

in Ireland. The proportion of owners of land to inhabited houses is 1 to 4 in England, 1 to 3 in Scotland, and 1 to 14 in Ireland. In England, the average extent of land held by each owner is 33 acres 3 roods 30 perches, while it is 143 acres 1 rood 6 perches in Scotland, and 293 acres 1 rood 32 perches in Ireland. The average estimated rental of each owner of land in England is £102, 3s., against £141, 8s. in Scotland, and £195, 3s. in Ireland.

According to the New Domesday Book, about two-thirds of the landed property accounted for in the returns as existing in England and Wales is held by 10,207 owners, who, therefore, well deserve the old title of the "upper ten thousand." The following proprietors outside the metropolis are returned in 1873 as either holding upwards of 50,000 acres, or having estimated rentals exceeding £100,000 per annum:—

Proprietor.	County	Acres.	Rental.
Duke of Northumberland	Northumberland	181,616	161,874
Duke of Devonshire	Derby, York (W.R.), Lancaster, Sussex	126,904	127,633
Sir W. W. Wynn, Bart.	Denbigh, Montgomery, Merioneth	87,256	42,882
Duke of Cleveland	Durham, Salop	81,441	61,824
Earl of Carlisle	Cumberland, Northumberland, York (N.R.)	78,540	49,601
Duke of Bedford	Bedford, Cambridge, Devon	74,996	127,653
Earl of Lonsdale	Westmoreland, Cumberland	67,457	69,959
Earl of Powis	Montgomery, Salop	60,531	62,694
Duke of Rutland	Leicester, Derby	57,082	70,998
Earl of Derby	Lancaster, Derby	56,471	163,195
Earl of Yarborough	Lingoh	55,272	76,226
Lord Leconfield	Sussex, York (E.R.), Cumberland	54,615	51,940
Marquis of Ailesbury	Wilts, York (N.R.)	53,362	58,030
Earl Cawdor	Carmarthen, Pembroke	51,517	34,987
Sir Lawrence Falk, Bart.	Devon	10,109	109,275
Sir J. W. Ramsden, Bart.	York, (W.R.)	8,588	167,501

In some cases the estimated rental exceeds the income derived from the property. The average estimated rental value of the whole of the land is given at £3, 0s. 2d. per acre, which is thrice that of Scotland, where the average is 19s. 9d. per acre, and four and a half times as much as in Ireland, where it is 13s. 4d. per acre. The comparatively high rental of the land in England and Wales, combined with the limited ownership of the soil, two-thirds being in the hands of little over ten thousand persons, and the rest divided among nearly a million, must have naturally the greatest influence on the state of agriculture of the country. To what extent this is the case, will be seen from the "Agricultural Returns" annually published by the Government.

These returns, drawn up under a well-organized system, on the basis of information regularly furnished by the occupiers of the land to the officers of the inland revenue, divide the whole of England, exclusive of Wales, into two great districts, the first being called the Western or "the Grazing division," and the second the Eastern or "the Corn-growing division," viz:—

Grazing Counties.	Corn Counties
Northumberland.	York, East Riding
Cumberland.	Lincolnshire.
Durham.	Nottingham.
York, North and West Ridings.	Rutland.
Westmoreland.	Huntingdon.
Lancashire.	Warwick.
Cheshire.	Northampton.
Derby.	Cambridge
Stafford.	Norfolk.
Leicester.	Suffolk.
Shropshire.	Bedford.
Worcester.	Bucks.
Hereford.	Oxford.
Monmouth.	Berks.
Gloucester.	Hants.
Wilts.	Hertford.
Dorset.	Essex.
Somerset.	Middlesex.
Devon.	Surrey.
Cornwall.	Kent.
	Sussex.

Although the number of counties is nearly the same in each of these two groups, the total average is larger in the grazing than in the corn division in the ratio of 53 to 47 per cent. of total acreage under crops and grass in England.

