

mountaineer who had gone for the hay and harvest work to England having first cropped his little field, started on their accustomed tour of mendicancy through the lowland. In the course of their perambulations, they called at the house of a farmer, who, conceiving from the very uncommon circumstance of their being accompanied by a diminutive cow that they were not objects of compassion, refused to assist them; another farmer overheard the boy saying to his mother as they were going away, "Mammy, it was well that we didn't bring *Moylee* (a second cow which the family possessed) with us too, for she'd have been starved entirely in this country, and had luck to it."

We shall close our observations by reversing the boy's concluding words, and sincerely wishing it a continuance of its present blessings, and a still higher step in the scale of improvement; we lay down our pen with the hearty benediction of "good luck to it." D.

ON BRITISH AGRICULTURAL STATISTICS AND RESOURCES IN REFERENCE TO THE CORN QUESTION.

By Mr JOHN DUDGEON, Spyelaw, Roxburghshire.

"How great a change to our advantage would have been in the commercial balance had we been feeding our neighbours instead of being partly fed by them; had we been in the course of receiving money for our corn instead of corn for our money; the field is still open; let us join hearts and hands to redeem time wofully mispent. I say again, there never was a period more favourable to agriculture, when good lessons in husbandry were more reasonable than the present."—*Kames*.

It has long been matter of surprise and regret, that in a country so advanced in information, and so enlightened in legislature, as Great Britain, comparatively little has been done, nationally, to afford authentic statistical information upon that most important branch of industry—Agriculture. The meagre and imperfect accounts we can obtain is left to be gleaned nearly entirely from the praiseworthy exertions of private individuals, who, however zealous and indefatigable in their researches, possessed not the gigantic appli-

ances which a nation alone can command to the right performance of so extensive an enterprise. It is true the labours of the Board of Agriculture, which it is to be regretted ever ceased to exist, produced some useful information, but its inquiries had reference generally too much to matters merely of detail; as where the statistics obtained by this body are of more universal application, they are so changed by altered circumstances as to cease to be available for present purposes. In fact, to be useful, the kind of information of which the want is so much regretted, and to which I allude, would require to be renewed at periods of no very distant intervals. The Transactions of the Highland and Agricultural Society of Scotland, too, present a mass of valuable materials, from which may be drawn matter available, in order to hazard an estimate of our agricultural resources: And, above all, for this end, much may be said to have been accomplished by the voluminous proceedings which have issued from Parliamentary Committees on Agriculture, which have sat at various times during the present century.

But still, strange to say, from none or all of these sources can we arrive at any conclusion which can, with any safety, be relied upon as to the present amount of the agricultural produce of the empire, or the probable state of the physical capacities of the soil. On this subject, so essential to correct legislation, much, it would appear, is left to mere conjecture; and while some staticians have varied in their calculations of the actual amount of our grain produce as 5 to 7, we find that the estimates of our best authorities have been formed frequently more from the amount supposed to be consumed than from any just information they have been able to procure with respect to the breadth of land under each particular crop, or the amount of its acreable produce. We have reason to suspect even, that the estimated number of acres of land under tillage has been acquired from no authentic source.

For instance, we find the estimated number of acres in England and Wales of *arable land*, or *land under crop*,—for the terms are used indifferently, as given by Arthur Young\*

\* Eastern Tour, vol. iv. p. 458.

and Mr Cowling,\* afterwards adopted by Mr Porter,† varies to the extent of upwards of a million and a half, or to the very considerable amount of more than 16 per cent; these authorities shewing the extent in round numbers to be respectively 12,700,000 and 11,000,000 acres. Mr Stevenson, in the article "England" in the Edinburgh Encyclopædia, estimated the arable land in 1812 at 11,500,000 acres; and Mr M'Culloch, from a review of these data, thus hesitatingly expresses himself with respect to the extent in 1837, when his valuable work of the Statistical Account of the British Empire was first published: "We believe we shall not be far wrong in supposing it to be at this moment 12,000,000 acres."‡

There is thus, it would appear, no certain information upon which this estimate is founded; and when we find the authorities upon which it rests exhibiting a difference in extent of area, which, under the ordinary distribution of the arable land, and at the average rate of the kingdom, would produce annually more than five times the amount of the yearly average of our foreign importations of all kinds of grain, with reason may it be said that we are woefully deficient in what constitutes the elements of correct legislation in this important matter.

