Department for Environment Food & Rural Affairs

1 December 2016

Total factor productivity of the UK agriculture industry

Second estimate for 2015

This release presents the second estimate of Total Factor Productivity (TFP) of the UK agriculture industry for 2015. It also presents volume indices for inputs and outputs.

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.

These figures have been revised using data that has become available since the first estimate published in April 2016. Details can be found in the revision section of this document.

Key points

- Total factor productivity of the agriculture industry in the United Kingdom is estimated to have increased by 0.7% between 2014 and 2015. This is driven by high levels of production in 2015 including record yields for cereals. Compared to 2010 productivity is up by 5.3%.
- The volume of all outputs was the highest level ever recorded for the UK representing an increase of 1.9% compared to 2014. This was driven by a slight fall (0.5%) in the volume of all crops offset by a 2.8% increase in the volume of livestock outputs.
- The volume of all inputs increased slightly (1.2%) but by less than the increase in outputs.
- Since 1973 total factor productivity has increased by 68% driven by a 35% increase in the volume of outputs and a 20% decrease in the volume of inputs.

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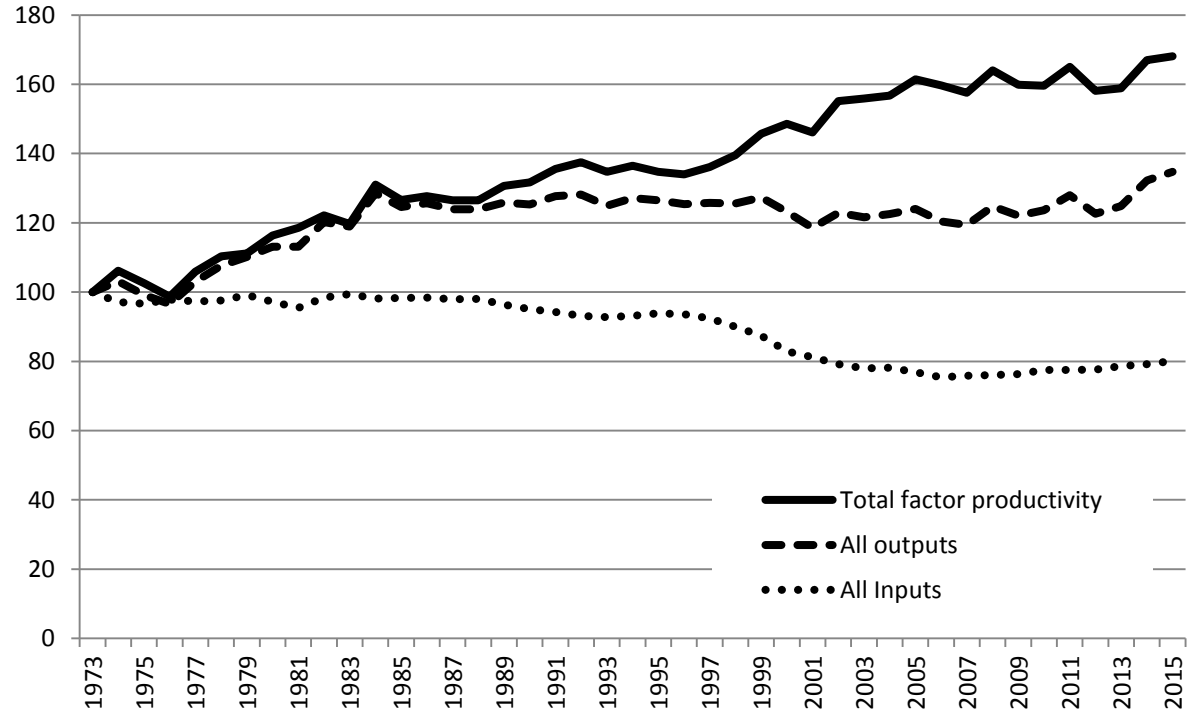
Total factor productivity estimates

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 increased by 0.7% between 2014 and 2015. Although there are annual fluctuations the long-term trend is still one of slow but steady overall improvement. The annual improvement is driven by an increase in outputs, partially offset by a smaller increase in the volume of inputs.