The following tables furnish a concise account of the acreage under crops and otherwise, together with the number of live stock, in the two divisions of grazing and corn-growing counties of England, according to the Agricultural Returns for the year 1877:—

	Grazing Counties.		Corn Counties.	
	Acreage.	Percentage of Total.	Acreage.	Percentage of Total.
Total acreage returned.	12,908,018	53.1	11,404,015	46.9
Wheat	1,047,077	35.1	1,940,052	64.9
Barley	724,679	36.2	1,275,852	63.8
Oats	777,215	52.2	712,784	47.8
Rye	15,800	32.5	32,804	67.5
Beans	126,851	27.0	343,302	73.0
Peas	69,820	22.8	236,536	77.2
<b>Total corn crops.</b>	<b>2,761,442</b>	<b>47.8</b>	<b>4,541,330</b>	<b>62.2</b>
Potatoes	179,013	58.9	124,951	41.1
Turnips and swedes	679,234	45.4	816,651	54.6
Mangold	101,529	29.2	246,760	70.8
Carrots	3,054	21.1	11,391	78.9
Cabbage, rape, &c.	69,120	39.2	107,098	60.8
Vetches, lucerne, &c.	125,367	29.8	295,006	70.2
Grass under } for hay	810,654	50.4	798,703	49.6
rotation. } not for hay	673,958	59.7	454,072	40.3
<b>Total green crops and grass</b>	<b>2,641,929</b>	<b>48.1</b>	<b>2,854,632</b>	<b>51.9</b>
Bare fallow	251,459	43.6	324,776	56.4
Permanent } for hay	2,033,187	62.8	1,206,178	37.2
pasture } not for hay	5,208,654	68.4	2,409,997	31.6
Flax	2,845	39.5	4,365	60.5
Hops	8,502	11.9	62,737	88.1
Orchards, &c.	122,499	77.0	36,596	23.0
Woods, &c.	676,139	51.0	649,626	49.0
<b>LIVE STOCK.</b>				
Horses, for agriculture.	365,664	48.0	395,425	52.0
Do., unbroken, and for breeding.	171,075	55.3	138,044	44.7
Cattle	2,621,282	65.9	1,358,368	34.1
Sheep	9,697,359	52.9	8,633,018	47.1
Pigs	1,028,734	48.6	1,086,017	51.4

The following short statement gives a summary of the preceding table, showing the percentage of the distribution of the acreage for each division:—

	Grazing Counties.	Corn-growing Counties.
	Percentage of Total Acreage in the Division.	Percentage of Total Acreage in the Division.
Acreage under—		
Corn crops	21.4	39.3
Green crops	9.0	14.0
Clover and other grass } for hay	6.3	7.0
under rotation } not for hay	5.2	4.0
Bare fallow	1.9	2.3
Permanent pasture } for hay	15.7	10.6
not for hay	40.4	21.1

In the returns of the census of 1871, before given, the total area of England was stated at 32,590,397 acres, and that of Wales at 4,734,436 acres. In the Agricultural Returns for the year 1877 it was reported that the total acreage under crops, bare fallow, and grass had come to be 24,312,033 acres in England, and 2,731,159 acres in

Wales. Thus there were 8,278,364 acres, or about one-fourth of the total, not accounted for in the Agricultural Returns for England, and 1,643,327 acres, or about one-third of the total, in those for Wales. The subjoined tables exhibit the distribution of the acreage, and the numbers of live stock, both for England and for Wales in the year 1877.

Crops.	England.	Wales.
Corn crops:—	Acres.	Acres.
Wheat	2,987,129	100,226
Barley or bere	2,000,531	147,212
Oats	1,489,999	239,298
Rye	48,604	1,455
Beans	470,153	2,979
Pease	306,356	3,508
<b>Total of corn crops</b>	<b>7,302,772</b>	<b>494,678</b>
Green crops:—		
Potatoes	303,964	42,942
Turnips and swedes	1,495,885	70,813
Mangold	348,289	7,713
Carrots	14,445	376
Cabbage, kohlrabi, and rape	176,218	1,305
Vetches and other green crops, except clover or grass	420,373	6,386
<b>Total of green crops</b>	<b>2,759,174</b>	<b>129,535</b>
Clover, sanfoin, and grasses under rotation:—For hay	1,609,357	207,012
Not for hay	1,128,030	144,785
<b>Total of clover, &amp;c.</b>	<b>2,737,387</b>	<b>351,797</b>
Permanent pasture or grass not broken up in rotation (exclusive of heath or mountain land):—For hay	3,239,365	399,194
Not for hay	7,618,651	1,333,089
<b>Total of permanent pasture, &amp;c.</b>	<b>10,858,016</b>	<b>1,732,283</b>
Flax	7,210	28
Hops	71,239	...
Bare fallow or uncropped arable land	576,235	22,838
<b>Total acreage under crops, bare fallow, and grass</b>	<b>24,312,033</b>	<b>2,731,159</b>

Live stock in England and Wales.

