EXPERIMENTS

ON THE

COMPARATIVE FATTENING QUALITIES OF DIFFERENT BREEDS OF SHEEP.

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COMPARATIVE FATTENING QUALITIES OF DIFFERENT BREEDS OF SHEEP.

No. 3.—Leicesters and Cross-breds.

In former numbers of this Journal, we have detailed the results of experiments upon the comparative fattening qualities of the Hampshire, and the Sussex Downs, and the Cotswold sheep; and, in our Report on the latter, we intimated our intention to institute in the succeeding season similar experiments with the Lincoln and Leicester breeds. This intention has, however, not been entirely carried out; for, on full inquiry as to the character of the so-called Lincoln sheep, and the present extent of its unmixed distribution, it was decided, that the comparison of it with the Leicesters would be of less interest and utility than that of some other animals more closely comparable both by affinity and contrast with the latter breed. The well known and extensively adopted cross between the Leicester ram and the Sussex Down ewe was therefore selected for the next experiment. And, as both the *ewes* and *wethers* of the *cross*-breed are from the first fed for the butcher, it was thought that it might be useful to experiment separately upon each of them. An equal number then of *pure Leicesters*, of the *cross-bred wethers*, and of the *cross-bred ewes*, formed the subjects of the experiment now to be recorded.

After the full explanation which has been given in our former

Reports, it is scarcely necessary again to remind the reader that the comparison sought to be instituted in this series of experiments with different breeds of sheep is limited to that of the adaptation of the respective breeds to a system of *rapid fattening*, upon a *liberal supply of food;* and, that it does not directly embrace the examination into their aptitude to different localities, and to widely different methods of feeding.

The general characters of the new Leicester sheep are too generally known, and too well described elsewhere, to render any lengthened account suitable to our present purpose. Its remarkable aptitude to develop flesh and *carcass fat*, and to come to early maturity, are the qualities by which, in a word, it may be said to be characterized, when compared with most of the breeds currently adopted under the comparatively modern system of high feeding. And it is by combining these qualities of the Leicester sheep with the better fleece, the greater hardiness, the greater fecundity, and the better nursing qualities of the Sussex Down, that the cross between the *Leicester ram* and the *Sussex ewe* has been found to be one of the most successful of the breeds or crosses which it has been sought to adapt to the system of liberal feeding which now characterizes the sheep farming of a large proportion of the best cultivated districts of the country.

The experiments about to be recorded were made in the winter and spring of 1852-3.

Fifty Leicester wether lambs were kindly selected by Mr. Cresswell, of Ravenstone, near Ashby-de-la-Zouch, in October, 1852. At that time, owing to the abundance of keep, store sheep were exceedingly dear. And, it was even with some difficulty that 50 good and pure lambs suited to the purpose, could be obtained at anything like a reasonable price. Nor could it be done at all, except from several different flocks.

The 50 Leicester wether lambs at length selected arrived at Rothamsted, on October 24, 1852. The cost was 35*s.* per head irrespective of expenses. Mr. Cresswell stated, that on comparing these wethers with his own ram lambs, he considered them not to be quite so large as could be wished; and he supposed from their appearance that their growth had been somewhat checked by the scarcity of food in the previous spring and summer. Upon the whole, however, the sheep were a good and even lot; and they may doubtless be taken as fully if not more than equal to the average of the breed in ordinary use.

The cross-breds were supplied by Mr. Edmund Farrer, of Spoole, near Swaffham, Norfolk. They were the produce of South Down ewes, with Leicester rams from the flock of Mr. Aylmer. Sixty of the cross-bred lambs—ewes and wethers indiscriminately—arrived at Rothamsted on October 24, 1852. This lot cost 32*s.* per head. Twenty-five more from the same flock—mixed ewes and wethers—were also received on November 13th; and this second lot cost 33*s.* per head.

All the experimental sheep, both Leicester wethers, and cross-bred ewes and wethers, were turned into a meadow as they arrived; and supplied at once with some pulled turnips, in order to accustom them to such food. On November 15th, all were put upon the rafters under cover, where the experiment was to be conducted; and, on November 18, each animal was separately weighed—the wool being by this time dry. At this date, 40 each, of the most even of the Leicester lambs, of the cross-bred wethers, and of the cross-bred ewes, were selected; and, from this time, until December 2, when the exact experiment commenced, they were allowed half the quantity of *dry* food which they would afterwards receive, and in addition, as many turnips as they chose to eat.

As with the Hampshire and Sussex Downs, and Cotswolds in the previous experiments, *oil-cake* and *clover-chaff* were the *dry* foods employed; and Swedish turnips the green food.

The quantities per head per day of the dry foods were allotted exactly in the same proportion to the average weights of the sheep, as in the experiments with the other breeds. It may here be noticed in passing, that the average weight of the Sussex sheep of the former experiment at its commencement was 88 lbs.;—that of the Hampshires was 113¾ lbs.;—and that of the Cotswold 113½ lbs. That of the sheep now under consideration was, for the Leicesters 101¼ lbs.; for the cross-bred wethers 95 lbs.; and for the cross-bred ewes 91¼. It was then exactly in proportion to these respective weights, that the daily supply of dry food was allotted per head for each of the six different breeds.

At the time of the first weighing and selection of the 40 each—Leicester wethers, cross-bred wethers, and cross-bred ewes—one of each was also selected of nearly the average weight, and of pretty uniform character with the 40 of its lot to be put under experiment; and, this single sheep of each lot, as in the case of the Cotswolds, was killed at once, in the store condition, in order to have the means of comparing the proportional weights of the carcass, and of the various parts of the offal, of the different sheep, in the *store*, and in the *fat* condition. As also in the case of previous experiments, a few of each kind were turned out into the field with the ordinary fattening flock of the farm.

The results of the experiments with the Leicester wether lambs and the cross-bred ewes and wethers, are given in the Tables which follow in the same detail as has already been done for the other breeds. But as it is not our intention, at any rate for the present, to pursue this line of experiment with any other breeds, and as we propose therefore to give a comparative summary of the results of the six breeds in the present paper, we shall not discuss separately at such length as formerly the details relating to the three lots which constitute the subject of the present Report.

In Tables I., II., and III., pp. 7, 8, and 9, are given, for each lot respectively:—

The weight of each sheep at the commencement of the experiment, Dec. 2, 1852;

The gain in weight of each sheep during each experimental period of 4 weeks;

The weight of wool from each sheep, shorn April 7, 1853;

The total increase of each sheep (including wool), during the total period of the experiment, namely 20 weeks;

The final weights, both inclusive and exclusive of wool;

And, in the 12th column, the *average weekly gain* of each sheep during the 20 weeks.

There are also given at the foot of these Tables, the total weight of the lot of 40 sheep at the beginning and at the end of the experiment, the latter both inclusive and exclusive of wool; the total increase during each period of 4 weeks and the total period of 20 weeks; as also the total wool. And, in the lower line, the means, or *weekly average* per head, as the case may be, of each of these particulars.

TABLE I.

TABLE I.

Increase, &c., of each of the Leicester Sheep.

Sheep. Nos.	Weights at commencement, Dec. 2.	Increase in 4 Weeks to Dec. 30.	Increase in 4 Weeks to Jan. 27.	Increase in 4 Weeks to Feb. 24.	Increase in 4 Weeks to Mar. 24.	Wool Shorn, April 7.	Increase (including Wool) in 4 Weeks to Apr. 21.	Total Increase (including Wool) in 20 Weeks.	Final Weight with Wool.	Final Weight without Wool.	Average Increase per head per Week.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs.	lbs. ozs.
1	112	7	— 2	16	12	9 4	9 4	42 4	154 4	145	2 2
2	118	8	5	16	14	7 13	10 13	53 13	171 13	164	2 11
3	105	7	2	12	12	9 2	11 2	44 2	149 2	140	2 3
4	108	5	4	9	12	6 5	8 5	38 5	146 5	140	1 15
5	119	14	13	15	14	10 4	10 4	66 4	185 4	175	3 5
6	105	7	1	9	4	11 4	10 4	31 4	136 4	125	1 9
7	96	— 2	— 2	16	9	6 0	10 0	31 0	127 0	121	1 8¼
8	108	8	9	15	12	10 0	12 0	56 0	164 0	154	2 13
9	118	4	3	13	9	12 6	8 6	37 6	155 6	143	1 14
10	95	9	1	11	12	7 4	10 4	43 4	138 4	131	2 2
11	117	9	10	13	12	10 0	18 0	62 0	179 0	169	3 1
12	114	5	9	12	12	8 3	8 3	46 3	160 3	152	2 5
13	112	10	3	10	9	6 3	7 3	39 3	151 3	145	1 15
14	121	12	5	16	14	8 12	15 12	62 12	183 12	175	3 2
15	91	9	6	9	12	6 3	5 3	41 3	132 3	126	2 1
17	105	7	3	13	12	8 5	10 5	45 5	150 5	142	2 4
18	105	7	0	10	17	6 10	7 10	41 10	146 10	140	2 1
19	91	9	7	12	7	7 12	13 12	48 12	139 12	132	2 7
20	98	5	7	5	11	6 11	6 11	34 11	132 11	126	1 12
21	102	8	3	15	12	9 4	12 4	50 4	152 4	143	2 8
22	104	8	— 2	12	12	8 10	7 10	37 10	141 10	133	1 14
23	92	4	2	7	7	8 9	11 9	31 9	123 9	115	1 9
24	91	10	5	13	14	8 8	8 8	50 8	141 8	133	2 8
25	105	9	8	11	15	8 14	11 14	54 14	159 14	151	2 12
26	112	8	— 7*	23	14	9 9	9 9	47 9	159 9	150	2 6
27	94	10	8	10	11	9 13	9 13	48 13	142 13	133	2 7
28	100	10	3	13	12	6 14	7 14	45 14	145 14	139	2 5
29	100	8	4	12	8	8 4	8 4	40 4	140 4	132	2 0
30	98	8	4	11	12	7 0	14 0	49 0	147 0	140	2 7
31	94	4	7	16	12	7 14	7 14	46 14	140 14	133	2 5
32	93	10	1	— 2	7	9 12	9 12	25 12	118 12	109	1 4
34	88	12	2	10	9	6 14	8 14	41 14	129 14	123	2 1
35	84	0	— 4	12	11	6 11	4 11	23 11	107 11	101	1 3
36	89	5	0	18	8	8 7	14 7	45 7	134 7	126	2 4
37	101	7	2	16	14	9 3	13 3	52 3	153 3	144	2 10
39	94	10	0	15	6	7 0	6 0	37 0	131 0	124	1 13
40	91	5	7	9	10	6 8	10 8	41 8	132 8	126	2 1
41	105	7	— 1	11	11	5 10	8 10	36 10	141 10	136	1 13
42	88	6	3	19	17	7 14	7 14	52 14	140 14	133	2 10
43	90	11	11	14	12	6 6	9 6	57 6	147 6	141	2 14
Totals	4053	300	140	497	450	325 13	395 13	1782 12	5835 13	5510	88 12¾
Means, and Average Weekly Gain per head during each Period.	Mean per Head. lbs. oz. 101 5	lbs. ozs. 1 14	lbs. ozs. 0 14	lbs ozs. 3 1¾	lbs. ozs. 2 13	Mean per Head. lbs. ozs. 8 2¼	lbs. ozs. 2 7½	Mean per Head. lbs. ozs. 44 9	Mean per Head. lbs. ozs. 145 14	Mean per Head. lbs. ozs. 137 12	lbs. ozs. 2 3¼

* Lame.

Table II.

Increase, &c., of each of the Cross-bred Wethers.

