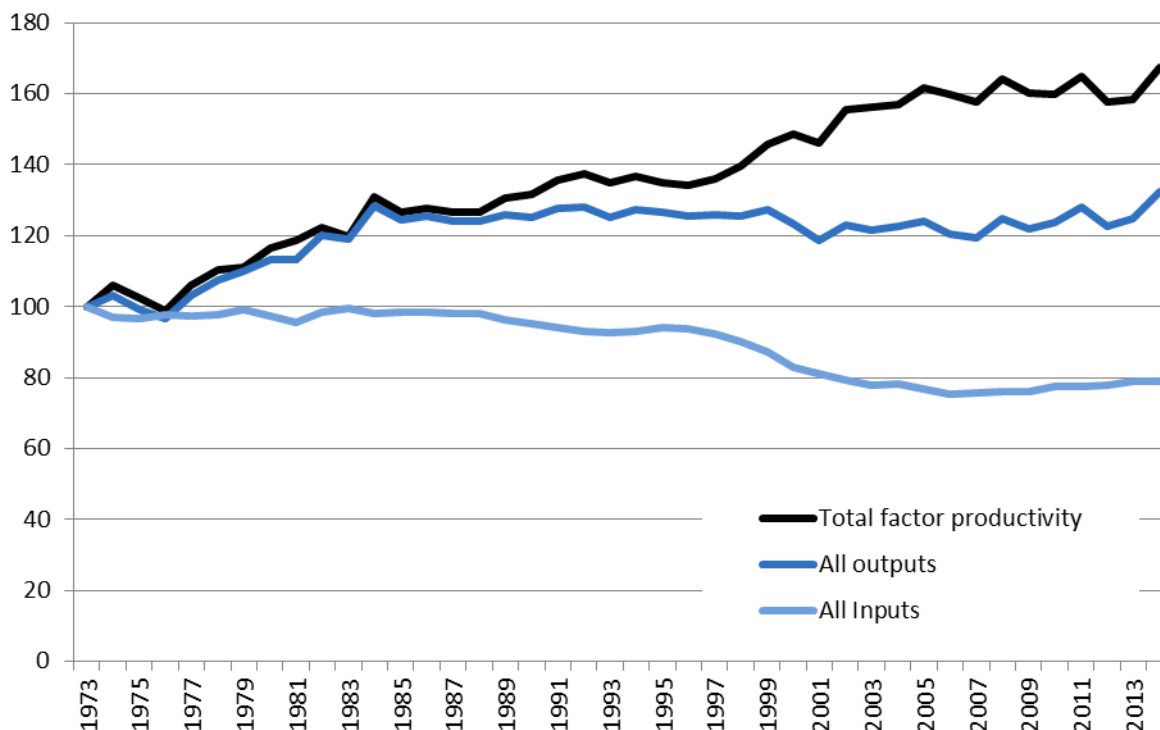
### Latest figures

Total factor productivity of the agricultural industry in the United Kingdom is estimated to have risen by 5.6% between 2013 and 2014.

Following two years where productivity was negatively affected by the weather 2014 was a marked change. Despite above average rainfall at the start of the year, with floods in South West England the remainder of the year was conducive to good crop growth. As a result in 2014 we saw record cereal yields which led to a 12% increase in the volume of crops. Weather does not have such a large influence on animal production but there was still a 2.9% increase in the volume of livestock output. This increase was largely down to an 8.2% increase in milk production, which was the highest level of production since 1987. Overall the volume of all outputs is estimated to have increased by 6.0%.

In 2014 there was only a small change in the volume in inputs, a 0.3% increase. This was due to a small increase in the use of animal feed, partly to achieve the higher milk yields, as well as an increase in the consumption of fixed capital.

**Figure 1: Total factor productivity of the UK agricultural industry (1973=100)**



## **2014 compared to 2011**

As productivity in 2012 and 2013 were negatively affected by the bad weather it is interesting to compare 2014 against 2011. Again we see increase in total factor productivity but now a more moderate 1.5% increase. There was a 3.4% increase in the volume of all outputs offset by a 1.8% increase in all inputs.

The volume of crop output rose by 4.2% between 2011 and 2014, compared to 12% between 2013 and 2014. The key driver for this change was the increase in cereals where there was a 12% increase between 2011 and 2014, reflecting the record yields seen in 2014.