Mr M'Culloch acknowledges that the real information at our command on this subject is as limited and imperfect, as respects Ireland and Scotland, as the more important division of the empire; and indeed the vague terms used with regard alike to all, shew too plainly, even on this general question of extent of surface under crop, that no confidence can be attached to the statements hazarded.

But I am inclined to think it is in the distribution, as it is called, of the arable land, or the extent under different crops, in which the greatest degree of error will be found; at least I conceive we have data within our observation sufficient to point out satisfactorily the existence of very important mistakes in our statistical records on this branch of the subject.

\* Tables laid before Emigration Committee.

† Porter's Prog. i. 177.

‡ Statis. Acct. Brit. Empire, vol. i. 528.

For example, Mr Comber,\* assuming the total number of acres under cultivation in England and Wales to amount to 11,591,000, thus distributes them:—

	Acres.
Wheat, . . . . .	3,160,000
Barley and Rye, . . . . .	861,000
Oats and Beans, . . . . .	2,872,000
Clover, Rye-grass, &c., . . . . .	1,149,000
Roots cultivated by the plough, . . . . .	1,150,000
Fallow, . . . . .	2,297,000
Hop, garden, and pleasure-grounds, . . . . .	102,000
	<hr/>
	11,591,000

Thus, in round numbers, he assumes nearly 7,000,000 acres to be annually under a grain crop, while four and a half millions only are devoted to grass and fallow and green crops. Hence nearly two-thirds of the whole arable surface is always under corn, a mode of management which, as no more than the extent of land devoted to the other division of crops remains fresh for grain in the next year, involves the necessity that nearly two millions and a half of the soil of England, or considerably more than a third of the whole land set apart for grain in any one year, is subjected to the same species of crop in the succeeding season—a system, it is well known, totally inconsistent with every sound principle of husbandry, and which could not be pursued with reference to the maintenance of fertility.

Mr McCulloch† so far alters Mr Comber's estimate, chiefly to shew that he has underrated the extent of ground under wheat, and over-stated, as he thinks, that set apart for fallow; but he falls into the still greater error of stating a larger proportion of the whole arable land to be under crop in each year, while, in his calculations, also, the alternate grasses compose a part of the estimated number of acres under tillage.

In the distribution of the arable land of Scotland, a very different rule is applied, but still, I think, erroneously. These errors, personal observation enables me better to point out, and with greater confidence; while the estimated consumption of the kingdom, which I have attempted to give below, goes far

\* On National Subsist. App. p. 52.

† Statis. Acct. vol. i. p. 529.

to establish the incorrectness of the estimated produce of the empire, taken as a whole.

The total number of arable acres in Scotland, as derived from the *General Report* made in 1814\*—and there is nothing completed since to vindicate a correction of these returns—is stated as 5,043,450. Of these, the proportion in grass is estimated at 2,489,725, leaving 2,553,725 to be annually under tillage—the proportion of arable land in grass, be it observed, being thus assumed as very nearly one-half of the whole extent; while in England, as we have seen, it is set down as less than two-fifths for grass, fallow, and green crop all included. Now, it is evident it would be much nearer the truth, taking into account the considerable proportion of land under a four-shift rotation, to say nothing of that occasionally devoted to two successive culmiferous crops, or a wheat crop following beans, to set aside not more than two-fifths of the *tillage land* of Scotland as annually under grass. Thus, in round numbers, in place of two and a half millions only being yearly under the plough, devoted to corn, fallow, and green crops, we have an aggregate of three millions, or a gain upon the estimate of 20 per cent. But, again, in the distribution of the two and a half millions acres of tillage land by Mr M'Culloch, we have the still more palpable mistake of a much less breadth of fallow and green crops in each year than the circumstances necessarily require; which division, in order to agree with the well-known method of culture prevalent throughout Scotland, ought—the grass, as in this case, being excluded—to stand in the proportion of a half to the extent of land under grain crops, while he has stated them at nearly a third less than this relative proportion. In the specific quantities set apart to each species of grain, there is also, I am satisfied, a very material error, however much he improves upon the estimate furnished in the *General Report* of 1814, which gives the proportion of land occupied by wheat at only 140,000 acres, equivalent to no more than 420,000 qrs., as the produce of the whole of this division of the empire.

Mr M'Culloch's estimated distribution of the land yearly subjected to tillage in Scotland is thus given (*Stat. Acct. Brit. Emp. vol. i. p. 537*):—

\* *General Report of Scotland*, iii, App. p. 5.

