EXPERIMENT STATION

OF THE

KANSAS STATE AGRICULTURAL COLLEGE,

MANHATTAN.

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FARM DEPARTMENT.

C. C. GEORGESON. M. SC.,
Professor of Agriculture and Superintendent of Farm.
F. C. BURTIS, M. SC., Assistant.
D. H. OTIS, B. SC., Assistant.

STEER FEEDING EXPERIMENTS.—SERIES IV.

A Comparison Between Pure Bred Shorthorns and Scrubs.

In the spring of 1893 it was decided to begin a comparative test between pure bred stock and scrubs in order to ascertain their relative merits under the same conditions as to feed and care. We accordingly set about finding two lots of ten head each. After some search for pure bred beef breeds, it became apparent that none could be found that were at all desirable for the test and which could be bought at any thing like reasonable figures, of either Herefords. Aberdeen-Angus or Galloways. For this reason, and for none other, these three breeds were eliminated from the start. The Shorthorns, on the contrary, are quite numerous in Kansas, and there was, therefore, some hope of finding a suitable lot of that breed. Yet it was surprising to find how few of them could be obtained. It was desirable to secure a uniform lot as to age and weight. After much searching and correspondence. Mr. T. H. Mastin, of Kansas City, consented to sell the station six head of yearling pure bred Shorthorn steers at the rather high price of $40 per head. The other four Short-

horns were obtained from the herd of Mr. T. P. Babst, of Dover, Kansas, in exchange for heifer calves from the College herd. The calves from Mr. Babst were from six to eight months younger than the steers from Mr. Mastin's herd. Moreover, they had not been castrated and were operated upon after they reached the station, which set them back considerably in their growth during the summer of 1893. For this reason as well as for the reason of their being younger, they were not large enough to put into the feed lot together with the six steers from Mr. Mastin's herd, when the feeding period here detailed began, November 1, 1894, and the account here given deals, therefore, only with the six older steers, and with six of the largest scrubs from the lot of ten, which were bought at the same time.

BREEDING OF THE SHORTHORNS.

As shown by the following pedigrees, the Shorthorns are of excellent breeding, but it would be too much to say that they were superior types of the breed. The fact that their breeder had castrated them while calves would rather indicate that he did not consider them of sufficient merit individually to warrant his rearing them for breeding purposes. However, at the time they were purchased they were fairly good looking steers and had, for their ages, made a fair average growth, as shown by the following table:

TABLE I.—SHOWING AGE, WEIGHT AND GAIN OF SHORTHORNS UP TO THEIR ARRIVAL AT THE STATION.

Number of steer	Date of birth, 1892.	No. of days old on May 25, 1893.	Assumed weight at birth. Pounds.	Weight on May 25, 1893. Pounds.	Gain. Pounds.	Average daily gain. Pounds.
Steer No. 1	March 19	432	60	807	747	1.73
Steer No. 2	March 18	433	60	703	643	1.48
Steer No. 3	Febru'y 26	453	60	835	775	1.71
Steer No. 4	Febru'y 25	454	60	831	771	1.70
Steer No. 5	March 17	434	60	746	686	1.58
Steer No. 6	March 19	432	60	760	700	1.62
Total		2638	360	4682	4322	9.82
Average		439	60	780	720	1.63

PEDIGREES.

NO. I.

Light roan; calved, March 19, 1892, bred by Thomas H. Mastin, of Kansas City, Mo.
Got by 4th Duke of Northallerton, 107484 R. K. Thomson.
Walnut Constance 3d (Vol. 33, page 940) by Oxford Duke of Airdrie, 71047 S. E. Ward.
Constance of Lyndale 4th by 2d Duke of Hillhurst (39748) M. H. Cochrane.
Constance of Lyndale 2d by Scotsman (27435) Duke of Bucleuth.

Constance 6th	by 7th Duke of Airdrie	(23718) R. A. Alexander.
Constance 3d	by Clifton Duke	(23580) R. A. Alexander.
Constance 2d	by Duke of Airdrie	(12730) R. A. Alexander.
Imp. Constance	by Bridegroom	(11203) R. Lawson.
Cherry Ripe	by Sir Walter	(2639) R. Crofton.
Young Cherry	by Young Waterloo	(8757) G. Cowling.
Cherry	by Waterloo	(2816) J Stephenson.
Old Cherry	by Waterloo	(2816) J. Stephenson.
The dam of Young Waterloo (8757)	by Kitt	(7127) J. Charge,
	by Kitt	(7127) J Charge,
	by Page's 2 Bull	(6269) R. Colling.

NO. 2.

Roan; calved, March 18, 1892, bred by Thomas H. Mastin, of Kansas City, Mo.

Got by Kirklevington Wild Eyes 5th, 108642 A. C. Briant.

Kirklevington 20th (Vol. 31, p. 832)	by 32d Duke of Airdrie,	50832 A. J Alexander.
Kirklevington 18th	by 14th Duke of Airdrie	(41348) R. A. Alexander.
Kirklevington 13th	by St. Valentine	(35459) R. A. Alexander.
Imp. Kirklevington 11th	by Delhi	(15865) T. Atherton.
Kirklevington 7th	by Earl of Derby	(10177) Thomas Bates.
Kirklevington 4th	by Earl of Liverpool	(9061) Thomas Bates.
Kirklevington 1st	by Duke of Northumberland	(1940) Thos. Bates.
Nell Gwynne	by Belvedere	(1706) J. Stephenson.
Northallerton	by Son of 2d Hubback	(2683) Thos. Bates.

NO. 3.

Red roan; calved, February 26, 1892, bred by Thomas H. Mastin, Kansas City, Mo.

Got by Kirklevington Wild Eves 5th, 108642 A. C. Briant.

Kirklevington 21st (Vol. 31, p. 832)	by 32d Duke of Airdrie,	50832 A. J Alexander.
Kirklevington 18th	by 14th Dukeof Airdrie	(41348) R. A. Alexander.
Kirklevington 13th	by St. Valentine	(35459) R. A. Alexander.
Imp. Kirklevington 11th	by Delhi	(15865) T. Atherton.
Kirklevington 7th	by Earl of Derby	(10177) Thos. Bates.
Kirklevington 4th	by Earl of Liverpool	(9061) Thos. Bates.
Kirklevington 1st	by Duke of Northumberland	(1940) Thos. Bates.
Nell Gwynne	by Belvedere	(1706) J. Stephenson.
Northallerton	by Son of 2d Hubback	(2683) Thos. Bates.

NO. 4.

Red and little white: calved, February 25, 1892, bred by Thomas H. Mastin, Kansas City, Mo.

Got by 4th Duke of Northallerton, 107484 R. K. Thomson.

Udorine 2d (Vol. 37, p. 709)	by Baron Bates 12th,	37541 T. J. Megibben.
Udorine	by Lord Liverpool,	60306 J. Barton.
Udora 6th	by 5th Lord Oxford	(31738) S. Campbell.
Udora 5th	by 17th Duke of Airdrie	(41349) R. A. Alexander.
Udora 4th	by Miss Bellvilles Son	(34859) A. B. Couger.
Udora	by Lord Ducie	(13181) Robt. Bell.
Imp. Lady Liverpool	by 3d Duke of York	(10166) Thos. Bates.
Lily	by 2d Duke of Oxford	(9046) Thos. Bates.
Harmless	by Cleveland Lad	(3407) Thos. Bates.
Hawkey	by Red Rose Bull	(2493) Thos. Bates.
Hart	by Rex	(1375) Mr. Farra.

NO. 5.

Red and white; calved, March 17, 1892, bred by Thomas H. Mastin, Kansas City, Mo.
Got by 4th Duke of Northallerton, 107484 R. K. Thomson.

Lady Liverpool of Oakwood (V. 36, p. 662)	by Kirklevington Duke 2d,	103926, S. White.
Lady Liverpool 12th	by Baron Bates 12th,	37541 T. J. Megibben.
Lady Liverpool 9th	by Lord Liverpool,	60306 J. Barton.
Lady Liverpool 6th	by 32d Duke of Airdrie,	50832 A. J. Alexander.
Lady Liverpool	by 5th Lord Oxford	(31738) S. Campbell.
Udora 6th	by 5th Lord Oxford	(31738) S. Campbell.
Udora 5th	by 17th Duke of Airdrie	(41349) R. A. Alexander.
Udora 4th	by Miss Bellevilles Son	(34859) A. B. Couger.
Udora	by Lord Ducie	(13181) Robt. Bell.
Imp. Lady Liverpool	by 3d Duke of York	(10166) Thos. Bates.
Lily	by 2d Duke of Oxford	(9046) Thos. Bates.
Harmless	by Cleveland Lad	(3407) Thos. Bates.
Hawkey	by Red Rose Bull	(2493) Thos. Bates.
Hart	by Rex	(1375) Mr. Farra.

NO. 6.

Red roan; calved, March 19, 1892, bred by Thomas H. Mastin, Kansas City, Mo.
Got by 4th Duke of Northallerton, 107484 R. K. Thomson.