For livestock there was a 2.7% increase between 2011 and 2014. This increase was driven by the high milk production in 2014 where there was a 7.1% increase in milk output.

Compared to 2011 there was a 1.8% increase in the volume of all inputs used. There was a 2.6% increase in the volume of intermediate consumption used driven by a 20% increase in plant protection products due to increased disease pressures in 2014.

### **Details**

#### ***Outputs: crops***

2014 was a good year for crop growth and when compared against 2013 there was a 12% increase in productivity. The key driver behind this growth is cereals where there was a 27% increase compared to 2013.

In 2014 the volume of wheat output increased by 43% when compared against 2013. This was due to a 20% increase in the planted area and a 16% increase in yield. The average wheat yield in 2014 was 8.6 tonnes/hectare, the highest recorded average for the United Kingdom.

2014 also saw the highest recorded yield for barley at 6.4 tonnes/hectare (average for spring and winter barley). Despite this increase in yield there was an 11% reduction in the planted area as farmers reverted back to wheat. This led to an overall 1% fall in the volume of barley when compared to 2013.

Oilseed rape also saw an increase in the volume of outputs. Good yields were offset by a reduction in the crop area to give a 14% increase in the volume of outputs. This was the second year in a row that the planted area of oilseed rape has fallen following the peak plantings in 2012.

#### ***Outputs: livestock***

Livestock output is not so directly affected by the weather as crops. Compared to 2013 there was a 2.9% increase in the volume of all livestock outputs.

The key contributor to the increase in livestock outputs was milk where there was an 8.2% increase in the volume compared to 2013. In 2014 milk production was 14.5 billion litres, the largest since 1987. This was achieved by an increase in the size of the dairy herd as well as increased production per cow. High milk prices at the start of the year are thought to have encouraged the additional production seen in 2014.

There is a mixed picture for meat production with increases seen in pigs and sheep which were offset by decreases in cattle and poultry. Overall there was no change in the volume of meat production.

### **Inputs**

In 2014 there was a 0.3% increase in the volume of all inputs.

Animal feed is the largest input and there was a 1.6% increase in the volume used in 2014. Overall, the volume of compounds used in 2014 was down by 0.2%. There was an increase in compounds used for poultry and pigs but a reduction for cattle and sheep. However, it is worth noting that there was an increase in the volume of compounds used by dairy herds to accommodate the increased milk production. The total volume of straights used in 2014 increased by 5.6%. This was driven by the lower cost of straights and an increase in oilseed based products possibly to boost the lower protein content seen in cereals this year.

The volume of plant protection products used in 2014 increased by 3.8%. This was due to a greater use of fungicides to match the increased area of winter wheat and winter oilseed rape. There was also higher disease pressure in 2014 compared to 2013.

There was a 2.8% fall in the use of energy in 2014. This was largely driven by the significant reduction in the use of heating fuels in the winter/spring due to the milder weather. Use of fuels for machinery were also lower as there was less land work in the spring, notably spring plantings of cereals.

### **Partial factor productivity**

Partial factor productivity shows the impact key inputs have on productivity. It measures total outputs against a part of the inputs. The figures below clearly show that labour is the key input in driving productivity gains. Productivity by labour shows a steady increase over the whole period. Labour volumes are now approximately half of what they were in 1973. However over the last few years growth in labour productivity is due to increased output rather than a reduction in labour number.

In 2014 all the partial factor productivity indicators were driven by the 6.0% increase in the volume of outputs. Land productivity saw the largest increase of 6.1% in 2014.

