



27 November 2014

Total factor productivity of the UK agricultural industry 2013 – 2nd estimate

This release presents the second estimate of total factor productivity of the UK agricultural industry and volume indices for 2013. 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.

Key points:

- Total factor productivity of the agricultural industry in the United Kingdom is estimated to have fallen by 0.2% between 2012 and 2013. This is the second year in a row that total factor productivity has fallen. The effects of the poor weather in 2012 also impacted on the 2013 figures.
- The volume of all inputs used in the production process rose by 1.2% whilst the volume of all outputs at market prices rose by 1.0%
- Since 1973 total factor productivity has increased by 47% driven by a 25% increase in the volume of outputs and a 16% decrease in the volume of inputs. However, there has been little change in total factor productivity since 2005.

Enquiries on this publication to: Helen Mason, Department for Environment, Food and Rural Affairs, Room 301, Foss House, Kings Pool, 1-2 Peasholme Green, York, YO1 7PX. Email: FarmAccounts@defra.gsi.gov.uk
Media enquiries to: Tel: 020 7238 5054 / 6001 / 5610 / 6092 / 6007 / 5599

A National Statistics publication. National Statistics are produced to high professional standards. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference. For general enquiries about National Statistics, contact the National Statistics Public Enquiry Service: tel. 0845 601 3034 email info@statistics.gov.uk. You can find National Statistics on the internet at www.statistics.gov.uk.

Long term trends

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.

Figure 1 show the trends in total factor productivity, outputs and inputs since 1973.