Walnut Lady Barrington (Vol. 33, p. 941)	by Oxford Duke of Airdrie, 71057. S. E. Ward.	
Imp. Lady York and Oxford Bates	by Baron Turncroft Oxford 4th	(37822) P. Graham.
Lady York and Thorndale Bates 2d	by 8th Duke of York	(28480) Col. Gunter.
Lady Tregunter Bates	by 2d Duke of Treguter	(26022) Col. Gunter.
Lady Thorndale Bates	by 4th Duke of Thorndale	(17750) S. Thorne.
Lady Bates 3d	by 4th Duke of Oxford	(11387) Earl Ducie.
Lady Bates 2d	by The Buck	(13836) H. Combe.
Lady Bates 1st	by Duke of Gloster	(11382) Earl Ducie.
Lady Blanch	by 4th Duke of York	(10167) Thos. Bates.
Lady Barrington 8th	by 2d Duke of Oxford	(9046) Thos. Bates.
Lady Barrington 5th	by 4th Duke of Northumberland	(3649) Thos. Bates.
Lady Barrington 3d	by Cleveland Lad	(3407) Thos. Bates.
Lady Barrington 2d	by Belvedere	(1706) J. Stephenson.
Lady Barrington	by Son of Herdsman	(304) C. Mason.
Young Alicia	by Wonderful	(700) B. Rudd.
Old Alicia	by Alfred	(23) C. Colling.

The above pedigrees furnished by the breeder show that they belong to families of high reputation. They are given here as evidence that the steers were backed by blood which many breeders will class with the best in the breed.

The price, $40.00 per head, which we were obliged to pay in order to get them, was too high for stock cattle of that age, and in the expense account of the two lots which follows later the purchase price has, therefore, been omitted in both cases. They were dehorned soon after they were purchased. They are illustrated in cuts 1 to 6, the numbers corresponding to the numbers on the pedigrees.

HISTORY OF THE SCRUBS.

The term "scrubs" is here used for the want of a more suitable name. It is not used as a derisive epithet, but rather to denote wholly unimproved stock as far as it was possible to obtain them. The term "natives" might have been adopted instead, but to the average reader it is apt to imply more or less improved blood, since one or another of the various improved breeds usually show their impress on the so-called "natives" to a greater or less extent. But the term "scrubs" implies as near as it can be expressed in one word the absence of improvement.

The ten scrub steers which we purchased for the trial were raised in the region about Manhattan. They were bought from Mr. Hiram Kearns, a farmer and ranchman in the neighborhood of the College. They were picked from a bunch af about fifty which he had collected in the surrounding country with a view of rearing them for the feed lot. Mr. Kearns could not tell the exact age of any of them, but they were about a year old, having been dropped in the spring of '92, and he had collected them in the fall of that year. They did not show any particular breeding, nor did they at the time of purchase give evidence of having any improved blood in their veins. As they matured, however, one of them, No. 14, bore some resemblance to a red Shorthorn in that he was more level and less angular than most of the others, and No. 16, by his appearance about the head, gave rise to the suspicion that he might carry a slight trace of Jersey blood; but nothing could be learned in regard to their breeding. They represented a fair average of the lot from which they were picked. In comparison with the Shorthorns they were small for their age and not calculated to inspire one with enthusiasm over their merits as beef cattle. Grade steers of much better quality with various degrees of pure blood could have been found, but as the test was to be between pure-breds and steers of no breeding it was considered that the object aimed at would have been defeated by selecting grades and we, therefore, chose scrubs, pure and simple. They cost $16.00 a head. Like the Shorthorns they were dehorned soon after they were purchased. See plates for illustrations Nos. 11 to 20.

TREATMENT FROM THEIR ARRIVAL AT THE STATION UNTIL PUT IN THE FEED LOT.

On their arrival at the station, May 25, 1893, the two lots were at once put on pasture together. It was a hilly prairie pasture which furnished only a moderate amount of feed. The scrubs were used to this and did not feel the change; but it was greatly to the disadvantage of the Shorthorns, as they were taken off the rich clover and tame grass pastures where they had been bred, on the extreme eastern border of the state, and for the first time in their lives were put on a diet of rather scanty and dry prairie grass. The result of this is shown in table No. II given below. By November 1, 1893, when they were taken from the pasture the Shorthorns had made an average gain of 110

pounds, whereas the scrubs had made an average gain of 179 pounds per head in the same time and on the same pasture.

During the winter of 1893-4 the two lots were fed exactly alike in the open yard with sheds for shelter. To enable us to weigh their feed separately they were kept in separate yards, only divided, however by a wire fence. The feed consisted of corn and corn stalks with a little sorghum hay and similar roughness The table shows the weights and gains and the amount eaten by each lot. They were fed sufficiently to be kept in a good growing condition.

On May 1, 1894, the two lots were again put together on the same pasture they occupied the year before. The first few days they were fed a little corn so as not to make the change too abrupt. They remained on pasture until October 29th when they were taken up and preparations made to put them in the feed lot for fattening.

TABLE II.—SHOWING MONTHLY WEIGHTS, GAINS AND FEED EATEN IN POUNDS FROM MAY 25, 1893, TO NOVEMBER 1, 1894

LOT 1 —SHORTHORNS.

First season on pasture—May 25, to November 1, 1893.

DATE, 1893-94.	Shelled corn, eaten.	Roughness eaten.	Steer 1.		Steer 2		Steer 3		Steer 4.		Steer 5.		Steer 6.		Total		Average.	
			Wt	Gain.	Wt.	Gain	Wt	Gain.	Wt.	Gain	Wt.	Gain	Wt.	Gain	Wt.	Gain	Wt	Gain.
May 25			807		703		835		831		746		760		4682		780	
October 7			974	167	813	110	978	143	941	110	901	155	860	100	5467	785	911	131
November 1			927	-47	777	-36	948	-30	930	-11	863	-38	895	35	5340	-127	890	-21
Total gain				120		74		113		99		117		135		658		110
Average daily gain				.75		46		71		62		73		84		4 11		68
Wintering in yard- November 1, 1893 to May 1, 1894.																		
November 1			927		777		948		930		863		895		5340		890	
December 1	1152	4364	939	12	842	65	1003	55	937	7	925	62	901	6	5547	207	924	34
Janurary 1	1476	4469	999	60	884	42	1032	29	1008	71	990	65	952	51	5865	318	977	53
February 1	1904	3511	1052	53	930	46	1125	93	1035	27	1021	31	1005	53	6168	303	1028	51
March 1	1747	2592	1078	26	980	50	1180	55	1089	54	1036	15	1040	35	6403	235	1067	39
April 1	1934	2822	1120	42	1004	24	1215	35	1125	36	1065	29	1069	29	6598	195	1099	32
May 1	1872	2506	1145	25	1043	39	1253	38	1107	-18	1109	44	1039	-30	6696	98	1116	17
Totals	10085	20264		218		266		305		177		246		144		1356		226
Daily average	55.65	111 95		1.20		1 47		1 68		98		1 36		80		7 49		1 24

Second season on pasture—May 1 to November 1, 1894.

DATE 1893-94.	Shelled corn eaten	Rough-ness eaten	Steer 1.		Steer 2		Steer 3		Steer 4.		Steer 5.		Steer 6		Total		Average	
			Wt	Gain	Wt	Gain	Wt	Gain	Wt	Gain	Wt	Gain	Wt	Gain	Wt	Gain	Wt	Gain.
May 1			1145		1043		1253		1107		1109		1039		6696		1116	
May 5	92	Pasture																
October 29			1233	88	1125	82	1295	42	1232	125	1193	84	1120	81	7198	502	1199	83
November 1	*54	345	1210	-23	1119	-6	1281	-14	1234	2	1191	-2	1120	0	7155	-43	1192	-7
Totals	146	345		65		76		28		127		82		81		459		76
Average daily gain.				35		41		15		69		45		44		2 49		41

*Ground wheat.

Summary of feed and gains.

Totals	10231	20609		403		416		446		403		445		360		2473		412
Average daily gain (525 days)				767		792		849		.767		.847		685		4 710		.784

TABLE II. CONTINUED.—SHOWING MONTHLY WEIGHTS, GAINS, AND FEED EATEN IN POUNDS FROM MAY 25, 1893, TO NOVEMBER 1, 1894.

LOT II.—SCRUBS.

First Season on pasture —May 25 to November 1, '93.

DATE 1893-94	Shelled corn eaten.	Roughness Eaten.	Steer 11		Steer 12		Steer 13		Steer 14.		Steer 16		Steer 20.		Total		Average.	
			Wt.	Gain	Wt	Gain	Wt	Gain	Wt	Gain.	Wt	Gain	Wt.	Gain	Wt.	Gain	Wt.	Gain.
May 25			373		434		513		355		402		355		2432		405	
October 7			521	148	590	156	686	173	521	166	579	177	545	190	3442	1010	573	168
November 1			538	17	606	16	680	-6	534	13	600	21	550	5	3508	66	584	11
Total gain				165		172		167		179		198		195		1076		179
Average daily gain				1 03		1 08		1 04		1 11		1 25		1 21		6 72		1 12

Wintering in yard—November 1, 1893, to May 1, 1894.

