
MISSOURI
Agricultural College Experiment Station.

BULLETIN NO. 24.

**Comparative Tests of Different
Breeds of Beef Cattle.**

TO DETERMINE

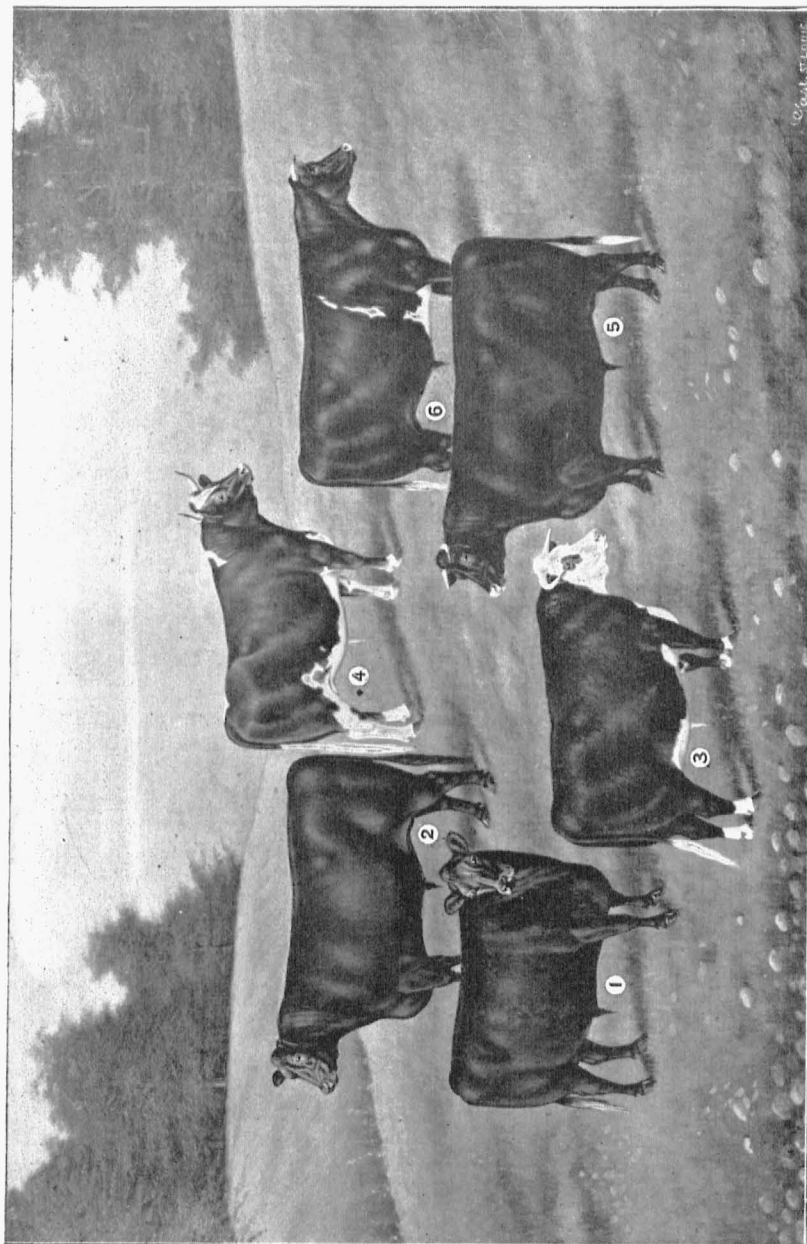
- (1) Influence of breed as distinguished from that of feed.
- (2) Amount of food required to grow a pound of beef of each breed.
- (3) Comparative age of maturity of each breed.
- (4) Period of life and season of the year at which each breed grows best.
- (5) Cost of growth of each breed during each month of life.
- (6) Exact cost of net product of each animal when matured and comparative value of same.
- (7) Chemical and biological investigations resulting from these tests.

COLUMBIA, MISSOURI.

JANUARY, 1894.

THIS BULLETIN, not written for general circulation, is sent to Experiment Stations, the Department of Agriculture at Washington and to such chemists and scientific men as may apply for it.

The conclusions of the trial are given in Bulletin 28 which is intended for general circulation and sent to every person on our mailing list. Write for it.



GROUP OF REPRESENTATIVE CATTLE.

- 1. BEAR.
- 2. NANCY.
- 3. ZENO,
- 4. JACK.
- 5. SANBORN.
- 6. JOE.

MISSOURI
Agricultural College Experiment Station.

BULLETIN NO. 24.

JANUARY, 1894.

COMPARATIVE TESTS OF DIFFERENT BREEDS
OF BEEF CATTLE.

BOARD OF CONTROL.