Figure 1: Total factor productivity of the UK agricultural industry

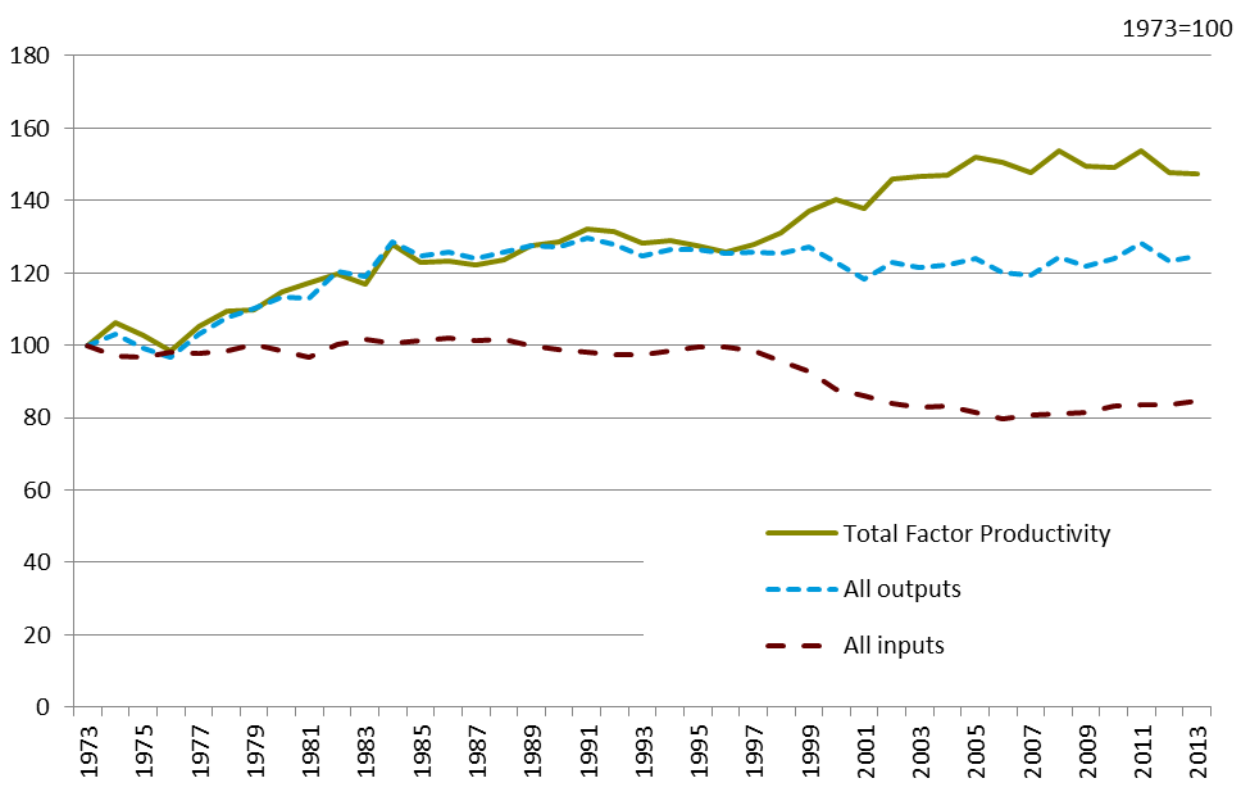


Figure 1 shows that outputs and total factor productivity rose quickly from 1973 to 1984. During this period the volume of inputs remained relatively flat although there was a significant change in the type of inputs used. There was an increase in the volumes of fertilisers (46%) and pesticides (170%) used during this period which was offset by a reduction in labour (17%) and energy (24%). The increased use of fertiliser and pesticides saw dramatic increases in the cereal yields, with wheat increasing by 75% and barley by 40%. During this period the volume of cereals and industrial crops doubled due to increased yields and increased areas grown. At the same time there was a decrease in the area and volumes of vegetables and fruit.

During 1997 to 2005 the increase in total factor productivity was due to a sharp reduction in the volume of inputs. There was a 30% reduction in both fertiliser and energy use as well as a 26% reduction in labour whilst the volume of all outputs fell by just 1.5%.

In this period an additional 350,000 hectares of less productive arable land was taken out of production as part of the set-aside scheme. In 2001 foot and mouth disease hit the UK. Following the outbreak not all the farmers restocked and some stopped farming. For those

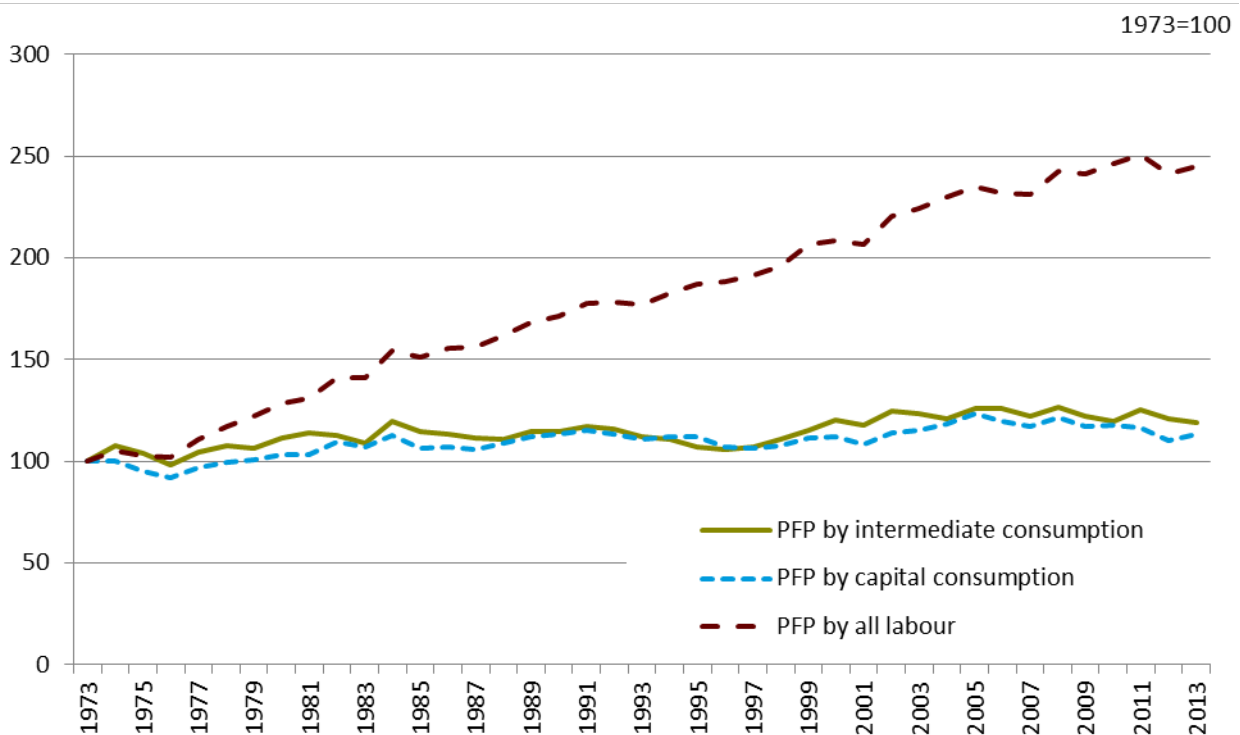
that remained in livestock farming there was a notable improvement in productivity. Despite a 20% fall in the dairy herd there was only a 2% fall in total milk production. Similar improvements were seen in the sheep industry with 18% fall in the breeding flock and only a 1% fall in the production of meat. Similar improvements were not seen in the pig industry where there was 40% reduction in both the pig herd and pig meat production. During this period there were also financial pressures on farmers as total income from farming fell by 24% in real terms during this period.