	Acres.		Quarters.
Wheat, . . . .	220,000	@ 3 qrs. p. acre,	660,000
Barley, . . . .	280,000	@ 3½ ...	980,000
Oats, . . . .	1,275,000	@ 4½ ...	5,737,500
Beans and Peas, . .	100,000		
Potatoes, . . . .	130,000		
Turnips, . . . .	350,000		
Fallow, . . . .	150,000		
	2,505,000		7,377,500

For the reasons stated, I am inclined to hold the following distribution—taking the total amount of arable acres as given by Mr M'Culloch—to be nearer the truth :—

	Acres.		Quarters.
Wheat, . . . .	340,000	@ 3 qrs. p. acre,	1,020,000
Barley, . . . .	400,000	@ 4 ...	1,600,000
Oats, . . . .	940,000	@ 4½ ...	4,230,000
Beans and Peas, . .	100,000	@ 3 ...	300,000
Turnips, . . . .	420,000		
Fallow, . . . .	165,000		
Potatoes, . . . .	140,000		
	2,505,000		7,150,000

Adding 20 per cent., then, to this estimate—for the deficiency pointed out in the assumed total extent of the land under crop, exclusive of grass, and which there is reason to think would fall chiefly to the produce of oats and barley—we would have a total of fully 8,500,000 qrs.

This additional amount of productiveness, it is thought, is in many respects corroborated by some facts bearing upon the estimated consumption and relative trade in corn, as connected with Scotland; and particularly to justify the chief alteration it has been deemed right to adopt in the latest distribution, as above set down, I may observe, that, from the improved habits of living of the people of Scotland generally of late years, it may now with all safety be assumed, that the consumption of wheaten bread, as the entire and partial food of this description of a portion of the inhabitants, cannot be taken at less than what would amount to the full estimated allowance for a million, or twelve hundred of the people. This would give the consumption of wheat in Scotland as about a million quarters. It has been difficult to ascertain whether the balance of trade in this article with other parts of the kingdom is, at all times, for or against this northern division

of the empire ; but as it appears we sent to England, in the five years ending 1836—years nearly entirely free from foreign importation—upwards of 170,000 quarters of wheat, while we imported from our southern neighbours only 116,000 quarters, it is thought the inference may be justly made, that in seasons of average productiveness Scotland supplies herself from her own resources ; and thus we have some corroboration of the estimate that our annual growth of wheat must considerably exceed any of the former calculations, and perhaps cannot be taken at less than a million quarters. With respect to barley, and to vindicate, in some measure, the larger space set apart for the growth of this grain, I find the annual quantity charged as malt, in this part of the empire, during the period of five years ending 1834—the last to which I have been able to gain access—is alone upwards of 500,000 quarters, about an equal quantity being used “*raw*” in distilleries ; while the yearly average exportation of this kind of grain to England for a like period, ending 1836, has been nearly 60,000 quarters—the imports from that quarter being no more than half that amount.\*

I have thought it right, as being confined to a comparatively narrow space, and as exhibiting better materials, for discriminating, thus to go somewhat minutely into detail, in order to shew more clearly, in respect to the subject as connected with Scotland, the imperfect nature of the information possessed upon a matter of such eminent importance. I now proceed to take a hasty glance of the whole subject, as relating to the united empire, with a view alike to point out, from the extent of the disparity which exists on different aspects, the difficulty of legislating aright, and that more correct data may be adduced upon which to rest the calculations afterwards to be submitted.

Mr M'Culloch, then, assuming, as we have seen, that 12,000,000 acres are the full extent of the arable land of England and Wales, *including alternate grasses*, and holding that nearly two-thirds of the whole of this extent are annually under corn—a mode of management which, as has been observed, involves the necessity that nearly a half of all the land in England growing grain in each year, is subjected to the

\* Appendix, No 21, to “Third Report of Agricultural Committee,” 21st July 1836.

same species of crop in the succeeding season—gives the total produce as . . . . . 29,450,000 qrs.

Thus—	Acres.	Prod. per Acre.	
Wheat,	3,800,000	3½ qrs.	12,350,000
Barley and Rye,	900,000	4 —	3,600,000
Oats and Beans,	3,000,000	4½ —	13,500,000
	<u>7,700,000</u>		<u>29,450,000</u>

Scotland, again, with only 2,553,000 of her 5,000,000 arable acres under crop, *exclusive of grass*, is calculated to produce . . . . . 7,377,500 ...