**Figures 2 Partial productivity indicators compared against total factor productivity (1973=100)**

Figure 2a Intermediate consumption

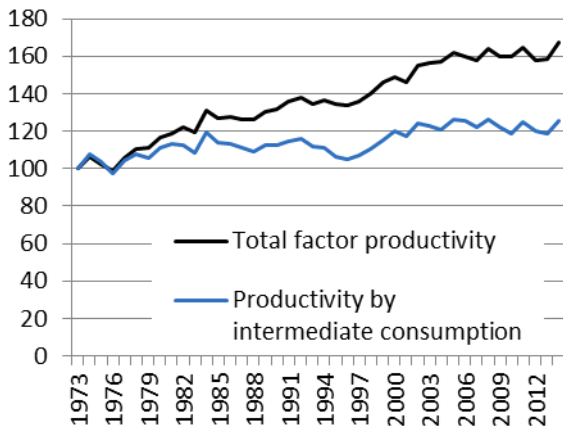


Figure 2b Capital consumption

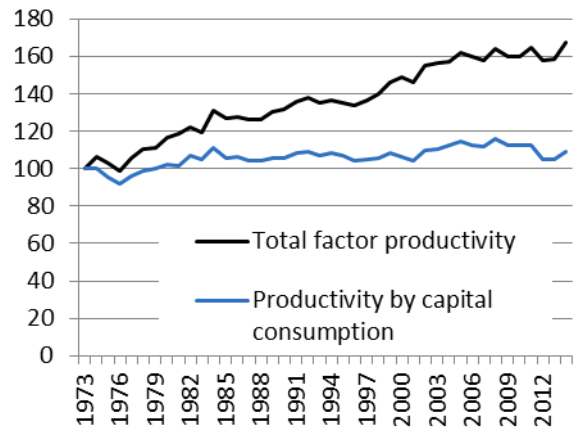


Figure 2c Labour

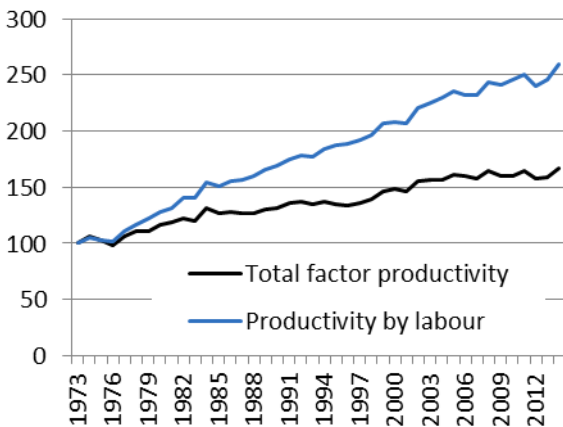
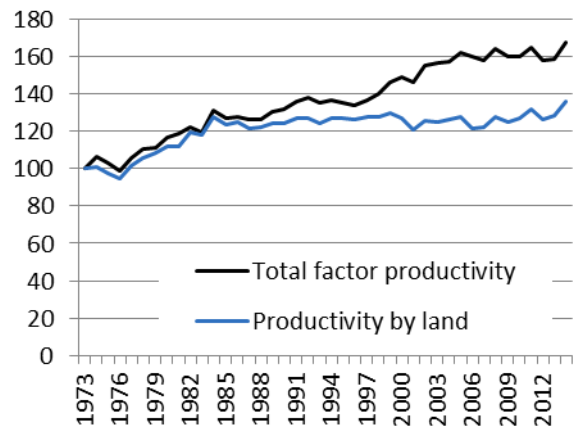