November 1			538		606		680		534		600		550		3508		584	
December 1	1152	3522	582	44	667	61	717	37	540	6	598	-2	561	11	3665	157	611	27
January 1	1476	3300	654	72	729	62	790	73	585	45	630	32	626	65	4014	349	669	58
February 1	1609	2503	702	48	781	52	851	61	630	45	685	55	662	36	4311	297	718	49
March 1	1521	2056	765	63	835	54	890	39	655	25	726	41	692	30	4563	252	760	42
April 1	1612	2025	808	43	870	35	943	53	663	8	755	29	717	25	4756	193	792	32
May 1	1560	1784	860	52	875	5	960	17	685	22	741	-14	697	-20	4818	62	803	11
Totals	8930	15190		322		269		280		151		141		147		1310		219
Daily Average	49 53	83 92		1 78		1 49		1 55		83		78		.81		7 24		1.21

Second season on pasture —May 1, to November 1, 1894

DATE. 1893-94.	Shelled corn eaten,	Rough-ness eaten.	Steer 11.		Steer 12.		Steer 13		Steer 14		Steer 16		Steer 20		Total		Average	
			Wt.	Gain	Wt	Gain	Wt.	Gain	Wt	Gain,	Wt.	Gain	Wt	Gain.	Wt	Gain.	Wt	Gain.
May 1			860		875		960		685		741		697		4818		803	
May 5	92	Pasture																
October 29.			955	95	1045	168	1102	142	985	274	949	208	975	278	5983	1165	997	194
November 1	*54	345	953	-2	1047	4	1071	-31	965	6	945	-4	981	6	5962	-21	993	-4
Total	146	345		93		172		111		280		204		284		1144		190
Average daily gain				51		93		60		1 52		1 11		1 54		6 21		1 03

*Ground wheat.

Summary of feed and gains.

Totals.	9076	15535		580		613		558		610		543		626		3530		588
Average daily gain (525 days)				1 104		1 167		1 062		1 161		1 034		1 192		6.723		1 120

It is of interest to note in this table the gains of the two lots during each of the three periods into which the table is divided. During the first summer on pasture the Shorthorns made an average gain of but .68 of a pound per day while the scrubs, under the same conditions, gained 1.12 pounds per day per head. During the six months of yard feeding, from November 1st to May 1st when the two lots were fed alike on corn and corn stalks, the Shorthorns gained a trifle more than the scrubs, and the figures show that they also ate a little more. From this we may infer that there was either a lack of feed on the pasture or that the Shorthorns did not "rustle" sufficiently to get all they wanted, or all they ought to have had. The next summer the difference is still more marked. They again ran together in the same pasture but owing to the dry summer of '94 it furnished even less feed than the year before, and at the close of the second season on pasture the Shorthorns show a daily gain for the summer of only .41 of a pound per head, while the scrubs show a gain of 1.03 pounds per head, which is just two and a half times as much. Here again this difference can be accounted for only on the theory that the Shorthorns lacked rustling qualities in the sense that they were not active enough in their search for food.

The table, as a whole, shows that from May 25, 1893, to November l, 1894, a total of 525 days, during which time they had spent two summers on prairie pasture without grain and in the intervening winter wintered in an open yard on corn and rough fodder, chiefly corn stalks, the usual winter feed of farmers, the Shorthorns made an average gain of 412 pounds per head while the scrubs gained 588 pounds per head.

An impartial judge must not overlook the point already noted, that the Shorthorns were brought from a richer section of the State and put on a hilly prairie pasture with scanty feed to which they were wholly unaccustomed, while the scrubs so to speak "were to the manner born"; to them there was no detrimental change in their condition. The effect of this change on the Shorthorns is especially noticeable in the fact that while they made an average daily gain of 1.63 pounds from birth until their arrival at the station the average daily gain per head during the 525 days they were kept here, previous to being put in the feed lot, was but little over .75 of a pound and there can be no doubt whatever that had they been kept on their native clover pastures and been stabled in winter, they would have made better gains and attained a much greater weight than they did under the conditions we could offer them here. In these particulars the experiment was decidely in favor of the scrubs. We call attention to these facts because they should not be lost sight of by fair minded judges of the result. It confirms, however, what is already well known, that under conditions of comparative hardship the Shorthorns are not as good rustlers as native cattle which are accustomed to shift for themselves. The former have through a long line of ancestry been bred under artificial conditions and to do their best these conditions must be maintained. The result

in this case brings the fact forcibly to the front that farmers who invest in pure-bred stock must also provide the conditions as to feed and care to which they have been accustomed through generations of breeding. If these conditions are not provided it is an inexorable law of nature that they must retrograde till they reach a level suited to their surroundings.

THE FATTENING PERIOD.

On November 1, '94, the steers were put in the feed lot for final preparation for market. The plan was to feed the two lots exactly alike as heretofore, and under the conditions that steers are usually fed by farmers. The two lots were put in adjoining yards with open sheds for shelter. They were fed twice daily, between 7:00 and 8:00 in the morning and between 5:00 and 6:00 in the evening, and they had access to water at all times. Salt was likewise kept within their reach constantly. The steers could, of course, not be fed individually, but records were made weekly of their individual weights and gains. This record is given in table III. which follows. It not only shows the usual fluctuation in weights, to which all cattle are subject, but it shows also that this flutcuation was much greater in the Shorthorns than in the scrubs. During the first seven weeks all made good gains and the Shorthorns in particular, but from that time on the fluctuation in their weekly gains is at times very great in individual steers. Thus steer No. 3 shows a gain of 59 lbs. on Jan. 10th, and a loss of 98 lbs. on Jan. 17th, and steer No. 4 shows a loss on February 7th of 60 pounds from the previous week's weight, but the week following he shows a gain of 95 pounds. That particular steer did, in fact, not do well from December 13th to February 7th, during which period he lost a total of 125 pounds. Several others show more or less loss during the same period, particularly No. 6 and No. 3 among the Shorthorns and No. 12 among the scrubs, and none of them made good gains during that period. This is attributed to the fact that wheat was their exclusive grain feed up to January 19th; we then had to add some corn meal to the wheat to improve their gains. The initial weights are the averages of four weights on four successive days.

TABLE III.

LOT I.—SHORTHORNS.

Weekly account of weight and gain in pounds.

DATE. 1894-95.	Steer 1.		Steer 2.		Steer 3.		Steer 4.		Steer 5.		Steer 6.		Total		Av'ge.	
	Wt	Gn	Wt	Gn	Wt	Gn	Wt	Gn	Wt	Gn	Wt	Gn	Wt	Gn	Wt	Gn
November 1	1210	....	1119	....	1281	....	1234	....	1191	....	1120	...	7155	....	1192	..
November 8.	1245	35	1176	57	1340	59	1304	70	1250	59	1174	54	7489	334	1248	56
November 15	1263	18	1183	7	1371	31	1331	27	1268	18	1195	21	7611	122	1268	20
November 22	1315	52	1211	28	1366	-5	1331	0	1255	-13	1205	10	7683	72	1280	12
November 29	1313	-2	1203	-8	1374	8	1345	14	1275	20	1233	28	7743	60	1290	10
December 6	1323	10	1259	56	1400	26	1382	37	1290	15	1250	17	7904	161	1317	27
December 13	1363	40	1252	-7	1450	50	1420	38	1307	17	1305	55	8097	193	1349	32
December 20	1325	-38	1296	38	1474	24	1406	-14	1348	41	1310	5	8153	56	1359	10
December 27.	1365	40	1292	2	1436	-38	1406	0	1335	-13	1300	-10	8134	-19	1356	-3
January 3	1412	47	1364	72	1448	12	1383	-23	1364	29	1310	10	8281	147	1380	24
January 10	1418	6	1313	-51	1507	59	1365	-18	1380	16	1280	-30	8263	-18	1377	-3
January 17	1437	19	1332	19	1409	-98	1295	-70	1390	10	1225	-55	8088	-175	1348	-29
January 24.	1457	20	1340	8	1435	26	1340	45	1378	-12	1272	47	8222	134	1370	22
January 31	1480	23	1318	-22	1470	35	1355	15	1402	24	1304	32	8329	107	1388	18
February 7	1490	10	1290	-28	1500	30	1295	-60	1372	-30	1331	27	8278	-51	1380	-8
February 14	1525	35	1305	15	1502	2	1390	95	1435	63	1345	14	8502	224	1417	37
February 21	1557	32	1340	35	1535	33	1405	15	1443	8	1317	-28	8597	95	1433	16
February 28	1525	-32	1349	9	1515	-20	1460	55	1459	16	1310	-7	8618	21	1436	3
March 7	1565	40	1380	31	1547	32	1478	18	1457	-2	1355	45	8782	164	1463	27
March 14	1555	-10	1365	-15	1555	8	1448	-30	1465	8	1342	-13	8730	-52	1455	-8
March 21	1585	30	1400	35	1547	-8	1470	22	1470	5	1357	15	8829	99	1471	16
March 28	1580	-5	1445	45	1540	-7	1490	20	1520	50	1360	3	8935	106	1489	18
April 4	1535	-45	1439	-6	1576	36	1535	45	1470	-50	1390	30	8945	10	1491	2
April 11	1571	36	1471	32	1618	42	1525	-10	1520	50	1401	11	9106	161	1517	26
Total	....	361	...	352	....	337	...	291	...	329	...	281	....	1951	....	325
Average daily gain	...	2 24	....	2 18		2 09	....	1.80	....	2.04	....	1.74	...	12.11	....	2.01

Total gain of lot, 1951 pounds.

Average daily gain 12.11 pounds.
Average daily gain per head 2.018 pounds.

TABLE III CONTINUED.

LOT II.—SCRUBS.

Weekly account of weight and gain in pounds.