Ireland, estimated after the vague manner of the presumed consumption of oats by a portion of the inhabitants, is held as having 1,100,000 acres of her soil devoted to this end; while the quantity required for seed, feeding of horses, and other internal uses, added to the amount of exports to England, is taken as warranting the calculation of three millions or three and a half millions in all, set apart to this species of grain, which, at 44½ bushels per acre, would give upon the medium extent, say . . . . . 18,000,000 ...

The *probable extent* of area occupied by wheat and barley, without any data being had recourse to, is said not to exceed 600,000 or 700,000 acres, which, at 3 qrs. per acre for wheat, and 4 for barley, in equal proportions, would, upon the largest quantity, shew—

Wheat,	.	.	1,050,000	
Barley,	.	.	1,400,000	
			<u>2,450,000</u>	...

This view exhibits the total produce of } the United Kingdom as } 57,277,500 ...

Thus, Wheat,	.	.	.	14,060,000
Barley,	.	.	.	5,980,000
Oats,	.	.	.	37,237,500

This result taken upon the aggregate, is evidently much under the mark, and a casual glance in some instances cannot fail to create an impression of error in some of the items. It can scarcely be, for instance, that the produce of wheat and barley in Ireland is so limited compared with that of Scotland with her much narrower surface of arable soil: and tak-



ing into account the important consumption of wheaten bread in Ireland with the very considerable exportations,\* particularly of the former grain, which annually take place to England, amounting to upwards of 600,000 qrs. on the average of the last twelve years, it is evident the produce of Ireland must far exceed a million quarters of wheat, and, perhaps, is not less than two and a half million quarters. It will be seen, also, as we proceed to apply to the whole matter the test afforded by the estimated consumption of the country, that the above calculation of our produce is evidently incorrect, and, as regards the article "barley" particularly, as being in great part subject to fiscal regulation, we have irrefragable proof of a consumpt far exceeding the amount of produce above set down.

Taking, then, the population of Great Britain at this time at 18,600,000, and of Ireland at 8,400,000, it may be fairly assumed, that of the former there are not fewer than 15,000,000 consumers of wheaten bread. I reckon, of this number, about fourteen millions for England; and, to justify this amount, I quote Mr M'Culloch's own words, who says, "wheat is now the all but universal bread-corn of England." Ireland will give at least two millions to this number, and taking Scotland at one million, as already estimated, we have a total in the United Empire, as consumers of wheat, of 17,000,000. Applying, then, the usual calculation to this subject, this number would not be held as consuming less than an equal number of quarters of wheat; but as this supposes an average consumption of rather more than two quartern loaves a week to each individual, it appears to me we shall be nearer the truth to set apart about seven bushels only to each consumer, and thus to adopt sixteen millions quarters of wheat as the annual consumption of these realms at the present time, including what is used in the manufacture of starch, pastry, &c. &c.

Man, however, does not live by wheaten bread alone, and there are other more questionable forms in which he appears a large consumer of corn, to which I will presently advert. In the mean time, it is conceived, it may be fairly held that these eaters of bread are consumers of other varieties of grain, to the extent nearly of what would amount to one

\* Irish exports of all kinds of grain said to be from  $2\frac{1}{2}$  to 3 millions annually. M'Culloch's Stat., vol. ii. p. 149.

bushel each annually on the average, or say equal to two million quarters of oats and barley in equal proportions ; while the remaining 11,000,000 persons, of which we exclude three millions, as being under an age to come into this average, giving 8,000,000, whom I presume, upon the ordinary data of  $1\frac{1}{2}$  quarters each, to consume 12,000,000 quarters of oats and barley, in the proportion of three-fourths of the former to one-fourth of the latter species of grain.\*

From the Parliamentary returns of the “ quantities of malt charged with duty ” in the united empire, during the average of five years ending 1840, at which period the consumption in this way seemed rapidly on the increase, it appears that the amount of barley thus consumed is upwards of 5,200,000 quarters. These figures, it will be observed, when the quantity required for seed is included, embrace nearly every quarter that is said to be grown, leaving nothing to be otherwise consumed by men and cattle, and for the very considerable quantity converted into spirits in an unmalted state.