Looking back just 5 years to 2008 total factor productivity fell by 3.9%, as all inputs rose by 4.2% with little change in the volume of all outputs. A 7.6% fall in the volume of crop outputs was offset by a 3.5% increase in the volume of livestock outputs. Total intermediate consumption is estimated to be 6.5% higher than in 2008. This was driven by large increases in plant protection products and energy expenses, in particular motor and machinery fuels. All of this reduction in productivity is related to the fall seen in the last two years on the back of the bad weather during 2012.

Partial factor productivity

Partial factor productivity shows the impact key inputs have on productivity. It measures total outputs against a part of the inputs. Figure 2 clearly shows that labour has the largest productivity gains. Productivity by labour shows a steady increase over the whole period although there are signs that this is now slowing down

Figure 2: Partial factor productivity of the UK agricultural industry



Latest figures

Total factor productivity of the agricultural industry in the United Kingdom is estimated to have fallen by 0.2% between 2012 and 2013. Compared to 2012 there was a 1% increase in the volume of outputs but a larger 1.2% increase in the volume inputs.

This is the second year in a row that total factor productivity has fallen. The effects of the poor weather in 2012 also impacted on the 2013 figures.

In 2013, high output prices saw farmers maximise profits with a slight fall in total factor productivity. Defra data shows that overall the price of outputs rose by 6% compared to a 3% increase in the price of inputs (Agricultural Price Indices). This was most notable for dairy where milk prices increased by 12%, encouraging farmers to increase output in order to maximise returns. As a result the volume of milk increased by 0.7%. Increasing output required increasing inputs and the volume of animal feed rose by 4.6%. Part of this increase was due to a cold spring which meant livestock were put out to grass later than normal.

In the arable sector, the wet autumn in 2012 reduced the amount of winter cereals drilled. As a result, greater amounts of spring sown crops were planted in 2013 leading to an increase in the amount of seeds. Spring crops do not yield as well as winter crops, but the better conditions in 2013 saw a small increase in the output of cereal crops compared to 2012.

Table 1 shows output and input volume indices.

Outputs

Crop output recovered slightly in 2013 following the poor harvest in 2012 a result of the difficult weather conditions. Cereals were a mixed picture, the volume of barley output rose by around a third compared to 2012 as both area planted, due to increased spring plantings, and yield increased. In comparison the volume of output of wheat fell by 14%, with a reduction in the area harvested partially offset by the increased yield.