Figure 2d Land



**Table 1 Volume indices for outputs and inputs**

	2010=100					
	2009	2010	2011	2012	2013	2014
<b>1 Output of cereals</b>	102.4	100.0	105.0	92.6	92.4	117.8
wheat	93.6	100.0	104.2	88.2	75.8	108.6
rye	86.4	100.0	100.0	68.2	90.9	90.9
barley	141.2	100.0	110.7	111.3	154.2	152.7
oats and summer cereal mixtures	109.8	100.0	92.1	93.3	150.5	113.9
other cereals	120.2	100.0	99.5	93.3	106.0	105.3
<b>2 Output of industrial crops</b>	99.5	100.0	118.3	105.8	98.6	111.3
oil seeds	87.0	100.0	122.9	112.9	95.2	108.3
oilseed rape	87.5	100.0	123.7	114.6	95.4	110.3
other oil seeds	75.4	100.0	98.9	58.0	86.4	54.7
protein crops	117.2	100.0	76.0	55.5	68.9	80.3
sugar beet	129.6	100.0	130.3	111.7	129.2	142.6
other industrial crops	98.1	100.0	101.1	101.1	101.1	101.1
<b>3 Output of forage plants</b>	105.3	100.0	107.1	109.0	121.3	121.3
<b>4 Output of vegetables and horticultural products</b>	96.4	100.0	97.7	95.0	97.8	99.7
fresh vegetables	96.4	100.0	98.1	93.4	97.9	101.9
plants and flowers	96.4	100.0	97.2	96.7	97.7	97.3
<b>5 Output of potatoes</b>	125.8	100.0	116.4	90.3	111.1	110.3
<b>6 Output of fruit</b>	99.7	100.0	101.3	93.0	100.1	106.7
<b>7 Output of other crop products</b>	103.5	100.0	114.4	126.9	119.1	132.6
<b>Total crop output (sum 1 - 7)</b>	101.7	100.0	105.5	95.7	97.8	109.9
<b>8 Output of livestock (meat)</b>	96.7	100.0	102.8	102.8	103.1	103.1
cattle	95.4	100.0	102.8	101.7	98.0	97.0
pigs	95.3	100.0	106.4	108.6	111.9	116.4
sheep	108.1	100.0	105.9	101.1	104.2	108.3
poultry	92.7	100.0	99.5	102.2	105.2	102.3
other animals	100.0	100.0	100.0	100.0	100.0	100.1
<b>9 Output of livestock products</b>	96.2	100.0	101.3	98.9	100.2	107.5
milk	97.5	100.0	101.5	99.9	100.5	108.7
eggs	89.2	100.0	99.6	96.5	99.5	100.0
raw wool	99.0	100.0	105.2	110.7	97.5	99.8
other animal products	92.9	100.0	98.7	57.5	84.2	106.8
<b>Total livestock output (8 + 9)</b>	96.5	100.0	102.2	101.3	102.0	104.9
<b>10 Inseparable non-agricultural activities</b>	100.5	100.0	101.5	103.1	115.4	112.6
<b>11 All outputs</b>	98.6	100.0	103.4	99.1	100.9	107.0

**Table 1 Volume indices for outputs and inputs (continued)**

	2010=100					
	2009	2010	2011	2012	2013	2014
<b>12 Seeds</b>	92.7	100.0	97.6	101.6	107.0	106.8
<b>13 Energy</b>	102.5	100.0	96.3	96.3	97.0	94.3
electricity and fuels for heating	100.5	100.0	94.5	93.8	87.4	72.3
motor and machinery fuels	103.4	100.0	96.9	97.2	100.9	103.7
<b>14 Fertilisers</b>	88.4	100.0	103.2	97.9	99.2	99.5
<b>15 Plant protection products</b>	92.3	100.0	108.1	117.9	124.9	129.6
<b>16 Veterinary expenses</b>	102.4	100.0	97.2	100.3	104.1	105.7
<b>17 Animal feed</b>	92.6	100.0	93.0	94.7	99.1	100.7
compounds	93.7	100.0	97.7	103.0	109.3	109.1
straights	90.9	100.0	85.3	81.3	82.5	87.2
<b>18 Total maintenance</b>	98.7	100.0	99.8	99.3	100.5	102.0
materials	97.4	100.0	101.4	100.2	102.2	103.3
buildings	100.8	100.0	97.2	97.8	97.6	99.8
<b>19 FISIM</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>20 Other goods and services</b>	103.3	100.0	102.7	97.6	98.5	95.2
<b>21 Intermediate consumption (excl Agricultural services)</b>	96.3	100.0	98.5	98.3	101.1	101.1
<b>22 Consumption fixed capital (excluding livestock)</b>	98.8	100.0	103.8	106.5	108.8	110.7
equipment	97.7	100.0	106.5	111.2	115.7	119.2
buildings	100.4	100.0	99.6	99.0	98.3	97.5
<b>23 All Labour</b>	100.5	100.0	101.6	101.6	100.8	101.2
Compensation of employees	100.7	100.0	102.4	102.4	101.7	102.3
Entrepreneurial workers (farm and specialist contractor)	100.3	100.0	101.2	101.2	100.3	100.6
<b>24 Land</b>	100.5	100.0	99.6	99.7	100.1	100.0
<b>25 All Inputs and Entrepreneurial Labour</b>	98.3	100.0	100.2	100.3	101.7	102.1
<b>Total factor productivity (11 divided by 25)</b>	<b>100.3</b>	<b>100.0</b>	<b>103.2</b>	<b>98.8</b>	<b>99.2</b>	<b>104.8</b>
<b>Partial factor productivity indicators</b>						
Productivity by intermediate consumption (11 divided by 21)	102.4	100.0	105.0	100.9	99.9	105.8
Productivity by capital consumption (11 divided by 22)	99.8	100.0	99.6	93.1	92.8	96.7
Productivity by labour (11 divided by 23)	98.2	100.0	101.8	97.6	100.1	105.7
Productivity by land (11 divided by 24)	98.1	100.0	103.8	99.4	100.8	106.9