Then we have the large consumption of corn by horses. Of these there are computed by the latest calculations to be not fewer than 1,600,000 in the United Empire, which, at the usual *very low* computation of ten quarters of oats annually for each horse, gives a total of 16,000,000 quarters.† The quantity of grain consumed by cows and feeding stock, cannot, perhaps, be taken at less than 5,000,000 quarters.‡

\* The usual annual consumption by the agricultural servants of Scotland, I consider equal to ten bushels each of oats, and four of barley and pease. And to shew that I have not over estimated the total consumption of these grains as above set down, I have entered into the calculation of the quantities thus consumed by the agricultural servants *ordinarily* employed, relatively to the whole extent of arable land in Scotland. This, I find, assuming one and a half, with their families, to be occupied on each 100 acres, at the ordinary allowance of ten and a half quarters to each family, gives a total of 787,500 quarters. Extending the same calculation to England and Ireland—though I am aware no similar consumption exists in the former at any rate, but for the sake of the results—we would have in all 5,115,500 quarters of the quantity of oats and barley as consumed by man given above, and taken off by a population, as it turns out, amounting to not much above 3,000,000.

† I am aware that eight quarters of corn is not an unusual estimate of the quantity annually consumed by a horse, but when it is considered that agricultural horses are allowed not less than fifteen quarters each annually, I think I am still under the mark in assuming the rate above taken.

‡ This I have found estimated at double the amount held as consumed

Then, lastly, there falls to be deducted from our estimated annual produce the amount required for seed. This, calculated according to the extent of land above set down, under-rated as we hold that to be, gives for

Wheat, at 3 bushels per acre, . . .	1,640,000
Barley, at 3 bushels . . . . .	574,000
Oats and beans, at 6 bushels . . . . .	5,680,000
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Total for seed, . . . . .	7,894,000

The whole matter then would stand thus—

Wheaten bread, . . . . .	16,000,000
Oats consumed by man, . . . . .	10,000,000
Barley eaten, . . . . .	4,000,000
Barley malted, . . . . .	5,200,000
Barley distilled unmalted, . . . . .	1,200,000*
Consumed by horses and cattle, . . . . .	21,000,000
Seed, . . . . .	7,900,000
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	65,300,000

Thus, even on a moderate calculation of our consumption, we have the enormous discrepancy of upwards of eight millions of quarters between the computed necessary wants of our population, and the estimates of the produce of the empire by our best statisticians. But let it not for a moment be supposed that any real deficiency of the means of subsistence exists from our highly-favoured and flourishing soil. The difference, we are certain, lies in error of calculation; for it is notorious that, while the alleged deficiency I have just pointed out amounts to upwards of an eighth part of our calculated requirements, we have not, upon an average of the whole years of the present century, *imported from abroad* annually an amount *much above a sixtieth part of the yearly average produce of our own soil!*†

by horses, but it is evidently a mistake.—Alison on Population, vol. ii., p. 436.

\* As the "returns" relative to spirits distilled in the United Kingdom shew a quantity equivalent to a consumption of upwards of 1,700,000 qrs. of grain (Parl. Returns, ordered, &c. 11th August 1840), while those relating to *malt* used in distillation in 1839-40 exhibit a total of little more than 500,000 qrs., it follows that the quantity of grain distilled *unmalted* must at least be equal to that above given.

† The annual average importations of all kinds of grain and flour, from 1800 to 1840 inclusive, amount to 1,160,284 quarters. See tables compiled

This error, then, I think, can be easily traced to the calculations of our estimated produce, and, more especially, I presume, will be found to have its origin in a misconception as to the mode of distribution of the arable land. For while, as I have attempted to shew, Mr M'Culloch assumes too great an extent of the whole arable land of England and Wales, upon his own data, to be annually under crop, and thus, as it were, appears at first sight to afford no room to correct his error as favourable to the exhibition of a larger amount of produce; yet, it appears to me, his great mistake lies in adopting the amount 12,000,000 acres as the whole land under a system of alternate husbandry, in place of the arable surface exclusive of grass, whereby, in fairness, and according to any right system of husbandry, he would be limited to at most a half, or 6,000,000 acres, as being under corn at any one time. I am inclined to think also the expression of Arthur Young, "under crop," as applied to his estimates of the soil in England available for corn, means the extent exclusively adapted to corn, fallow, and green crops; and in this supposition, I conceive, I am strengthened by the wording of Mr Cowling's estimates, who seems in his different states, in discriminating between arable and pasture lands, to make use of these terms distinctively. In this way we are then entitled, adopting Mr M'Culloch's own figures, but as having reference to the arable land exclusive of grass, to consider fully two-thirds of the whole 12,000,000 acres as under a grain crop in each year. This would give for England as annually in grain 8,000,000, or probably—as a considerable extent of the finer soils of the south are devoted to corn two years consecutively—nearer 8,400,000 acres, being a difference on Mr M'Culloch's calculation of

700,000 acres.