Sheep. Nos.	Weights at commencement, Dec. 2.	Increase in 4 Weeks to Dec. 30.	Increase in 4 Weeks to Jan. 27.	Increase in 4 Weeks to Feb. 24.	Increase in 4 Weeks to Mar. 24.	Wool Shorn, April 7.	Increase (including Wool) in 4 Weeks to Apr. 21.	Total Increase (including Wool) in 20 Weeks.	Final Weight with Wool.	Final Weight without Wool.	Average Increase per head per Week.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs.	lbs. ozs.
1	91	9	8	9	11	5 8	10 8	47 8	138 8	133	2 6
2	95	13	7	11	14	5 7	7 7	52 7	147 7	142	2 10
3	88	11	11	10	13	8 12	11 12	56 12	144 12	136	2 13
4	93	9	8	7	12	5 10	6 10	42 10	135 10	130	2 2
5	89	9	9	7	12	8 5	7 5	44 5	133 5	125	2 3
6	95	12	5	11	13	4 12	4 12	45 12	140 12	136	2 4
7	89	9	4	12	8	5 7	9 7	42 7	131 7	126	2 2
8	100	6	2	10	11	7 8	5 8	34 8	134 8	127	1 11
9	96	9	9	11	14	7 12	6 12	49 12	145 12	138	2 8
10	94	8	9	7	8	6 15	6 15	38 15	132 15	126	1 15
11	101	11	4	6	14	5 8	9 8	44 8	145 8	140	2 3
12	102	10	8	15	15	6 12	5 12	53 12	155 12	149	2 11
13	104	6	5	7	11	6 11	8 11	37 11	141 11	135	1 14
14	100	12	0	10	13	6 8	7 8	42 8	142 8	136	2 2
15	93	11	10	12	14	7 0	9 0	56 0	149 0	142	2 12
16	93	9	9	12	14	6 0	9 0	53 0	146 0	140	2 10
17	99	9	8	11	16	7 10	11 10	55 10	154 10	147	2 12
18	101	13	6	5	15	5 7	1 7	40 7	141 7	136	2 0
19	96	6	10	10	11	6 13	6 13	43 13	139 13	133	2 3
20	98	3	8	10	11	6 9	12 9	44 9	142 9	136	2 4
21	95	9	7	4	8	6 2	9 2	37 2	132 2	126	1 13
22	96	10	5	9	13	5 9	5 9	42 9	138 9	133	2 2
23	94	8	8	10	8	6 13	5 13	39 13	133 13	127	1 15
24	100	10	6	12	12	6 10	8 10	48 10	148 10	142	2 7
25	98	14	4	10	15	7 14	5 14	48 14	146 14	139	2 7
26	102	10	7	11	12	5 4	5 4	45 4	147 4	142	2 4
27	100	10	5	7	11	6 2	6 2	39 2	139 2	133	1 15
28	98	5	11	10	14	4 4	7 4	47 4	145 4	141	2 6
29	87	9	8	8	10	6 4	7 4	42 4	129 4	123	2 2
30	88	5	7	7	12	5 6	5 6	36 6	124 6	119	1 13
31	98	8	10	12	12	7 0	7 0	49 0	147 0	140	2 7
32	98	8	10	12	12	6 12	9 12	44 12	132 12	126	2 4
33	88	6	7	11	11	6 7	6 7	52 7	138 7	132	2 10
34	86	12	12	9	13	6 7	8 7	33 7	131 7	125	1 11
35	98	3	2	9	11	5 13	6 14	36 13	127 13	122	1 13
36	91	6	5	10	10	6 14	10 12	42 14	128 14	122	2 2
37	86	6	7	10	11	6 12	2 12	48 12	146 12	140	2 7
38	98	7	7	10	14	5 12	2 0	40 12	138 12	133	2 0
39	98	12	4	12	10	6 0	7 3	39 0	130 0	124	1 15
40	91	9	7	9	12	8 3		38 3	133 3	125	1 14
41	95	6	7	8	10						
Totals	3804	350	276	383	479	257 2	282 2	1780 2	5584 2	5327	88 8
Means, and Average Weekly Gain per Head during each Period. — Mean per Head.						Mean per Head.		Mean per Head.	Mean per Head.	Mean per Head.	
	lbs. oz. 95 1½	lbs. ozs. 2 3	lbs. ozs. 1 11½	lbs. ozs. 2 6	lbs. ozs. 3 0	lbs. ozs. 6 7	lbs. ozs. 1 13¾	lbs. ozs. 44 8	lbs. ozs. 139 9¼	lbs. ozs. 133 3	lbs. ozs. 2 3¼

Table III.

Increase, &c., of each of the Cross-bred Ewes.

Sheep. Nos.	Weights at commencement, Dec. 2.	Increase in 4 Weeks to Dec. 30.	Increase in 4 Weeks to Jan. 27.	Increase in 4 Weeks to Feb. 24.	Increase in 4 Weeks to Mar. 24.	Wool Shorn, April 7.	Increase (including Wool) in 4 Weeks to Apr. 21.	Total Increase (including Wool) in 20 Weeks.	Final Weight with Wool.	Final Weight without Wool.	Average Increase per head per Week.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs.	lbs. ozs.
1	91	13	2	10	10	7 4	14 4	49 4	140 4	133	2 7
2	92	11	7	9	7	8 4	7 4	41 4	133 4	125	2 1
3	100	5	6	10	7	7 12	8 12	36 12	136 12	129	1 13
4	86	8	7	11	10	7 8	7 8	43 8	129 8	122	2 3
5	93	9	4	13	10	9 4	9 4	45 4	138 4	129	2 4
6	91	7	11	10	10	7 6	13 6	51 6	142 6	135	2 9
7	95	10	6	11	11	7 10	10 10	48 10	143 10	136	2 7
8	93	5	6	16	11	8 12	7 12	45 12	138 12	130	2 4
9	95	7	6	11	12	6 14	14 14	50 14	145 14	139	2 8
10	98	12	5	11	7	5 10	7 10	42 10	140 10	135	2 2
11	94	9	1	15	9	6 4	6 4	40 4	134 4	128	2 0
12	89	7	0	4	11	6 7	7 7	29 7	118 7	112	1 7
13	90	10	5	14	13	5 8	6 8	48 8	138 8	133	2 7
14	92	6	3	11	7	6 6	6 6	33 6	125 6	119	1 10
15	87	9	8	13	7	7 3	5 3	42 3	129 3	122	2 2
16	98	9	5	7	9	9 12	14 12	44 12	142 12	133	2 4
17	98	10	3	9	9	6 10	6 10	37 10	135 10	129	1 14
18	100	2	7	13	12	6 0	5 0	39 0	139 0	133	1 15
19	86	5	8	13	10	7 10	7 10	43 10	129 10	122	2 3
20	90	2	8	12	10	8 5	3 5	35 5	125 5	117	1 12
21	91	7	3	10	8	5 8	5 8	33 8	124 8	119	1 11
22	94	10	3	12	11	7 2	10 2	46 2	140 2	133	2 5
23	98	6	6	10	11	6 8	10 8	43 8	141 8	135	2 3
24	84	8	5	11	11	7 4	5 4	40 4	124 4	117	2 0
25	88	0	7	13	11	6 14	9 14	40 14	128 14	122	2 0½
26	96	6	7	10	8	7 12	10 12	41 12	137 12	130	2 1
27	98	3	8	10	8	6 5	7 5	36 5	134 5	128	1 13
29	78	8	5	14	12	7 13	4 13	43 13	121 13	114	2 3
30	94	8	7	10	10	7 10	10 10	45 10	139 10	132	2 4
31	79	8	3	11	11	6 7	6 7	39 7	118 7	112	1 15
32	86	12	5	9	10	6 1	7 1	43 1	129 1	123	2 2
33	89	9	6	3	17	7 0	8 0	43 0	132 0	125	2 2
34	98	4	10	10	11	6 14	9 14	44 14	142 14	136	2 4
35	84	11	12	14	12	7 14	10 14	59 14	143 14	136	3 0
36	92	2	11	10	9	7 4	9 4	41 4	133 4	126	2 1
37	88	10	4	11	10	7 8	10 8	45 8	133 8	126	2 4
38	90	8	1	11	9	6 12	5 12	34 12	124 12	118	1 12
39	90	6	3	11	11	9 8	8 8	39 8	129 8	120	1 15
40	91	7	5	12	9	6 6	8 6	41 6	132 6	126	2 1
41	84	10	11	10	9	8 8	6 8	46 8	130 8	122	2 5
Totals	3650	299	230	435	400	289 3	336 3	1700 3	5350 3	5061	84 9½
Means, and Average Weekly Gain per Head during each Period. — Mean per Head.						Mean per Head.		Mean per Head.	Mean per Head.	Mean per Head.	
	lbs. oz. 91 4	lb. ozs. 1 14	lb. ozs. 1 7	lbs. ozs. 2 11½	lbs. ozs. 2 8	lbs. ozs. 7 3¾	lbs. ozs. 2 1¼	lbs. ozs. 42 8	lbs. ozs. 133 12	lbs. ozs. 126 8	lbs. oz. 2 1¾

A glance at these Tables shows very great irregularity in the *apparent* rate of increase of the same sheep during different periods, and also of different sheep during one and the same period. This general result we have shown to be very marked in all our feeding experiments. The variation in the total increase per head, among each lot, is also very great; but this irregularity, from whatever cause, is obviously much greater among the Leicesters than the cross-breds. It may be due to the decidedly greater irregularity in weight of the Leicester lambs when first put up; but whether this variableness in rate of increase is really more usual among the lambs of the pure breed than of the cross-breds, or whether it is only due in the present instance to the Leicesters having been drawn from several flocks, and the cross-breds carefully selected from one, we have not the means of deciding. At any rate however, in the case of our experiment, a given weight of either of the cross-bred lots gave a greater average proportion of increase than the Leicesters.

The variation in *average weekly increase per head*, is seen to be—among the 40 Leicesters, from 1 lb. 3 ozs. to 3 lbs. 5 ozs.; among the 40 cross-bred wethers, from 1 lb. 11 ozs. to 2 lbs. 13 ozs.; and among the 40 cross-bred ewes, from 1 lb. 7 ozs. to 3 lbs. That the state of the weather was not without some influence upon the variable rate of increase throughout the different monthly periods, would appear from the fact, that *all the three lots* gave a considerably less amount of increase during the second period —the unusually cold month of January—than at any other time.

These few observations upon the three Tables which show the detailed progress of each sheep, are sufficient again to show the absolute necessity of operating upon large numbers of animals, and extending our experiments over a considerable period of time, if we would attempt to draw trustworthy conclusions from comparative feeding experiments.

In the six following Tables are given, for each lot of sheep respectively (Leicesters, cross-bred wethers, and cross-bred ewes):—

In Table IV. The *total foods* consumed, and *total increase* in live-weight produced, by each lot of 40 sheep, between each weighing (monthly periods).

In Table V. The quantities of the foods consumed during each separate period, and the total period of the experiment, to produce 100 *lbs. increase* in live weight.

In Table VI. The amounts of foods consumed *per head weekly*.

In Table VII. The amounts of the foods consumed *per* 100 *lbs. live weight weekly*.

In Table VIII. The average *increase in weight* per head weekly.

In Table IX. The average increase *upon each* 100 *lbs. live-weight weekly*.

TABLE IV.

Description and Quantities of Food consumed, and Increase produced, by each lot of Sheep between each interval of weighing (monthly periods). Quantities given in lbs.

Periods.	Length of Time in Weeks.	Oilcake.			Clover Hay.			Sweedes.			Increase in Live Weight.		
		Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2nd to December 30th	4	896	896	840	896	896	840	11,223	10,957	10,609	300	350	299
" December 30th to January 27th	4	896	896	840	896	896	840	10,345	10,169	9,637	140	276	230
" January 27th to February 24th	4	896	896	840	896	896	840	12,890	12,595	12,172	497	383	435
" February 24th to March 24th	4	896	896	840	896	896	840	16,009	15,939	14,662	450	419	400
" March 24th to April 21st	4	1,120	1,120	1,120	896	896	896	16,584	16,650	15,330	395¾	292	336
Total consumption and increase of 40 each of Leicesters, Cross-bred Wethers, and Cross-bred Ewes	20	4,704	4,704	4,480	4,480	4,480	4,256	67,051	66,310	62,410	1,782¾	1,780	1,700
Average Food consumed, and Increase produced by each lot of Sheep (of 40 each) in 4 weeks	-	940¾	940¾	896	896	896	851¼	13,410	13,262	12,482	356¼	356	340

TABLE V.

Quantities of Food consumed during each separate period, and the total period of the experiment, to *produce* 100 *lbs. Increase in Live Weight.* Quantities given in lbs. and ozs.

Periods.	Time in Weeks.	Oilcake.			Clover Hay.			Sweedes.		
		Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2nd to December 30th	4	298 10	256 0	280 15	298 10	256 0	280 15	3,741	3,130	3,548
December 30th to January 27th	4	640 0	324 10	365 3	640 0	324 10	365 3	7,389	3,684	4,190
January 27th to February 24th	4	180 4	233 15	193 1	180 4	233 15	193 1	2,593	3,288	2,798
February 24th to March 24th	4	199 2	187 0	210 0	199 2	187 0	210 0	3,857	3,327	3,665
March 24th to April 21st	4	282 15	383 6	333 2	226 6	306 11	266 8	4,189	5,699	4,560
Average for the total period of the experiment	20	263 13¾	264 4¼	263 8¾	251 4¾	251 10¾	250 5¼	3,761	3,725¾	3,671

TABLE VI.

Average Weekly Consumption of Food, *per Head*, during each separate period, and the total period of the experiment.
Quantities in lbs. and ozs.

