



25 May 2017

## Total factor productivity of the UK agriculture industry

### First estimate for 2016

This release presents a minor correction to the first estimate of Total Factor Productivity (TFP) of the UK agriculture industry and volume indices for inputs and outputs, published on 27 April 2016.

Total factor productivity is a measure of how well inputs are converted into outputs giving an indication of the efficiency and competitiveness of the agriculture industry. While external factors such as weather conditions or disease outbreaks may have short term impact on productivity, it is developments in productivity over a longer period that constitute one of the main drivers of agricultural income.

Minor revisions to pre-2016 estimates have been made using data that has become available since the release published in November 2015. Details can be found in the revision section of this document.

#### Key points

- Total factor productivity is estimated to have fallen by 2.3% between 2015 and 2016. This is driven by a fall in overall levels of production combined with static volumes of inputs.
- The volume of all outputs fell 2.5% from the high levels seen in 2015. This was driven by the following volume changes:
  - a 7.9% fall for all crops
  - a 2.5% increase for livestock meat outputs
  - a 2.1% fall for livestock product outputs
- The volume of all inputs fell slightly (0.2%) but by less than the decrease in outputs.

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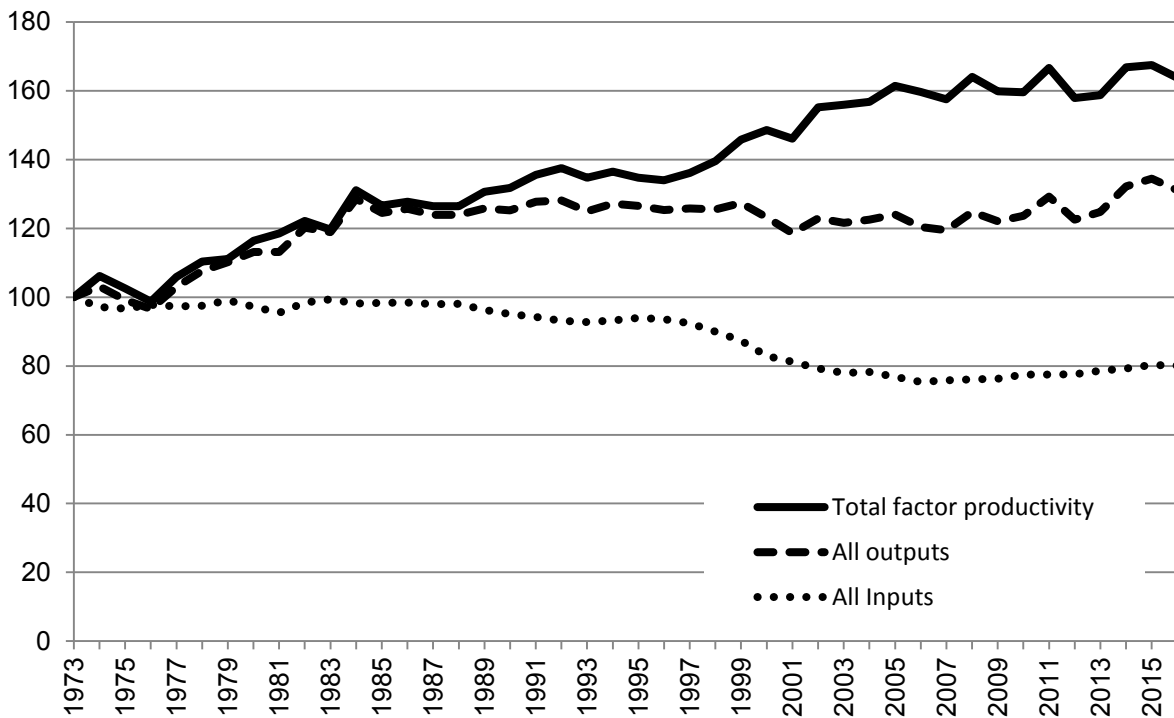
**Enquiries on this publication to:** Helen Mason, Department for Environment, Food and Rural Affairs, Room 201, Foss House, Kings Pool, 1-2 Peasholme Green, York, YO1 7PX. Email: [FarmAccounts@defra.gsi.gov.uk](mailto:FarmAccounts@defra.gsi.gov.uk)

**Media enquiries to:** Tel: 020 7238 5054 / 6001 / 5610 / 6092 / 6007 / 5599

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## Total factor productivity estimates

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



Total factor productivity of the agriculture industry in the United Kingdom is estimated to have fallen by 2.3% between 2015 and 2016. Although there are annual fluctuations the long-term trend is still one of slow but steady overall improvement. The slight annual fall is driven by a reduction in outputs, partially offset by a slight reduction in the volume of inputs.