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

	2010	2011	2012	2013	2014	2015	% change	
							2014-2015	2010-2015
All outputs	100.0	103.4	99.2	101.0	106.9	108.9	+1.9%	+8.9%
All inputs	100.0	100.1	100.1	101.5	102.2	103.4	+1.2%	+3.4%
Total factor productivity	100.0	103.4	99.0	99.5	104.6	105.3	+0.7%	+5.3%

Compared to 2014 the volume of all outputs rose by 1.9%, representing the highest level recorded for the UK. The volume of all inputs increased slightly (1.2%) but by less than the increase in outputs.

Since 2010 outputs have increased by 8.9% whilst a smaller increase of 3.4% to inputs has led to an overall increase in TFP of 5.3%.

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

	2010	2011	2012	2013	2014	2015
1 Output of cereals	100.0	105.0	92.6	92.6	118.0	121.7
wheat	100.0	104.2	88.2	75.9	109.7	109.1
rye	100.0	100.0	68.2	90.9	90.9	90.9
barley	100.0	110.7	111.3	154.3	153.5	164.4
oats and summer cereal mixtures	100.0	92.1	93.3	150.6	82.5	174.7
other cereals	100.0	99.5	93.3	106.0	105.1	89.3
2 Output of industrial crops	100.0	118.3	105.8	98.6	111.6	109.5
oil seeds	100.0	122.9	112.9	95.2	108.3	111.3
oilseed rape	100.0	123.7	114.6	95.4	110.3	114.0
other oil seeds	100.0	98.9	58.0	86.4	54.6	39.7
protein crops	100.0	76.0	55.5	68.9	81.8	124.5
sugar beet	100.0	130.3	111.7	129.2	142.6	95.3
other industrial crops	100.0	101.1	101.1	101.1	101.1	101.1
3 Output of forage plants	100.0	107.1	109.0	121.3	121.3	121.3
4 Output of vegetables & horticultural products	100.0	97.7	95.0	97.8	100.1	100.3
fresh vegetables	100.0	98.1	93.4	97.9	102.7	103.0
plants and flowers	100.0	97.2	96.7	97.7	97.3	97.4
5 Output of potatoes	100.0	116.4	90.7	112.8	109.7	88.3
6 Output of fruit	100.0	101.3	93.0	100.1	106.8	110.4
7 Output of other crop products	100.0	114.4	126.9	119.1	133.9	132.5
Total crop output (sum 1 - 7)	100.0	105.5	95.7	98.0	110.1	109.6
8 Output of livestock (meat)	100.0	102.8	102.8	103.0	102.8	105.8
cattle	100.0	102.8	101.9	97.9	96.2	100.0
pigs	100.0	106.4	108.6	111.9	115.8	119.9
sheep	100.0	105.9	101.2	103.3	108.3	109.4
poultry	100.0	99.5	102.2	105.5	102.5	105.4
other animals	100.0	100.0	100.0	100.0	100.0	100.0
9 Output of livestock products	100.0	101.3	98.9	100.2	107.3	109.9
milk	100.0	101.5	99.8	100.5	108.5	111.4
eggs	100.0	99.6	96.5	99.5	100.0	103.4
raw wool	100.0	105.3	110.4	97.4	99.8	101.9
other animal products	100.0	98.7	57.5	84.2	106.8	88.9
Total livestock output (8 + 9)	100.0	102.2	101.3	101.9	104.6	107.5
10 Inseparable non-agricultural activities	100.0	101.5	103.1	115.4	113.7	122.4
11 All outputs	100.0	103.4	99.2	101.0	106.9	108.9