Periods.	Time in Weeks.	Oilcake.		Clover Hay.		Swedes.	
		Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2nd to December 30th	4	5 9¼	5 9¼	5 4	5 9¼	5 9¼	5 4	70 2	68 8	66 5
,, December 30th to January 27th	4	5 9¼	5 9¼	5 4	5 9¼	5 9¼	5 4	64 10	63 9	60 4
,, January 27th to February 24th	4	5 9¼	5 9¼	5 4	5 9¼	5 9¼	5 4	80 9	78 11	76 1
,, February 24th to March 24th	4	5 9¼	5 9¼	5 4	5 9¼	5 9¼	5 4	100 1	99 10	91 10
,, March 24th to April 21st	4	7 0	7 0	5 9¼	5 9¼	5 9¼	5 9¼	103 10	104 1	95 13
Average for the total period of the experiment	20	5 14	5 14	5 9¼	5 9¼	5 9¼	5 5	83 13	82 14	78 0

TABLE VII.

Average Weekly Consumption of Food, *per* 100 *lbs. Live Weight of Animal*, during each separate period, and the total period of the experiment. Quantities in lbs. and ozs.

Periods.	Time in Weeks.	Oilcake.		Clover Hay.		Swedes.	
		Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2nd to December 30th	4	5 5¾	5 10	5 8¾	5 5¼	5 10	5 8¾	66 12	68 13¾	69 12¾
,, December 30th to January 27th	4	5 1	5 3¾	5 2¾	5 1	5 3¾	5 2¾	58 7¼	59 3¾	59 2¾
,, January 27th to February 24th	4	4 11¼	4 13¾	4 12¾	4 11¼	4 13¾	4 12¾	67 15¼	68 2	69 3¾
,, February 24th to March 24th	4	4 4¾	4 6¾	4 5¾	4 4¾	4 6¾	4 5¾	76 12	78 13¾	76 2
,, March 24th to April 21st	4	4 15¾	5 2¾	5 6¼	3 15¼	4 5	4 5	73 8¼	76 8¾	73 15¼
Average for the total period of the experiment	20	4 12	5 0	4 15¾	4 8¼	4 12¼	4 11¼	67 13	70 10	69 3¼

TABLE VIII.

Average *Weekly Increase per Head* during each separate Period, and the Total Period of the Experiment.

Quantities in lbs. and ozs.

Periods.	Time in Weeks.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2 to December 30	4	1 14	2 3	1 14
,, December 30 to January 27	4	0 14	1 11½	1 7
,, January 27 to February 24	4	3 1¾	2 6¼	2 11½
,, February 24 to March 24	4	2 13	3 0	2 8
,, March 24 to April 21	4	2 7½	1 13	2 1½
Average for the Total Period of the Experiment	20	2 3½	2 3½	2 2

TABLE IX.

Average Weekly Increase *per* 100 *lbs. Live-Weight* during each separate Period, and the Total Period of the Experiment.

Quantities in lbs. and ozs.

Periods.	Time in Weeks.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
From December 2 to December 30	4	1 12½	2 3	1 15½
,, December 30 to January 27	4	0 12½	1 9¾	1 6½
,, January 27 to February 24	4	2 9¾	2 1	2 7½
,, February 24 to March 24	4	2 2½	2 5¾	2 1¼
,, March 24 to April 21	4	1 12	1 5½	1 9¾
Average for the Total Period of the Experiment	20	1 12¾	1 14¼	1 14

In Table IV. we have a summary of the actual facts of the consumption of food and the increase in weight, in these feeding experiments; but the comparisons which the results involve will be more easily studied in some of the succeeding Tables. We may notice, however, as indicated in Table IV., that the allowance of oil-cake was increased to each of the three lots, from ¾ lb. to 1 lb. per head per day, during the last four weeks of the experiment. Notwithstanding this there was an increase in the amount of swedes consumed in this period, as compared with the previous ones; throughout which there had been a considerable progressive increase in the rate of consumption of the roots as the season advanced. This increased consumption was probably in part due to the deterioration in the quality of the turnips themselves. But it is doubtless in greater part attributable to the increased requirements of the animals after

losing the protection of their wool, and it may be recalled to mind that the same effect was observable in the experiments with the Cotswolds and the Hampshire and Sussex sheep. The *gross increase* was, however, by no means in proportion to the increased consumption of food during the last four weeks of the experiment.

These remarks on the general progress of the experiment as shown in Table IV. apply pretty equally to the three lots of sheep; though, as is seen in the Table, the increase in the supply of dry food during the last four weeks was, in proportion, rather greater for the cross-bred ewes than for the other two lots of sheep; for it was considered that, taking into calculation their progress, their allowance hitherto had perhaps been scarcely equal to that of the others, in relation to their *mean weight throughout the experiment.*

Table V.—which gives the quantity of each food consumed *to produce* 100 *lbs. increase in live weight*, during each monthly period of the experiment—shows an extraordinary variation in the apparent effect of the food as measured by *increase*, during the different periods. This irregularity is notably greater with the Leicesters than with either of the cross-breds. It is at the same time apparent that there was somewhat of a general tendency among the three lots to greater or less rate of increase, at one and the same period. Thus all three consume a larger amount of food for a given effect during the second period; during the next two periods there was a somewhat better result with all; and during the final month there was again a tendency with all to consume a larger amount of food for a given amount of increase. These observations only tend again to prove the necessity of extending comparative feeding experiments over a considerable length of time; and this will be further seen from the observations which next follow.

Notwithstanding the very great differences which Table V., as just noticed, shows in the amounts of food consumed during one period of the experiment compared with another to produce 100 lbs. of increase—and also the great difference in the amounts consumed by the different lots of sheep for a given effect during each separate period—still, the base line of the table, which gives the *average amount* consumed, to produce 100 lbs. of increase during the *total period* of the experiment, shows, that thus taking the whole course of the experiment, the three lots consumed almost identical amounts of the respective foods, to produce a given weight of increase. The identity of the figures is indeed quite remarkable, in a series of comparative trials on such a scale. Though, if the variations, small as they are, are to be taken as indicating any real difference between the lots, it would seem, that the *cross-bred ewes* have given somewhat the best account of the food which they have consumed.

Table VI. shows the amounts of the foods consumed *per head per week.* But as the allowance of the *dry* foods (until it was increased during the last period of the experiment) was allotted in fixed quantity in relation to the weights of the animals at the beginning, the variation in their amounts during the first four periods indicates nothing more than the variation in the original weights of the different lots of sheep. However, we see, that the average consumption per head of *swedes*, which were given *ad libitum*, varies among the three lots as nearly as possible in the same ratio as that of the other foods; and hence, it would appear, that in relation to the weights of the animals, the requirements of food are the same for the three lots. This point is better seen in Table VII.

In Table VII., we have the average weekly consumption of food *per* 100 *lbs. live weight of animal*, instead of per head. The figures in this Table show that the cross-bred wethers consumed rather the most of each of the three foods in relation to their average weight throughout the experiment. The cross-bred ewes were the next in order in this respect, whilst the Leicesters consumed the least. Since, however, we have seen in Table V. that the cross-bred ewes gave if anything a somewhat better rate of increase in relation to food consumed than the Leicesters, the slightly larger consumption by them in relation to weight within a given time is at any rate no disadvantage.

In Table VIII. we have the *average weekly increase per head.* With great fluctuation in this respect between the three lots at every separate period of weighing, there is comparatively little difference taking the average of the whole period. We would here, however, fix attention upon the fact that in these experiments with 40 sheep of good quality in each lot, fed under cover—the experiment extending over 20 weeks, and with food certainly superior to that which is frequently given to fatting sheep—we have with neither lot an average weekly gain in weight of 2¼ lbs. per head. We refer to this point particularly, as a further proof of the over-estimations which are frequently founded upon experiments conducted on a comparatively limited scale.

In Table IX. we have the average weekly gain *per cent.*, that is, *per* 100 *lbs. live weight of animal*, instead of *per head.* We see here, that with neither lot of sheep is there an average gain of 2 per cent. per week upon the live weight. Both the lots of cross-breds gave a somewhat higher rate of increase, in proportion to their weight, than the Leicesters: the amounts being, for the cross-bred wethers 1 lb. 14¼ ozs.; for the cross-bred ewes 1 lb. 14 ozs.; and for the Leicesters 1 lb. 12¾ ozs.

Upon the whole, then, comparing the new Leicester sheep with the cross between the Leicester ram and the Southdown ewe, when fed under cover upon a liberal supply of good food, the results, so far as the relation of gross increase to food consumed is concerned, are very nearly identical; but if there be a difference sufficiently marked in these experiments, it is certainly in several points somewhat in favour of the *cross-breds;* whilst, among the latter, the *ewes* would seem to make mutton rather faster than the wethers.

The circumstances of these experiments were certainly all in favour of the requirements of the pure Leicester breed; or rather the hardier qualities of the cross with the Southdown were not put to the test. Nine of the Leicester lambs purchased were, however, wintered with the ordinary flock on the farm; and it should be remarked that they none of them stood the winter so well as the main flock—a cross between the Hampshire and Sussex Down: several of these 9 Leicesters indeed died; and none of them did well. It is to be regretted that an equal number of the cross-bred wethers and ewes (Leicester and Southdown) were not at command to turn out by the side of the pure Leicesters, two only of the cross-breds being wintered in the field; these two, however, stood the winter well. Such a result is, in the general, much what we should have expected. But it is only fair to say that the 9 Leicesters which were turned out were the worst of the 50 lambs purchased; and it is not improbable, therefore, that they were somewhat bad representatives of their race.

The next point of comparison is as to the wool; the amounts of which are given in Table X., which follows.

TABLE X.

	Average Wool per Head.	Proportion of Wool in 100 lbs. Live Weight of Animal at the time of being Shorn.
	lbs. ozs.	
Leicesters shorn .. .. April 7, 1853	8 2¼	5·58
Cross-bred Wethers shorn .. ,,	6 7	4·60
Cross-bred Ewes shorn .. .. ,,	7 3½	5·40

The three lots of sheep were shorn on April 7th, 1853, having been washed a week previously. The average yield of wool *per head* is seen to be 8 lbs. 2¼ ozs. for the Leicesters, 7 lbs. 3½ ozs. for the cross-bred ewes, and 6 lbs. 7 ozs. for the

cross-bred wethers. The average for the cross-breds is therefore about 6 lbs. 13 ozs. per head. The Leicesters therefore have given an average of nearly 1¼ lb. more *weight* of wool per head than the cross-breds. The respective money values of the different descriptions of wool will be referred to further on.

The second column of the Table (X.) shows that the pure Leicesters and cross-bred ewes each gave about 5½ *per cent. of their weight* of wool at the time of shearing; and the cross-bred *wether* only about 4½ per cent.

As in the case of the breeds previously reported upon, some of these Leicesters and cross-breds were killed at home, and the weights of the carcasses and of the different parts of the offal taken; some were sold alive; and a few kept to be fed till the Christmas following. The main experiments with the Hampshire and Sussex Downs had been extended over 26 weeks; that with the Cotswolds only 20 weeks, when some of them were found to be already even too fat. These Leicesters and cross-breds also were kept on fattening food for only 20 weeks. But, as appeared by the results, neither of these three lots was as well ripened as had been the Hampshire and Sussex Downs and the Cotswolds.

Of each of the lots of 40 sheep under consideration, 16 were killed at home, and their carcasses sent to Newgate market; 16 were sold alive at Smithfield; and 8 retained for further fattening.

The 16 killed at home were—

The 4 of *largest* increase,
The 4 of *smallest* increase, and
The 8 of *medium* increase.

The 16 sent to Smithfield alive were, respectively—

The 8 of the *next largest*, and
The 8 of the *next smallest* increase—to the lots of 4 each above mentioned.

The remaining 8 of each lot were fed till Christmas.

The following Table (XI.)—giving the mean increase per head, average weight of wool per head, and average weights of the sheep at the commencement and at the conclusion of the experiment—shows how far the method of allotment adopted brought together pretty average qualities within each lot in these respects. The only point deserving any notice is, that the sheep allotted for feeding until Christmas appear to have been on an average somewhat lighter throughout than the other lots.

TABLE XI.

	Average Increase per Head, including Wool.			Average Wool per Head (Shorn April 7).		
	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
Mean of 16 killed at home	44 8¼	44 14½	42 10¼	8 3	6 9½	6 15¼
Mean of 16 sold alive	44 5	44 9¼	42 4	8 1	6 10¼	7 8¼
Mean of 8 to be fed till Christmas	44 11	43 8½	42 11¾	8 3	5 10½	7 3¾
Mean of 40 Sheep	44 9	44 8	42 8	8 2¼	6 7	7 3½

	Average Original Weight, Dec. 2, 1852.			Average Final Weight, April 21, 1853 (without Wool).		
	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
Mean of 16 killed at home	102 2	95 8	91 1	138 7	133 12¼	126 12
Mean of 16 sold alive	102 5	96 2	91 14	138 13	134 1	126 10
Mean of 8 to be fed till Christmas	97 12	92 4	90 6	134 4	130 2	125 12
Mean of 40 Sheep	101 5	95 1½	91 4	137 12	133 3	126 8

The following Table (XII.) gives the *dead-weights*, &c., of the sheep killed at home, by the side of some particulars of them whilst alive. And we have, especially in the *summary* given at the foot of the Table, the means of comparing the state of maturity and quality as meat-producers, both of the lots of different rates of increase within each breed, and of the average of the whole 16 of each killed. (*See* pp. 20, 21.)