**Table 1 Volume indices for outputs, inputs and total factor productivity (2010=100)**

	2011	2012	2013	2014	2015	2016	% change 15-16
<b>All outputs</b>	104.5	99.1	100.9	107.0	108.7	106.1	-2.5%
<b>All inputs</b>	100.1	100.1	101.4	102.3	103.6	103.4	-0.2%
<b>Total factor productivity</b>	104.4	99.0	99.5	104.5	105.0	102.6	-2.3%

The volume of all outputs fell by 2.5%, from the record levels recorded for the UK in 2015. The volume of all inputs fell slightly (0.2%) but by less than the decrease in outputs.

Since 2010 outputs have increased by 6.1% whilst a smaller increase of 3.4% to inputs has led to an overall fall in TFP of 2.3%.

**Table 2a Volume indices for outputs (2010=100)**

	2009	2011	2012	2013	2014	2015	2016
<b>1 Output of cereals</b>	102.4	105.0	92.6	92.6	118.8	120.4	107.3
wheat	93.6	104.2	88.2	75.9	109.7	109.1	98.1
rye	86.4	100.0	68.2	90.9	90.9	90.9	90.9
barley	141.2	110.7	111.3	154.3	153.5	164.5	140.8
oats and summer cereal mixtures	109.8	92.1	93.3	150.6	114.1	119.7	121.8
other cereals	120.2	99.5	93.3	106.0	105.1	89.3	77.6
<b>2 Output of industrial crops</b>	99.5	118.3	105.8	98.6	111.6	109.5	84.7
oil seeds	87.0	122.9	112.9	95.2	108.3	111.3	78.9
oilseed rape	87.5	123.7	114.6	95.4	110.3	114.0	79.6
other oil seeds	75.4	98.9	58.0	86.4	54.6	39.7	66.4
protein crops	117.2	76.0	55.5	68.9	81.8	124.5	113.3
sugar beet	129.6	130.3	111.7	129.2	142.6	95.3	87.1
other industrial crops	98.1	101.1	101.1	101.1	101.1	101.1	101.1
<b>3 Output of forage plants</b>	105.3	107.1	109.0	121.3	121.3	121.3	121.3
<b>4 Output of vegetables and horticultural products</b>	96.7	97.4	94.7	97.6	100.0	100.3	99.8
fresh vegetables	96.9	97.7	92.8	97.4	102.5	103.0	100.5
plants and flowers	96.4	97.2	96.7	97.7	97.3	97.4	99.0
<b>5 Output of potatoes</b>	126.6	116.4	90.7	112.8	109.7	94.1	95.7
<b>6 Output of fruit</b>	99.7	101.3	93.1	100.2	106.9	110.4	98.6
<b>7 Output of other crop products</b>	103.5	114.4	126.9	119.1	133.9	123.2	126.1
<b>Total crop output (sum 1 - 7)</b>	101.9	105.5	95.6	97.9	110.4	109.6	101.0
<b>8 Output of livestock (meat)</b>	96.7	106.0	102.8	102.9	102.7	105.6	108.2
cattle	95.4	111.9	102.0	98.0	96.3	100.2	103.9
pigs	95.3	106.4	108.6	111.9	115.8	119.9	124.6
sheep	108.1	105.9	101.2	103.3	108.3	110.2	106.5
poultry	92.7	99.5	102.2	105.5	102.5	104.4	108.1
other animals	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>9 Output of livestock products</b>	96.2	101.3	98.9	100.2	107.3	109.9	107.7
milk	97.5	101.5	99.8	100.5	108.5	111.4	107.7
eggs	89.2	99.6	96.5	99.5	100.0	103.5	107.9
raw wool	99.0	105.3	110.4	97.4	99.8	101.2	102.2
other animal products	92.9	98.7	57.5	84.2	106.8	88.9	88.9
<b>Total livestock output (8 + 9)</b>	96.5	104.1	101.2	101.8	104.6	107.4	108.2
<b>10 Inseparable non-agricultural activities</b>	100.5	101.5	103.1	115.4	113.2	120.7	120.7
<b>11 All outputs</b>	98.7	104.5	99.1	100.9	107.0	108.7	106.1