DATE. 1894-95.	Steer 11		Steer 12		Steer 13		Steer 14		Steer 16		Steer 20		Total		Av'ge	
	Wt.	G'n	Wt	G'n	Wt.	G'n	Wt.	Gn	Wt.	G'n	Wt.	G'n	Wt.	G'n	Wt.	G'n
November 1	953	....	1047	....	1071	...	965	....	945	....	981	....	5962	...	993	....
November 8	955	2	1074	27	1140	69	980	15	960	15	996	15	6105	143	1017	24
November 15	965	10	1100	26	1145	5	1016	36	952	-8	1012	16	6190	85	1031	14
November 22	995	30	1129	29	1204	59	1036	20	980	28	1040	28	6384	194	1064	33
November 29	1012	17	1135	6	1222	18	1063	27	1015	35	1090	50	6537	153	1089	25
December 6	1008	-4	1166	31	1225	3	1063	0	1037	22	1096	6	6595	58	1099	10
December 13	1010	2	1207	41	1210	-15	1107	44	1068	31	1145	49	6747	152	1124	25
December 20	1028	18	1207	0	1248	38	1080	-27	1090	22	1155	10	6808	61	1134	10
December 27	1023	-5	1190	-17	1262	14	1105	25	1037	-53	1172	17	6789	-19	1131	-3
January 3	1075	52	1200	10	1295	33	1140	35	1089	52	1180	8	6979	190	1163	32
January 10	1068	-7	1204	4	1302	7	1130	-10	1104	15	1179	-1	6987	8	1165	1
January 17	1073	5	1205	1	1307	5	1150	20	1132	28	1185	6	7052	65	1175	11
January 24	1075	2	1208	3	1336	29	1165	15	1151	19	1198	13	7133	81	1188	13
January 31	1080	5	1229	21	1342	6	1187	22	1140	-11	1198	0	7176	43	1196	8
February 7	1088	8	1232	3	1322	-20	1175	-12	1200	60	1200	2	7217	41	1203	7
February 14	1100	12	1259	27	1325	3	1220	45	1152	-48	1250	50	7306	89	1218	15
February 21	1086	-14	1250	-9	1335	10	1240	20	1165	13	1261	11	7337	31	1223	5
February 28	1100	14	1273	23	1395	60	1227	-13	1190	25	1274	13	7459	122	1243	20
March 7	1105	5	1311	38	1385	-10	1265	38	1203	13	1287	13	7556	97	1259	16
March 14	1118	13	1293	-18	1396	11	1280	15	1220	17	1235	-52	7542	-14	1257	-2
March 21	1125	7	1298	5	1390	-6	1290	10	1241	21	1254	19	7598	56	1266	9
March 28	1130	5	1325	27	1400	10	1275	-15	1201	-40	1241	-13	7572	-26	1262	-4
April 4	1107	-23	1337	12	1423	23	1315	40	1241	40	1242	1	7665	93	1277	15
April 11	1127	20	1331	-6	1401	-22	1296	-19	1228	-13	1253	11	7636	29	1272	-5
Total gain	....	174	....	284	....	330	....	331	....	283	....	272	....	1674	....	279
Average daily gain	....	1.08	....	1.76	...	2.04	....	2 05	....	1 75	....	1 68	...	10.39	....	1.73

Total gain of lot 1674 pounds.

Average daily gain 10.39 pounds.

Average daily gain per head 1.731 pounds.

FEED AND COST OF GAIN.

Table IV shows the feed consumed by each lot weekly and the kind and cost of that feed together with the cost of the gain. The original plan was to fatten them on wheat exclusively with cut corn stalks for roughness: but although they made excellent gains on the wheat the first few weeks, by the end of December it became apparent that an exclusive wheat diet was not desirable. The plan was persisted in however until the 19th of January when a little corn meal was added to the ration. The next week the corn meal was increased to one-fourth of the total grain ration, and this ratio was maintained until the 21st of March when, for one week, the feed consisted of equal parts of wheat and corn meal. On March 28th the wheat was reduced to one-fourth of the entire feed and the remaining three-fourths were corn meal and cotton seed meal, the cotton seed meal amounting to one pound per head per day, and the last week of the period, from April 4th to 11th, the wheat was entirely withdrawn and the feed consisted of corn meal and two pounds of cotton seed meal daily per head. The wheat was ground moderately fine, as was also the corn meal, and all the feed was fed dry. While the ratios of wheat, corn meal and cotton seed meal was maintained for both lots alike the two lots of steers did not eat the same amount, as is shown by table IV. Care was taken to give each lot what they would eat up clean and no more. The amount fed daily was thus guaged by their appetites.

The corn fodder was run through a cutter and cut in inch lengths, chiefly with a view to avoid waste. It was not a first-class article. It was withered by the drought before it produced any ears, and in this half-dry condition it was cut and shocked. The stalks, consequently, were not large and woody as when the corn is matured, but the steers, nevertheless, did not eat them up clean. They picked out the leaves and top portions of the stalks and left the bits of butt.

The cost given for these feeds in table IV is their cost laid down at the station. The corn fodder cost as much as a first-class quality of hay in ordinary seasons. The footings of the table show the amount and cost of each feed eaten by each lot for the entire feeding period of 161 days. This table also shows the gain made from the 1st of November to each succeeding weigh day.

TABLE IV.

LOT I.—SHORTHORNS.

Weekly account of feed and cost of gain.

DATE 1894-95.	Ground Wheat		Corn Meal		Cotton Seed Meal		Cut Corn Fodder		Gain of lot from November 1st, lbs	Av daily gain of lot from Nov 1, lbs	Av. daily gain per head f'm Nov. 1, lbs.	Cost Per lb of gain from Nov. 1, cts.
	Wt. lbs.	Cost 84¼ per cwt	Wt. lbs.	Cost $5¼ c per cwt	Wt. lbs.	Cost $5 per cwt	Wt. lbs.	Cost 28 cts per cwt.				
November 1	.....	.....	.....	.....	....	....	...	.....	....	.....	....	....
November 8	408	$ 3.437	.....	.....	....	.....	938	$2.626	334	47.71	7.95	1.81
November 15	480	4.044	.....	.....	....	.....	825	2.310	456	32.57	5.42	2.72
November 22	552	4.650	.....	.....	....	.....	801	2.242	528	25.14	4.19	3 65
November 29	600	5.055	.....	.....	....	.....	641	1.794	588	21.00	3.50	4.44
December 6	648	5.459	.....	.....	....	.....	731	2.046	749	21.40	3.56	4.49
December 13	720	6.066	.....	.....	....	.....	646	1.808	942	22.42	3.73	4.40
December 20	756	6.369	.....	.....	....	.....	620	1.736	998	20.36	3.39	4.97
December 27	798	6.723	.....	.....	....	.....	515	1.442	979	17.48	2.91	5.90
January 3	785	6.613	.....	.....	....	.....	317	.887	1126	17.87	2.97	5.79
January 10	629	5.299	.....	.....	...	...	271	.758	1108	15.82	2.63	6.44
January 17	613	5.164	.....	.....	....	.....	227	.635	933	12.11	2.01	8.27
January 24	552	4.650	96	$.818	....	.....	240	.672	1067	12.70	2.11	7.80
January 31	531	4.473	131	1.133	....	.....	276	.772	1174	12.90	2.15	7 63
February 7	555	4.675	138	1.176	....	.....	250	.700	1123	11.45	1 90	8.56
February 14	555	4.675	138	1.176	....	.....	335	.938	1347	12.82	2.13	7.64
February 21	548	4.616	137	1.167	....	.....	344	.963	1442	12.87	2.14	7.61
February 28	555	4.675	138	1.176	....	.....	414	1.159	1463	12.29	2.04	7.98
March 7	556	4.684	139	1.184	....	.....	528	1.478	1627	12.91	2.15	7.62
March 14	560	4.718	140	1.193	....	.....	629	1.761	1575	11.84	1.97	8.36
March 21	560	4.718	140	1.193	....	...	597	1.671	1674	11.95	1.99	8.32
March 28	350	2.948	350	2.983	....	.....	633	1.772	1780	12 10	2.01	8.26
April 4	142	1.196	510	4.347	48	$.408	656	1.836	1790	11.62	1.93	8.65
April 11	...	.....	528	4.501	84	.714	661	1.850	1951	12.11	2.01	8 30
Totals	12453	$104.907	2587	22.047	132	1.122	12095	$33.856	....	....	....	....

Grain eaten 15172.

Total food eaten 27267 pounds.

Average gain per head 325.16 pounds.

Average daily gain per head 2.018 pounds.

Total cost of feed $161.932

Grain eaten per pound of gain 7.77 pounds.

Corn fodder eaten 12095 pounds.

Total gain, 161 days, 1951 pounds.

Average daily gain of lot 12.11 pounds.

Average cost per pound of gain 8.30 cents.

Average cost of feed per head $26.988.

Corn fodder eaten per pound of gain 6.20 lbs

Total food eaten per pound of gain 13.97.

TABLE IV —CONTINUED.

LOT II.—SCRUBS.

Weekly account of feed and cost of gain.