The total extent of land under corn and green crop in Scotland, I have found good reason to alter to the amount of 20 per cent., which gives upon that under corn alone, in each year, a difference from former estimates of upwards of

300,000

Together, . . . . . 1,000,000 acres.

Thus, without making any change upon the estimated number of acres of land under tillage in Ireland, to justify an interference with which I am not aware that any precise information exists, though I have found good reason to hold it also as underrated, we have here a difference of extent of area, which would afford an addition to our annual computed productiveness, at the usual average rate per acre of all kinds of grain, of 4,500,000 quarters. If, in addition, we assume,—which it appears to me we are well entitled to do, from the effects now visible in many parts from recent improvements—a higher rate of produce than the state of cultivation, at the period of former estimates warranted, I am satisfied it will not be difficult fully to account for the discrepancy which I have pointed out, seeing that an addition of a bushel an acre, with the deficiency pointed out above as respects Ireland, would be more than enough to make up for the whole deficiency.

It is not to be doubted that we are now well entitled to appropriate a larger acreable produce, and altogether it is no more than might have been expected, that a great discrepancy should be found in our estimated produce, since it would appear we have few materials to afford precise calculations later than 1812 and 1814. Circumstances, it is evident, must have changed very materially, during these thirty years, to justify a larger result than has yet been assumed; and especially as regards the amount of the different varieties of crops, are subject to so many varying influences, that it is only a close periodical investigation, that in such a matter could be expected to shew us our real state, and account, perhaps, for some of the late anomalies in the trade in corn. For instance, I may just mention,—what may be the change in other quarters of the kingdom I know not,—that in the district within the scope of my own immediate observation, I am confident the effect of the prevailing low price of wheat from 1833 to 1837, and probably other causes, was at that time to curtail the growth of this grain nearly a half—a decrease which has never yet, to anything like the full extent, been made up; and if a similar influence has been in operation over any large extent of surface,—and in some other parts of Scotland, at any rate, I believe it to have prevailed—it may well account, on other grounds than altogether deficient harvests, for the increased

importations of the last four years, which have been almost entirely of wheat.

I fear these details may appear to many somewhat tedious and unnecessary; since the fact of the under-estimate of our production may be said to be sufficiently established on a comparison of our consumption, in connection with the trifling amount of foreign importation. But I trust it may not be without its use, that I have, even at the risk of being tiresome, endeavoured to point out in what respect so slight reliance is to be placed on the conclusions of our ablest guides in this matter; and I shall hold myself well repaid for the trouble of the investigation, should the subject be thus brought to attract the attention of those who may be able to lead to the removal of so complete a bar to correct legislation. A minute investigation and periodical revisal of the actual proceeds of the soil, I am satisfied, would neither be so difficult nor so expensive a matter as many suppose.\*

But I have another object in view in thus investigating these calculations; and if it be of advantage to point out where, I humbly conceive, error is found to exist, or rather to shew how it is that, with our present deficient means, a correct conclusion cannot be arrived at, it is no less advantageous, and a much more pleasing task, to have it in our power to prove, from the materials we possess—(defective as they are)—that, at all events, this country possesses within itself physical capabilities sufficiently adequate to meet the demands of an immensely increased population; perhaps it might be safely said, more than adequate to maintain a population larger than has yet been known to exist within similar limits.

The very magnitude of a prospective benefit, however, fre-

\* Such questions as the following, addressed to two or three persons of ordinary intelligence acquainted with agricultural subjects, in each parish or other specified district, and these repeated occasionally, perhaps at the period of taking the census, would sufficiently bring out the information required:—

The quantity of land under cultivation.

The extent of which, annually under grass.

The proportion of the remainder under each variety of crop, as well grain as roots, specifying also the number of acres in bare fallow.