Live Stock.	England.	Wales.
Horses, including ponies:—	Number.	Number.
Used for purposes of agriculture	761,089	71,043
Unbroken horses and mares kept solely for breeding	309,119	58,595
<b>Total of horses</b>	<b>1,070,208</b>	<b>129,638</b>
Cattle:—		
Cows and heifers in milk or in calf	1,557,574	254,392
Other cattle:—		
2 years of age and above	1,072,407	120,355
Under 2 years of age	1,349,669	241,462
<b>Total of cattle</b>	<b>3,979,650</b>	<b>616,209</b>
Sheep:—		
1 year old and above	11,481,945	1,974,313
Under 1 year old	6,848,432	887,700
<b>Total of sheep</b>	<b>18,330,377</b>	<b>2,862,013</b>
Pigs	2,114,751	230,720

It appears from the last annual Agricultural Returns that the extent of arable land in England and Wales is on the decrease, as is also the produce of live stock, while, on the other hand, the area of pasture land is on the increase. The decline in the acreage of arable land, very marked in the five years from 1872 to 1877, was greater in Wales than in

England, and embraced all the principal crops. The land under wheat fell from 3,336,888 acres in 1872 to 2,987,129 in 1877, in England; and from 126,367 acres in 1872 to 100,226 in 1877, in Wales. During the same period, the acreage under potatoes fell in England from 339,056 to 303,964, and in Wales from 48,417 to 42,942; and that under clover in England from 2,822,392 to 2,737,387, and in Wales from 370,850 to 351,797. In the acreage under barley and oats there was a slight increase in England, but a decrease in Wales; while in the acreage under turnips and swedes there was a trifling increase in England and a decrease in Wales during the period. Taken altogether, the extent of arable land in England fell from 13,839,000 acres in 1872 to 13,454,000 acres in 1877, being a decrease of 385,000 acres. In Wales, the extent of arable land sank from 1,104,000 acres to 999,000 acres in the same period, the decrease amounting to 105,000 acres. The decrease of arable land during the five years was very steady, and so likewise was the increase in the acreage of pasture land. There were in England under pasture—exclusive of heath and mountain land—9,991,000 acres in 1872, and 10,858,000 acres in 1877, the increase in the five years amounting to 867,000 acres, being more than double the extent of decrease of arable land. In Wales there were under pasture 1,532,000 acres in 1872, and 1,732,000 acres in 1877, making the increase amount to 200,000 acres, this also being not far from double that of the decrease in arable land. The decrease in the extent of arable land, and simultaneous increase of pastures, may be explained by the fact of England being supplied, more and more, with corn from foreign countries, where it can be grown cheaper than at home. Naturally, the produce of pasture lands cannot be brought in the same way into the country.

If the decrease of arable land and increase of pastures can be thus explained, it is not so easy to account for the decline of live stock which also took place during the same period, more especially from 1874. It might have been expected that the widening of the pastoral area would have led to an increase of live stock, but the contrary was the case, more especially as regards horned cattle and sheep. In England there were 4,305,440 head of cattle in June 1874, and 3,979,650 head in June 1877, so that there was a decrease of 325,790 head in three years. During the same period, the number of cattle in Wales fell from 665,105 to 616,209, being a decline of 48,896. The decrease in numbers was even greater in sheep. There were 19,859,758 sheep in England in June 1874, and 18,330,377 in June 1877, being a decrease of 1,529,381. In Wales, during the same period, the number of sheep fell from 3,064,696 to 2,862,013, being a decrease of 202,683. Thus the total decline in the number of sheep in England and Wales was no less than 1,732,064 in the short space of three years. The great diminution of live stock during the triennial period from 1874 to 1877 was not confined to England and Wales, but occurred simultaneously in Scotland, as well as in Ireland, being greatest in the latter country, where the decline in sheep alone amounted to 10½ per cent.