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

	2010	2011	2012	2013	2014	2015
12 Seeds	100.0	97.6	101.6	107.0	107.7	107.5
13 Energy	100.0	96.3	96.3	97.0	97.4	99.5
electricity and fuels for heating	100.0	94.5	93.8	87.4	81.0	82.3
motor and machinery fuels	100.0	96.9	97.2	100.9	104.2	106.7
14 Fertilisers	100.0	103.2	97.9	99.2	100.8	100.3
15 Plant protection products	100.0	108.1	117.9	124.9	130.7	134.0
16 Veterinary expenses	100.0	97.2	100.3	104.1	105.6	104.3
17 Animal feed	100.0	93.0	94.7	99.1	101.2	105.4
compounds	100.0	97.7	103.0	109.3	109.9	114.5
straights	100.0	85.3	81.3	82.5	87.1	90.7
18 Total maintenance	100.0	99.8	99.3	100.5	105.0	101.4
materials	100.0	101.4	100.2	102.2	103.0	93.7
buildings	100.0	97.2	97.8	97.6	108.2	113.9
19 FISIM	100.0	100.0	100.0	100.0	100.0	100.0
20 Other goods and services	100.0	102.7	97.6	98.5	95.7	98.3
21 Intermediate consumption (excl Agricultural services)	100.0	98.5	98.3	101.1	102.3	104.1
22 Consumption fixed capital (excluding livestock)	100.0	102.2	104.0	105.9	107.3	108.9
equipment	100.0	103.9	107.2	110.8	113.7	116.9
buildings	100.0	99.6	99.1	98.4	97.7	96.9
23 All Labour	100.0	101.6	101.6	100.8	100.9	101.6
Compensation of employees	100.0	102.4	102.4	101.7	101.8	102.7
Entrepreneurial workers (farm & specialist contractor)	100.0	101.2	101.2	100.3	100.5	101.0
24 Land	100.0	99.6	99.7	100.1	100.0	99.5
25 All Inputs and Entrepreneurial Labour	100.0	100.1	100.1	101.5	102.2	103.4

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

	2010	2011	2012	2013	2014	2015
Total factor productivity (11 divided by 25)	**100.0**	**103.4**	**99.0**	**99.5**	**104.6**	**105.3**
Partial factor productivity indicators						
Productivity by intermediate consumption (11÷21)	100.0	105.0	100.9	99.9	104.5	104.7
Productivity by capital consumption (11÷22)	100.0	101.3	95.5	95.5	99.7	100.0
Productivity by labour (11÷23)	100.0	101.8	97.6	100.2	105.9	107.2
Productivity by land (11÷24)	100.0	103.8	99.4	100.8	106.9	109.5

Annual change in volumes of outputs and inputs

OUTPUTS

Total outputs increased by 1.9% compared to 2014, driven by a slight fall (-0.5%) in the volume of all crops, offset by a 2.8% increase in the volume of livestock outputs.

Total volume of **all crops** for 2015 fell slightly (-0.5%) compared to 2014.

Cereal volumes increased by 3.2% compared to 2014 with a slight fall in wheat being offset by a 7.1% increase for barley.

Oilseed rape saw an increase in the volume of outputs, up 3.4% compared to 2014.

Compared to 2014 there was a 2.8% increase in the volume of all **livestock** outputs.

Milk was the key contributor to the increase in livestock outputs with a 2.6% increase in the volume compared to 2014. This represents the largest volume of production in thirty years.

Total volume of **meat** production increased 3.0% compared to 2014. This was driven by increases of 4.0% for cattle, 3.5% for pigs, 2.9% for poultry and 0.9% for sheep. Volume of output for other animals remained level.