DATE 1894-95.	Ground Wheat		Corn Meal		Cotton Seed Meal		Cut Corn Fodder		Gain of lot from November 1st, lbs	Av daily gain of lot from Nov 1, lbs.	Av daily gain per head from Nov. 1, lbs.	Cost Per lb of gain from Nov 1, cts
	Wt. lbs.	Cost 84¼ per cwt	Wt. lbs.	Cost 85¼ c per cwt	Wt. lbs.	Cost $5 per cwt	Wt. lbs.	Cost 28 cts per cwt.				
November 1												
November 8	408	$ 3.437					648	$1.814	143	20.42	3.40	3.67
November 15	480	4.044					615	1.722	228	16.28	2.71	4.83
November 22	552	4.650					486	1.360	422	20.09	3.34	4 03
November 29	586	4.937					330	.924	575	20.53	3.42	3.98
December 6	630	5.307					300	.840	633	18.08	3.01	4.58
December 13	642	5.408					271	758	785	18.69	3.11	4.48
December 20	664	5.594					260	.728	846	17.26	2.87	4.90
December 27	672	5.661					225	.630	827	14.76	2.46	5.78
January 3	714	6.015					190	.532	1017	16.14	2.69	5.34
January 10	687	5.787					169	.473	1025	14.64	2.44	5 91
January 17	661	5.568					171	.478	1090	14 15	2.35	6.11
January 24	576	4.852	96	$.818			164	.459	1171	13.94	2.32	6.21
January 31	543	4 574	135	1.150			221	.618	1214	13.34	2 22	6 51
February 7	555	4.675	138	1.176			256	.716	1255	12.80	2 13	6.82
February 14	504	4.246	126	1 074			207	.579	1344	12.80	2.13	6.81
February 21	555	4.675	138	1.176			219	.613	1375	12.27	2.04	7.13
February 28	555	4.675	138	1.176			282	.789	1497	12.57	2.09	6.99
March 7	556	4.684	139	1.184			353	.988	1594	12.65	2.10	6.99
March 14	518	4.364	130	1 108			269	753	1580	11.87	1.97	7.45
March 21	494	4.161	123	1.048			212	593	1636	11.68	1.94	7.55
March 28	329	2.771	329	2.804			195	.546	1610	10 95	1.82	8.05
April 4	133	1.120	477	4.066	48	$ 408	204	.571	1703	11.05	1.84	7.97
April 11			547	4.663	84	.714	345	.966	1674	10 39	1.73	8 49
Totals	12014	$101.205	2516	21.448	132	1.122	6592	$18.45				

Grain eaten 14662 pounds.
Total food eaten 21234 pounds.
Average gain per head 279.00 pounds.
Average daily gain per head 1.731 pounds.
Total cost of feed $142.225
Grain eaten per pound of gain 8.76 pounds.
Corn fodder eaten 6592 pounds.
Total gain, 161 days, 1674 pounds.
Average daily gain of lot 10.39 pounds.
Average cost per pound of gain 8.49 cents.
Average cost of feed per head $23.704.
Corn fodder eaten per pound of gsin 3.93lbs.

Total food eaten per pound of gain 12.69.

The writer calls special attention to the two last columns of this table which shows the average daily gain per head from November 1st and the cost of this gain. The last item is especially interesting. We see here an almost regular increase in the cost of the gain as the steer matures. In the case of the Shorthorns the cost per pound of gain in the early part of the feeding period was remarkably low and the gain was very rapid. By the end of the third week this lot had gained 528 pounds, or a daily average of 4.19 pounds per head at the cost of 3.65 cents per pound. By the close of the seventh week the cost had risen to nearly 5 cents per pound of gain. By the end of the tenth week it was nearly six and a half cents per pound of gain, and from that time until the close of the feeding period the cost oscillates between seven and two-thirds and eight and two-thirds cents per pound of gain, and at the close, the 1,951 pounds gained by that lot had cost eight and three-tenths cents per pound.

The scrubs present an equally interesting study in this respect. While their gain was not so great it was more steady and the cost of the gain is rather higher at the beginning and finishes up at the close of the period with a trifle higher cost per pound of gain than the Shorthorns. The difference, however, is only .19 of a cent per pound. At the close of the sixth week the cost per pound of gain is nearly the same for both lots, that of the scrubs being a trifle higher, but from that time on until April 4th the scrubs made a cheaper gain per pound. The concluding week, however, placed the Shorthorns again a little ahead, as already noted.

The data are of interest beyond the present case in as much as they illustrate a principle in feeding which holds true under all circumstances and under all methods of handling cattle and with all kinds of feed, namely, that it takes more and more feed to produce a pound of gain as the steer matures and consequently the cost of the gain will continue to increase gradually, subject, however, to slight fluctuations, until the close of the feeding period. The summaries for each lot given in table IV are self-explanatory. They give the whole subject of the feeding and its results in a nut-shell and furnish interesting data for comparison between the two lots. It is to be noted that the scrubs ate 8.76 pounds grain for each pound of gain, while the Shorthorns made a pound of gain on 7.77 pounds grain. On the other hand the Shorthorns ate 6.20 pounds fodder per pound of gain against 3.93 pounds eaten by the scrubs.

TABLE V

Showing the number of pounds grain and fodder eaten for each pound of gain at dates given.

DATE.	Lot I.—Shorthorns.		Lot II.—Scrubs.	
	Lbs. Grain Eaten per lb. of Gain.	Lbs. Fodder Eaten p.lb of G'n	Lbs Grain Eaten per lb. of Gain.	Los. Fodder Eaten p.lb.of G'n
November 8	1.22	2.79	2.85	4.53
November 15	1.93	3.86	3.89	5.54
November 22	2.72	4.86	3.41	4.14
November 29	3.47	5.45	3.52	3.61
December 6	3.59	5.25	1.19	3.75
December 13	3.62	4.86	4.20	3.37
December 20	4.17	5.21	4.68	3.43
December 27	5.07	5.84	5.60	3.79
January 3	5.10	5.36	5.25	3.26
January 10	5.75	5.69	5.88	3.40
January 17	7 49	7.00	6.14	3.36
January 24	7.16	6.35	6.29	3.26
January 31	7.01	6.00	6.62	3.33
February 7	8.00	6.50	6.96	3.43
February 14	7.16	5.66	6.97	3.35
February 21	7 18	5.53	7.31	3.44
February 28	7.56	5.73	7.18	3.34
March 7	7.22	5.48	7.18	3.36
March 14	7.91	6.06	7.65	3.56
March 21	7.86	6.06	7.77	3.57
March 28	7.78	6.05	8.30	3.75
April 4	8.13	6.33	8.23	3.66
April 11	7 77	6.20	8.76	3.93

Table V. has been worked out with a view to show the increase in the amount of feed required to make a pound of gain as the feeding progresses. It is an interesting and instructive table, especially when taken in connection with the cost of the gain shown in the last column of table IV. The table shows remarkable regularity in the case of lot II. There is an almost regular increase in the amount of grain required for each pound of gain from week to week through the entire period. The fodder, on the other hand, remains practically constant. They ate the most fodder per pound of gain at the start, but after the first three weeks the relation of fodder consumed to gain remained stationary. This is not the case with the Shorthorns. They ate the least fodder at the outset and gradually increased the consumption until the close of

the fattening period. With the exception of that period in January and the beginning of February, during which their progress was changed to retrogression, and they, therefore, show a greater consumption for the gain made, the increase of fodder eaten is fairly regular from the beginning. The same is true of their increase in the consumption of grain. The interruption in January, in like manner, shows a marked increase in the grain eaten per pound of gain. The disturbance to the even progress of this lot in January can be traced to two possible causes and probably both have a bearing on the case. In the first place they began to scour violently, which was attributed to the continuous wheat diet. This affection caused them to get off their feed and resulted in severe losses in weight. In the second place some cold storms occurred in the latter part of January from which they apparently suffered more than the scrubs and which doubtless aided in preventing their rapid return to good appetite and normal gains. This is not necessarily proof that they were tenderer than the scrubs or more susceptible to the influence of climatic changes, and yet the evidence points in that direction. Taken in connection with the cost of the gain the table emphasizes the fact that steers can readily be kept too long before they are turned off, thereby increasing the cost beyond profitable limits. Just when to market cannot be shown by experiment. It is a matter to be gauged by the value of fat steers and the cost of feed, as well as the condition of the steers. These steers would have sold better had they been marketed four weeks earlier. The gains they made during the last month did not compensate for the cost of the feed during that time. This is especially true in the case of the scrubs which gained more slowly than the Shorthorns. Moreover, the market price ranged higher at that time so it seems probable that they would have realized as much then as when they were finally sold, even though their condition was not quite as good, and the feed eaten during the last month might have been saved.

SALE OF THE STEERS.

The two lots were shipped to Kansas City Stock Yards on the evening of April 12th and sold to Swift and Company the following day. The last weight recorded is the average of three weighings on three successive days. The steers did not realize all that we expected they would bring. The Shorthorns not only averaged 245 pounds per head more than the scrubs but owing to their better beef form they made a decidedly better appearance. At the last weighing at the station the Shorthorns averaged 1517 pounds per head and the scrubs averaged 1272 pounds per head. In spite of these differences the buyer was inclined to put the same price on all. As the result of his final judgment he picked the three heaviest Shorthorns, Nos. 1, 3 and 5, and judged them to be worth $5.65 per hundred. The remaining three Shorthorns and all of the scrubs were sold at $4.65 per hundred. In the judgment of the writer this price did not do justice to either lot. Two of the scrubs, Nos. 12 and 13, were particularly

good and it will be seen from the block test which follows that No. 13 ranked with the best Shorthorns in price of the cuts, but we had to accept his decision, however, as it was the best that could be done under the circumstances. The financial results of the sale will be given later on.