The average productiveness of the different species of grain crops, and the value per acre of the roots or other productions.

quently leads to doubt as to its probable existence ; and, accordingly, we find it is no new thing that anxiety should be testified as to the nation's means of future subsistence, notwithstanding the strongest evidence of their permanency. It was attempted to be shewn, we know, at the close of the last century, by a celebrated economist, whose name conferred on the prediction no slight favour, that ere twenty-five years would elapse, the inhabitants of this empire would have outgrown the capacity of the soil to maintain them ; but forty-five years have since nearly passed away, and the annual average supply of corn from abroad has scarcely, as we have already seen, amounted in all that time to a sixtieth part of our annual produce ! and this, notwithstanding our consumption, has increased comparatively more, from the improved habits and enhanced luxuries of the people, than from addition to the population, unprecedented as that has been. In point of fact, the number of inhabitants has increased, during this time, to the extent of fully ten millions\*—a population requiring for their maintenance, from what we have seen, fully 20,000,000 quarters of grain ; and yet it clearly established, that nearly at the close of this time, that is—saving the few past disastrous seasons,—for *six successive* years up to 1837—we have provided the whole of this additional subsistence entirely from our own soil ;† while our total imports, taking the whole period, would, at the same ratio, scarcely yield support to 500,000 of the people.

Our home agriculture, it would thus appear, has steadily kept pace with these increasing and unprecedented demands ; but surely no one will have the hardihood to say, that our efforts in this achievement have been in any way overstrained, and that on this account we are the less likely to be able to continue to make effectual exertions to meet our still growing necessities. On the contrary, it is well known that it is only very lately, indeed, that discoveries have been made in agri-

\* Population of Great Britain and Ireland in 1801, 16,338,102.

..... 1841, 26,870,143.

† “ The fact is in full evidence, that during six successive years, the produce of the United Kingdom has sufficed for the consumption, greatly increased as that has been.”—Tooke's History of Prices, vol. ii. p. 263.

culture, and appliances of various kinds have been devised, which, when brought generally to bear, cannot fail to give a stimulus to production which it will be difficult for any probable increase of population to overtake.

To instance alone the recent improvements of thorough-draining and deep-ploughing, for which we are mainly indebted to the enterprising and ingenious Mr Smith of Deanston. In many of the instances in which this system has been faithfully applied, it is well known to have more than doubled the produce, while in all it has been more or less eminently successful. It is comparatively a trifling extent of land, indeed, that has yet been subjected to the exercise of these principles, but there can be no question that their beneficial use is all but of universal application. Taking the arable land alone of the empire, we may well conclude there are not less than what would be equal to 10,000,000 acres annually under crop, to which the improvements of thorough-draining and its accessories might be profitably applied, and with immense advantage to the nation's comfort and pecuniary resources. From what is known of the effects of those operations on different kinds of soil, I consider that I am within the mark in estimating the result of their application, on so extended a scale as I have contemplated, as equal to an average of fully eight bushels an acre. Indeed, Mr Smith states the effect of such improvements upon "the most unpromising sterile soil," as exhibiting a return of sixteen bushels an acre higher than the average assumed by Mr M'Culloch for the arable land of all England;\* and, in point of fact, to justify the expense of these operations, we are warranted in assuming to the full the increase I have supposed. This, then, without having recourse to new soils, would give an addition to the annual produce of the empire of 10,000,000 quarters—an amount just about ten times larger than our average annual importation for the last forty years! The like course of improvement applied to the 15,000,000 acres of uncultivated land capable of tillage, we may well hold as affording a farther increase of 20,000,000 quarters, after the wonders Mr Smith declares it has achieved upon the most sterile and unpromising of Scot-

\* Remarks on Thorough-draining, &c. by James Smith, Esq. p. 20.



land's soils.\* Thus we have subsistence for an increased population, with all its concomitants, to the extent of a half more than our present numbers !†

It needeth not, then, that we stop to enquire what may be the effects of the more extended application of machinery to agriculture—the fertilizing powers of new manures—the influence of a higher education upon farmers, when chemistry, botany, and mineralogy shall be the companions of his walk, and the guides to his daily operations, or of the less pleasing occupations of science in the laboratory—when, as M. Liebig has well shewn, much of the heavy expenses in agriculture may be obviated by the concentration of the essentials of many of our manures in chemical manufactories.

But it remains that I briefly point out what is conceived essential to the development of our agricultural resources, in the ratio suited to the requirements of the people, and the urgency of the times in which we live. The operations to which I have chiefly alluded, as applicable to this purpose, involve we know a very considerable outlay of capital—perhaps not less, on an average, than L.6 per acre. This sum we find exactly the amount computed as the whole means employed in

*	5)15,000,000 acres.
	3,000,000
	2
	2-fifths, 6,000,000 @ 3½ quarters per acre.
	3½
	18,000,000
	3,000,000
	21,000,000 quarters.