**Table 2b Volume indices for inputs (2010=100)**

	2009	2011	2012	2013	2014	2015	2016
<b>12 Seeds</b>	92.7	97.6	101.6	107.0	107.0	106.2	105.5
<b>13 Energy</b>	102.5	96.3	96.3	97.0	95.9	98.0	98.1
electricity and fuels for heating	100.5	94.5	93.8	87.4	80.7	82.4	81.0
motor and machinery fuels	103.4	96.9	97.2	100.9	102.2	104.4	105.5
<b>14 Fertilisers</b>	88.4	103.2	97.9	99.2	100.5	100.9	103.1
<b>15 Plant protection products</b>	92.3	108.1	117.9	124.9	130.6	134.2	136.1
<b>16 Veterinary expenses</b>	102.4	97.2	100.3	104.1	105.6	104.1	104.4
<b>17 Animal feed</b>	92.6	93.0	94.8	98.9	101.3	105.4	104.9
compounds	93.7	97.7	103.0	109.3	109.9	114.5	116.3
straights	90.9	85.3	81.6	82.1	87.4	90.8	86.1
<b>18 Total maintenance</b>	98.7	99.8	99.3	100.5	106.9	107.0	107.2
materials	97.4	101.4	100.2	102.2	103.1	101.1	100.8
buildings	100.8	97.2	97.8	97.6	112.9	116.6	117.5
<b>19 FISIM</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>20 Other goods and services</b>	103.3	102.7	97.6	98.5	96.8	99.3	97.9
<b>21 Intermediate consumption (excl Agricultural services)</b>	96.3	98.5	98.3	101.0	102.5	104.7	104.6
<b>22 Consumption fixed capital (excluding livestock)</b>	100.6	102.2	104.0	105.9	107.3	108.8	110.0
equipment	97.7	103.9	107.2	110.8	113.7	116.8	119.3
buildings	104.9	99.6	99.1	98.4	97.7	96.9	96.0
<b>23 All Labour</b>	100.5	101.6	101.6	100.8	100.9	101.2	100.3
Compensation of employees	100.7	102.4	102.4	101.7	101.8	102.1	100.8
Entrepreneurial workers (farm and specialist contractor)	100.3	101.2	101.2	100.3	100.5	100.7	100.1
<b>24 Land</b>	100.5	99.6	99.7	100.1	100.0	99.5	100.7
<b>25 All Inputs and Entrepreneurial Labour</b>	<b>98.5</b>	<b>100.1</b>	<b>100.1</b>	<b>101.4</b>	<b>102.3</b>	<b>103.6</b>	<b>103.4</b>
<b>Total factor productivity (11 divided by 25)</b>	<b>100.2</b>	<b>104.4</b>	<b>99.0</b>	<b>99.5</b>	<b>104.5</b>	<b>105.0</b>	<b>102.6</b>

**Table 2c Total and partial factor productivity (2010=100)**

	2011	2012	2013	2014	2015	2016
<b>Total factor productivity (11 divided by 25)</b>	<b>104.4</b>	<b>99.0</b>	<b>99.5</b>	<b>104.5</b>	<b>105.0</b>	<b>102.6</b>
<b>Partial factor productivity indicators</b>						
Productivity by intermediate consumption (11÷21)	106.1	100.8	99.9	104.4	103.8	101.4
Productivity by capital consumption (11÷22)	102.2	95.3	95.3	99.7	99.9	96.5
Productivity by labour (11÷23)	102.9	97.5	100.1	106.0	107.5	105.7
Productivity by land (11÷24)	104.9	99.3	100.8	106.9	109.3	105.3

**Annual change in volumes of outputs and inputs between 2015 and 2016**

## OUTPUTS

**Total outputs** fell by 2.5%, driven by a fall of 7.9% in the volume of all crops, offset by a slight (0.8%) increase in the volume of livestock outputs.

**Cereal** volumes fell by 11% with oats being the only cereal crop to see an increase (1.7%).

**Oilseed rape** saw a large fall in the volume of outputs, down 30%.

**Livestock** outputs showed little change overall, with an increase of 0.8%.

**Milk** volume fell by 3.2% from the high levels seen in 2015.

Total volume of **meat** production increased 2.5%. This was driven by increases of 3.7% for cattle, 4.0% for pigs, 3.5% for poultry and a fall of 3.4% for sheep. Volume of output for other animals remained level.