In the census returns of 1871, the number of persons entered as "agriculturists" in England and Wales was 1,447,481, comprising 1,264,031 men and 183,450 women. At the preceding census (1861) the number of "agriculturists" was given at 1,833,652, showing a diminution of 386,171 within the decennial period, due probably to the augmented use of machinery for the cultivation of the soil.

IV.—Mines and Minerals.

Next to agriculture, first foundation of the wealth of all countries, the material resources of England lie in its

minerals. The earliest traces of its mineral riches appear in the visits of men from the Mediterranean, who braved the dangers of unknown seas to gather the tin of Cornwall. Cornish tin still holds the first place in the annual reports on the "Mineral Statistics of the United Kingdom" drawn up by the keeper of mining records; but, though by no means an unprolific source of riches, it has sunk far behind a number of other minerals, unknown, even in name, at the time the Phœnicians visited, in search of it, the island of Britain. In the last of those annual reports the mineral produce of Great Britain is summarized as follows, in regard to quantities and value, under nineteen headings, or classes, representing the produce of the year 1876:—

Minerals.	Quantities.		Value. £
	Tons.	Cwts.	
Coal	133,344,766	0	46,670,668
Iron ore	16,841,583	14	6,825,705
Copper ore	79,252	0	317,186
Tin ore	13,688	9	600,923
Lead ore	79,096	6	1,218,078
Zinc ore	23,613	8	90,142
Iron pyrites	48,809	14	43,870
Arsenic	4,223	1	23,092
Manganese	2,796	17	9,783
Ochre and amber	3,805	4	4,478
Wolfram	23	10	172
Fluor spar	337	10	230
Clays	3,971,123	0	744,224
Oil shales	610,785	0	319,853
Salt	2,273,256	0	1,186,623
Barytes	23,561	18	24,479
Coprolites	253,150	0	625,000
Gypsum	61,741	0	18,571
Sundry minerals, including China stone	...	...	13,750
Total value of minerals produced in 1876			58,691,832

Total value of minerals and metals.

Under another calculation, the keeper of mining records gives the following summary of the total value of minerals, together with metals, obtained from the mines of the United Kingdom in 1876:—

Coal	£46,670,668
Metals, obtained from ores	18,668,818
Earthy and other minerals	2,887,367
Total value	£68,226,853

The metals obtained from ores are classified as follows, according to quantities and value, in 1876:—

Metals.	Quantities.		Value. £
	Tons.	Cwts.	
Pig iron	6,555,997		16,062,192
Lead	58,667		1,270,415
Tin	8,500		675,750
Copper	4,694		392,300
Zinc	6,641		158,011
Silver	483,422		106,262
Gold	293		1,138
Other metals	...		2,750
Total value			18,668,818

Chief articles of British mineral produce.

It will be seen by a glance at the preceding tables that the mineral wealth of the United Kingdom lies, in substance, in two articles, namely, coal and iron ore. From these springs, as immediate produce, a third, namely, pig iron. Coal and iron ore together form, as regards value, over nine-tenths of the mineral produce; while pig iron by itself holds nearly the same position in value among the metals produced in the United Kingdom.

Coal.—In the production of the by far most important article of Great Britain's mineral wealth, to which all others are but appendages, England and Wales stand foremost to such an extent as to throw the other two divisions

of the United Kingdom into comparative insignificance.<sup>1</sup> To the total coal produce of the United Kingdom in the year 1876, England and Wales contributed 114,554,278 tons, being five-sixths of the whole. The remainder, 18,790,488 tons, was produced almost entirely in Scotland,—the mines of East Scotland furnishing 11,667,648 tons, and those of West Scotland 6,997,904 tons. The production of coal in Ireland in 1876 was not more than 124,936 tons.