The volume of oilseed rape output fell by 17% between 2012 and 2013. Due to the poor planting conditions in the autumn of 2012 the harvested area was down by 12% and the yields were at their lowest since 2004.

The volume of output of potatoes rose by 15%, with the 2013 potato harvest back to normal levels and stocks replenished following the difficulties seen in 2012.

The volume of fruit also recovered after the fall in 2012 and rose by 6.8% in 2013; however the volumes are not back to the levels seen in 2011.

Overall there was a 0.7% increase in livestock output with increases seen in most sectors. The exception being cattle where the volume fell by 3.6% with production lower as feed availability and higher costs affected weights.

Inputs

Additional feed was used in 2013 due to limited forage stocks caused by the poor forage harvest in 2012, as well as poor early season grass/fodder growth, increased pig and poultry numbers and the need for extra rations to maintain milk production following milk price rises. This led to a 4.6% increase in the volume of animal feed in 2013.

Increased spring plantings and drilling resulted in an increase in seed inputs in 2013 compared to 2012 when autumn plantings were affected by the poor weather.

In contrast use of plant protection products fell by 2.1% due to the improved weather conditions and a reduced area of wheat and oilseed rape crops.

Table 1 Volume indices for outputs and inputs

	2010=100					
	2008	2009	2010	2011	2012	2013
1 Output of cereals	117.1	102.6	100.0	104.7	92.4	91.3
wheat	113.6	93.4	100.0	103.7	87.9	75.4
rye	86.4	86.4	100.0	100.0	68.2	90.9
barley	133.6	142.0	100.0	110.6	111.5	150.1
oats and summer cereal mixtures	119.4	109.6	100.0	92.0	93.1	150.5
oats and summer cereal mixtures	77.5	120.1	100.0	99.5	93.3	106.0
2 Output of industrial crops	93.9	98.4	100.0	118.3	105.9	98.6
oil seeds	86.8	85.4	100.0	122.9	112.9	95.2
oilseed rape	88.5	85.7	100.0	123.7	114.6	95.4
other oil seeds	41.2	75.4	100.0	98.9	58.0	86.4
protein crops	92.9	117.2	100.0	76.0	55.5	69.0
sugar beet	117.1	129.6	100.0	130.3	111.7	129.2
other industrial crops	99.7	98.1	100.0	101.1	101.1	101.1
3 Output of forage plants	104.1	105.3	100.0	107.1	109.0	121.3
4 Output of vegetables and horticultural products	98.4	96.3	100.0	97.6	97.4	97.8
fresh vegetables	92.1	96.3	100.0	98.0	93.9	96.8
plants and flowers	107.2	96.4	100.0	97.1	101.6	99.0
5 Output of potatoes	117.6	119.3	100.0	117.2	96.4	110.6
6 Output of fruit	94.6	99.9	100.0	101.3	93.0	99.3
7 Output of other crop products	98.7	103.6	100.0	115.0	127.9	119.8
Total crop output (sum 1 - 7)	105.3	101.1	100.0	105.6	96.8	97.3
8 Output of livestock (meat)	99.7	96.7	100.0	102.9	102.8	103.2
cattle	98.1	95.4	100.0	102.8	101.7	98.0
pigs	99.0	95.6	100.0	107.1	108.9	112.2
sheep	111.7	108.1	100.0	105.9	101.1	104.2
poultry	95.7	92.7	100.0	99.5	102.2	105.3
other animals	99.9	100.0	100.0	100.0	100.0	100.0
9 Output of livestock products	97.0	96.2	100.0	101.3	98.9	100.2
milk	98.6	97.5	100.0	101.5	99.9	100.5
eggs	88.3	89.2	100.0	99.6	96.5	99.5
raw wool	108.2	99.0	100.0	105.2	110.7	97.5
other animal products	87.8	92.9	100.0	98.7	57.5	84.2
Total livestock output (8 + 9)	98.6	96.5	100.0	102.3	101.3	102.0
10 Inseparable non-agricultural activities	86.1	96.8	100.0	98.2	100.5	109.0
11 All outputs	100.4	98.2	100.0	103.3	99.5	100.5