† I am aware that the able and eloquent author of the History of the French Revolutionary Wars has, in his late work on Population (Principles of Population, by Arch. Alison, Esq. vol. i. p. 50, and App. No. III.), alluding to the powers of production in reference to population, entered into a calculation of the physical capacities of the soil to maintain an increased number of inhabitants, which exhibits a result far exceeding that above set down; but from the nature of the argument with which it is connected, he has found himself obliged to adopt too extreme a case—though probably possible under a different system—to be of any practical bearing, as applicable to the present practice of agriculture.

agriculture in the earlier part of the century, before any such expensive improvements were contemplated; and I believe it will be readily admitted, is fully equivalent to the real farming capital of the present day. It is clear, then, however enterprising and desirous to do their part, the tenantry *alone* have not the means to effect the desired end, and retain what is necessary otherwise to cultivate their lands efficiently. If they had, however, the returns from draining are not so immediate, or so ample, even according to the estimate I have given, as in ordinary cases to justify so extensive an outlay by a tenant. As regards the proprietor, it is otherwise; for although there is little risk that the increased produce will prove sufficient to enable the tenant to pay a fair, and even liberal, per-centage for the landlord's expenditure, it is to be feared—and hence the check to improvement in his hands—that the double return which it is necessary the improvement should yield to repay capital and interest, within the limits of an ordinary lease, may not, in every instance, be forthcoming. Dr Adam Smith has well elucidated the difference, as respects the position of parties in this matter, when he says:—"The farmer, compared with the proprietor, is as a merchant who trades with borrowed money compared with one who trades with his own. The stock of both may improve; but that of the one, with only equal good conduct, must always improve more slowly than that of the other, on account of the large share of the profits which is consumed by the interest of the loan."—(Wealth of Nations, b. III. cap. ii.)

But draining is in no respect a tenant's work. It is essentially—to be performed as it ought—a permanent improvement, and as such peculiarly the province of the landlord. In point of fact, drains are—or at least may be made, at no great expense—more permanent than buildings; and on the former as well as the latter a great deal of money has been expended, and continues to be thrown away by tenants unprofitably, in performing partially and inefficiently what ought to be substantially and once for all completed by the proprietor; for it were evidently much better for the country, and more profitable to the parties, that L.6 were expended at once, from which a full return is annually accruing, than that L.3 should be required to be laid out every fifteen or twenty years, yielding only a partial effect.

It is to the landlord, then, that we are chiefly to look to give that impetus to our agricultural exertions, so important at the present time. The tenant, there is no doubt, generally is prepared to do his part—to give a liberal allowance for monies expended ; and let improvements be performed substantially and well, and then there will be fewer disappointments as to the immediate result, and a far higher encouragement afforded to perseverance in the right path in future. It were infinitely better for the man of means, and a much more laudable ambition, in place of adding acre to acre, upon which  $2\frac{1}{2}$  or at most 3 per cent. can be obtained, to lay out his spare capital upon ameliorations, which would immediately yield a much higher rate of interest, and render the land he possesses permanently more valuable. We have some lee-way to make up, and proprietors may tarry too long, if they wait the slow progress which all the efforts of the tenantry permit *them* to make. They, it is hoped, will ever be found willing to lend a helping hand, and there is much which falls within their peculiar province to favour and to forward the improvements alluded to ; but they cannot do all. It is true, through their unaided exertions, in many instances, we see the hand of the drainer, apparently at no great intervals, plying his unsightly but satisfactory work, and, it may be, many numerous bright spots mark where his labours have taken effect ; but we must remember, that though the whole of the present arable land of Scotland were subjected to his magic touch, our increased produce would amount to little more than what our necessities, in unpropitious seasons, too often demand. It is on the wide and fertile plains of England that the struggle must first be made. Ireland, also, presents a fair field, and her sons have never proved laggards in Britain's need. We of Scotland shall not cease, I trust, to persevere in the van. But it is on the potent barons and substantial yeomen of the south that we rest our main dependence ; and in their hands, with proper energy, the victory cannot long be doubtful.\*

\* This paper, now somewhat abridged, was intended to have been read by the author at the Highland and Agricultural Show at Berwick, in October last.—EDITOR.