England and Wales are officially divided into nineteen colliery districts, very unequal in size, but so arranged, geographically, as to be within the constant and regular inspection of the Government survey. The following table gives a list of these districts, with the number of collieries in each, and the quantities of coal taken from them in the year 1876.<sup>2</sup>

Colliery Districts.	Number of Collieries.	Coal produce in 1876. Tons.
North Durham and Northumberland	183	12,580,500
South Durham	185	19,411,123
Cumberland and Westmoreland	42	1,401,603
Cheshire	39	584,880
Lancashire, North and East	385	8,265,000
Lancashire, West	174	9,125,000
Yorkshire	562	15,055,275
Derbyshire	261	7,025,350
Nottinghamshire	48	3,415,100
Warwickshire	29	884,750
Leicestershire	27	1,005,000
Staffordshire, South, and Worcestershire	434	10,081,067
Staffordshire, North	152	4,077,548
Shropshire	64	1,054,049
Gloucestershire	89	1,257,547
Somersetshire	45	650,415
Monmouthshire	134	4,499,985
Wales, North	123	2,207,250
Wales, South	400	11,973,336
Total	3,381	114,554,278

Seeing the supreme importance of coal as the chief material agent of modern civilization, and one the value of which, instead of lessening, is likely to become infinitely greater in future years, with the expansion of science and arts, the question has frequently been discussed whether the British coal-fields may not become exhausted at some time or other. The subject more especially engaged the attention of parliament and the Government in 1866, through the publication of a work by Professor W. Stanley Jevons, of Manchester, entitled *The Coal Question*, which, while admitting the immensity of England's wealth in coal, asserted that the present ever-increasing rate of supply could not continue in the same proportion for any great length of time. This theory found much opposition, others maintaining that the coal deposits of Great Britain were virtually inexhaustible, and that, properly managed, and with constantly improved scientific appliances, their riches would last as long, if not longer, than the probable life of the nation.

The discussion in and out of parliament on "the exhaustion of our coal mines," important as it was, scarcely settled the main points of the question, namely, first, to what depth the coal mines of Great Britain can be practically worked, and, secondly, to what extent the use of coal may be limited in the future, by the discovery of other motive powers. As to the first point, Mr Edward Hull, a well-known authority on mining subjects, laid it down, after practical inquiries, that the limit of coal-mining was not reached till the depth of 4000 feet; but this again

<sup>1</sup> See also COAL, vol. vi. p. 49.

<sup>2</sup> Compare with this the table at vol. vi. p. 79.

was disputed by other investigators, who expressed confidence that the limit was 2500 feet, a depth already reached in some existing mines. Greater still must be the uncertainty regarding the possible or probable discovery of other sources of motive power as substitutes for coal. The opponents of the widely expressed theory that such discoveries were not only possible, but of the very nature of scientific progress, which having, quite recently, taught mankind the high value of coal, was not likely to stop here, found powerful support in Professor Tyndall, who insisted that coal was the absolute monarch, present and future. "I see no prospect," he wrote to Professor Jevons, "of any substitute being found for coal as a motive power. We have, it is true, our winds and streams and tides; and we have the beams of the sun. But these are common to all the world. We cannot make head against a nation which, in addition to these sources of power, possesses the power of coal." Professor Tyndall concludes with the somewhat startling dictum that "the destiny of this nation is not in the hands of its statesmen, but of its coal-owners," adding, emphatically, that, "while the orators of St Stephen's are unconscious of the fact, the life-blood of this country is flowing away."

Increase in the production of coal, 1855 to 1876.

Professor Tyndall wrote this letter in 1866; and if, as he and others thought, the "life-blood of this country" was then flowing at too high a rate, it has been flowing much faster ever since. In the ten years from 1856 to 1866, the production of the coal mines of the United Kingdom rose from 66,645,450 tons to 101,630,544, and after another lapse of ten years, in 1876 it had risen to 133,344,766 tons. The gradual rise in production is indicated in the subjoined table, which shows the quantities and the value of the coal brought from the mines of the United Kingdom every third year from 1855, when the first accurate returns were published, to 1876:—

Years.	Quantities.		Value. £
	Tons.	Cwts.	
1855	61,453,079		16,113,267
1858	65,008,649		16,252,162
1861	83,635,214		20,908,803
1864	92,737,873		23,197,963
1867	104,500,480		26,125,145
1870	110,431,192		27,607,798
1873	127,016,747		47,631,280
1876	133,344,766		46,670,668

It is an admitted fact that the price of coal, which has been gradually rising in recent years, must continue to rise, both on account of its increased consumption, and of the constantly growing expenses of raising it. Although the total area of the coal-fields of Great Britain extends, according to the most authentic estimates, over 5400 square miles, comparatively few new pits have been opened in recent years; and the ever-increasing demand has been supplied by the deepening, as well as widening, of the best collieries. This could only be achieved at an increased outlay, inasmuch as the cost of raising coal to the surface and the attendant expenses of administration and supervision are far greater than the cost of the actual displacement of the material from its beds.