SLAUGHTER TEST.

The Station is under great obligation to Swift and Company, which is hereby acknowledged, for the trouble and expense they went to in undertaking slaughter and block tests of these steers and our thanks are particularly due to Superintendent Young, and to Mr. Hovey, superintendent of the dressed beef department, for their interest in the matter and personal supervision of the slaughtering, weighing and pricing of the meat. Owing to the kindness of the firm in this matter we are able to present the following interesting tables of the slaughter and block tests of the two lots.

Table VI. gives the detailed slaughter weights of each steer in the two lots. The numbers heading the columns are the Experiment Station numbers of the steers. The weights are given in pounds unless otherwise noted. The table is self-explanatory. Special attention is, however, called to the last column of each lot headed "Per cent of Live Weight." It shows the average per cent which each of the organs or parts of the body named constitute of the live weight of the lot. By comparing the two lots it will be seen that the scrubs fall two per cent below the Shorthorns in the per cent of dressed carcass while they are a little above the Shorthorns in the per cent of the offal and less useful parts. It should be explained, however, that steer No. 6 in the Shorthorn lot is omitted from the calculation, and the percentage based upon the five remaining steers in that lot. No. 6 had met with an accident, or been otherwise injured, whereby the bladder had burst and the water was retained in the body. This probably occurred during shipment. On slaughtering a large quantity of water was set free which, of course, raised his live weight much higher than it would have been under normal conditions, and he is therefore omitted in the calculation, as stated.

TABLE VI.

LOT I.—DETAIL SLAUGHTER WEIGHTS.

Experiment Station Number	2	6	4	3	5	1	Average Percent of Live Weight
Weight just before slaughter	1340	1490	1460	1480	1410	1500	
Detail weights from slaughter:							
Blood	41	21	48	40	39	38	2.8
Head (tongue out)	31½	28	33	34½	32	32	2.2
Hide	79	73	80	88	72	76	5.4
Tail	2	2	2½	2	1½	2	.1
Rough trimmings	5	22	5	4	4	5½	.3
Tongue and gullet	9½	9	11	11½	10	7	.6
Pluck	40	45	46	41	37	47	2.9
Legs	24	21	25	24	22	23	1.6
Throat sweet bread (gland)	2 oz	9 oz	6 oz	7 oz	6 oz	5 oz	.02
Entrals (full)	225	227	237	214	255	237	16.2
Beef, green weight	818	755	873	945	898	940	62.2
Dead cold weight (66 hours old)	807	745	860	934	886	927	61.3
Percent dressed weight (green)	61		59	63	63	62	
Detail fat weights:							
Caul (leaf)	39	26	24	33	29	36	2.2
Ruffle (gut)	18	13	24	20	27	24	1.5
Chip (gut)	13	10	9	11	16	18	.9
Taimmings (fat)	1	1	1	1	2	2	.09
Paunch, peck, reed (empty)	7	7	11	6	10	11	.6

Under pluck is included the following:

Heart, liver and gall, spleen, esophagus, lungs and windpipe, aorta, veins and auricles.

Entrails include:

Paunch, peck, reed and guts.

TABLE VII.

LOT I.—SHORTHORNS.—BLOCK TEST.

Name of Cuts.	Steer 1.				Steer 2.				Steer 3.				Steer 4.				Steer 5.				Steer 6				Total of the 5.65 bunch, Steers 1,3,5			Total of the 4.65 bunch, Steers 2,4,6			Total of Lot.		
	Weight Pounds.	Price Cents..	Amount.	Percent of dres'd weight..	Weight Pounds	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Amount.	Percent of dres'd weight..	Weight Pounds.	Amount.	Percent of dres'd weight..	Weight Pounds.	Amount.	Percent of dres'd weight..
Loins	151	18	$27.18	16.3	131	17	$22.27	16.3	149	18	$26.82	16.0	145	17	$24.65	16.9	152	18	$27.36	17.2	125	17	$21.25	16 9	452	$ 81.36	16.5	401	$ 68.17	16.7	853	$149.53	16.6
Ribs	91	16	14.56	9.8	73	15	10.95	9.1	87	16	13.92	9.4	81	15	12.15	9.4	87	16	13 92	9.8	73	15	10.95	9.9	265	42.40	9.7	227	34.05	9.5	492	76.45	9.6
Rounds	202	6¾	13.63	21.9	194	6⅝	12.85	24.1	212	6¾	14.31	22.8	197	6⅝	13.05	22.9	197	6¾	13.29	22.3	174	6⅝	11 52	23.5	611	41.23	22.3	565	37.42	23.5	1176	78.65	22.9
Suet	32	4½	1.44	3 5	18	4½	.81	2.2	20	4½	.90	2.2	30	4½	1.35	3.5	36	4½	1.62	4.1	*11	4½	.49	1.5	88	3.96	3.2	59	2.65	2.4	147	6.61	2.8
Kidneys	2	2	.04	.2	2	2	.04	.2	2	2	.04	.2	3	2	.06	.4	2	2	.04	.2	†1	2	.02	.2	6	.12	.2	6	.12	.3	12	.24	.2
Flanks	44	3	1.32	4.8	32	3	.96	4.0	40	3	1.20	4.3	33	3	.99	3.8	37	3	1.11	4.2	37	3	1.11	5.0	121	3.63	4.4	102	3.06	4.3	223	6.69	4.3
Chucks	191	6½	12.41	20.7	170	6½	11 05	21 1	190	6½	12.35	20.5	170	6½	11.05	19.8	182	6½	11.83	20.6	155	6½	10.07	21.0	563	36.59	20.6	495	32.17	20.6	1058	68.76	20.6
Plates	128	3¾	4.80	13.9	107	3	3.21	13.3	141	3¾	5.29	15.2	112	3	3.36	13.0	112	3¾	4 20	12.7	92	3	2.76	12.4	381	14.29	13.9	311	9.33	12.9	692	23.62	13.5
Shanks	55	2	1.10	5.9	51	2	1.02	6.4	55	2	1.10	5.9	55	2	1.10	6.4	51	2	1.02	5.8	46	2	.92	6.2	161	3.22	5.9	152	3.04	6.3	313	6.26	6.1
Neck	15	1⅞	.28	1.6	16	1⅞	30	2.0	20	1⅞	37	2.2	21	1⅞	.39	2.4	18	1⅞	.33	2.0	17	1⅞	.31	2 3	53	.98	1.9	54	1.00	2.2	107	1.98	2.1
Two clods	6	5½	.33	.6	5	5½	.27	.6	6	5½	.33	.6	6	5½	.33	.7	3	5½	.16	.3	3	5½	.16	.4	15	.82	.6	14	.76	.6	29	1.58	.6
1 hangi'g tenderloin	3	2¾	.08	.3	3	2¾	.08	.4	2	2¾	05	.2	3½	2¾	.09	.4	3	2¾	.08	.3	2	2¾	.05	.3	8	.21	.3	8½	.22	.4	16½	.43	.3
Two skirts	4	2½	.09	.5	2	2½	.05	.3	5	2½	.12	.5	3	2½	.07	.4	4	2½	.10	.5	3	2½	.07	.4	13	.31	.5	8	.19	.3	21	.50	.4
Total	924	....	$77.26	100.00	804	....	$63.86	100.00	929	....	$76.80	100.00	859½	....	$68.64	100.00	884	....	$75.06	100.00	739	...	$59.68	100.00	2737	$229.12	100 0	2402½	$192.18	100.00	5139½	$421.30	100.00
Average per cwt...	$8.36				$7.94				$8 26				$7.98				$8 49				$8.07				$8.37			$7.99			$8.19		

*Part thrown away with kidney.

†Only one.

TABLE VII.—CONTINUED.

LOT II.—SCRUBS.—BLOCK TEST.