The construction of this Table (XII.) is designed to show the connection between the tendency to rapid increase and other particulars of the sheep whilst alive, on the one hand, and those ascertained on killing them, on the other. The first observation that occurs on looking at the Table is that which has been made in reference to other breeds—viz., that there is among animals of pretty equal increase great diversity in other qualities. This is not, however, either equally marked with these three lots of sheep, or in relation to all the qualities indicated in the Table.

Thus, in each of the three lots, the animals brought together as having increased nearly equally show a considerable diversity in amount of wool, in original weight, in final weight; also, pretty generally, in actual carcass-weight, in proportion of

carcass-weight to live-weight, and particularly in the percentage of loose or inside fat.

In the summary at the bottom of the Table we have again shown, that which has already been otherwise indicated, the much greater irregularity in the rate of increase among the Leicesters than among either of the cross-bred lots. Thus, among the Leicesters the average gain of the 4 of *smallest* increase is less than half that of the 4 of *greatest* increase; the numbers being, for the former 28 lbs. per head, and for the latter 61¾ lbs. The variation among the cross-breds is much less. Among the *wethers* the average gain of the 4 of smallest increase was 35½ lbs., and that of the 4 of largest increase 55½ lbs.; and among the *ewes*, that of the 4 of smallest increase was 32¾ lbs., and of the 4 of largest increase 52¾ lbs. The bottom lines of these columns of increase show, however, that although the differences were much greater within one lot than another, yet the *average* increase per head of each lot of 40 sheep was very nearly identical for the Leicesters, cross-bred wethers, and cross-bred ewes. It was, however, for the ewes about 2 lbs. less than for either of the other lots.

With, as already noticed, great diversity in the amount of *wool* yielded by sheep of nearly equal increase, we have still, with all three lots, somewhat more wool with the sheep of largest increase than with those of either smallest or medium rate of increase. The summary shows too, as we should expect, that in each of the allotments, according to increase, the Leicesters give more wool than the cross-breds; and, among the cross-breds, the ewes give upon the whole more wool than the wethers.

The actual carcass or dead weight (calculated in stones of 8 lbs.) varies among the 16 Leicesters killed from little more than 6¼ stones to nearly 12¼ stones; among the 16 cross-bred wethers it ranges only from nearly 8 stones to nearly 10½ stones; and among the slaughtered cross-bred ewes the variation is from nearly 7¾ stones to 9¾ stones. With this great variation in the amount of meat produced per head, and particularly among the Leicesters, the average of the whole 16 of each lot killed agrees more nearly than we should have expected. Thus the average yield of mutton of the 16 Leicesters killed is about 9½ stones; that of the cross-bred wethers 9¼ stones; and of the cross-bred ewes nearly 8¾ stones. The cross-breds have therefore given, on the average, nearly as much meat per head as the Leicesters. As already intimated, however, all three lots would have been somewhat better for another month of feeding; which, we may calculate, would have given at that stage of the fattening process an average of nearly a stone per head more carcass-weight for each of the three lots of sheep.

TABLE XII.

Sheep. Nos.			Weights Alive.									Final Live Weight without Wool.			Weights Alive.			Weights Dead.								
			Increase per Head, including Wool, in 20 Weeks.			Wool per Head, Shorn April 7.			Original Weight, December 2nd, 1852.			Not Fasted.			Fasted.			Carcass, 28 to 36 hours after killing.			Proportion of Cold Carcass in 100 Unfasted Weight.			Proportion of Cold Carcass in 100 Fasted Weight.			Proportion of Loose or Inside Fat in 100 Fasted Weight, including Wool.		
Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.	Leicesters.	Cross-bred Wethers.	Cross-bred Ewes.
			lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.									
5	3	35	66 4	56 12	59 14	10 4	8 12	7 14	119 0	88 0	84 0	175 0	136 0	136 0	160 0	126 0	122 0	97 14	76 1	75 4	55·9	55·9	55·3	61·2	60·4	61·7	4·80	4·60	5·92
14	15	6	62 12	56 0	51 6	8 12	7 0	7 6	121 0	93 0	91 0	175 0	142 0	135 0	160 0	131 0	122 0	99 15	83 13	76 1	57·1	59·0	56·4	62·5	64·0	62·4	5·19	6·42	5·05
11	17	9	62 0	55 10	50 14	10 0	7 10	6 14	117 0	99 0	95 0	169 0	147 0	139 0	155 0	135 0	125 0	94 5	81 8	76 9	55·8	55·4	55·1	60·8	60·4	61·2	5·56	4·08	6·94
8	12	1	56 0	53 12	49 4	10 0	6 12	7 4	108 0	102 0	91 0	154 0	149 0	133 0	140 0	135 0	118 0	86 10	82 6	70 10	56·2	55·3	53·1	61·9	61·0	59·8	4·46	5·25	5·06
Mean of the 4 largest			61 12	55 8¼	52 13¼	9 12	7 8½	7 5¼	116 4	95 8	90 4	168 4	143 8	135 12	153 12	131 12	121 12	94 11	80 15	74 10	56·2	56·4	55·0	61·6	61·4	61·3	5·00	5·09	5·74
7	36	38	31 0	36 13	34 12	6 0	5 13	6 12	96 0	91 0	90 0	121 0	122 0	118 0	110 0	110 0	105 0	65 5	66 11	63 14	54·0	54·7	54·1	59·4	60·6	60·2	5 07	4·31	6·18
23	30	21	31 9	36 6	33 8	8 9	5 6	5 8	92 0	88 0	91 0	115 0	119 0	119 0	104 0	106 0	107 0	57 10	63 4	66 0	50·1	53·2	55·5	55·4	59·7	61·7	3·21	4·71	7·19
32	8	14	25 12	34 8	33 6	9 12	7 8	6 6	93 0	100 0	92 0	109 0	127 0	119 0	100 0	115 0	108 0	58 6	64 10	66 11	53·6	50·9	56·0	58·4	56·2	61·7	3·03	5·69	4·73
35	35	12	23 11	33 7	29 7	6 11	6 7	6 7	84 0	98 0	89 0	101 0	125 0	112 0	92 0	116 0	102 0	50 7	67 11	61 8	49·9	54·2	54·9	54·8	58·4	60·3	3·07	6·10	4·87
Mean of the 4 smallest			28 0	35 4½	32 12½	7 12	6 4½	6 4½	91 4	94 4	90 8	111 8	123 4	117 0	101 8	111 12	105 12	57 15	65 9	64 8½	51·9	53·2	55·1	57·0	58·7	61·0	3·59	5·20	5·74
12	6	19	46 3	45 12	43 10	8 3	4 12	7 10	114 0	95 0	86 0	152 0	136 0	122 0	140 0	122 0	112 0	88 11	77 9	64 5	58·3	57·0	52·7	63·3	63·6	57·4	4·64	6·19	5·93
28	26	23	45 14	45 4	43 8	6 14	5 4	6 8	100 0	102 0	98 0	139 0	142 0	135 0	126 0	134 0	123 0	77 14	79 5	74 6	56·0	55·9	55·1	61·8	59·2	60·5	4·73	7·25	5·48
36	33	4	45 7	44 12	43 8	8 7	6 12	7 8	89 0	88 0	86 0	126 0	126 0	122 0	113 0	114 0	111 0	63 14	70 12	66 6	50·7	56·1	54·4	56·5	62·1	59·8	3·86	5·64	5·88
17	20	10	45 5	44 9	42 10	8 3	6 9	5 10	105 0	98 0	98 0	142 0	136 0	135 0	130 0	127 0	124 0	79 15	77 10	78 4	56·3	57·1	58·0	61·5	61·1	63·1	6·74	6·01	6·18
3	11	15	44 2	44 8	42 3	9 2	5 8	7 3	105 0	101 0	87 0	140 0	140 0	122 0	130 0	126 0	110 0	78 2	79 9	67 5	55·8	56·8	55·2	60·1	63·1	61·2	4·83	4·77	5·73
10	5	26	43 4	44 5	41 12	7 4	8 5	7 12	95 0	89 0	96 0	131 0	125 0	130 0	115 0	115 0	118 0	71 7	67 0	69 13	54·5	53·6	53·7	62·1	58·3	59·2	5·03	3·88	6·34
18	19	40	41 10	43 13	41 6	6 10	6 13	6 6	105 0	96 0	91 0	140 0	133 0	126 0	128 0	126 0	116 0	79 5	71 8	71 13	56·6	53·8	57·0	62·0	56·7	61·9	3·74	4·58	5·59
40	14	2	41 8	42 8	41 4	6 8	6 8	8 4	91 0	100 0	92 0	126 0	136 0	125 0	117 0	120 0	112 0	69 2	75 1	70 1	54·9	55·2	56·0	59·1	62·6	62·5	5·62	6·10	5·56
Mean of the 8 medium			44 2½	44 7	42 7½	7 10½	6 5	7 1½	100 8	96 2	91 12	137 0	134 4	127 2	124 14	123 0	115 12	76 0¾	74 12¼	70 4½	55·4	55·7	55·3	60·8	60·8	60·7	4·90	5·55	5·84

SUMMARY.

Mean of the 4 largest	61 12	55 8½	52 13¼	9 12	7 8½	7 5¼	116 4	95 8	90 4	168 4	143 8	135 12	153 12	131 12	121 12	94 11	80 15	74 10	56·2	56·4	55·0	61·6	61·4	61·3	5·00	5·09	5·74
Mean of the 4 smallest	28 0	35 4½	32 12½	7 12	6 4½	6 4½	91 4	94 4	90 8	111 8	123 4	117 0	101 8	111 12	105 12	57 15	65 9	64 8½	51·9	53·2	55·1	57·0	58·7	61·0	3·59	5·20	5·74
Mean of the 8 medium	44 2½	44 7	42 7½	7 10½	6 5	7 1½	100 8	96 2	91 12	137 0	134 4	127 2	124 14	123 0	115 12	76 0¾	74 12¼	70 4½	55·4	55·7	55·3	60·8	60·8	60·7	4·90	5·55	5·84
Mean of 16 killed	44 8½	44 14½	42 10½	8 3	6 9½	6 15½	102 2	95 8	91 1	138 7	133 12½	126 12	126 4	122 6	114 12	76 2¼	74 0½	69 14¼	54·7	55·3	55·2	60·0	60·5	60·9	4·60	5·35	5·79
Mean of the 40 Sheep	44 9	44 8	42 8	8 2¼	6 7	7 3¼	101 5	95 1¼	91 4	137 12	133 3	126 8																	

From the circumstance, too, of the sheep being rather *under* fattened, the *proportion* of carcass to live weight is generally somewhat small among these three lots of sheep. In the Table the proportion of dead or carcass weight, calculated both to the *un*fasted and the *fasted* live-weight, is given. But as in the *un*fasted condition the animals are likely to retain much more variable amounts of unassimilated food—affecting therefore considerably the weight of the stomach and intestines—the percentage of carcass in the *fasted* weight gives us the safest ground of comparison. Among the sheep of largest increase we see a slight tendency to a greater percentage of carcass among the Leicesters than the cross-breds. Among those of the smallest increase, on the other hand, the difference is in favour of the cross-breds; and it is here also more marked than with the lots of largest increase. Among these lots of smallest increase, too, the cross-bred *ewes* give a markedly better proportion of carcass than the wethers. The mean percentage relation of carcass to fasted weight, among the sheep of *medium* rate of increase, is curiously identical for the three descriptions of sheep. It is also, as seen in the bottom line of the summary, very nearly identical for the three lots, taking the mean of the whole 16 killed in each case. It is, however, slightly better with the cross-breds than with the Leicesters; and, among the former, slightly better with the ewes than with the wethers.

Considering the general points of contrast between the Leicester and Southdown sheep—and especially the admitted greater tendency of the former to fatten in carcass and come early to maturity—we should perhaps have anticipated a better proportion of *dead* or *carcass* to live-weight among the Leicesters than the cross-breds; and more especially so under the circumstances of our experiment, in which its perhaps somewhat premature termination would, we should suppose, have been more adverse to the cross-bred than to the generally earlier ripening pure Leicesters. We leave it to the reader to decide whether the results, as the figures show them, should be considered true indications of the comparative qualities of pure Leicesters and cross-breds; or whether the obviously greater irregularity among the sheep composing our flock of the pure breed should be taken as evidence of a less successful selection for the purposes of our experiment in their case than in that of the cross-breds.