From the returns of one of the oldest and best-managed collieries in England, the South Hetton, in Durham, it appears that out of 529 men employed, only 140 were hewers of coal. The account, interesting in various ways, stands as follows:—

	Persons.
Hewers of coal	140
Putters, screeners, and loaders	227
Administrative staff	123
Miscellaneous workers	39

Total number of persons employed in colliery...529

The extraordinarily large number of persons required in a colliery, over and above the actual producers of coal, to attend to the working of the establishment, is explained by the mine and its machinery requiring the most strict and unceasing supervision to prevent dangerous accidents. Thus a large staff of workmen and artisans of all kinds, such as smiths, joiners, engine-wrights, masons, and others, has to be kept, to watch over the complicated apparatus by which the mine is ventilated and the precious mineral raised from the bowels of the earth. It may be said that, as a rule, the working of the collieries of England and Wales is most satisfactory, the superintendence, both on the part of the private owners and the Government, being the best that human ingenuity can devise. Nevertheless, the annual loss of life is terribly large. In the ten years from 1857 to 1866, the number of deaths from colliery accidents averaged 1000 per annum; and though in the next ten years the death rate decreased, it never fell under 800 a year.

The production of coal in the United Kingdom was more than doubled in the period from 1855 to 1876, but the exports to foreign countries during the same time increased nearly eight-fold. From 4,976,902 tons in 1855 the exports rose to 9,170,477 tons in 1865, and to 11,702,649 tons in 1870. They further rose to 13,193,494 tons in 1872, to 13,927,205 tons in 1874, to 14,544,916 tons in 1875, and to 16,299,077 tons in 1876. Of the total exports of the year 1876, France took 3,160,555 tons, Germany 2,243,722 tons, and Italy, Russia, and Sweden and Norway each a little over a million tons, the remainder being distributed over thirty other foreign countries and British colonies. Vast as has been the amount of the coal exports in recent years, they still represent less than one-eighth of the coal produce of the country. The mines of the district of South Durham alone produced in 1876 considerably more coal than was exported to all foreign countries.

Iron Ore.—Though vastly inferior, as a source of national wealth, to coal, and deriving nearly all its value from it, still the second most important produce of English mines, the iron ore, has the greatest effect upon the industrial character of the country. England and Wales alone produce iron ore, the amount raised in Scotland and Ireland being quite insignificant. It amounted in Scotland to 5226 tons, valued at £3432, and in Ireland to 116,066 tons, valued at £60,748, in 1876. The whole of the rest of the produce of the United Kingdom, 16,720,291 tons, valued at £6,761,525, was raised in England and Wales.

The following table exhibits the quantities and value of the iron ore raised in the chief producing counties and districts of England and Wales in the year 1876:—

Counties.	Quantities.		Value		Produce of iron ore in English and Welsh counties.
	Tons.	Cwts.	£	s. d.	
Cornwall	18,390	0	10,566	18 0	
Devonshire	9,936	10	5,075	15 0	
Somersetshire	44,299	3	31,110	3 6	
Gloucestershire	115,098	3	77,394	3 0	
Wiltshire	83,957	0	20,989	5 0	
Oxfordshire	26,140	0	5,223	0 0	
Northamptonshire	1,161,130	10	173,366	10 0	
Lincolnshire	573,374	15	101,622	19 0	
Staffordshire, North	19,998	13	14,658	10 0	
Lancashire	984,460	18	728,505	15 0	
Cumberland	1,353,910	9	906,046	2 6	
Yorkshire, North Riding	6,562,000	0	1,162,020	0 0	
Northumberland and Durham	24,202	12	14,521	16 0	
South Wales and Monmouthshire	83,969	15	41,484	17 0	
Iron Ore worked under the Coal Mines Regulation Act in other counties	5,659,423	0	3,378,933	6 0	
Total, England and Wales	16,720,291	0	6,761,525	0 0	