## INPUTS

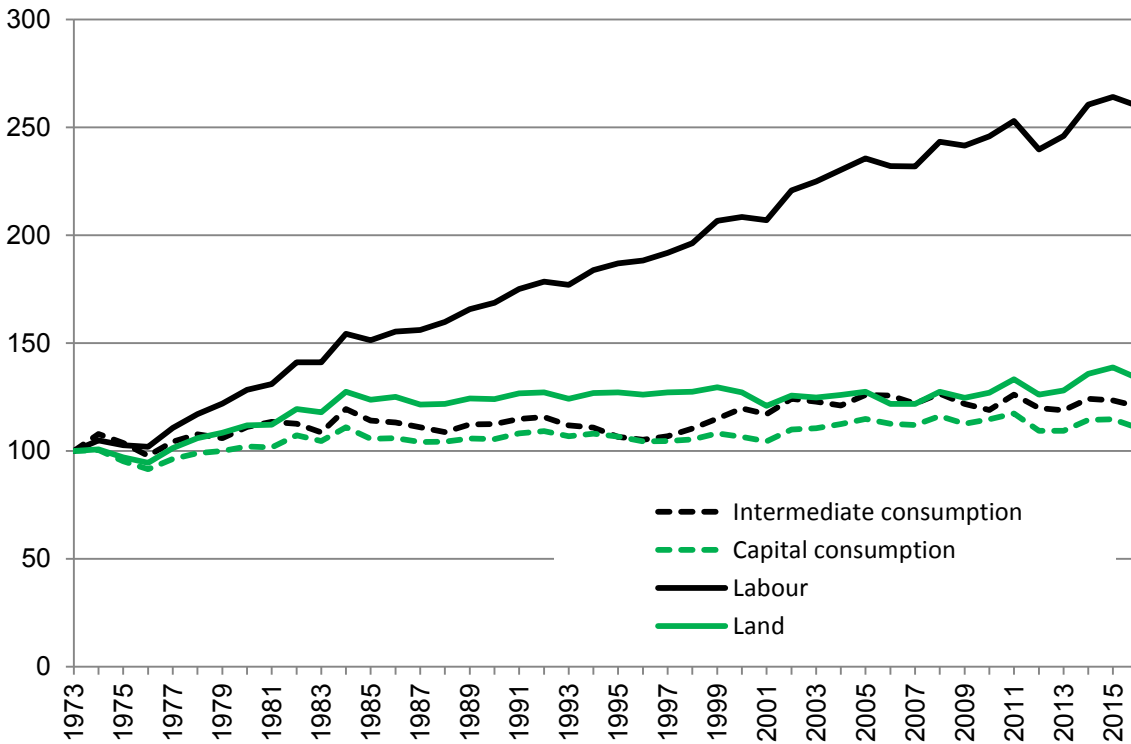
Overall there was a slight fall of 0.2% in the volume of **all inputs**.

**Animal feed** is the largest input and showed a slight fall of 0.6% overall. This was driven by a 5.1% fall for straights, partly offset by a small increase in compounds (1.5%).

## Partial productivity

Partial 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.

**Figure 2 Partial productivity indicators (1973=100)**



## Background to 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 agriculture industry uses the resources that are available to turn inputs into outputs. It is expressed here as a relative measure rather than an absolute measure, enabling us to see if improvements are made by comparing one year to another.

External factors such as weather and animal disease can have short term effects on total factor productivity. When we look at the results we should consider the overall, long-term trend. In the long-term, 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 are also used to produce other measures of the performance of the agriculture industry, including Total Income from Farming.

## Definitions and explanations

<b>All outputs</b>	The volume of all outputs sold off the farm. This excludes transactions within the industry.
<b>All inputs</b>	The volume of goods and services purchased and consumed. This excludes transactions within the industry.
<b>Total factor productivity</b>	How efficiently all inputs are turned into outputs. Derived by dividing all outputs by all inputs.
<b>Partial productivity</b>	How efficiently intermediate consumption, capital, labour or land is transformed into outputs. Derived by dividing all outputs by each factor.

## Revisions

Revisions to the estimates for 2015 have been made using data that has become available since the Statistics Release published in December 2016.

**Table 2 Revisions made to the 2015 estimate of total factor productivity between December 2016 and April 2017**

<b>2010=100</b>	<b>December 2016 estimates for 2015</b>	<b>April 2017 estimates for 2015</b>
<b>All outputs</b>	108.9	108.7
<b>All inputs</b>	103.4	103.6
<b>Total Factor Productivity</b>	105.3	105.0

## 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 and external experts.
- Quality assessments made by Eurostat, the statistical office of the European Union.

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 provides users with information on usability and fitness for purpose of these estimates.

## 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 agriculture industry.
- Inform research into the economic performance of the agriculture 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.