The only further point to notice, relating to the *dead-weights*, is as to the proportion of *loose* or *inside fat*. The general distinctive character of Leicesters and Downs is pretty well borne out by the figures under this head. Thus, notwithstanding the considerable variation in the amounts yielded by *individuals* within each breed, there is an obvious tendency in the cross-

breds—both among those of largest, of smallest, and of medium increase—to give a greater amount of "loose," "inside," or "offal" fat than the Leicesters. The amount is obviously greater too, among the cross-bred *ewes* than the cross-bred wethers. Comparing on this point the cross-breds, as a whole, with the Leicesters, we should, as already said, have anticipated a larger proportion of inside fat among the former than the latter. But as we have with this, at the same time, a general tendency to better proportion of *carcass-weight* also among the cross-breds, it would seem that they had perhaps, in point of fact, made, up to the time of killing, nearly as large a proportion, both of carcass and of inside—that is, of total fat—and were therefore in reality as fully "ripened," as the Leicesters, and this result we scarcely should have looked for.

Upon the whole, then, the result indicated by a consideration of this Table (XII.) of the particulars of the live and dead weights of those of the sheep killed at home is, that the Leicesters, although they have given, in *individual cases*, a very large carcass-weight, have, on the average, given not more than half a stone per head above the cross-breds; that the cross-breds, and especially the ewes, have given a somewhat better proportion of carcass-weight to live-weight; and more obviously still, the cross-breds, and again the ewes in particular, have given the largest proportion of inside or loose fat.

In the Tables which next follow are given the particulars of sale of the three lots of sheep.

TABLE XIII.

Particulars of Sale of the Leicesters.

			s.	d.	Weight. lbs.	oz.	Produce of Sale. £.	s.	d.
8 Sheep—4 of Largest, and 4 of Smallest Increase	6 Carcasses, at		4	2 per stone	407	0	10	11	11
	2	,,	4	0 ,,	188	0	4	14	0
8 medium Sheep	1	,,	4	1 ,,	69	0	1	15	2
	7	,,	4	2 ,,	525	0	13	13	3
	Wool		1	3 per lb.	131	2	8	3	11
	Skins		0	9 each	..		0	12	0
	Heads & Plucks		1	3 ,,	..		1	0	0
	Loose Fat		0	3½ per lb.	100	8	1	11	5
							42	1	8
Killing, 8*d.* per head; Selling and Charges at Newgate Market, 14*s.* 10*d.*					..		1	5	6
Net for 16 Sheep sold dead					..		40	16	2
Net per head					..		2	11	0

TABLE XIII.—*continued.*

	Weight.	Produce of Sale.
	lbs. oz.	£. s. d.
16 Sheep sold alive, viz. .. .. {8 at 40s. per head	..	16 0 0
{8 at 38s. ,,	..	15 4 0
Wool at 1s. 3d. per lb.	128 15	8 1 2½
		39 5 2½
Commission and Selling	..	0 10 8
Net for 16 Sheep sold alive	..	38 14 6½
Net per head	..	2 8 4¾
SUMMARY.		
16 Sheep sold dead (including Wool)	..	40 16 2
16 Sheep sold alive (including Wool)	..	38 14 6½
8 Sheep not sold, estimated at the price of those sold alive	..	19 7 3¼
		98 17 11¾
Average per head (including Wool)	..	2 9 5¼

TABLE XIV.

Particulars of Sale of the Cross-bred Wethers.

		Weight.	Produce of Sale.
	s. d.	lbs. oz.	£. s. d.
8 Sheep—4 of Largest, and 4 of Smallest Increase	Carcasses at .. 4 2 per stone	569 0	14 16 3
8 medium Sheep	,, 4 2 ,,	579 0	15 1 5
	Wool .. .. .. 1 5 per lb.	105 11	7 9 8¾
	Skins .. .. .. 0 9 each	..	0 12 0
	Heads & Plucks 1 3 ,,	..	1 0 0
	Loose Fat .. .. 0 3¾ per lb.	110 12	1 14 7½
			40 14 0¼
Killing, 8d. per head; Selling and Charges at Newgate Market, 14s. 2d.		..	1 4 10
Net for 16 Sheep sold dead		..	39 9 2¼
Net per head		..	2 9 3¾
16 Sheep sold alive at 41s. per head		..	32 16 0
Wool at 1s. 5d. per lb.		106 3	7 10 5
			40 6 5
Commission and Selling		..	0 10 8
Net for 16 Sheep sold alive		..	39 15 9
Net per head		..	2 9 8¾

TABLE XIV.—*continued.*

	Weight.	Produce of Sale.
SUMMARY.	lbs. oz.	£. s. d.
16 Sheep sold dead (including Wool)	..	32 9 2¼
16 Sheep sold alive (including Wool)	..	39 15 9
8 Sheep not sold, estimated at the price of those sold alive	..	19 17 10½
		99 2 9¾
Average per head (including Wool)	..	2 9 6¾

TABLE XV.

Particulars of Sale of the Cross-bred Ewes.

		Weight.	Produce of Sale.
	s. d.	lbs. oz.	£. s. d.
8 Sheep—4 of Largest, and 4 of Smallest Increase	2 Carcasses at 4 4 per stone	125 0	3 7 8
	6 ,, 4 2 ,,	416 0	10 16 8
8 Medium Sheep	2 ,, 4 1 ,,	135 0	3 8 10
	6 ,, 4 2 ,,	410 0	10 13 6
	Wool .. .. .. 1 5 per lb.	114 3	8 1 9¼
	Skins .. .. .. 0 9 each	..	0 12 0
	Heads & Plucks 1 3 ,,	..	1 0 0
	Loose Fat .. .. 0 3¾ per lb.	112 12	1 15 3
			39 15 8¼
Killing, 8d. per head; Selling and Charges at Newgate Market, 14s.		..	1 4 8
Net for 16 Sheep sold dead		..	38 11 0¼
Net per head		..	2 8 2¼
16 Sheep sold alive at 38s. per head		..	30 8 0
Wool at 1s. 5d. per lb.		120 1	8 10 1
			38 18 1
Commission and Selling		..	0 10 8
Net for 16 Sheep sold alive		..	38 7 5
Net per head		..	2 7 11½
SUMMARY.			
16 Sheep sold dead (including Wool)		..	38 11 0¼
16 Sheep sold alive (including Wool)		..	38 7 5
8 Sheep not sold, estimated at the price of those sold alive		..	19 3 8½
			96 2 1¾
Average per head (including Wool)		..	2 8 0½

The carcasses of the 16 of each lot killed at home were sold at Newgate Market on April 25th and 27th, and the offal and loose fat were sold at home. The 16 of each sold alive were sent to Smithfield on April 25th. The 8 of each kept to be fed till Christmas are calculated at the prices obtained per head for those sold alive. The wool was not sold, but was valued, according to the prices then ruling, at 1*s.* 5*d.* per lb. for the cross-breds, and 1*s.* 3*d.* per lb. for the Leicesters. Both mutton and wool were exceedingly dear at the time of these sales, compared with those of the Hampshires, Sussex Downs, and Cotswolds; but the Leicester and cross-bred lambs were also purchased at a very high price.

The prices per stone (of 8 lbs.) of the sheep sold dead ranged, for the Leicesters, from 4*s.* to 4*s.* 2*d.*, giving an average of 4*s.* 1½*d.* The cross-bred wether carcasses all sold at 4*s.* 2*d.* per stone; the ewes at from 4*s.* 1*d.* to 4*s.* 4*d.*, giving an average of about 4*s.* 2*d.* The difference of price in favour of the cross-bred carcasses is only, therefore, about ½*d.* per stone of 8 lbs., which is certainly less than we should have expected. This was probably due to the rather under-fattened condition of the animals, which would not perhaps have the tendency to depreciate the price per stone of the Leicesters so much as that of the cross-breds, which latter particularly would certainly have been improved if they had had a little more time. The wool of the Leicester sheep amounted to about 10*s.* 2*d.* per head; that of the cross-bred wethers to 9*s.* 4½*d.*; and of the cross-bred ewes to 10*s.* 4½*d.* These prices will give an average of somewhat less than 6*d.* per head in favour of the Leicesters over the cross-breds on the score of wool. In *loose fat* the Leicesters yielded about 3*d.* per head less than the cross-breds.

Of the 16 sheep of each lot sold alive, the prices per head of the Leicesters ranged from 38*s.* to 40*s.*, giving an average of 39*s.* per head. The cross-bred wethers sold for 41*s.*, and the cross-bred ewes for 38*s.*, giving an average of 39*s.* 6*d.* per head.

The general result as to price is, that, of the sheep sold dead, the Leicesters gave, including wool and offal, an average of about 2*l.* 11*s.*; the cross-bred wethers 2*l.* 9*s.* 4*d.*, and the cross-bred ewes about 2*l.* 8*s.* 2*d.* per head.

Of the sheep sold alive (including wool), the Leicesters averaged 2*l.* 8*s.* 5*d.*; the cross-bred wethers, 2*l.* 9*s.* 9*d.*; the cross-bred ewes 2*l.* 8*s.*: or an average per head for the cross-breds of about 2*l.* 8*s.* 10½*d.*

Of the sheep sold dead, therefore, the price per head is about 2*s.* in favour of the Leicesters; and of those sold alive about 6*d.* in favour of the cross-breds. The ewe mutton, both alive and dead, fetched rather less than the wether.

Taking the average of the 40 sold (the 8 not sold being estimated at the prices of those sold alive), the produce per head is, for the Leicesters, 2*l.* 9*s.* 5¼*d.*; for the cross-bred wethers, 2*l.* 9*s.* 6¾*d.*; for the cross-bred ewes, 2*l.* 8*s.* 0½*d.*: or an average for the 80 cross-breds—mixed ewes and wethers—of about 2*l.* 8*s.* 9½*d.*; that is, on the whole, about 8*d.* per head less for the cross-breds than for the Leicesters.

In giving a balance-sheet of these experiments, we must reiterate a protest against any great reliance being placed on money calculations of this kind, in which the rates both of purchase and sale are subject to so many fluctuating circumstances. Such a *balance*-sheet may be of some use to those who will accept it with due qualification; but, even then, not as a means of measuring the profit or loss of the feeding process, which involve so many other considerations than the mere cost of the store animals and their food on the one hand, and their produce of sale on the other. It is only given then as a means of aiding a *comparison* between the particular lots under consideration, and even then it must be borne in mind that, in going into the market to procure animals pure as to breed, and to a certain extent even and above average quality, something like a fancy price must be paid for the stores, which will vary according to the trouble that has been taken and the number of flocks that have been visited in making the selection. Given then with these cautions, the following are balance-sheets for the Leicesters, cross-bred wethers, and cross-bred ewes respectively.

TABLE XVI.

Balance Account of the Leicesters.

	£. s. d.	£. s. d.
Cost of 40 Leicester Lambs at 36*s.* 6*d.* per head	..	73 0 0
They consumed of purchased food:—		
4704 lbs. Oilcake at 8*l.* per ton	16 16 0	..
4480 lbs. Clover Hay at 4*l.* 10*s.* per ton	9 0 0	..
Total purchased food	..	25 16 0
		98 16 0
40 Fat Leicester Sheep and Wool sold, April, 1853, for	..	98 17 11¾
Difference	..	0 1 11¾

TABLE XVII.

TABLE XVII.

Balance Account of the Cross-bred Wethers.

	£. s. d.	£. s. d.
Cost of 40 Cross-bred Wether Lambs at 34*s.* per head	..	68 0 0
They consumed of purchased food:—		
4704 lbs. Oilcake at 8*l.* per ton	16 16 0	..
4480 lbs. Clover Hay at 4*l.* 10*s.* per ton	9 0 0	..
Total purchased food	..	25 16 0
		93 16 0
40 Fat Cross-bred Wethers and Wool sold, April, 1853, for	..	99 2 9¾
Difference	..	5 6 9¾

TABLE XVIII.

Balance Account of the Cross-bred Ewes.

	£. s. d.	£. s. d.
Cost of 40 Cross-bred Ewe Lambs at 33*s.* per head ..	..	66 0 0
They consumed of purchased food:—		
4480 lbs. Oilcake at 8*l.* per ton	16 0 0	..
4256 lbs. Clover Hay at 4*l.* 10*s.* per ton	8 11 0	..
Total purchased food	..	24 11 0
		90 11 0
40 Fat Cross-bred Ewes and Wool sold, April, 1853, for	..	96 2 1¾
Difference	..	5 11 1¾

The Leicesters, as before stated, cost 35*s.* per head when bought, and, in addition to this, 3*d.* per head per week is charged for their board up to the time of commencing the experiment, which brings them to 36*s.* 6*d.* on December 2nd.