Name of Cuts.	Steer 11.				Steer 12.				Steer 13.				Steer 14.				Steer 16.				Steer 20.				Total of Lot.		
	Weight Pounds.	Price Cents....	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Price Cents...	Amount.	Percent of dres'd weight..	Weight Pounds.	Amount.	Percent of dres'd weight..
Loins	111½	14	$15.61	17.4	127	17	$21.59	16.8	140	18	$25.20	16.8	123	17	$20.91	16 6	119	14	$16.66	17.9	120	15½	$18 60	16.7	740½	$118.57	17.0
Ribs	63	13	8.19	9.9	74	15	11.10	9.8	88	16	14.08	10.5	74	15	11.10	10.0	69	13	8.97	10 4	71	14	9.94	9.9	439	63.38	10.1
Rounds	146	6½	9.49	22.8	166	6⅝	10.99	21.9	184	6¾	12.42	22.1	174	6⅝	11.52	23.5	143	6½	9.29	21.6	162	6⅝	10.73	22.5	975	64 44	22.4
Suet	16	4½	.72	2.5	36	4½	1.62	4.7	27	4½	1.21	3.2	25	4½	1.12	3.4	19½	4½	.87	2.9	19	4½	.85	2.6	142½	6.39	3.2
Kidneys	1½	2	.03	.2	2	2	.04	.3	1½	2	.03	.2	3	2	.06	.4	1½	2	.03	.2	1½	2	.03	.2	11	.22	.3
Flanks	24½	3	.73	3.8	29	3	.87	3 8	38	3	1.14	4.6	26	3	.78	3.5	25	3	.75	3.8	27	3	.81	3.7	169½	5.08	3.9
Chucks	129	6	7.74	20.2	150	6½	9.75	19 8	175	6½	11.37	21.0	154	6½	10.01	20.8	139½	6	8 37	21 0	156	6½	10.14	21.7	903½	57.38	20.8
Plates	82	3	2.46	12.8	100	3	3.00	13.2	110	3¾	4.12	13.2	87	3	2.61	11.8	84	3	2.52	12.7	94	3	2.82	13 1	557	17.53	12.8
Shanks	39	2	.78	6.1	45	2	.90	5.9	44	2	.88	5.3	46	2	.92	6.2	39	2	.78	5.9	41	2	.82	5.7	254	5.08	5,8
Neck	17	1⅞	.31	2.7	18	1⅞	.33	2.4	17	1⅛	.19	2.0	19½	1⅞	.36	2.7	14	1⅞	.26	2.1	18	1⅞	.33	2.5	103½	1.78	2.4
Two clods	5	5½	.27	.8	5½	5½	.30	.7	4	5½	.22	.5	2	5½	.11	.3	3½	5½	.19	.5	4	5½	.22	.6	24	1.31	.6
1 hangi'g tenderloin	2	2¾	.05	.3	2½	2¾	.06	.3	2	2¾	.05	.2	3	2¾	.08	.4	3	2¾	.08	.5	2	2¾	.05	.3	14½	.37	.3
Two skirts	3	2½	.07	.5	3	2½	.07	.4	3½	2½	.08	.4	3	2½	.07	.4	3½	2½	.08	.5	3½	2½	.08	5	19½	.45	.4
Total	639½	.....	$46.45	100.00	758	.....	$60.62	100.00	834	.....	$70.99	100 00	739½	.....	$59.65	100.00	663½	.....	$48.85	100.00	719	....	$55.42	100.00	4353½	$341.98	100.00
Average per cwt...	$7.26				$7 99				$8.51				$8.06				$7.35				$7.70				$7.85		

TABLE VI.—CONTINUED.

LOT II.—DETAIL SLAUGHTER WEIGHTS.

Experiment Station Number	12	11	16	13	29	14	Average Pegged of Live Weight
Weight just before slaughter	1260	1080	1140	1460	1220	1230	
Detail weights from slaughter:							
Blood	38	37	34	45	32	33	2.9
Head (tongue out)	31	28	28½	29	31½	32	2.4
Hide	78	75	73	77	92	67	6.3
Tail	3	1	2	3	2	2	.1
Rough trimmings	4	2	4	4	3	5	.3
Tongue and gullet	10½	10¼	9	10½	11	10	.8
Pluck	35	29	38	40	33	34	2.8
Legs	20	18½	18	20	21	21	1.6
Throat, sweet bread (gland)	5 oz	7 oz	5 oz	7 oz	8 oz	9 oz	.03
Entrails (full)	200	178	194	253	192	208	16.7
Beef, green weight	769	649	678	850	735	753	60.4
Dead cold weight (66 hours old)	759	640	668	839	724	742	59.6
Percent dressed weight (green)	61	60	59	60	60	61	
Detail fat weights:							
Caul (leaf)	41½	28	38	28	29	38	2.7
Ruffle (gut)	21	15	23	34	20	18	1.7
Chip (gut)	11	10	9	14	11	11	.9
Trimmings (fat)	1	1½	1	1	1	1	.08
Paunch, peck, reed (empty)	9½	5	7	10	6	6½	.6

THE BLOCK TEST

Table VII not only shows the weight of each cut of each animal but also the price placed upon the several cuts by the firm's experts. In the first column under each steer is shown weight of the cut, the second column shows the price per pound; the third shows the total value of each cut and the total value of the dressed carcass, while the fourth column shows what per cent each cut is of the whole dressed carcass. This table, it will be noticed, includes only those portions of the carcass that can be used for food. Legs, head, hide, entrails, blood and other offal, all of which have a value, are not priced in this table. Finally the table shows under the totals the united value of each particular cut of all the steers in each lot.

HOGS FOLLOWING THE STEERS.

Four shoats were put behind each lot of steers when the experiment began, November 1st. The plan was that they should pick what they could from the manure and if extra feed was needed, to feed them enough of the same kind of grain on which the steers were fed to keep them doing well. All the pigs were alike in quality and breeding, being grade Berkshires. Table VIII. shows the weights and gains at the dates named of each pig in the two lots together with the amount of feed each lot ate. The extra feed was the same in quantity and quality for both lots. During the 162 days (they were fed one day longer than the steers) each lot ate 2,876 pounds of grain in addition to what they found in the manure. From November 1st to February 28th their feed consisted of ground wheat. On that date it was changed to one half corn meal and this ratio continued until March 31st when the wheat was wholly withdrawn and the feed consisted of corn meal only. Their feed was given them as a thick slop.

It will be noticed that the pigs following the Shorthorns gained 724 pounds, against 674 pounds by the other lot. As the Shorthorns ate somewhat more grain than the scrubs, this result is what might be expected, the gain of lot I., therefore, cost a trifle less per pound than the gain of lot II. The two lots were in fine marketable condition and sold for the same price in Kansas City, viz., $4.85 per hundred, as will be shown in the account.

TABLE VIII.

LOT I.—HOGS FOLLOWING.—WEIGHTS GAINS AND FEED EATEN.

DATE. 1894-1895.	Extra Fd (wheat) eaten lbs	Pig 1.		Pig 2.		Pig 3.		Pig 4.		Total.		Av r ge	
		Wt. lbs	Gn. lbs	Wt. lbs.	Gn. lbs.	Wt. lbs	Gn. lbs.	Wt. lbs	Gn. lbs.	Wt lbs.	Gn. lbs.	Wt. lbs.	Gn. lbs
November 1	...	94	...	94	..	89	....	110	....	387	....	97	....
November 23	144	109	15	106	12	102	13	124	14	441	54	110	13
December 14	168	126	17	122	16	108	6	137	13	493	52	123	13
January 4	288	144	18	135	13	130	22	161	24	570	77	142	19
January 25	336	169	25	156	21	147	17	187	26	659	89	164	22
February 15	416	194	25	179	23	174	27	210	23	757	98	189	25
March 8	*456	216	22	203	24	190	16	241	31	850	93	212	23
March 29	652	260	44	244	41	225	35	287	46	1016	166	254	42
April 12	†416	281	21	263	19	254	19	323	36	1111	95	278	24
Totals	2876	....	187	...	169	....	155	....	213	...	724	....	181
Daily average (162 days)	17.75	....	1.154	...	1.043	..	.956	...	1.314	...	4.469	....	1.117

*Feb. 28. feed changed to one-half corn meal.

†Mar. 31, feed changed to all corn meal.

Cost per of extra feed eaten, $24.31.

Cost per pound of gain, 3.35 cents.

LOT II.—HOGS FOLLOWING.—WEIGHTS, GAINS AND FEED EATEN.

DATE. 1894-1895,	Extra Fd (wheat) eaten lbs	Pig 5.		Pig 6.		Pig 7		Pig 8		Total.		Av r ge	
		Wt. lbs.	Gn. lbs.	Wt. lbs.	Gn. lbs.	Wt- lbs	Gn. lbs	Wt. lbs.	Gn. lbs	Wt. lbs	Gn. lbs	Wt. lbs.	Gn. lbs.
November 1	.....	76	...	92	....	116	....	101	....	385	....	96	...
November 23	144	81	5	95	3	122	6	105	4	403	18	101	5
December 14	168	90	9	108	13	137	15	120	15	455	52	114	13
January 4	288	105	15	127	19	157	20	135	15	524	69	131	17
January 25	336	125	20	140	13	181	24	154	19	600	76	150	19
February 15	416	146	21	171	31	210	29	186	32	713	113	178	28
March 8.	*456	170	24	190	19	232	22	211	25	803	90	200	22
March 29	652	200	30	220	30	268	36	250	39	938	135	234	34
April 12	†416	227	27	265	45	287	19	280	30	1059	121	264	30
Totals.	2876	....	151	....	173	....	171	....	179	....	674	....	168
Daily average (162 days)	17 75	....	.932	....	1.067	....	1.055	....	1.105	....	4.160	....	1.037

*Feb. 28, feed changed to one half corn meal.

†March 31, feed changed to all corn meal.

Cost of extra eaten, $24.31.

Cost per pound of gain, 3.60 cents.

FINANCIAL DATA.

In the account which follows all items of expense in connection with the two lots are given, save the first cost of the steers. This has not been given in this account, because the two lots are not on the same basis. Forty dollars per head, as was paid for the Shorthorns, was altogether too high a price for yearling steers, and even sixteen dollars a head, which was paid for lot II., was a liberal price for their weight and quality. It may be assumed that it will cost but little more to rear one class of stock to the age they are put in the feed lot than it will the other.

Leaving the first cost out of consideration the Shorthorns show a balance in their favor of $190.45 and the scrubs a balance in their favor of $109.80. The hogs following the Shorthorns brought $24.33 above the cost of their feed, and the hogs following the scrubs $21.90 more than the cost of their feed, making a total of $214.88 for the Shorthorns and $131.70 for the scrubs.

FINANCIAL DATA.

