

lean meat in proportion to the whole edible flesh? Which accumulates most fat marbled in the lean and least fat deposited in a form conducive to culinary and other waste?

Scientific investigation of the nutritive and fattening values of different foods for animals has taught lessons to the breeder and grazier; but few inquiries have been instituted in England with regard to the comparative economy of the carcasses produced by these instructed feeders. It is nearly thirty years since Sir John Lawes and Dr. Gilbert made their laborious and costly experiments at Rothamsted on the chemical compositions of animals fed upon different foods, incidentally throwing some light upon the relative carcass-economy of several distinct breeds. And it is now much to be desired that a systematic examination should be made of the respective nutritive properties of our improved breeds.

The objects to be ascertained by the Rothamsted experiments were—first, the amount of food or its several constituents consumed in relation to a given weight of animal within a given time; second, the relation of the gross increase in live weight to the amount of food or its constituents consumed; third, the comparative development of the different organs or parts of fattening animals—their final, ultimate, and proximate composition—and the probable composition of their gross increase of live weight during the feeding process; fourth, the composition of the solid and liquid excrements—that is, the manure—in relation to that of the food consumed; fifth, the loss or expenditure of constituents by respiration and by the cutaneous exhalations—that is, the mere sustenance of the living meat and manure-making machine. For these purposes some hundreds of animals, oven, sheep, and pigs, were subjected to prolonged feeding experiments; the weights of the slaughtered carcasses and organs and parts of several hundred of these animals were ascertained, and for standard samples a large number of the carcasses and offal parts were submitted to chemical analysis. In these sample cases the flesh, fat, and bones were cut up, dried in a water bath, at 212 degrees Fahrenheit, for several days, and the melted fat collected; and then any parts still containing fat after that were tied up in canvas and squeezed in a screw press; and, lastly, fat which resisted the melting and expression was extracted by means of ether. The crude, dried substance was ground into a coarse powder, and the proportions of nitrogen and mineral matter found in the usual manner. Nothing like so comprehensive and elaborate an inquiry is needed for the present purpose. What meets the case would, probably, be ascertaining the weight of the entire carcass, and separately of the offal parts and of the bones or skeleton, in a large number of examples chosen to represent as equally as possible different breeds under uniform treatment. In the Rothamsted experiments the animals were fasted for eighteen to twenty-four hours before being killed, and the parts weighed quickly, so as to avoid much waste evaporation.

#### THE MILK CROP OF SCOTLAND.

Professor Sheldon in North British Agriculturist.

The publication, commencing with 1868, of the annual "Agricultural Returns of Great Britain," supplies comparative data and statistics which ought to be universally studied and referred to by the farmers of the British Islands. These returns do not pretend to be absolutely correct, but they are collected and compiled with great care, and, to say the least, approximately correct—are, in fact, as nearly accurate as any census returns can be reason-

ably expected to be. The essence of a census, after all, is approximative, supplying comparisons which, being all obtainable in the same manner, are sufficiently accurate as regards each other, presenting a picture which is reliable as a practical guide. These returns, which, owing to the innate suspicion of farmers, were more difficult to obtain at first than now, are gradually approaching accuracy; meanwhile however they are, and have been since the start, very valuable estimates as to the average of different kinds of crops, and the numbers of different kinds of cattle in these islands; and in addition to mere numbers of each species of live stock, they tell us the number of cattle, horses, and sheep of different ages.

In this way the returns present us with, as it were, an instantaneous photograph of the relative positions which, in regard to number, the different kinds of dairy stock hold toward each other, and we see at a glance whether stock-raising, for instance, is increasing or decreasing in any two contiguous years. Returns of this character, which are collected in June each year, and issued in autumn, are calculated to be of great service to farmers who will take the very small amount of pains required to extract the lessons they contain. They are, in fact, literally a national stock-taking, by means of which we learn how the country speeds in this, that, or the other particular. Here are cattle statistics for the last seventeen years, the whole series relating to Scotland:—

Years.	In-milk or in-calf.	Two years old and above.	Under two years.
1868	384,235	257,770	408,912
1869	379,670	250,291	387,763
1870	375,997	254,536	410,901
1871	380,189	257,477	432,441
1872	391,516	261,338	467,739
1873	396,990	261,014	490,053
1874	395,704	278,562	480,880
1875	396,863	281,207	465,010
1876	393,249	202,312	455,526
1877	395,051	271,555	435,468
1878	388,002	279,120	428,265
1879	388,686	259,727	435,188
1880	387,195	258,967	453,124
1881	388,539	269,567	438,106
1882	389,667	252,644	438,935
1883	395,182	252,362	446,773
1884	408,745	248,089	479,770