The larger number of the cross-breds were bought in at 32*s.* per head; but others, which arrived some weeks later, cost 33*s.*: charging, as before, 3*d.* per head per week for board, the cross-breds average 33*s.* 6*d.* per head at the commencement of the experiment; but as the mean live-weight of the *wether* stores was about 4 lbs. more than that of the ewes, the former are reckoned as costing 34*s.*, and the latter 33*s.* per head.

On former occasions we have charged the oilcake at 6*l.* 15*s.* per ton, and the clover-hay at 4*l.* per ton: both these, however, were much dearer at the time of this experiment, and they are charged therefore at their market prices at the time, without carriage—viz., the oilcake at 8*l.* per ton, and the clover-hay at 4*l.* 10*s.*

In Table XVI. it is seen that, upon the estimates assumed, the 40 fat Leicester sheep, with their wool, sold for only 2*s.* more than the cost of the lambs, together with that of the oil-cake and clover-chaff; leaving, therefore, the manure of the cake, clover, and turnips to pay for the turnips and attendance, lodging, &c.

Balancing the cross-breds on the same plan, it is seen that the *wethers* give 5*l.* 6*s.* 10*d.*, and the *ewes* 5*l.* 11*s.* 2*d.*, besides their manure, to pay for the turnips, attendance, &c.

This kind of calculation would therefore tell very much in favour of the cross-breds in this particular experiment. But it may be well to observe that a reduction of 2*s.* 6*d.* per head on the price of the Leicester lambs—that is, if we charge them the same as the cross-bred wethers, at 34*s.*, instead of 36*s.* 6*d.*—would bring them to pretty nearly an equality with the other lots. Before, therefore, any reliance can be placed in the comparison between Leicesters and cross-breds which this balance-sheet shows, it should be decided what in practice would, on the average, be the relative cost of Leicester lambs averaging 101 lbs. per head, and of cross-bred wethers weighing 95 lbs. And with a view to a judgment on this point, it may be mentioned that our actual prices on this occasion represent the Leicesters as costing about 4*d.* more per 100 lbs. live weight than the cross-breds. We suppose, therefore, the price paid for the Leicesters to be relatively somewhat too high. The actual prices adopted also represent the cross-bred ewes as worth 3*d.* or 4*d.* more per 100 lbs. live weight than the wethers; and considering their slightly better yield, both of wool and meat, for food consumed, it is perhaps not unfair to estimate the ewe lambs as fully equal in value, weight for weight, to the wethers. Assuming, then, the relative prices of the ewe and wether lambs to have been fair, our balance-sheet shows an advantage of a few shillings on the 40 sheep in favour of the ewes over the wethers, and certainly we did find them to give slightly the best account of the food they consumed.

Upon the whole, then, the general results of this comparative trial between the Leicesters and their cross with the South-Down are:—

That the cross-breds consumed slightly more food, in relation to a given weight of animal, within a given time, than the Leicesters.

That the Leicesters and cross-bred wethers consumed all but identical amounts of food to produce a given amount of increase, and the cross-bred *ewes* rather *less* than either.

That the cross-breds yielded slightly the most increase upon a given weight of animal within a given time.

That the Leicesters gave rather more wool, both per head and per cent. upon their weight, and the cross-bred ewes more than the wethers.

That the fat Leicesters averaged only about 4 lbs. more weight per carcass than the cross-breds.

That the cross-breds gave, within a given time, slightly the highest percentage of dead-weight to live-weight; rather the most loose or inside fat (especially the ewes), and slightly the highest price per stone of mutton.

And finally, when sold dead, the Leicesters,—and when sold alive the mixed cross-bred,—gave slightly the highest average price per head.

With the above observations we conclude the comparison between the Leicesters and cross-breds *alone*, as rapid fatteners on a liberal system of feeding and management; and in the usual 'Tabulated Summary' of the results which next follows (Table XIX.), we include those of the Hampshire and Sussex Downs and Cotswolds. Henceforth, therefore, the whole six lots of sheep will be compared together.

Taking the items of comparative interest somewhat in the order in which they stand in this *Tabulated Summary*, it is seen that of the six lots that have been experimented upon, the Cotswolds give by far the largest average weekly increase per head; indeed, about half as much more than either the Sussex, Leicester, or cross-bred sheep, and nearly one-fourth more than the Hampshires, which are the second in order of *rate of increase per head per week*.

The increase *per* 100 *lbs. live weight per week*, as given in the last line of the first or upper division of the *Summary Table*, does not show by any means such a variation in the rate of increase among the six lots, when it is thus calculated in relation to their respective weights instead of per head. Still, even in this respect, the Cotswolds stand the first; next come the cross-breds; then the Hampshires and Leicesters; and lastly the Sussex Downs. The rate of increase thus calculated in relation to the average weight of the animal is for the Cotswolds one-tenth more than for the cross-breds, and from one-seventh to one-sixth more than for the Hampshires, Leicesters, and Sussex Downs. It is here worthy of observation, that, excluding the Leicesters, the order in which the different lots gave increase in relation to their weight is obviously pretty nearly the inverse of that of the *quality of the mutton*. That is to say, those which have given the greatest increase in proportion to their weight yield the coarsest mutton, and those which gave the least increase in relation to their weight the finest mutton. Consistently with this view, the Leicesters, however, fall somewhat short in the rate of their increase considering

TABLE XIX.

General Summary of Experiments with Hampshire and Sussex Downs, Cotswolds, Leicesters, Cross-bred Wethers, and Cross-bred Ewes.

PARTICULARS.			40 Hants. Nov. 1850, to May, 1851, 26 Weeks.	40 Sussex. Nov. 1850, to May, 1851, 26 Weeks.	46 Cotswolds. Dec. 1851, to April, 1852. 20 Weeks.	40 Leicesters. Dec. 1852, to April, 1853, 20 Weeks.	40 Cross-bred Wethers. Dec. 1852, to April, 1853, 20 Weeks.	40 Cross-bred Ewes. Dec. 1852, to April, 1853, 20 Weeks.
			lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
Average weight per head when put up			113 7	88 0	119 13	101 5	95 1	91 4
,, when fat (including Wool)			183 1	140 12	183 7	145 14	139 9	133 12
,, Total increase per head			69 10	52 12	63 10	44 9	44 8	42 8
,, Increase per head Weekly			2 10¾	2 0½	3 2¾	2 3½	2 3½	2 2
,, Weekly increase per 100 lbs. live weight			1 12¾	1 12½	2 1	1 12¾	1 14½	1 14
Average Food consumed per head Weekly		Oil-Cake	7 12¾	6 0½	8 1	5 14	5 14	5 9½
		Clover-Hay	7 0	5 12½	6 14½	5 9½	5 9½	5 5
		Swedes	106 3½	77 12½	113 4	83 13	82 14	78 0
Average Food consumed Weekly per 100 lbs. live weight of animal		Oil-Cake	5 4½	5 4½	5 3½	4 12	5 0	4 15½
		Clover-Hay	4 11½	5 0½	4 7½	4 8½	4 12½	4 11½
		Swedes	71 10½	68 0½	73 6½	67 13	70 10	69 5½
Food consumed to produce 100 lbs. increase of live weight of animal		Oil-Cake	291 9½	297 6½	253 10½	263 13¾	264 4½	263 8½
		Clover-Hay	261 6¾	285 7	216 11¾	251 4¾	251 10¾	250 5½
		Swedes	3,966 12	3,835 12	3,557 8	3,761 0	3,725 4	3,671 0
Average Wool per head			6 4	5 10	9 4½	8 2½	6 7	7 3½
Average Wool per 100 lbs. live weight of animal when shorn			3·77	4·57	5·44	5·58	4·60	5·40
			st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.
Average Dead or Carcass Weights (in stones of 8 lbs.)	Weights taken at Home.	Of the 4 of largest and 4 of smallest Increase	12 6½	9 4	12 6½	9 4½	9 1½	8 5½
		Of the 8 of medium Increase	12 4½	9 5½	12 3½	9 4	9 2½	8 6½
		Of the 16 killed*	12 5½	9 5½	12 5	9 4½	9 2	8 6
	Weights allowed at Newgate Market.	Of the 4 of largest and 4 of smallest Increase	12 4	9 2	— —	9 2½	8 7	8 3½
		Of the 8 of medium Increase	12 2	9 4½	— —	9 2½	9 0½	8 4
		Of the 16 killed	12 3	9 3	12 2	9 2½	8 7½	8 3½
Proportion of Carcass in 100 lbs. of the *gross*, or unfasted live weight		Of 4 of largest Increase	56·9	57·2	59·1	56·2	56·4	55·0
		Of 4 of smallest Increase	56·4	56·1	57·4	51·9	53·2	55·1
		Of 8 of medium Increase	56·8	57·4	57·8	55·4	55·7	55·3
		Of Total 16 killed	56·7	57·0	58·0	54·7	55·3	55·2

* In the case of the Cotswolds, all the averages in this Table are calculated from the results of the 5 of largest, the 5 of smallest, and the 10 of medium increase—in all 20 killed, instead of only 16 killed, as in the case of all the other breeds.

TABLE XIX.—*continued.*

PARTICULARS.	40 Hants. Nov. 1850, to May, 1851, 26 Weeks.	40 Sussex. Nov. 1850, to May, 1851, 26 Weeks.	46 Cotswolds. Dec. 1851, to April, 1852, 20 Weeks.	40 Leicesters. Dec. 1852, to April, 1853, 20 Weeks.	40 Cross-bred Wethers. Dec. 1852, to April, 1853, 20 Weeks.	40 Cross-bred Ewes. Dec. 1852, to April, 1853, 20 Weeks.
Proportion of Carcass in 100 lbs. of the *fasted* live weight — Of 4 of largest Increase	61·2	61·8	62·9	61·6	61·4	61·3
Of 4 of smallest Increase	60·0	59·3	60·4	57·0	58·7	61·0
Of 8 of medium Increase	60·6	60·6	61·2	60·8	60·8	60·7
Of Total 16 killed	60·6	60·6	61·4	60·1	60·5	60·9
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
Average weight of loose fat *per head*, weighed warm — Of 4 of largest Increase	12 15½	10 4½	8 11¾	8 3½	7 2	7 7
Of 4 of smallest Increase	11 5	8 6¾	8 2½	3 15½	6 3	6 7
Of 8 of medium Increase	12 7	10 2½	9 8½	6 8	7 3½	7 2¾
Of Total 16 killed	12 4¾	9 12	8 15½	6 4½	6 15	7 0¾
Proportion of loose fat in 100 *lbs. of the fasted weight* — Of 4 of largest Increase	6·54	7·08	4·57	5·00	5·09	5·74
Of 4 of smallest Increase	7·34	7·17	5·08	3·59	5·20	5·74
Of 8 of medium Increase	7·24	7·45	5·53	4·90	5·55	5·84
Of Total 16 killed	7·09	7·29	5·18	4·60	5·35	5·79
Average weight of lung and windpipe *per head*, weighed warm — Of 4 of largest Increase	1 10¾	1 4½	1 14¾	1 6½	1 8½	1 3½
Of 4 of smallest Increase	1 9¾	1 3¾	1 9	1 8¾	1 6½	1 4½
Of 8 of medium Increase	1 9½	1 6½	2 0½	1 6	1 5¾	1 3½
Of Total 16 killed	1 9¾	1 5½	1 14½	1 6¾	1 6½	1 3½
Proportion of lungs (including the windpipe) in 100 *lbs. of the fasted weight* — Of 4 of largest Increase	0·84	0·89	1·01	0·85	1·09	0·94
Of 4 of smallest Increase	1·03	1·05	0·99	1·43	1·18	1·15
Of 8 of medium increase	0·93	1·03	1·19	1·05	1·05	0·99
Of Total 16 killed	0·93	1·00	1·06	1·10	1·09	1·02
	1851.		1852.	1853.		
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Average price of the Carcasses, per stone of 8 lbs.	3 0	3 2½	2 10	4 1½	4 2	4 2
Average gross money return per head of those sold dead (without Wool)	40 8½	32 6½	37 1½	40 9½	39 11½	38 1
Average gross money return per head of those sold alive (without Wool)	40 4	34 4	35 4	38 4	40 4	37 11½
Average money return of the Wool per head	7 0½	6 6½	9 8	10 2	9 3½	10 3
Price of the Wool per lb.	1 1½	1 2	1 0½	1 3	1 5	1 5

sidering the somewhat inferior quality of their mutton compared with that of the cross-bred and Hampshire sheep.

In the second main division of the *Summary Table* we have the various particulars of the consumption of food by the different lots of sheep. Leaving the point of the amounts of food consumed *per head*, the variations in which, so far as the dry foods are concerned, depend on the varying original weights of the different lots; and looking only to the amounts consumed *per* 100 *lbs. live weight of animal*, or *to produce* 100 *lbs. of increase*, we see that, although the oilcake and clover-chaff were in each case given in proportion to the original weights of the sheep, yet the result was that, taking the average throughout the entire period of the experiment, the Leicesters had less of these dry foods in relation of their average weight than any of the other lots, and more particularly than the Hampshires, Sussex Downs, and Cotswolds. Notwithstanding this, however, the Leicesters also ate less in relation to their average weight of the *turnips*, which they were allowed *ad libitum*, than any of the other breeds. This less consumption of total food in relation to their weight by the Leicesters might be in their favour, if the result were that they consumed also less for the production of a given amount of increase. But the fact is seen to be, that, in relation to the increase they yielded, the Leicesters consumed quite as much food as the cross-breds, and notably more than the Cotswolds. Leicesters, cross-breds, and Cotswolds, however, all give a larger amount of gross increase for a given amount of food consumed than either the Hampshires or the Sussex sheep. Such are the results of the experiments as they stand on the point of the amount of food required to yield a given amount of increase. But we must not forget that the trials were not all made side by side and in the same season; those with the Hampshire and Sussex Downs being made together in 1850-1, those of the Cotswolds alone in 1851-2, and those with the Leicesters and cross-breds in 1852-3. And although the quality of the respective foods was in all cases as nearly alike as circumstances would allow, yet the actual stocks used were different for the three seasons. There is, nevertheless, much of consistency in the general character and direction of the actual numerical results; which are, indeed, much what we should expect, considering the generally admitted distinctions between the different breeds, though perhaps not on all points what is currently stated of them.

With respect to the *wool*, it is seen that the long-woolled Cotswolds and Leicesters gave the greatest weight, both *per head* and *per* 100 *lbs. live weight of animal;* next in order come the cross-breds; and lastly, the Hampshire and Sussex Downs. The order of highest amount of wool *per head* is—

Cotswolds,
Leicesters,
Cross-bred ewes,
Cross-bred wethers,
Hampshires,
Sussex Downs.

The order of highest amount of wool *per* 100 *lbs. live weight* is—

Leicesters,
Cotswolds,
Cross-bred ewes,
Cross-bred wethers,
Sussex Downs,
Hampshires.

It is worthy of notice, that of the cross-breds, which were fed in the same season and side by side with the Leicesters, the *ewes* gave considerably more wool both per head and per 100 lbs. live weight than the wethers; the female offspring, therefore, inheriting more prominently the qualities of the male parent so far as the *fleece* is concerned. Comparing together the Hampshires and Sussex Downs, which were fed side by side with each other, the Hampshires gave an average of 1¼ lb. more wool *per head;* but the Sussex, on the other hand, gave nearly one-fourth more than the Hampshires *per* 100 *lbs. live weight of animal.*

Looking to the question of the quantity of mutton or weight of carcass yielded by the different breeds thus fed only to the age of about fifteen or sixteen months, it is seen that the Hampshires and Cotswolds averaged nearly 12¼ stones (8 lbs. per stone) of marketable meat or dead weight, equal to 24 or 25 lbs. per quarter; these Cotswolds were, however, six weeks' less time on fattening food than the Hampshires, and were nevertheless somewhat too fat. The Sussex Downs and Leicesters gave only about three-fourths as much dead weight per head as the Hampshires and Cotswolds; that is, little more than 9¼ stones each, equal to about 19 lbs. per quarter; the long-woolled Leicester again giving an equal weight of mutton with the short-woolled Sussex after six weeks' shorter time on fattening food, though probably, it is true, not in point of fact six weeks younger, owing to their earlier date of lambing. Of the cross-breds, the wethers gave about 9, and the ewes about 8¼ stones of meat per head—equal respectively to about 18 and 17 lbs. per quarter.

The Hampshires, therefore, after an equal length of time on fattening food, were brought to about one-third more carcass-weight per head than the Sussex sheep. The Cotswolds, with six weeks less on fattening food than either the Hampshire or

Sussex sheep, gave an equal carcass-weight with the former and one-third more than the latter. And again, the Cotswolds, with an equal length of time on fattening food, gave about one-third more carcass-weight than the Leicesters, and nearly one-half more than the cross-breds.

The next point to notice in the *Summary Table* is the proportion of the dead or carcass-weight to live-weight—an item which, other things being equal, may be taken as indicating the comparative tendency to *carcass* growth generally and early maturity. The figures in the Table do not show any very great differences among the six lots, but, such as they are, the result of the comparison differs somewhat accordingly as we calculate the carcass-weight in relation to the *fasted* or to the *un*fasted live-weight. And since, when calculated on the *fasted* weight, the result is less influenced by the incidental contents of the stomach, we assume that method to give the safest ground for comparison.

It will be remembered that the Hampshire and Sussex sheep were nearly one-third longer time on fattening food than any of the other lots, and this should be all in their favour as far as proportion of dead weight to live is concerned. It is seen, however, that the *Cotswolds*, although fed six weeks' shorter time, gave a higher percentage of carcass than either the Hampshire or Sussex Downs. Indeed the Cotswolds had more of the tendency to increase and fatten in *carcass* for the food they consumed than any of the other sheep. But the quality of their mutton is certainly inferior, and will command a somewhat lower price. The Leicesters gave a less proportion of deadweight than any of the other sheep—even than their cross with the Down—fed side by side, and for an equal length of time. This is not what would be expected, for the current character of the Leicester, like that of the Cotswold, is certainly to yield carcass rather than inside growth. The crosses again, though fed six weeks' shorter time than the pure Hampshire and Sussex Down, still give an equal proportion of dead weight to live.

The tendency to give large proportion or percentage of carcass weight, is certainly generally coincident with that of laying on fat on the carcass rather than inside. This character, which is that of *early maturity*, and which is favoured by the modern system of rapid fattening, is certainly somewhat unfavourable to high *quality* of mutton. This *carcass fattening* bespeaks a languid, though full circulation, and less of muscular or motive activity, and with this less of the hardiness dependent on respiratory vigour. The cross-breds, however, in these experiments, gave both an equal tendency to carcass growth with the pure Lei-

cesters; and they also fetched a somewhat higher price per stone of mutton, though the difference in this respect was probably less than it would have been, had not our Leicester mutton, from their want of growing character, been more delicate than usual, and our cross-bred on the other hand rather under the mark for want of a little more time. Our next observations will further illustrate the above points of comparison.

The Hampshire and Sussex Downs gave the largest proportion of loose, or caul and gut fat. This is consistent with the known comparative less tendency of the hardier Downs to give very fat carcasses, and also with the known superior quality of their mutton. It must not be forgotten, however, that in these experiments the Downs were the longest on fattening food which would favour their production of fat generally; but this was obviously deposited over the internal viscera rather than on the carcass, or muscular and motive part of the body; for whilst they gave the highest proportion of inside fat, they did not give a high proportion of dead or carcass weight. The cross-breds again gave a larger proportion of inside fat than the Cotswold, or than the pure Leicesters, and the ewes rather more than the wethers. Thus, in this internal character, the crosses inherit more of the qualities of the female parent, and the female offspring rather more so than the male. These qualities of the crosses are quite consistent with their admitted hardier character as compared with the pure Leicesters, and also with the better quality of their mutton.

The degree of development, or activity of *lung*, is certainly, other things being equal, coincident with the habits of activity or rest, and with the character for hardiness of the animal. Those animals adapted or accustomed to more of exposure and exercise should doubtless have a greater development of lung and of respiratory and circulatory activity; and with this would go less tendency to massive accumulation of fat on the carcass, or motive part of the body. Activity or large development of lung, a less fat carcass, a higher quality of mutton, a greater hardiness, and more of inside fat, should thus go together.

Our figures relating to the proportional weight of lung in the different cases are not so consistent with these general principles as we should have expected, when we compare together all the six lots of sheep. Those relating to the other points involved we have seen are so, and those relating to the weights of lung are indeed consistent when comparing together only certain lots —as for instance the Hampshire and Sussex Downs—and some of the cases of inconsistency are perhaps not incapable of some explanation. Thus the higher average proportional weight of

lung of the Cotswolds, Leicesters, and cross-breds, than the Downs, would probably have been lessened had the former been as long on fattening food as the latter. Again, the higher proportion of lung among the Leicesters than the cross-breds is not what we should expect, but the higher *average* among the former is obviously due to the very high amount of those of the Leicester sheep of *smallest increase*. This excessive proportion of lung is consistent enough with very little tendency to increase; and we find indeed the largest proportion of lung among the animals of *smallest increase*, in the case of every lot except the Cotswolds. It may be, however, that activity of respiratory function is not, under all circumstances, indicated by comparative *weight* of lung alone. A comparison of the proportional weights of the heart, and the other internal organs or viscera of animals of different breeds, or differently fed, would be unsuited to the objects of this paper; but this is a subject which it is our intention to treat of on some other occasion, together with that of the comparative composition in a more chemical point of view of our domestic animals in different conditions of fatness or maturity.

Comparing then together all the six lots, the results as a whole pretty generally confirm the usually current views as to their characteristic tendencies and qualities. And, in a word, it may be said that the greater the tendency to rapid growth, to early maturity, and to give a large proportion of gross increase to food consumed, the fatter will be the carcass, the coarser the mutton and wool, the less the proportion of butcher's valuable offal, and the less the hardiness of the animal under exposure and exercise. Thus the Cotswolds and the new Leicesters (though the latter have certainly not fully borne out their current character in these experiments), if they do possess the quality of giving a comparatively large return of gross increase for food consumed, they at the same time give fatter carcasses, are less hardy, give less valuable offal, and yield a lower price for a given weight, both of mutton and wool, than either the Downs or their crosses.

This brings us to the consideration of the comparative money value of the different lots. In the concluding lines of the *Summary Table* are given the prices per stone (8 lbs.) of mutton, the money return per head sold dead and sold alive (excluding wool), and the return per head, and the prices per lb. of the wool, as realized in the actual sales of the experimental sheep. Since, however, some of these sales were not only made in different markets from the rest, but even in different years, no general comparison of them can be made; hence the "*Balance Accounts*" which have been given from time to time, as affording the best

means the circumstances admitted, of an approximate comparison in a money point of view, between the lots fed side by side, cannot be employed in any way in comparing together the result of the whole six lots.

If, however, we could arrive at any satisfactory manner of estimating the average money value of the lambs of the respective breeds, we could then institute a pretty safe comparison of the money return of the different lots; for, on the one hand, the dry foods could be taken at one uniform rate for all, and, on the other, the Tables which are published of the *Average Prices* of the different descriptions of mutton and wool, would enable us to put all on the same footing, so far as the *produce of sale* is concerned.

No satisfactory comparative estimate of the average cost of the respective lambs, at a given age or weight, can be made. To say nothing of the variation in different seasons or localities, according to the supply of food and other matters, the methods of business adopted in the rearing or procuring of stores of a pure breed, and of a first cross, are necessarily so different in themselves, independently of the influence of locality on the two modes, that any attempt to form an estimate of the average comparative value of the different kinds of lambs could only yield a fallacious basis for any further calculations.

Perhaps the safest way of applying the results of the experiments, to institute a comparison of the relative economy of the different lots as rapid fatteners, is, then, to set aside altogether the question of the relative prices of the lambs, and to take into account only the relative amounts of food required to yield a given weight of the fattened animal in the different cases, and the average comparative value of the mutton and wool produced. That is to say, if we take the amount of food consumed by each lot to produce 100 lbs. of live weight on the one hand, and the *average* money value of 100 lbs. live weight of each of the different descriptions of sheep on the other, we have a pretty fair means of forming an approximate comparison of the economy at least of feeding, if not of the rearing of the respective lots.

Setting aside then the actual prices obtained for the different descriptions of mutton and wool, we have in the following Table (XX.), which is compiled from *Bell's Weekly Messenger* of January 1851, the average price at Smithfield Market, and during a period of ten years, namely, from 1840 to 1849 inclusive, of different descriptions of mutton per stone of 8 lbs. to sink the offal.

TABLE XX.

TABLE XX.