INPUTS

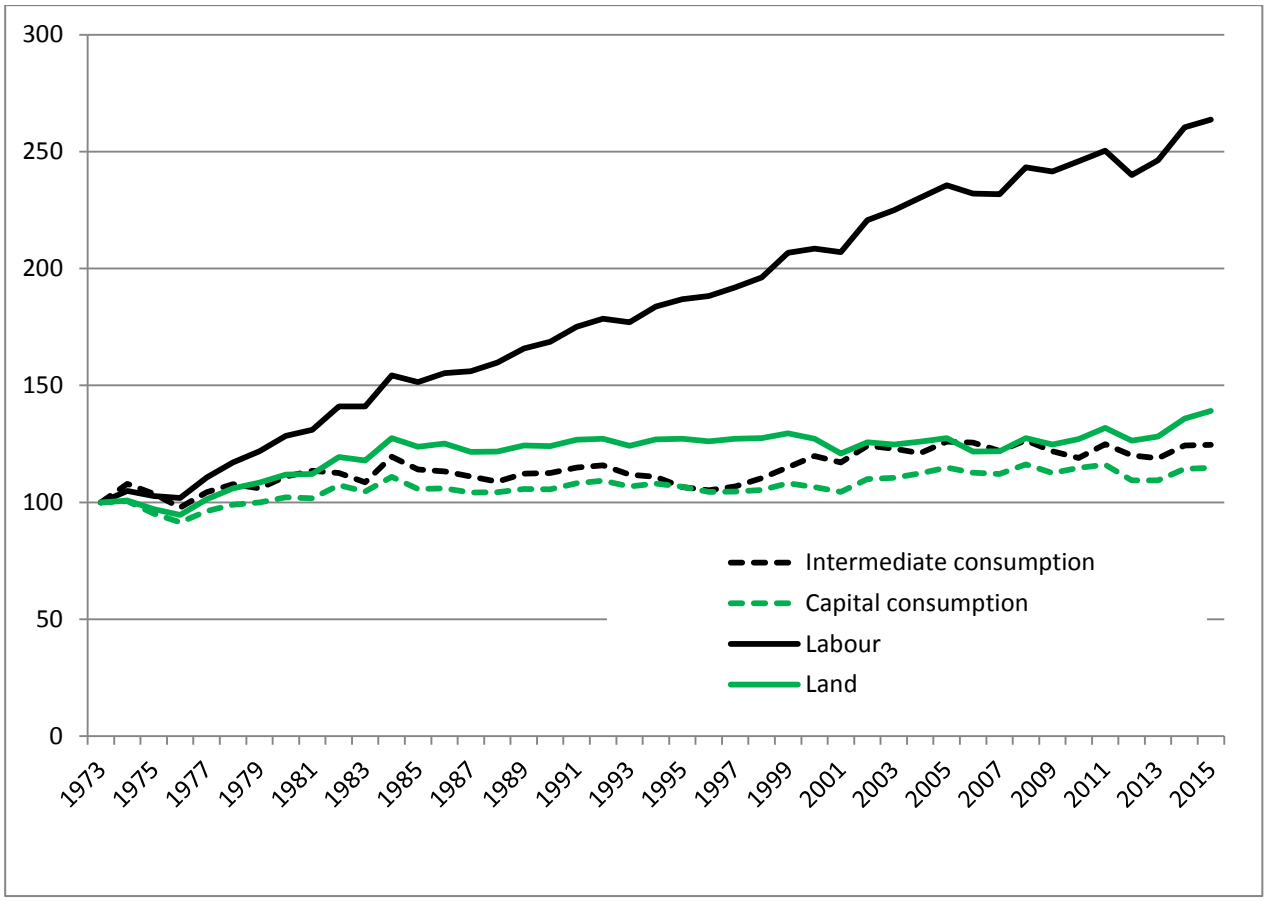
Compared to 2014 there was a 1.2% increase in the volume of **all inputs**.

Animal feed is the largest input and there was a 4.2% increase in the volume used in 2015. This was driven by similar increases for both compounds and straights.

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

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 transactions within the industry.
Total factor productivity	How efficiently all inputs are turned into outputs. Derived by dividing all outputs by all inputs.
Partial productivity	How efficiently intermediate consumption, capital, labour or land is transformed into outputs. Derived by dividing all outputs by each factor.

Revisions

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

Table 2 shows the impact these changes have had on the 2015 estimates of total factor productivity.

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

2010=100	April 2016 estimates for 2015	December 2016 estimates for 2015
All outputs	107.4	108.9
All inputs	101.9	103.4
Total Factor Productivity	105.3	105.3

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.