THE CURATORS OF THE UNIVERSITY OF THE STATE OF MISSOURI.

EXECUTIVE COMMITTEE OF THE BOARD OF CURATORS.

DR. C. M. WOODWARD, Pres't, HON. B. R. CAUTHORN, HON. WM. M. EADS,
St. Louis, Mexico, Carrollton.

ADVISORY COUNCIL.

THE BOARD OF AGRICULTURE OF THE STATE OF MISSOURI.

OFFICERS OF THE STATION.

EDWARD D. PORTER, DIRECTOR AND AGRICULTURIST.
P. SCHWEITZER, CHEMIST.
CHAS. A. KEFFER, HORTICULTURIST.
A. C. VANDIVER, FARM SUPERINTENDENT.
IRVIN SWITZLER, SECRETARY.
R. B. PRICE, TREASURER.

INTRODUCTORY.

In carrying out the objects of the organization of an "Agricultural Experiment Station," we cordially invite the co-operation of all persons interested in its success. Suggestions as to lines of experimental work, problems to be solved, inquiries relating to agriculture, horticulture, stock, and the dairy will be cheerfully received and answered as far as possible; but no work will be undertaken unless of public value, and the results of which we are at liberty to use for the public good.

Specimens of grains and grasses; seeds of fruit and forest trees; vegetables, plants and flowers that are true to name; varieties of beneficial and injurious insects; samples of mineral waters and ores, and whatever may illustrate any department of agriculture will be gladly received and due acknowledgments made in annual reports. Directions for collecting, packing and shipping such specimens will be furnished on application.

Bulletins will be issued at least quarterly, giving the results of experimental work as fast as completed, together with such suggestions and information as may be thought valuable to the farmers of Missouri.

The bulletins and reports of this Station are sent free to every citizen of Missouri who applies for them. Copies are sent as soon as issued to every newspaper in the State, to every Grange, Farmers' Alliance or other agricultural organization whose address can be obtained. Bulletins and reports are also sent to the leading agricultural papers of the country, and will be sent to *any* paper that may desire to exchange.

Letters relating to any special line of work should be directed to the officer in charge of that division, but all general correspondence relating to the work of the Station should be addressed to

EDWARD D. PORTER,
Director of Experiment Station.

COLUMBIA, Boone County, Mo.

This is one of the bulletins delayed by the sickness and subsequent death of Dr. Porter. It is written by the undersigned from the data kept by the assistant agriculturist at the time, Mr. J. H. Waters, now called to the directorship of the Station, and leaves Nos. 21 and 28 yet to be published. Both will appear within the present year.

June, 1895.

P. SCHWEITZER,
Acting Director.

COMPARATIVE TESTS OF DIFFERENT BREEDS OF BEEF CATTLE.

P. SCHWEITZER, *Chemist and Acting Director.*

The experiments herein described were designed to determine:

1. Influence of breed as distinguished from that of feed.
2. Amount of feed required to grow a pound of beef of each breed.
3. Comparative age of maturity of each breed.
4. Period of life and season of the year at which each breed grows best.
5. Cost of growth of each breed during each month of life.
6. Exact cost of net product of each animal when matured and comparative value of same.
7. Chemical and biological investigations resulting from these tests.
8. To ascertain the relative weights of all the vital organs and bones and other parts of each of the breeds.
9. To ascertain the tensile and crushing strength of the bones and muscles of the breeds.
10. To ascertain the influence of breed on the marbling of meat and the relative amounts and character of the fat to fibre and the positions of fat in the body.

HISTORICAL.

In the autumn of 1886, November, Prof. J. W. Sanborn, then Dean of the Agricultural College, met with the four National Breeders' Associations, representing the Shorthorn, Hereford, Aberdeen, Angus and Galloway breeds of cattle, at their respective annual conventions held in Chicago during the American Fat Stock Show and proposed to carry on a com-

parative test of these different beef breeds on the following conditions:

First. Each association to select ten male representatives of its breed from the drop of the spring of 1887, all eligible to registry, and donate the same to the College of Agriculture of the state of Missouri.

Second. The College agreeing to feed and care for such animals in all respects alike, carefully weighing and keeping record of the food consumed by each until matured at two and onehalf years old or over, when all were to be exhibited at the American Fat Stock Show at Chicago, and at its close slaughtered, the customary block tests being made with each animal.

The agreement was made by each of the above associations, but in the fall of 1887, the time assigned for the reception of the calves at the college farm, owing to the uncompleted condition of the farm barn and the failure of two of the associations to make good their promise, the experiment was, for the time, abandoned.