continued

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

	2010=100					
	2008	2009	2010	2011	2012	2013
12 Seeds	107.0	104.4	100.0	104.5	109.2	117.6
13 Energy	89.9	102.6	100.0	95.6	95.7	97.0
electricity and fuels for heating	94.0	100.5	100.0	94.5	93.9	87.3
motor and machinery fuels	88.2	103.5	100.0	96.1	96.3	100.8
14 Fertilisers	97.6	88.4	100.0	103.2	97.9	99.2
15 Plant protection products	89.8	91.5	100.0	105.7	122.2	119.6
16 Veterinary expenses	95.5	102.4	100.0	99.4	101.7	104.8
17 Animal feed	92.5	92.6	100.0	93.0	94.7	99.1
compounds	95.0	93.7	100.0	97.7	103.0	109.3
straights	88.2	90.9	100.0	85.3	81.3	82.5
18 Total maintenance	95.0	98.7	100.0	99.8	99.3	100.4
materials	94.7	97.4	100.0	101.4	100.2	102.2
buildings	95.6	100.8	100.0	97.2	97.8	97.6
19 FISIM	95.9	94.4	100.0	95.7	96.4	96.4
20 Other goods and services	98.8	102.1	100.0	103.5	96.0	99.1
21 Intermediate consumption	95.2	96.7	100.0	98.9	98.6	101.4
22 Consumption fixed capital (excluding livestock)	97.2	98.5	100.0	104.5	106.4	104.0
equipment	94.3	97.0	100.0	106.6	110.1	108.1
buildings	101.5	100.8	100.0	100.8	100.0	97.0
23 All Labour	101.9	100.4	100.0	101.6	101.7	101.0
Compensation of employees	102.0	100.7	100.0	102.3	102.4	101.5
Entrepreneurial workers	101.9	100.3	100.0	101.3	101.3	100.7
24 All Inputs	97.5	98.0	100.0	100.3	100.4	101.6
Total factor productivity (11 divided by 24)	103.0	100.2	100.0	103.0	99.1	98.9
Partial factor productivity						
Productivity by intermediate consumption (11 divided by 21)	105.4	101.6	100.0	104.5	100.9	99.1
Productivity by capital consumption (11 divided by 22)	103.3	99.8	100.0	98.9	93.5	96.6
Productivity by labour (11 divided by 23)	98.5	97.8	100.0	101.6	97.8	99.5

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, in particular:

An improved method of estimating potatoes for human consumption has been introduced covering the value and quantity of output of maincrop ware potatoes in 2011, 2012 and 2013. The new method is based on merchant returns on potatoes purchased for human consumption. This replaces the previous method which relied too heavily on measurements of end year stocks and was found to be inadequate in explaining the unusual production pattern seen in 2013.

2013 straight feed data is revised due to Defra processing survey returns since the last accounts was run, providing us with more accurate data. Data back to 2000 is revised due to errors found when reviewing the straight feed categories.

Changes have been made to the proportion of cereals sold off the farm back to 2008, following a review of the data.

An improved method of estimating seed usage has been used for 2012 and 2013 to reflect the unusual weather conditions towards the end of 2012 which led to additional spring plantings in 2013.

Plant protection products have been revised back to 2011 as more information became available.

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

Table 2 Revisions made to the 2013 estimate of total factor productivity between May 2014 and November 2014

2010=100	1st estimate May-14	2nd estimate Nov-14	Revision from 1st estimate
All outputs	99.9	100.5	0.6%
All inputs	101.2	101.6	0.4%
Total Factor Productivity	98.7	98.9	0.2%

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.