## **Definitions and explanations**

All outputs	The volume of all outputs sold off the farm. This excludes transactions within the industry.
All inputs	The volume of goods and services purchased and consumed. This excludes any transactions for goods or service within the industry.
Total factor productivity:	A measure of the efficiency of turning all inputs into outputs. Derived by dividing all outputs by all inputs.
Productivity by intermediate consumption	A measure of how efficiently intermediate consumption is transformed into outputs. Derived by dividing all outputs by intermediate consumption.
Productivity by capital consumption	A measure of how efficiently capital is consumed in the production of outputs. Derived by dividing all outputs by capital consumption.
Productivity by all labour	A measure of how efficiently labour is used in the production of all outputs. Derived by dividing all outputs by all labour.

## **Description of total factor productivity**

Total factor productivity is a key measure of the economic performance of agriculture and an important driver of farm incomes. It represents how efficiently the agricultural industry uses the resources that are available to turn inputs into outputs. The volumes of outputs and inputs are weighted by price.

Total factor productivity is not an absolute measure of the efficiency of transforming inputs into outputs but a relative measure, which enables us to see if improvements are made by comparing one year to another.

When we look at the results we need to consider the trend as changes from year to year are often shaped by factors outside the farmer's control. Factors such as weather, animal disease, policy interventions and general economic conditions can have short term effects on total factor productivity. However, over a longer period, developments in productivity constitute one of the major factors that impact on income.

These results are produced as part of the preparation of aggregate agricultural accounts required by EU legislation and by UK policy making. The accounts also produce other measures of the performance of the agricultural industry, including Total Income from Farming.



## Revisions

Revisions have been made owing to further information becoming available and methodology reviews.

For more recent year's data first published in April are routinely updated in this second estimate as more information becomes available. Additional revisions to historic data are due to improvements or corrections in methodology or data as part of an on-going review.

Table 2 shows the impact these changes have had on the 2013 figures for total factor productivity.

**Table 2 Revisions made to the 2014 estimate of total factor productivity between April 2015 and November 2015.**

2010=100	Apr-15 2014	Nov-15 2014	% change to 2014
All outputs	107.4	107.0	-0.4%
All inputs	102.0	102.1	0.1%
Total Factor Productivity	105.3	104.8	-0.5%

## Summary quality report

A summary quality report for this statistical release can be found on the GOV.UK website at <https://www.gov.uk/government/collections/productivity-of-the-agricultural-industry>

This is an overview note which is not release specific but will be reviewed and updated at regular intervals. It pulls together key qualitative information on the various dimensions of quality as well as providing a summary of methods used to compile the output. It relates to estimates of Total Income from Farming and aim to provide users with information on usability and fitness for purpose of these estimates.

## Quality Assurance

Defra has in place quality assurance processes to check the accuracy and reliability of the aggregate agricultural accounts that includes:

- Ongoing review of methods employed in the calculation of the accounts.
- Assessment of the quality of the estimates of components of the accounts with internal experts.
- Discussion of components of the accounts with external experts.
- Quality assessments made by Eurostat, the statistical office of the European Union.

## Main users and uses of total factor productivity

Total factor productivity is used in conjunction with other economic information to:

- Inform policy decisions and to help monitor and evaluate current policies relating to agriculture in the UK by Government and in the European Union by the European Commission.
- Inform stakeholders of the performance of the agricultural industry.
- Inform research into the economic performance of the agricultural industry.
- As an impact indicator of Government policy.

### **User engagement**

As part of our ongoing commitment to compliance with the Code of Practice for Official Statistics <http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html>, we wish to strengthen our engagement with users of these statistics and better understand the use made of them and the types of decisions that they inform. Consequently, we invite users to make themselves known, to advise us of the use they do, or might, make of these statistics, and what their wishes are in terms of engagement. Feedback on this notice and enquiries about these statistics are also welcome.