On June 15, 1888, Dr. Paul Schweitzer, having been called, on February 1, 1888, to the directorship of the recently established Experiment Station, prepared a circular letter embracing such features of a cattle feeding and slaughter test as it seemed possible with the facilities at hand to undertake and successfully carry to a conclusion and sent it to about twenty representative breeders and dealers in cattle asking their assistance and co-operation for its realization.

Letter to secretaries of the various beef cattle associations, and others:

AGRICULTURAL EXPERIMENT STATION.

COLUMBIA, Mo., June 15, 1888.

Dear Sir:—It is intended to begin at this Station, in the fall, a series of comparative feeding experiments with the different beef breeds of cattle. The main question will be to ascertain the cost and the rate per 100 pounds of feed consumed and per 100 pounds of live weight produced,

in bringing a yearling steer to 2-years old, and a 2-year old to 3-years old. We wish to obtain about four head each of the stock of these breeds, and I enquire whether your association can furnish the eight animals of the breed it represents, and at what cost. They should, of course, be thrifty, etc., and possess the traits of the breed, so that the experiments, which will be made with all the aid science can furnish, will definitely settle these and some allied questions. Please answer and oblige yours truly,

P. SCHWEITZER,
Director of Experiment Station.

To this circular no definite replies were received, for reasons which it is not necessary here to give. On July 5, 1888, Prof. J. W. Sanborn succeeded Dr. Schweitzer as director of the station and submitted the matter once more to the several associations, originally consulted, showing the superior inducements furnished for these experiments, by the increased facilities for work secured in the organization of the Experiment Station under the act of congress, known as the "Hatch Act," with its liberal congressional support; but only one, the Aberdeen Angus Association, responded to the appeal by contributing three steers. However, through the interest, liberality and public spirit of individual breeders, together with purchases made from funds in the hands of the State Board of Agriculture, appropriated by the legislature of the State of Missouri for the purchase of cattle for the college, five pure bred Short-horns, three pure bred Herefords, one pure bred Angus, one grade Shorthorn, one grade Hereford or cross, one grade Angus or cross, one grade Red Polled and four native Scrubs were added to the three Angus furnished by the American Aberdeen Angus Breeders' Association.

The Aberdeen Angus donated by the association were selected by the Hon. George Gray, of Brookfield, Missouri, then president of the association.

The Shorthorns were selected by James Parker, of Columbia, Boone county, Missouri, an extensive breeder of Shorthorns.

The Herefords were selected by F. W. Smith, an experienced breeder of Hereford cattle, of Columbia, Boone county, Missouri.

Grades and scrubs were selected by W. S. Wilson, farm superintendent.

One Angus, "Jean Val Jean," and one Shorthorn, "Wilson" were selected from the college farm herd by Prof. Sanborn.

The grades or crosses were purchased in Boone County, while the scrubs or natives of southeast Missouri, were purchased in Crawford county.

To recapitulate, then, and give the necessary details as to origin and age of the animals, a table is constructed which will show Bonnie to have been the youngest of the animals under experiment, the others being older, by the number of days given opposite to their names:

Curley (Hereford), 258 days.	Parker (Shorthorn), 252 days.
Jack (scrub), 252 days.	Wilson (Shorthorn), 250 days.
Joe (grade), 235 days.	Mitchell (grade), 230 days.
Slocum (scrub), 232 days.	Wilkes (grade), 224 days.
Nancy (grade), 224 days.	Quisenberry (scrub), 223.
Bear (Angus), 219 days.	Young (scrub), 205 days.
Sanborn (Shorthorn), 197 days.	Dandy (Angus), 203 days.
Zeno (Hereford), 187 days.	Allan (Shorthorn), 170 days.
Gov. Francis (Shorthorn), 181 days.	Jean (Hereford), 81 days.
Bonnie (Angus), — days.	Elbert (Hereford), 69 days.

TABLE I.
ORIGIN AND AGE OF EXPERIMENTAL ANIMALS.

Date of Birth.	Name of Animal.	Breed.	Date of Arrival.	Color.	Name and Postoffice Address of Breeder.
March 8, 1888	"Jas. Parker"	Shorthorn	Dec. 19, 1888	Red Roan	H. C. Duncan, Osborne, Missouri.
May 2, 1888	"Sanborn"	Shorthorn	Dec. 19, 1888	All Red	H. C. Duncan, Osborne, Missouri.
May 29, 1888	"Allan"	Shorthorn	Dec. 20, 1888	Red and White	B. O. Cowan, New Point, Missouri.
May 18, 1888	"Gov. Francis"	Shorthorn	Dec. 20, 1888	Red and White	J. N. Winn, Edgerton, Missouri.
March 10, 1888	"Wilson"	Shorthorn	Dec. 20, 1888	Pale Red	Mo. Experiment Station, Columbia, