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EXPERIMENTS  
ON THE  
COMPARATIVE FATTENING QUALITIES  
OF DIFFERENT  
BREEDS OF SHEEP.

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Part II.—*Cotswolds*.

IN the last number of this Journal we gave, in considerable detail, the results of experiments made during the winter and spring of 1850-1, on the comparative *fattening* qualities of the Hampshire and Sussex Downs; and we stated that it was our intention to undertake, in the succeeding season, a similar experiment with the Cotswold and new Oxford breeds,—taking, after them, the Leicesters and Lincolns, and so on, until most of the breeds of importance in this country had been brought under comparison in this respect. As to the new Oxfords, however, we were unfortunately disappointed of them at the last moment; so that during the season now just past, we were only able to have the Cotswolds under experiment; and it is, therefore, the result of the trial with this breed only that we have to record on this occasion.

We must here repeat that these experiments have not for their object the settlement of the various questions as to the adaptation of this or that breed to this or that different locality, or different treatment; but, in the course of our general investigation of the chemistry of the consumption of food by animals upon the farm, for its double produce of meat and manure, under the more and more prevailing system of artificial food and early

maturity, we have sought to combine, with this more general object, a comparison of the several breeds of sheep in these respects;—that is, as to their character as early fatteners, when liberally supplied with good food.

We need not here recall special attention to the results given so fully in our last report, as to the Hampshire and Sussex breeds; but, to assist the reader in his comparison of the several breeds, we shall refer in passing to some of those results, as the various points, elicited in the experiment with the Cotswolds, come before our view. It is our wish, however, to give no bias whatever in the matter, beyond that of the facts themselves; and we should prefer that those interested in the question should study the figures and other particulars for themselves, and come to their own conclusions.

Neither is it necessary to our object to enter into any lengthened historical account of the Cotswold breed. It will be sufficient to say, on this head, that this long-woolled sheep is one of the largest in the country—that it has the character of being hardy and prolific, of having a considerable propensity to fatten, and of coming early to maturity. It is said to be of a peculiarly quiet disposition, a quality tending both to economy of food, and to its character as a fattening sheep; yet it has, nevertheless, sometimes been said to consume a comparatively large amount of food in relation to its weight. However this may be, this breed, like many others, has certainly been much improved of late years; and it was our object to obtain animals for the purposes of our experiment which should be good specimens of the modern breed. With this view, we availed ourselves of the judgment of Mr. William Garne, of Aldsworth, Northleach, Gloucestershire, whose name is well known as a prizeman for this breed, at the shows of the Royal Agricultural Society of England.

We communicated to Mr. Garne the object of our experiment, and accordingly he selected for us 50 wether lambs in October last. We were informed that they were not bred by himself, and, both by their marks and the character of the animals, we concluded that they came from at least two different flocks, some three or four, perhaps, coming from a third; at any rate, the whole seemed to be divisible into two lots about equal in number—the one averaging four or five lbs. more per head than the other. This fact is, however, for the purposes of the experiment, perhaps rather desirable than otherwise, as giving a character not so exclusively that of a single flock as might have been the case had the animals been more strictly uniform.

In each lot, the relation of the lightest to the heaviest sheep was about as three to four; but this difference is not greater

than was found with the Hampshires; and among the Sussex sheep, which were judged to be so peculiarly pure and uniform, the variation in weight was not much less.

The fifty Cotswold lambs travelled by railway to London, whence they were driven to Rothamsted, a distance of 25 miles. They arrived on October 16, 1851, and were allowed until the 24th to recover the effects of their journey, before being weighed. They were then fed upon turnips, in the field, until November 21, when they were put upon the rafters in the shed, as had been done with the Hampshire and Sussex sheep in the previous season. On November 24 the Cotswolds were re-weighed and marked; and at this date, one of each of the two apparently different lots, of equal weights, and about the average of the whole in this respect, were selected to kill as *stores*, in order to determine the proportion of carcass, &c., in the live weight in that condition.

The description of foods selected was the same as for the Hampshire and Sussex sheep, viz., oil-cake and clover chaff, as *dry* foods, given in fixed quantities, according to the average weight of the animals, and swedes, given *ad libitum*. The 48 Cotswold lambs were given these foods from November 24, when first put upon the rafters; and on December 1, when they had become accustomed both to food and situation, they were re-weighed, and the exact experiment was commenced;—the quantities of the dry foods having been fixed according to the average weight of the animals when first put upon the rafters, viz., on November 24.

It had previously been decided not to include in the exact experiment the preliminary week, in the new situation, and with the new food; though, as the result turned out, the animals during this period gave much more than the average increase in live weight; indeed, on comparing the total result of the Cotswolds under experiment with that of the Hampshire and Sussex Downs, in which is included the first week of more than usual increase, the relative gain per head of the Cotswolds will be understated by about 6 lbs., owing to this slightly different arrangement of the experiment.

In the previous experiments, the average weight per head of the Sussex sheep when they were put up (Nov. 7, 1850), was 88 lbs. and that of the Hampshires 113½ lbs.; to the latter there was allotted 1 lb. of oil-cake and 1 lb. of clover chaff per head per day; and to the Sussex sheep quantities in exactly the same proportion to their weight. The average weight per head of the Cotswolds when put up was 113½ lbs., identical, therefore, with that of the Hampshires; and it was decided to give them the same



amount of dry food at the commencement, viz., 1 lb. per head per day, of each, oil-cake and clover chaff; and towards the conclusion of the experiment, the allowance of oil-cake was increased by one half, as it had been with the other breeds.

It will be observed that this experiment with the Cotswolds was commenced 3 weeks later in the season than that with the other breeds, there having been this delay in the hope of receiving the new Oxfords. Notwithstanding this, however, it was also closed 3 weeks earlier, the animals being already fully fit for the butcher.

In Table I., p. 7, are given—

The weight of each sheep at the commencement of the experiment, December 1, 1851;

The gain in weight of each animal during each period of 4 weeks of the experiment;

The weight of wool, shorn March 22, 1852;

The increase of each animal (including wool) during the entire period of the experiment;

The final weights, both inclusive and exclusive of wool.

In the 12th column, the average weekly gain of each animal; and at the foot of the table, the total gain of the entire lot of sheep between each period of weighing, their total wool, &c.; also the average weight per head at the commencement and conclusion of the experiment, the average weekly gain per head during each period, and the average weight of wool, shorn March 22, 1852.

This Table (I.) brings prominently to our view the point to which we have so often called attention, namely, the great variation in the rate of gain of the same animal during different consecutive periods, and of different animals of the same breed, however carefully selected, and having ostensibly the same description and quantities of food. This point we feel it is important to insist upon so often, as showing the uselessness of comparative experiments on feeding, unless both conducted with a large number of animals, and extended over a considerable period of time, so as to eliminate, as far as possible, the effects of the various sources of irregularity which we have before pointed out.

It will be seen by the Table (I.) that for the first 12 weeks, namely, up to February 23, the sheep were weighed only in regular periods of 4 weeks each. In one week from this time, namely, on March 1, the allowance of oil-cake was increased from 1 lb. to 1½ lb. per head per day. A fortnight later, namely, on March 15, or 3 weeks after the last weighing, the animals were weighed, and then washed preparatory to being shorn. In one

TABLE I.

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

Numbers of the Sheep. (1)	Weights at the commencement, Dec. 1.	Increase in 4 weeks to Dec. 29.	Increase in 4 weeks to Jan. 26.	Increase in 4 weeks to Feb. 23.	Wool Shorn, Mar. 22.	Increase in 4 weeks, including Wool, to Mar. 22.	Increase in 26 days to Apr. 17.	Total Increase, including Wool, in 20 weeks.	Final Weight with Wool.	Final Weight without Wool.	Average Gain per Head per Week.
1	lbs.	lbs.	lbs.	lbs.	lbs. oz.	lbs. oz.	lbs.	lbs. oz.	lbs. oz.	lbs.	lbs. oz.
2	122	18	12	12	9 10	10 10	14	66 10	158 10	179	3 5½
3	103	15	15	11	8 4	9 4	7	57 4	160 4	162	2 13½
4	108	18	14	17	9 9	12 9	14	75 9	183 9	174	3 12½
5	121	16	10	16	9 8	4 8	17	63 8	184 8	175	3 2½
6	116	16	15	14	8 13	14 13	6	65 13	181 13	173	3 4½
7	134	15	19	16	10 0	8 0	8	66 0	200 0	190	3 4½
8	(123)	(16)	(14)	(-3)	(8 0)	..	..	..	..	..	..
9	114	14	17	11	13 12	12 12	12	66 12	180 12	167	3 5½
10	122	9	13	16	9 0	9 0	13	60 0	182 0	173	3 0
11	121	13	9	16	10 7	16 7	16	70 7	191 7	181	3 8½
12	109	17	8	16	9 12	13 12	15	69 12	178 12	169	3 7½
13	146	11	16	16	8 12	16 12	17	76 12	222 12	214	3 13½
14	108	14	14	9	7 3	16 3	16	65 3	176 3	169	3 6½
15	108	19	18	15	8 0	16 0	9	77 0	185 0	177	3 13½
16	121	16	11	13	10 0	7 0	13	60 0	181 0	171	3 0
17	108	16	16	10	9 0	12 0	15	69 0	177 0	168	3 7½
18	140	15	16	18	11 12	11 12	12	72 12	212 12	201	3 10½
19	109	16	16	14	9 0	9 0	14	68 0	177 0	168	3 6½
20	120	11	11	13	8 8	7 8	..	..	..	..	..
21	121	11	14	8	9 12	7 12	8	37 8	166 8	158	1 14
22	109	11	10	10	8 12	3 12	12	48 12	169 12	160	2 7
23	123	17	17	16	9 3	6 3	18	46 12	155 12	147	2 5½
24	127	15	14	16	11 1	15 1	14	70 3	193 3	184	3 8½
25	109	14	10	11	9 5	8 5	20	80 1	207 1	196	4 0
26	116	14	5	12	8 10	16 10	10	53 5	162 5	153	2 10½
27	119	17	11	13	9 2	17 2	17	57 10	173 10	165	2 14
28	132	16	14	13	10 10	9 10	14	75 2	194 2	185	3 12
29	117	14	16	14	10 7	12 7	17	66 10	198 10	188	3 5½
30	135	13	12	8	9 12	6 12	15	73 7	190 7	180	3 10½
31	119	16	16	14	10 1	8 1	16	53 12	188 12	179	2 11
32	122	16	11	10	8 0	10 1	10	66 1	186 1	175	3 4½
33	128	15	8	17	10 1	8 0	11	56 0	178 0	170	2 12½
34	133	17	11	12	11 9	7 1	18	65 1	193 1	183	3 4
35	112	16	9	12	8 6	0 9	3	43 9	176 9	165	2 2½
36	112	16	15	17	8 6	7 6	12	56 6	168 6	160	2 13
37	121	14	6	12	9 8	16 8	8	72 8	184 8	176	3 10
38	(120)	(17)	(21)	(12)	(10 0)	11 8	16	69 8	180 8	171	2 15½
39	132	11	9	9	9 0	10 0	16	55 0	187 0	178	2 12
40	120	0	8	9	8 8	13 8	10	40 8	160 8	152	2 0
41	108	14	1	22	8 13	10 13	13	60 13	168 13	160	3 0½
42	125	15	15	7	9 8	16 8	14	66 8	191 8	182	3 5½
43	112	14	8	13	9 5	9 5	16	60 5	172 5	163	3 0½
44	105	17	14	17	8 2	5 2	10	63 2	168 2	160	3 2½
45	122	13	13	14	10 0	16 0	15	71 0	193 0	183	3 8½
46	123	10	20	17	8 11	6 11	12	65 11	188 11	180	3 4½
47	130	22	16	12	11 2	11 2	11	72 2	202 2	191	3 9½
48	128	12	9	12	9 2	6 2	10	49 2	177 2	168	2 7½
49	112	17	22	17	10 0	10 0	23	89 0	201 0	191	4 7½
50	112	17	22	17	10 0	10 0	23	89 0	201 0	191	4 7½
Totals . .	5511	665	584	617	435 12	484 12	578	2928 12	8439 12	8004	146 6½
Means; and Average Weekly Gain per Head (46 sheep) during each period	Mn. per Head lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	Mn. per Head lbs. oz.	lbs. oz.	lbs. oz.	Mn. per Head lbs. oz.	Mn. per Head lbs. oz.	Mn. per Head lbs.	lbs. oz.
	119 13	3 9½	3 2½	3 5½	9 7½	2 10	3 2½	63 10½	183 7½	174	3 3

(1) Nos. 20 and 47 were killed as stores at the commencement; and as Nos. 7 and 38 died or were killed before the conclusion of the experiment, their weights are not included in the means or in the subsequent Tables.



more week, that is on March 22, which was the date for the regular monthly weighing, the animals were shorn; and the wool and sheep each separately weighed. From the last date to April 17 constituted the next and final period, of 26 days only, instead of 28, as previously, it being necessary thus to close the experiment 2 days short of the regular monthly period, in order to secure the Monday's Smithfield Market for those animals which were to be sold alive.

At the foot of column 12 of the table, it is seen that the average weekly gain of weight per head of the entire lot of sheep, during the 20 weeks of the experiment, is 3 lbs. 2½ ozs.

We need not, perhaps, make further comment upon this table of details excepting to note in explanation of it, that one of the sheep, namely, No. 7, became unwell after being washed, and died by scouring shortly afterwards; and another, No. 38, was "killed to save its life," not long after being shorn. In the tables which follow, therefore, the particulars only of the 46 remaining sheep will be given. As to the *construction* of these tables we need not enter into any explanation in this place, having called particular attention to this point in our former paper; and, indeed, we have endeavoured so to arrange them, as that they should afford a sufficient explanation for themselves. As to their *results*, too, we shall go less into detail than in the former paper, especially as we shall have, to some extent, to reconsider the whole when the experiments with other breeds are completed.

In the six following tables are given:—

In Table II. the *total food* consumed, and total increase in live weight produced between each weighing, &c.

In Table III. the quantities of *food consumed* during each single period and the *total period* of the experiment, to *produce 100 lbs. increase* in live weight.

In Table IV. the *food consumed per head* weekly.

In Table V. the *food consumed per 100 lbs. live weight* weekly.

In Table VI. the *average increase in weight per head* weekly.

In Table VII. the *average increase upon each 100 lbs. live weight* weekly.

TABLE II.

Showing the Description and Quantities of Food consumed, and Increase produced, by 46 Cotswold Sheep, between each interval of Weighing.

Periods.	Length of Time.	Oilcake.	Clover Hay.	Swedes.	Increase in Live Weight.
	Weeks.	lbs.	lbs.	lbs.	lbs. ozs.
From Dec. 1 to Dec. 29	4	1288	1288	18,461	665 0
" " 29 to Jan. 25	4	1288	1288	17,602	584 0
" Jan. 26 to Feb. 23	4	1288	1288	22,701	617 0
" Feb. 23 to Mar. 22	4	1771	1288	21,493	484 12
" Mar. 22 to Apr. 17	4	1794	1196	23,935	578 0
Total food and increase of 46 Cotswold sheep in 20 weeks	20	7429	6348	104,192	2928 12
Average food consumed and increase produced by 46 sheep in 4 weeks	...	1485 8	1269 6	20,838 4	585 12

TABLE III.

Showing the Quantities of Food consumed during each period to produce 100 lbs. Increase in Live Weight by Cotswold Sheep.

Periods.	Length of Time.	Oilcake.	Clover Hay.	Swedes.
	Weeks.	lbs. ozs.	lbs. ozs.	lbs.
From Dec. 1 to Dec. 29	4	193 10	193 10	2776
" " 29 to Jan. 26	4	220 8	220 8	3014
" Jan. 26 to Feb. 23	4	208 12	208 12	3679
" Feb. 23 to Mar. 22	4	365 5	265 11	4433
" Mar. 22 to Apr. 17	4	310 6	206 14	4141
Average for the entire period of the experiment	20	253 10½	216 12	3557½

TABLE IV.

Showing the average Weekly Consumption of Food per Head for each period of the experiment.

Periods.	Length of Time.	Oilcake.	Clover Hay.	Swedes.
	Weeks.	lbs. ozs.	lbs. ozs.	lbs. ozs.
From Dec. 1 to Dec. 29	4	7 0	7 0	100 5
" " 29 to Jan. 26	4	7 0	7 0	95 10
" Jan. 26 to Feb. 23	4	7 0	7 0	123 6
" Feb. 23 to Mar. 22	4	9 10	7 0	116 13
" Mar. 22 to Apr. 17	4	9 12	6 8	130 1
Average per week for the entire period of the experiment	(20)	8 1¼	6 14½	113 4

TABLE V.

Showing the average Weekly Consumption of Food, per 100 lbs. Live Weight of Animal, for each period of the Experiment.

Periods.	Length of Time.	Oileake.		Clover Hay.		Swedes.	
	Weeks.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
From Dec. 1 to Dec. 29 . . . .	4	5	8	5	8	78	15 $\frac{3}{4}$
" " 29 to Jan. 26 . . . .	4	4	15 $\frac{1}{2}$	4	15 $\frac{1}{2}$	68	0 $\frac{1}{2}$
" Jan. 26 to Feb. 23 . . . .	4	4	8 $\frac{3}{4}$	4	8 $\frac{3}{4}$	80	5
" Feb. 23 to Mar. 22 . . . .	4	5	13	4	3 $\frac{1}{2}$	70	8 $\frac{1}{4}$
" Mar. 22 to Apr. 17 . . . .	4	5	8	3	10 $\frac{3}{4}$	73	6
Average per week for the entire period of the experiment }	(20)	5	5 $\frac{1}{4}$	4	8 $\frac{3}{4}$	74	11

TABLE VI.

Showing the average Weekly Increase per Head during each period of the Experiment.

Periods.	Length of Time.	Cotswold Sheep.	
	Weeks.	lbs.	ozs.
From Dec. 1 to Dec. 29 . . . .	4	3	9 $\frac{3}{4}$
" " 29 to Jan. 26 . . . .	4	3	2 $\frac{3}{4}$
" Jan. 26 to Feb. 23 . . . .	4	3	5 $\frac{1}{2}$
" Feb. 23 to Mar. 22 . . . .	4	2	10
" Mar. 22 to Apr. 17 . . . .	4	3	2
Average per week for the entire period of the experiment }	(20)	3	3

TABLE VII.

Showing the average Weekly Increase per 100 lbs. Live Weight for each period of the Experiment.

Periods.	Length of Time.	Cotswold Sheep.	
	Weeks.	lbs.	ozs.
From Dec. 1 to Dec. 29 . . . .	4	2	1 $\frac{1}{2}$
" " 29 to Jan. 26 . . . .	4	2	4
" Jan. 26 to Feb. 23 . . . .	4	2	2 $\frac{3}{4}$
" Feb. 23 to Mar. 22 . . . .	4	1	9 $\frac{1}{4}$
" Mar. 22 to Apr. 17 . . . .	4	1	12 $\frac{1}{4}$
Average per week for the entire period of the experiment }	(20)	2	1 $\frac{3}{4}$

An inspection of Tables II. and IV. will show that, as in the case of the Hampshire and Sussex sheep, the Cotswolds consumed more food as they increased in size and weight; but.

Table V., which gives the consumption *per 100 lbs. live weight*, shows that there is no decided either progressive increase or diminution of consumption *to a given weight of animal*, which can be clearly referred to the state of progress of the animal. On the other hand, the fluctuations in this respect would seem to be more probably connected with the state of the weather and of the animals in relation to it. Consistently with this idea, and also with the result of the experiments with the Hampshire and Sussex sheep, we have the consumption in relation to a given live weight most increased at the time when the animals lost the protection of their wool.

Table III. shows that as the experiment proceeded a larger amount of food was required to yield a given amount of increase in live weight. This was also the case with the Hampshire and Sussex sheep. Our experiments on the composition of animals in various stages of fatness lead us to believe, however, that this seeming diminished effect of the food as the animal progresses to maturity is perhaps more apparent than real; for as the animal ripens, the increase is found to be much less aqueous than during the earlier periods of growth. Hence it may be that there is as great, if not even greater, deposition of real solid substance from a given amount of food as maturity is approached, though the proportion of the gross live weight may be less.

It is not improbable, however, that some portion both of the actual increased consumption and of the lessened relation of increase to it, as the experiment proceeded, might be due to some depreciation in the nutritive quality of the turnips as the season advanced.

From Table VI. we learn that the average increase in live weight, *per head*, of the 46 Cotswolds, during the 20 weeks of the experiment, was 3 lbs. 3 ozs. That of the Hampshires during the entire period of the experiment was, however, only 2 lbs. 10 $\frac{3}{4}$  ozs., and that of the Sussex sheep only 2 lbs. 0 $\frac{1}{2}$  oz.

Again, in Table VII. we see that the average weekly increase per 100 lbs. live weight was with these Cotswolds 2 lbs. 1 $\frac{3}{4}$  oz.; that of the Hampshire was 1 lb. 12 $\frac{3}{4}$  ozs.; and that of the Sussex sheep, 1 lb. 12 $\frac{1}{4}$  ozs.

The following is a short tabulated summary, bringing to view the comparative results of the three breeds, in regard to some of the points given for the Cotswolds, more in detail in the preceding Table.



TABLE VIII.

Summary of results of Cotswold, Hampshire, and Sussex Sheep.

	Average Food consumed to produce 100 lbs. Increase in Live Weight.			Average Food consumed per Head Weekly.			Average Food consumed per 100 lbs. Live Weight Weekly.			Average Gain in weight per Head Weekly.	Average Gain in Weight per 100 lbs. Live Weight Weekly.
	Oilcake.	Clover Chaff.	Swedes.	Oilcake.	Clover Hay.	Swedes.	Oilcake.	Clover Hay.	Swedes.		
	lbs.	lbs.	lbs.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
Cotswold .	253½	216½	3557½	8 1½	6 14½	113 4	5 5½	4 8½	74 11	3 3	2 1½
Hampshire.	291½	261½	3966½	7 12½	7 0	106 3½	5 4½	4 11½	71 10½	2 10½	1 12½
Sussex . .	297½	285½	3835½	6 0½	5 12½	77 12½	5 4½	5 1	68 0½	2 0½	1 12½

From Division 1 of this summary we learn that the Cotswolds consumed the least food to produce a given amount of increase in live weight, and the Sussex sheep the most.

From Division 2 we see that the Cotswolds consumed the largest amount of food per head, weekly; and the Sussex sheep the least.

In Division 3 are given the quantities of food, *in the fresh state*, consumed *per 100 lbs. live weight weekly*, by the several breeds; and there is some general uniformity observable in the amount consumed to a given weight of animal by the different breeds. But when the quantities of the respective foods are calculated each to their contents of *dry substance*, it is found that the total quantity consumed to a given weight of animal, within a given time, *is all but absolutely identical for the three breeds*.

Lastly, in Divisions 4 and 5 respectively we see that the average weekly gain in live weight, whether calculated *per head* or *per 100 lbs. live weight*, is greatest with the Cotswolds, and least with the Sussex sheep.

We would here call attention to the fact, that the increase in weight, *per 100 lbs. weekly*, though greatest with the Cotswolds, is even with them very little more than 2 lbs., that is, 2 per cent.

The next point is as to the quantity of wool shorn from the Cotswold sheep. By reference to Table I. it will be seen that the date of shearing was March 22nd, and we have there given the amount of wool taken from each animal separately, and the total amount from the 48 Cotswolds. In Table IX., which follows, we have given the *average* quantity of wool obtained per

head, and per 100 lbs. live weight, of the whole lot of Cotswolds; and for the convenience of comparison we have added the same particulars relating to the Hampshire and Sussex sheep.

TABLE IX.

	Average Wool per Head.		Proportion of Wool to 100 lbs. Live Weight of Animal at the Time of being Shorn.
	lbs.	ozs.	
Wool shorn from Cotswolds, } March 22, 1852 . . . . .	9	7½	5.54
Wool shorn from Hampshires, } March 27, 1851 . . . . .	6	4	3.77
Wool shorn from Sussex, } March 27, 1851 . . . . .	5	10	4.57

From this Table it appears that the long-woolled Cotswold sheep gave more than half as much again *wool per head* as either the Hampshire or Sussex sheep. The Cotswold, again, gave 5½ per cent. of wool upon its live weight; the Hampshire giving only 3¾ per cent., and the Sussex sheep 4½ per cent.

We now come to the question of the character of the Cotswold sheep, as *meat*-producers. It will be remembered, that in the case of the Hampshire and Sussex sheep, out of the 40 of each breed, the 4 which had increased most, the 4 that had increased least, and the 8 of medium increase, were killed at home; the weights of the carcasses and of all the viscera being taken separately, and the carcasses sold at Newgate Market; and the 8 of next larger, and the 8 of next smaller increase, were sold alive at Smithfield. With the Cotswolds a similar plan was adopted. Thus, of the 46 sheep, the 5 of most, the 5 of least, and the 10 of medium increase, were killed at home; the weight of all the parts separately taken, and the carcasses sent to Newgate Market. The 10 of next larger, and the 10 of next smaller increase, were sold alive at Smithfield, and the remaining 6 were kept to be fed till Christmas. The only exception to this arrangement was, that 2 of the animals thus allotted by their increase in weight to be kept till Christmas, were exchanged for 2 of the others of about equal weight, but which were less ripe and more adapted for feeding on, than the 2 in question.

The following summary of average qualities within each set as thus allotted, will show how far the method of selection adopted was calculated to yield a fair average of qualities in the respective lots:—



TABLE X.

	Average Increase per Head, including Wool.		Average Wool per Head (Shorn Mar. 22).		Average Original Weight, Dec. 1, 1851.		Average Final Weight, April 17, 1852, without Wool.	
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
Mean of the 20 killed at home	63	0 $\frac{1}{2}$	9	2 $\frac{3}{4}$	119	12 $\frac{3}{4}$	173	10 $\frac{1}{2}$
Mean of the 20 sold alive	65	1 $\frac{3}{4}$	9	12	119	5 $\frac{1}{2}$	174	11 $\frac{1}{4}$
Mean of the 6 to be kept till Christmas.	61	0 $\frac{1}{2}$	9	8 $\frac{1}{2}$	121	5 $\frac{1}{4}$	172	13 $\frac{1}{4}$
Mean of the 46 Sheep .	63	10 $\frac{1}{2}$	9	7 $\frac{1}{2}$	119	13	174	0

In the next Table (No. XI.) are given at one view, some of the main particulars whilst alive, of the animals to be killed at home, by the side of those ascertained on killing them.

In this Table we find with these Cotswolds, that there was some degree of uniformity as to rate of increase in weight within each of the three lots, drawn out for killing; though comparing lot with lot, we see that the 5 of largest increase gave an average actual increase nearly double that of the 5 of smallest increase. On the other hand, as shown in the summary, the average increase per head of the 10 of medium increase, of the whole 20 killed, and of the whole 46 sheep fed under experiment, was very nearly equal. This was also the case with the Hampshire and Sussex sheep; and as with them, we find also with the Cotswolds, that those animals thus brought together within each lot as having increased in weight at nearly equal rates, had few other qualities in common.

Thus, turning to the column of the amount of wool given by the Cotswolds, we see, that although the *average* of any one lot does not differ much from that of either of the others, or of the whole 46 sheep, yet the amount obtained from the different individual sheep is almost equally variable among those of the largest, those of the smallest, and those of the medium rate of increase, respectively.

In the column of *carcass-weight*, we see that the 5 sheep which increased most, gave on April 19th, when therefore they were little more than a year old, an average of 113 lbs. 15 oz., or 14 stones and nearly 2 lbs. (8 lbs. per stone). The 5 of smallest increase gave at the same time an average of 90 $\frac{3}{4}$  lbs. carcass, equal to 11 stone 2 $\frac{3}{4}$  lbs.; and the 10 of medium increase gave an average of 99 lbs. 6 oz. carcass, or nearly 12 $\frac{1}{2}$  stones. The average carcass weight of the whole 20 killed was 101 lbs., or 12 stone 5 lbs.; this is exactly the weight to which the Hampshires had been brought in the previous season by May 8, after

26 weeks of experiment; and the average weight of the Sussex carcasses at the same date was 9 stone 5 lbs.

The next two columns of Table XI. show the proportion of carcass to live weight. In the first, it is calculated upon the *unfasted* live-weight, and in the second upon the *fasted*. It is worthy of remark, that whichever basis of calculation is taken, the Cotswolds are found to have given a larger percentage of carcass

TABLE XI.

Numbers of the Sheep.	WEIGHTS ALIVE.					WEIGHTS DEAD.				
	Increase per Head, including Wool, in 20 Weeks.	Wool per Head, shorn March 22.	Original Weights on Dec. 1, 1851.	Final Live Weights, without Wool.		Carcass 28 to 36 hours after Killing.	Proportion of Cold Carcass in 100 Un- fasted Weight.	Proportion of Cold Carcass in 100 Fasted Weight.	Proportion of Loose or Inside Fat in 100 Fasted Weight.	
				Not Fasted.	Fasted.					
50 24 14 12 27	lbs. oz. 89 0 80 1 77 0 76 12 75 2	lbs. oz. 10 0 11 1 8 0 8 12 9 2	lbs. oz. 112 0 127 0 108 0 146 0 119 0	lbs. oz. 191 0 196 0 177 0 214 0 185 0	lbs. oz. 178 0 185 0 170 0 200 0 173 0	lbs. oz. 112 7 114 10 107 6 128 2 107 2	58.8 58.5 60.6 59.9 57.9	63.18 61.96 63.16 64.08 61.94	4.99 3.98 4.14 4.94 4.82	
Mean of 5 largest.	79 9	9 6	122 6	192 0	181 3	113 15	59.14	62.86	4.57	
49 22 34 40 19	49 2 46 12 43 9 40 8 37 8	9 2 8 12 11 9 8 8 8 8	128 0 109 0 133 0 120 0 129 0	168 0 147 0 165 0 152 0 158 0	157 0 140 0 157 0 143 0 154 0	98 12 76 0 96 0 89 14 93 6	58.8 51.7 58.2 59.1 59.1	62.92 54.28 61.16 62.88 60.63	6.09 4.89 4.36 4.08 6.00	
Mean of 5 smallest.	43 7	9 4	123 12	158 0	150 3	90 13	57.38	60.37	5.08	
13 42 31 5 46 33 4 44 41 43	68 3 66 8 66 1 65 13 65 11 65 1 63 8 63 2 60 13 60 5	7 3 9 8 10 1 8 13 8 11 10 1 9 8 8 2 8 13 9 5	108 0 125 0 119 0 116 0 123 0 128 0 121 0 105 0 108 0 112 0	169 0 182 0 175 0 173 0 180 0 183 0 175 0 180 0 180 0 163 0	157 0 171 0 166 0 165 0 172 0 170 0 164 0 153 0 154 0 152 0	96 7 104 13 101 6 102 15 106 14 102 13 100 4 96 10 89 10 92 6	57.1 57.6 57.9 59.5 59.4 58.2 57.3 60.4 56.0 56.7	61.44 61.29 61.07 62.40 62.13 60.49 61.14 63.17 58.22 60.77	5.82 6.27 5.23 6.50 5.60 6.21 5.04 5.45 4.51 4.69	
Mean of 10 medium.	64 8	9 0	116 8	172 0	162 6	99 6	57.81	61.21	5.63	
SUMMARY.										
Mean of 5 largest.	79 9	9 6	122 6	192 9	181 3	113 15	59.14	62.86	4.57	
Mean of 5 smallest.	43 7	9 4	123 12	158 0	150 3	90 13	57.38	60.37	5.08	
Mean of 10 medium.	64 8	9 0	116 8	172 0	162 6	99 6	57.81	61.21	5.63	
Mean of 20 killed.	63 0½	9 2¾	119 12¾	173 10½	164 0¾	100 14½	58.03	61.41	5.18	
Mean Total	63 10½	9 7½	119 13	174 0	..	..	..	..	..	



carcass weight than either the Hampshire or Sussex sheep of the previous experiment; both of these, however, as has already been stated, were put earlier in the season upon the fattening food than the Cotswolds, and were kept upon it later.

These long-woolled sheep were, indeed, very fully ready for the butcher. They very remarkably, too, manifested the *characteristics* of the white-faced, long-woolled sheep, as contrasted with the black-faced Down. Thus, although, as we have stated, their proportion of carcass was greater, and the carcasses themselves were much fatter than in the case of either of the other breeds, yet the kidneys of these Cotswolds were by no means well made up. The rumps, and saddle generally, and breast, were, however, too fat; indeed, the fat was chiefly accumulated *outside* the frame instead of inside, as is more the case with the Downs: there was, too, a deficiency of lean in the Cotswold carcasses. Some of the rumps and breasts were extraordinarily fat, especially of the 5 animals which had given the greatest increase. The 10 of medium increase were the best made up on the kidneys, and had also the best distribution of lean. The 5 of least increase were the whitest and most delicate; they were in every way less fat; they had altogether less of the character of the fat long-woolled sheep, and would well have borne to be fed a little longer. On the other hand, the carcasses of the 5 sheep of largest increase were much coarser in appearance, and the surface was much more streaky and vascular.

It may be remarked, that there is no clearly evident connexion between rapidity of fattening and the *proportion* of carcass. There is nearly equal variation in regard to proportion of carcass weight, among the animals of greatest, of least, and of medium increase respectively.

As to the *actual* proportion of dead or carcass weight to live weight, in these early ripened sheep, we may observe that 57.14 per cent. of carcass is equal to a stone of 8 lbs. dead for a stone of 14 lbs. alive, and that the average proportion of carcass of each lot of these sheep is higher than this. Thus, taking the calculations upon the gross, or unfasted, live weight, the 5 animals of largest increase gave an average proportion of carcass of 59.14 per cent., the 5 of smallest increase of 57.4 per cent., and the 10 of medium increase 57.8 per cent. The average of the whole 20 killed is 58.0 per cent. The 5 animals of largest increase, which gave such a large *actual weight* of carcass, and upon the whole, the heaviest *proportion* of carcass, were nevertheless deficient in kidney and inside fat generally.

Looking to the column of loose, or caul and gut fat, we see that the average proportion of it in 100 of the fasted live weight of the 20 Cotswolds was 5.2. In the Hampshire and Sussex sheep it was more than 7 per cent. The Table shows also that

the animals of largest increase, and which were the fattest, especially on the outside of the frame, gave on the average the least proportion of inside or loose fat. The 10 sheep of medium increase gave upon the whole the largest proportion of loose fat; though, owing to a large amount in 2 of the animals of smallest increase, the *mean* of these is higher than that of the former.

In fact, the more the original character of the large, rapidly growing Cotswold sheep prevailed, the greater was the proportion of fat on the outside of the carcass, and the coarser was the mutton. On the other hand, the quality was the best the less there was of tendency to excessive fat on the carcass, and the greater the proportion on the kidneys, and of inside fat generally.

It has been well said, that the Cotswold is not so much the butcher's, or gentleman's, as the poor man's sheep—supplying as it does, when sold as meat, a small proportion of bone and a large proportion of fat—but yielding to the butcher comparatively little profit in the shape of tallow-cake and loose fat. Whether or not the Cotswold is the *farmer's* sheep is, however, a question to which no unconditional answer can be given. This must depend upon many local circumstances, such as the character of the land, and of the farming adopted, and also the character of the demand. As to the question of demand, it is probable that wherever *quality of mutton* has much influence on its price, and this rather than quantity is most sought after, the Cotswold and other white-faced sheep will, other things being equal, not be so profitable as their character as rapid and early fatteners, upon a given amount of food, would, at first sight, lead us to suppose. But we shall recur to the question of price further on.

As in the case of the Hampshire and Sussex sheep (and of most animals which have been killed at home after having been fed under experiment, and, indeed, of others also) we have, as already stated, taken the weights of all the separate internal parts, or "offal," of the 20 Cotswold sheep. We reserve, however, any further points connected with this subject until we have an opportunity of considering all the facts which we have collected relating to it. Indeed it would be out of place to go into them at any length just now.

We have found, then, by an examination of the particulars of the *dead weights* of the Cotswold sheep, that they gave a heavier carcass in a given time than either the Hampshire or Sussex sheep—a somewhat heavier proportion of carcass to live weight—a considerably less proportion of loose or inside fat, but a considerably larger amount of fat on the outside of the frame.

We now come to the question of the money result of this experiment upon the fattening qualities of the Cotswold sheep.

As already stated, the experiment was concluded on April 17th, and the whole of the sheep were weighed on that day. Twenty



were sent off alive in carts the next evening for the Monday morning's Smithfield market of April 19th. On the same day, the 20 allotted for killing at home were slaughtered; their carcasses were sold at Newgate Market on the 21st, and their offal was sold at home. The particulars of these sales are given in the following Table. No estimate is this time made for the (six) sheep to be fed till Christmas, the statement being confined to the 40 sheep actually sold.

TABLE XII.

Produce of Sale of the Cotswolds.

	Weight in lbs.	Produce of Sale.
	lbs. oz.	£. s. d.
20 carcasses, at 2s. 10d. per stone of 8 lbs. .	1968 0	34 17 0
Wool, at 12½d. per lb. . . . .	183 7	9 11 1
Skins, at 8d. each. . . . .	...	0 13 4
Heads and plucks, at 1s. 3d. . . . .	...	1 5 0
Loose fat, at 1s. 11d. per stone of 8 lbs.	172 0	2 1 2½
		48 7 7½
Killing, at 8d., 13s. 4d.; Selling and } Charges at Newgate Market, 20s. 6d. }	...	1 13 10
Net for the 20 sheep sold dead . . . .	...	46 13 9½
Net per head for the 20 sheep sold dead .	...	2 6 8¼
20 sheep, sold alive, at 36s. per head . .	...	36 0 0
Wool, at 12½d. per lb. . . . .	195 2	10 3 3
		46 3 3
Selling and charges . . . . .	...	0 13 4
Net for 20 sheep sold alive . . . . .	...	45 9 11
Net average per head for 20 sheep sold alive	...	2 5 5¾

## SUMMARY.

	£. s. d.
20 Sheep, sold dead . . . . .	46 13 9½
20 Sheep, sold alive . . . . .	45 9 11
Total . . . . .	92 3 8½
Average per head for the 40 sheep .	£2 6 1

It is seen by this Table of the produce of sale that the carcasses of the Cotswolds, sold dead, fetched 2s. 10d. per stone at Newgate Market. The net return per head of the sheep sold alive was about 1s. 3d. less than for those sold dead. And if we reckon the average weight of the carcasses at a little above 12 stones

this would reduce the price per stone of the carcasses of the sheep sold alive by a little more than 1d. below that of those sold dead, that is, to about 2s. 9d.

So fluctuating are the markets that it would of course be impossible to institute any exact comparison as to the produce of sale of the Cotswolds with that of the Hampshire and Sussex sheep without first comparing the state of the market at the different times of sale. We shall defer, however, any full consideration of the subject in this point of view until we have completed our experiments with other breeds. In the meantime, however, we subjoin a balance-sheet of the experiments with the Cotswolds in the same form as given for the Hampshire and Sussex Downs; but for the reasons stated above we shall not, on this occasion, go into a full consideration of its bearings; nor need we here repeat our explanation of the plan and object of a balance-sheet in the particular form adopted; in which, as will be seen, we have only the cost of the lambs and of their dry or marketable food on the one side, set against the net produce of sale of the fat sheep and their wool on the other.

TABLE XIII.

Balance Sheet of the Cotswolds.

	£. s. d.	£. s. d.
Cost of 40 Cotswold wether lambs, at 33s. 3d. .	...	66 10 0
They consumed, of purchased food,—		
6460 lbs. of oilcake, at 6l. 15s. per ton .	19 9 3¾	
5520 lbs. of clover hay, at 4l. per ton . .	9 17 1¾	
Total of purchased food . . . . .	...	29 6 5½
		95 16 5½
40 fat Cotswolds, sold April, 1852 (with wool) .	...	92 3 7½
Difference . . . . .	...	3 12 10

After the remarks above, introducing this balance-sheet, we need only here say, in explanation, that, as before in estimating the cost of the lambs at the commencement of the experiment, 3d. per head per week is charged for their board up to that time; and we may add, that (so far to aid the comparison) the oilcake and clover-chaff are charged exactly at the same rates as for the Hampshire and Sussex sheep, regardless of any fluctuations in the cost of those articles.

It may also be noticed that the market in which these Cotswolds were sold was quoted as "exceedingly heavy"; and it will be observed that the increase of the fat sheep with their wool did not cover the cost of the dry foods by about 3l. 13s., instead of within 6s. or 7s., as was the case with the Hampshire and Sussex sheep. These, however, were also sold in a bad market.

We have only now to add a general tabulated summary, giving at one view the results embodied in detail in the preceding Tables



of this paper; and for the convenience of comparison we have, where it seemed useful, placed by their side the particulars of the Hampshire and Sussex sheep on the same points.

TABLE XIV.  
GENERAL SUMMARY.

PARTICULARS—(Cotswold Sheep.)	Actual Results of Experiments.			Percentage relation of Hants to Cotswold.	Percentage relation of Sussex to Cotswold.
	Cotswold.	Hants.	Sussex.		
	lbs. oz.	lbs. oz.	lbs. oz.		
Average weight per head when put up, Dec. 1st	119 13	113 7	88 0	94.67	73.44
Average weight per head when fat (including wool)	183 7½	183 1	141 0	99.78	76.86
Total increase in weight of 46 sheep (Cotswolds) in 20 weeks	2,928 12	..	..	..	..
Increase per head weekly	3 3	2 10½	2 0½	83.82	63.67
Increase upon 100 lbs. live weight weekly	2 1½	1 12½	1 12½	85.19	85.21
Total food consumed by 46 Cots- wolds in 20 weeks	Oilcake . . . 7,429 0 Clover Hay . . . 6,348 0 Swedes . . . 104,192 0	..	..	..	..
Food consumed per head weekly	Oilcake . . . 8 1½ Clover Hay . . . 6 14½ Swedes . . . 113 4	7 12½ 7 0 106 3½	6 0½ 5 12½ 77 12½	96.51 101.36 93.79	74.66 83.71 68.68
Food consumed per 100 lbs. live weight of animal weekly	Oilcake . . . 5 5½ Clover Hay . . . 4 8½ Swedes . . . 74 11	5 4½ 4 11½ 71 10½	5 4½ 5 1 68 0½	98.83 103.78 95.92	98.83 111.34 91.94
Food consumed to produce 100 lbs. increase of live weight	Oilcake . . . 253 12 Clover Hay . . . 216 12 Swedes . . . 3,557 8	291 8 261 8 3,966 12	297 8 285 8 3,835 12	114.88 120.65 111.50	117.24 131.72 107.82
Total wool of 46 sheep, shorn March 22nd	417 12	..	..	..	..
Wool per head ditto ditto	9 7½	6 4	5 10	66.00	59.40
Wool per 100 lbs. live weight of animal, when shorn	6.54	3.775	4.567	67.24	83.95
	st. lbs. oz.	st. lbs.	st. lbs.		
Average weights of cold carcass in stones of 8 lbs.	(Of the 5 largest and 5 smallest increase. Of 10 medium increase. Of the 20 killed)	Weights taken at home	Weights allowed by butcher		
	12 6 5	12 6½	9 4	100.18	74.28
	12 3 6	12 4½	9 5½	101.38	78.24
	12 4 14½	12 2	9 4½	100.56	76.78
	12 2 0	12 3	9 3	..	..
Proportion of carcass (cold) in 100 lbs. of the gross live weight of animal, April 17th (i.e., not fasted)	(Of the 5 largest Of the 5 smallest Of the 10 medium Of the 20 killed)	59.14 57.38 57.81 58.03	56.87 56.42 56.82 56.73	57.16 56.15 57.41 57.03	96.16 97.85 98.28 97.76
Proportion of carcass (cold) in 100 lbs. of the fasted weight.	(Of the 5 largest Of the 5 smallest Of the 10 medium Of the 20 killed)	62.86 60.37 61.21 61.41	61.24 60.00 60.64 60.63	61.81 59.28 60.67 60.56	97.42 99.39 99.08 98.73
Average weight of loose fat per head (weighed warm)	(Of the 5 largest Of the 5 smallest Of the 10 medium Of the 20 killed)	8 11½ 8 2½ 9 8½ 8 15½	12 16½ 11 5 12 7 12 4½	10 4½ 8 6½ 10 2½ 9 12	148.63 139.23 130.92 136.89
					117.65 103.65 106.90 107.51

PARTICULARS (Cotswold Sheep).	Actual Results of Experiments.			Percentage relation of Hants to Cotswold.	Percentage relation of Sussex to Cotswold.
	Cotswold.	Hants.	Sussex.		
Proportion of loose fat in 100 lbs. fasted weight	(Of the 5 largest Of the 5 smallest Of the 10 medium Of the 20 killed)	4.57 5.08 5.53 5.18	6.54 7.34 7.24 7.09	7.08 7.17 7.45 7.29	143.10 144.49 130.92 136.87
Price of the carcass per stone of 8 lbs.	{ 1st sale 2 10 2nd do. ..	{ s. d. 2 9 3 3	{ s. d. 3 0 3 4½	97.06	105.88
Gross money return per head of the 20 Cotswolds sold dead (without wool)	37 1½	..	..	114.70	119.12
Gross money return per head of the 20 Cotswolds sold alive (without wool)	36 0	..	..	..	..
Average value of wool per her head	9 8	7 0½	6 6½	72.84	67.67
Price of wool per lb.	1 0½	1 1½	1 2	108.00	112.00