LOT I.—DR.

To pasturing 6 heads (summer of '93) @ $2.25	$ 13 50	
To 4005 lbs. ear corn (winter of '93-94), 40 cts. per cwt	16 02	
To 6973 lbs. shelled corn (winter of '93-94), 50 cts. per cwt	34 86	
To 20264 lbs. roughness (winter of '93-94), 12½ cts per cwt	25 33	
To pasturing 6 heads (summer of '94) @ $2.25	13 50	
To 54 lbs. wheat (preliminary fall feed, '94), 84¼ cts. per cwt	45	
To 345 lbs. corn stover (preliminary fall feed, '94), 28 cts. per cwt	96	
To 12453 lbs. ground wheat, 84¼ cts. per cwt	104 90	
To 2587 lbs. corn meal, 85¼ cts. per cwt	22 04	
To 132 lbs. cotton seed meal, 85 cts. per cwt	1 12	
To 12095 lbs. cut corn stover, 28 cts. per cwt	33 85	
To 129 lbs. corn meal (preparation for shipping), 85¼ cts. per cwt	1 09	
To 60 lbs. soaked corn (preparation for shipping), 83½ cts. per cwt	50	
To 169 lbs. prarie hay (preparation for shipping), 37½ cts. per cwt	63	
To 40 lbs. sorghum hay (preparation for shipping), 20 cts. per cwt	08	
To freight and expense of sale	11 40	
Total	$280 23	

CR.

By 3 steers, 4660 lbs. (weight at Kansas City), 5.65 cents	$263 29	
By 3 steers, 4460 lbs. (weight at Kansas City), 4.65 cents	207 39	
Total	$470 68	
Balance		$190 45

HOGS FOLLOWING LOT I.—DR.

To 2042 lbs ground wheat, 84¼ cts per cwt	$ 17 20	
To 834 lbs. corn meal, 85¼ cts. per cwt	7 11	
To freight and expense of sale	2 77	
Total	$ 27 08	

CR

By 4 hogs, 1060 lbs. (weight at Kansas City), 4.85 cents	$ 51 41	
Balance		24 34
Total balance in favor of Lot I, steers and hogs		$214 88

LOT II.—DR.

To pasturing 6 head (summer of '93), $2.25	$ 13 50	
To 3909 lbs. ear corn (winter of '93-94), 40 cts. per cwt	15 63	
To 5895 lbs. shelled corn (winter of '93-94), 50 cts. per cwt	29 47	
To 15535 lbs. roughness (winter of '93-94), 12½ cts. per cwt	19 41	
To pasturing 6 head (summer of '94), $2.25	13 50	
To 54 lbs. ground wheat (preliminary fall feed, '94), 84¼ cts. per cwt	45	
To 345 lbs. corn stover (preliminary fall feed, '94), 28 cts. per cwt	96	
To 12014 lbs. ground wheat, 84¼ cts. per cwt	101 20	
To 2516 lbs. corn meal, 85¼ cts. per cwt	21 44	
To 132 lbs. cotton seed meal, 85 cts. per cwt	1 12	
To 6592 lbs. cut corn stover, 28 cts. per cwt	18 45	
To 126 lbs. corn meal (preparation for shipping), 85¼ cts. per cwt	1 07	
To 60 lbs. soaked corn (preparation for shipping), 83½ cts. per cwt	50	
To 149 lbs. prairie hay (preparation for shipping), 37½ cts. per cwt	55	
To 30 lbs. sorghum hay (preparation for shipping), 20 cts. per cwt	06	
To freight and expense of sale	11 40	
Total	$248 71	

CR.

By 6 steers, 7710 lbs. (weight at Kansas City), 4.65 cents	$358 51	
Balance		$109 80

HOGS FOLLOWING LOT II.—DR.

To 2042 lbs. ground wheat, 84¼ cts. per cwt	$17 20	
To 834 lbs. corn meal, 85¼ cts. per cwt	7 11	
To freight and expense of sale	2 77	
Total	$27 08	

CR.

By 4 hogs 1010 lbs. (weight at Kansas City), 4.85 cents	$48 98	
Balance		$21 90
Total balance in favor of Lot II, steers and hogs		$131 70

CONCLUSION.

A general survey of the experiment appears to show that although the Shorthorns are ahead they are not so far in advance of the scrubs as might perhaps have been expected. As the weights in table I. indicate the Shorthorns were good average yearlings when they arrived at the station. The scrubs, on the other hand, were small and poor. The treatment of the two lots was the same in every respect from the day they arrived until they were slaughtered. As has already been noted, the Shorthorns were under a disadvantage from the outset in that they were taken off good clover and tame-grass pasture and put on a dry hilly pasture of prairie grass. This feature, in a measure, vitiates the force of the results. It is shown in table II. that during the two summers they were on pasture they gained very much less than the scrubs on the same pasture. This must be attributed to their lack of activity in hunting for food. While the feed was short, dry and poor, especially during the second summer, the scrubs, nevertheless, found enough to gain over a pound daily per head each season while the Shorthorns gained but an average of .68 of a pound per head during the first summer and .41 of a pound during the second summer. This proves, I think, that the Shorthorns are not adapted to unfavorable conditions to the extent the scrubs are. There can not, however, be the least doubt, but that on pastures similar to those they had been reared on they would have made very much better gains, and it is equally reasonable to suppose that the scrubs too would have done still better than they did on good clover and tame grass pasture. The transfer of the Shorthorns from clover to prairie grass is a weak point in the experiment, which, however, could not be obviated. To make a perfectly fair comparison between pure bred beef breeds and scrubs they should be reared and fed together in the same place from birth to the shambles, and to make it fair to the pure-breds they should be kept under the same favorable conditions as regards feed and shelter which are furnished the breed to which they belong.

The two lots reached the fattening period in the fall of '94 in fair average condition. The Shorthorns still had the advantage of greater weight by 200 pounds. They averaged 1,192 pounds on November 1st when they were put in the feed lot, while the scrubs averaged but 993 pounds. Having greater size the Shorthorns would naturally be expected to eat more than the scrubs and so they did, but as is shown by the summaries in table IV. they made better gains for the food consumed than the scrubs did. They made a pound of gain for every 7.77 pounds of grain they ate, whereas the scrubs required 8.76 pounds of grain to make a pound of gain. The Shorthorns, on the other hand, ate over one-third more coarse fodder than the scrubs. The cost of food per pound of gain was 8.3 cents in the case of the Shorthorns and 8.49 cents in the case of the scrubs.

Incidentally the experiment shows admirably the important fact, which all feeders should bear in mind, that the cost of the gain increases rapidly as the

steer ripens and that the last 25 pounds gained in weight may possibly cost as much as 100 pounds gain in the early stages of fattening. It emphasizes the importance of having thrifty steers which will gain rapidly and which can be turned off after a comparatively short feeding period. Both lots were fed all that they would eat. They were not limited to any given quantity care being taken, however, to avoid stalling them. Their grain feed consisted of ground wheat exclusively during the first half of the feeding period, and the fodder used throughout was cut corn fodder. Although both lots gained very rapidly at first, it became apparent by the end of the 11th week that they were not doing as well on this feed as it was desirable they should. To improve their appetite and gains some corn meal was added to the ration in small amount at first, then increased to one-fourth, later to one-half and finally the wheat was withdrawn altogether during the last week. From the result we may conclude that wheat alone is not as well adapted to the fattening of cattle as a mixed feed. Theoretically it should be an ideal food; in practice it produced astonishing gains at the outset but was not equal to a mixture of corn meal and wheat for the later stages of fattening.

The prices brought by the two lots on the market can scarcely be taken as a just criterion of their value. The Shorthorns gave the best returns, partly because they were heavier and partly because of their being in better condition. The percentage column in the slaughter test shows that the scrubs gave the greater per cent of offal and a less per cent of dressed carcass than the Shorthorns did. This is probably the best test of their comparative value, at any rate, from the butcher's standpoint. In the block test it will be noticed that the Shorthorns gave the best returns not simply because the gross weight of their carcasses were greater than that of the scrubs but also because their meat was esteemed better by the experts in the packing house, who were asked to judge of the quality and assign prices. They did so without their having any knowledge of the history of the animals or even knowing to what lots they belonged. In the three best Shorthorns the loins and ribs were valued at 18 and 16 cents respectively and in the three poorest Shorthorns 17 and 15 cents respectively for the same cuts. In the scrubs the loin was rated at 18 cents per pound in one, at 17 cents in two, at 15.5 cents in one and at 14 cents in two, showing that the Shorthorns had the best meat in that cut, and in like manner the ribs were rated from 1 to 2 cents less than the ribs in the Shorthorns. The rounds, on the other hand, were of about equal value in the two lots, though two of the scrubs are rated at a quarter of a cent less per pound than the poorest of the Shorthorns.

On the whole it may be said that while the experiment is by no means conclusive, as the results might be otherwise under different conditions, nevertheless, the Shorthorns have given the best returns for the feed consumed in the feed lot, and this under conditions more unfavorable to them than the

conditions they were accustomed to, both in their development as a breed and in their rearing during the first year of their age; but they show themselves inferior graziers on prairie pasture. The scrubs, on the other hand, did remarkably well considering that they are not backed by an improved ancestry. The whole may be summed up by saying that improved cattle are the best for improved farms, while scrub cattle are not without merits under unimproved conditions.