These figures illustrate several features in Scottish dairy husbandry, of which, perhaps, the most striking is the decrease in the number of cattle two years old and above, while the other classes are considerably increased. Some of these intermediate cattle are, no doubt, included in the figures of the class to the left of them, viz., those in-calf or in-milk; and, so far as this is the case, young cattle are being brought to profit at an earlier age than was formerly the case—more of them, that is, are in calf at two years old. This points to the development of the principle of early maturity, which, if not pushed too far, is a valuable feature in the management of dairy stock. The figures show, also, that the raising of stock has received in Scotland the impetus which high prices give, for the number of bovine stock under two years of age is much larger now than in any year since 1874. In each and all the columns we see the influence of the disastrous decade of years out of which we have just emerged. It is satisfactory to find the number of cows and heifers in-milk or in-calf much larger now than in any previous year of which we have a record, and it is no less than 18,423 above the average of the seventeen years; the number, too, of cattle under two years old is no less than 35,385 above the average, while that of the intermediate class is 15,237 below it. The present number of cattle

of all ages is greater than that of the average, by no less than 38,591, which is going to a very satisfactory extent, for the time being, in the right direction. The average number of cows and heifers in-milk or in-calf, for seventeen years, is 390,322; that of the intermediate class, 263,326; and that of the young class, 444,385. We may hope that, in August next, it will be found that Scotland, in the aggregate number of her cattle, has exceeded the average of eighteen years.

However, to come to the milk itself from the cattle that produce it, there were in June last 408,745 cows and heifers in-milk or in-calf, and if we assume the average yield of each cow to be 450 gallons of milk per annum, we have as a result the stupendous total of 183,935,250 gallons, which, valued at 6d. a gallon, is worth £4,598,880, or upwards of four and a half millions sterling. This estimate of the annual yield of milk by cows in Scotland is, of course, only approximative, for it is quite possible that they give more than this. Were they all Ayrshires, indeed, this estimate would be too low, and I think I could easily lay my finger, so to speak, on a herd of a hundred whose average yield of milk is probably close on 600 gallons. There are, however, the West Highlanders, the Galloways, and the Aberdeens, all of which are more famous for beef than milk, and it is perhaps not unfair to assume that these three breeds, excellent as they are in other respects, lower the high average yield of milk which the Ayrshires alone would undoubtedly show. My impression, indeed, is that the Ayrshires are the most practical and valuable breed of cattle in any country, save in the beef-making department; for if we take them on quantity and quality of milk, on vigor and hardiness of constitution, on the return they make for the food they consume, and also take into account the size of the cow, where shall we find a breed to equal them? The Jerseys, no doubt, are wonderful milkers, giving the richest milk of any breed of cows in the British Islands or elsewhere, but they would simply die out in many countries where the Ayrshires would flourish. The Kerrys, perhaps, are the cattle that will compare best with the Ayrshires in the qualities I have named; and they, too, are out of the running in beef.

The milk crop of Scotland, then, is a most valuable one, more so than any crop besides; and as it is evidently increasing in value, the question of its disposal and utilization in the best way possible is one of great moment to the community at large, and to dairy farmers in particular. It is satisfactory to know that the latter are fully alive to the need of improvement in the dairy, as well as to progress out of doors. The tendency of the period is toward dairy-farming and stock-raising, connected more or less directly with stock-fattening. The number of cattle in Scotland, as in England too, is still far below what it ought to be, in view of the extensive laying down of land to grass which has been going on for some years past, and which may be expected to go on for some years to come. In the latter country, however, a higher point in the number of cattle is touched in last year's returns than in those of any previous year; the lowest point was 3,979,650 in 1877, and now the number is 4,451,658. But in Scotland, on the contrary, the highest point yet touched was in 1874, when the aggregate number of cattle was 1,154,846, which, notwithstanding the fact that the number of cows and heifers in-milk or in-calf is now greater than ever before, is no less than 18,242 more than the present aggregate; the tendency, however, is to increase, and as there is still ample room for expansion in dairy-farming, we may hope that the tendency will remain in force for some time to come.