Years.	Prime South Downs.	Prime Coarse-woolled Sheep.
	s. *d.*	*s.* *d.*
1840	4 11	4 6
1841	5 0	4 8
1842	4 8	4 4
1843	4 4	4 0
1844	4 8	4 3
1845	5 1	4 10
1846	4 9	4 4
1847	5 7	5 1
1848	5 3	4 10
1849	4 5	3 10
Average of 10 years	4 $10\frac{1}{2}$	4 $5\frac{1}{2}$

Now, if we take our Sussex sheep as "prime South Downs," our Leicesters and Cotswolds as "prime coarse-woolled sheep," and our Hampshires and cross-breds as intermediate between the two, we have the average relative price per stone of 8 lbs. of our six lots of mutton, as given in the following Table (XXI.). It may, perhaps, be objected by some, that Cotswold mutton, from its large size, should not be taken at quite so high a rate as the Leicester; but we are disposed to think that if brought as early to the butcher as the liberal system of feeding we are supposing implies, the former would, in ordinary markets, fetch an equal price per stone with the latter. However, as the data and plan upon which our estimates are framed will be fully before the reader, he can easily amend our figures and carry out the calculations on this or any other point as he may think fit.

TABLE XXI.

Description of Sheep.	Average Price per Stone of 8 lbs. to sink the offal.
	s. *d.*
Sussex Downs	4 $10\frac{1}{2}$
Hampshire Downs	4 8
Cross-bred wethers	4 8
Cross-bred ewes	4 8
Leicesters	4 $5\frac{1}{2}$
Cotswolds	4 $5\frac{1}{2}$

In the following Table (XXII.) we have computed from the weekly lists given in 'The Economist' the average prices per lb. of different descriptions of wool (in fleeces), taken from the

entries of nearly every week, over a period of nearly five years, namely, 1850 to 1854 inclusive :—

TABLE XXII.

Years.	South Down Hogs.	South Down Ewes and Wethers.	Half-bred Hogs.	Leicester Ewes and Wethers.
	s. d.	*s. d.*	*s. d.*	*s. d.*
1850	1 1¼	0 10¾	1 1⅜	0 9¾
1851	1 2	0 11½	1 2¼	0 11
1852	1 3½	1 0⅝	1 3¼	0 11¾
1853	1 5¼	1 3¾	1 4½	1 3½
1854	1 2¼	1 1¾	1 1¾	1 1
Average of 5 years ..	1 2¾	1 1	1 2½	1 0¼

We have here the average price per lb. over a period of nearly five years of the wool, both of the hoggets and of the ewes and wethers, of the South Downs, that of the former being nearly 2*d.* more than that of the latter. Of the Leicesters, we have the price of the wool of the ewes and wethers only. There would certainly, however, be on the average a less difference than 2*d.* per lb. between the price of the hogget and of the ewe and wether wool, in the case of the long-woolled sheep. If, therefore, we raise the average price of 1*s.* 0¼*d.*, as given in the table for Leicester ewe and wether wool, to 1*s.* 1*d.* for that of Leicester hoggets, this will probably give a fair average price, compared with that of the other descriptions. We have been unable to find any collateral published price for Cotswold hogget wool ; but we suppose that we may assume it the same as for the Leicester for our present purpose.

Upon these data, then, we take the average relative prices per lb. of the wool of our six descriptions of experimental sheep, as given in the following Table (XXIII.) ; but subject, of course, as before, to the emendation of the reader, if his judgment do not agree with our own.

TABLE XXIII.

Description of Sheep.	Average Price of Wool per lb.
	s. d.
Sussex Downs	1 3
Hampshire Downs	1 3
Cross-bred wethers	1 2½
Cross-bred ewes	1 2½
Leicesters	1 1
Cotswolds	1 1

In the next table, the foregoing data of the *average prices* of our saleable produce—mutton and wool—are applied to form some estimate of the probable comparative economy of the different lots of sheep as early fatteners, and when fed under cover. In this Table (XXIV.) we have—for each description of sheep,—

The foods consumed to produce 100 lbs. increase in live-weight.

The *extra food beyond Cotswolds* (which consumed the least), consumed to produce 100 lbs. live-weight.

The quantities of marketable produce—mutton and wool—contained in 100 lbs. of the *unfasted live-weight with shorn wool added.*

The money-return, at *average rates*, of the mutton and wool in 100 lbs. live-weight.

Difference of money-return *over or under that of Cotswolds* for 100 lbs. live-weight.

Cost of *extra food consumed beyond Cotswolds* to produce 100 lbs. live-weight: the oilcake reckoned at 1*d.* per lb. = 9*l.* per ton ; the clover-chaff at ½*d.* per lb. = to 4*l.* 10*s.* per ton ; and the Swedes at 4*d.* per cwt., consumed on the farm, = 6*s.* 8*d.* per ton.

And, lastly, the difference or excess of extra cost of food over money-return for 100 lbs. live-weight, compared with Cotswolds.

According to the figures in this Table (XXIV.), in no case does the average extra price of the mutton and wool of the more choice descriptions of sheep, compensate for the cost of the extra food which has been consumed to produce them. It may be objected to our exact figures, that all the experiments were not made side by side, and during the same period, and that therefore both difference of season and some variation in the quality of the roots may, perhaps, in a degree affect the results ; nor, perhaps, is the method of estimate adopted free from all objection. It is, however, the safest we can adopt ; and, we believe, that the results give a fair indication, at least of the *direction* of the comparative economy of the different lots, considered as early fatteners, and fed under cover.

It is quite consistent with the physiological distinctions which must characterise animals adapted to more of exposure and exercise, that they should—as in the experiments they were found to do—consume more food to produce a given weight of increase than the opposite description of animal. The experimental results should therefore, as we have said, be taken as certainly in the right *direction*, whether or not they exactly represent *quantitatively* the relative fattening qualities under the system adopted, of the different lots. And, again, this extra food required for a given amount of increase, and the greater

TABLE XXIV.

Description of Sheep.	Average Food consumed to produce 100 lbs. Increase in Live Weight.			Extra Food *beyond Cotswolds* consumed to produce 100 lbs. Live Weight.			Marketable Produce in 100 lbs. unfasted Weight, including Wool.		Money Return at *Average Rates* of 100 lbs. Live Weight.			Difference of Money Return *over or under Cotswolds* for 100 lbs. Live Weight.	Cost of *Extra Food consumed beyond Cotswolds* to produce 100 lbs. Live Weight.	Difference or Excess of Extra Cost over Money Return for 100 lbs. Live Weight compared with Cotswolds.
	Oilcake.	Clover.	Swedes.	Oilcake.	Clover.	Swedes.	Mutton (sinking offal).	Wool.	Mutton (sinking offal).	Wool.	Total.			
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sussex	297¼	285½	3,855¾	43¾	68¾	278¼	53 3	4 0	32 5	5 0	37 5	+1 11¾	7 4	5 4¼
Hampshires	291½	261¼	3,966¾	38	44½	409¼	53 6	3 7	31 1½	4 3½	35 5	−0 0½	6 2¾	6 3
Cross-bred wethers	264¼	251⅜	3,725½	10¾	35	167¾	51 2	4 10	29 10	5 7	35 5	−0 0¼	2 10¼	2 10½
Cross-bred ewes ..	263½	250¼	3,671	10	33½	113½	50 10	5 6	29 6½	6 6	36 0½	+0 7¼	2 6¾	1 11½
Leicesters	263¾	251¼	3,761	10¼	34½	203½	50 11	5 9	28 3	6 0½	34 3¼	−1 2	2 10¾	4 0¾
Cotswolds	253½	216¾	3,557½	..	..	..	53 6	5 4	29 9	5 8½	35 5¼			

hardiness or power of resistance to cold from without, bespeak more of motive or muscular activity, and a larger respiratory expenditure, and consequently greater resource of internal temperature. It is in this way that we pay for the increased quality of the meat, induced by a greater circulatory activity of the fluids of the body, and a slower and less massive deposition of fat.

We must not, however, place the whole of the extra food consumed to the cost of the mutton and wool; for most of its nitrogen will be recovered in the manure, the value of which will therefore be increased in a certain degree in proportion to the extra food consumed. Then, again, a due consideration of the invaluable working qualities, and the more choice mutton of the hardier kinds of sheep, which always give them the preference over the earlier fattening long-woolled breeds in certain localities, with certain descriptions of farming, and in certain markets, will at once show that any conclusions from the comparison of cost, brought out in these experiments with very liberal feeding and protection from the weather, must be applied with much caution, in seeking to form an estimate of the comparative qualities, of the different breeds under widely different circumstances.

In conclusion: it must be admitted, that, as is already well known, the Downs and their crosses are better adapted to exposure and activity than the long-woolled sheep. It would seem, however, that when liberally fed, and protected from inclement weather, the long-wools, especially the Cotswolds, will yield a larger amount of gross increase for a given amount of food consumed than the Downs or crosses. The *average prices* of Down, and also of cross-bred mutton and wool, are, however, higher than for those of the long wools; but not sufficiently so to compensate for the cost of the extra food consumed. It would appear, therefore, that when equally fitted to climate, locality, and system of farming adopted, both as to their rearing and fattening qualities, and when on the other hand what may be termed a fancy or over-average price for Down mutton is not attainable, those animals yielding most mutton and wool for a given quantity of food, will have an advantage in supplying the demand of the *masses* of the population. The cross-breds, however, seem to have in several respects very valuable intermediate qualities between the hardy Downs and the more rapidly fattening long-wools; though it must not be forgotten that these advantages of the cross-breds cannot be maintained unless the pure breeds from which they are derived are duly cultivated and kept up. And it is fortunate that so undoubted is the superiority of the pure

breeds, under certain circumstances and in certain localities, that we need have no fear of the deterioration of our crosses on that score.

In other words, it results that although there is an evident relation between the amount of food required to produce a given quantity of mutton, and the quality or value of the mutton produced, yet the variations in the rate of increase to food consumed on the one hand, and in money value on the other, are not of themselves sufficient to afford any decisive conclusion as to the comparative economy of the different breeds founded *merely on the productiveness of the food* under certain circumstances of fattening. Perhaps the result of the comparison of the several breeds in this one respect is as satisfactorily brought out in these experiments as we can hope it will be *experimentally* at all. And it would seem that the farmer must, after all, be guided in his choice mainly by the many practical and business considerations which it is not within the province of such investigations as those we have recorded directly to illustrate.

So much, then, for the comparative fattening qualities of the several breeds, when protected from the weather and fed rapidly for the market upon a liberal supply of good food. We have seen that although the extraordinary rates of increase frequently spoken of have not been met with (nor were they expected) in these somewhat extensive and carefully conducted experiments, yet it is strikingly brought out that under the modern system of rapid fattening with a liberal supply of purchased or saleable food, a weight of mutton can be produced in fifteen to eighteen months, which not long since generally required at least twice that period. And if the quality of the rapidly-fed mutton is not quite equal in the judgment of the rich and connoisseur, there can still be no doubt which course must be adopted in the long run in the production of food for a large and increasing population and demand.

Although, however, we have already carried our Report of the progress of our comparative experiments with the different breeds only up to the point at which good marketable mutton may be produced, yet, as frequently alluded to in our papers, a few of each of these lots of sheep were fed for some six months more; and the results of these extra or somewhat over-fattened sheep must form the subject of a supplementary and separate Report.

The following is a short enumeration of useful and practical facts relating to sheep-feeding, which our experiments have brought out:—

Consumption of Food:—

Sheep of different breeds consume quantities of food in proportion to their respective weights when at an equal age, stage of feeding, &c.; that is to say, three sheep weighing 100 lbs. each will consume the same quantity of food as two sheep of 150 lbs. each.

Sheep on good fattening food—such as cake or corn, with chaff and roots—will consume weekly about 4¾ lbs. of cake, 4¾ lbs. hay, and about 70 lbs. of roots, for every 100 lbs. of their live-weight.

When fed as above, they will consume every week about one-seventh of their own weight of the *dry* substance of food; that is, after deducting the moisture it contains.

Rate of Increase:—

Sheep well fed and under cover will increase about two per cent. per week upon their weight; that is to say, 100 lbs. live-weight will increase from 1¾ lb. to 2 lbs. per week.

To increase 100 lbs. in live weight, sheep will consume about 2¼ cwts. of cake or corn, 2¼ cwts. of hay-chaff, and 1½ to 1¾ tons of roots.

The increase of a fattening sheep is at the rate of about 1 lb. live-weight to 8 lbs. or 9 lbs. of the *dry substance of the food* consumed.

Live and Dead Weights, &c.:—

Hoggets or tegs (under twelvemonths old), and in a lean or store condition, will contain about one half of their weight carcass, and about one half offal.

Shorn sheep, sufficiently fat for the market, will contain about 56 lbs. of carcass in every 100 lbs. of the unfasted live-weight.

Sheep in an ordinary state of fatness yield from 7 lbs. to 14 lbs. of offal or loose fat per head, according to breed and size; the long-wools giving the least, and the Downs the most.

Value of Increase, &c.:—

The value of the increase of fattening sheep is less than the cost of the food consumed to produce it; the difference is to be charged to the manure.

The value of the total offal is from 4*s.* to 6*s.* per head, independently of the wool.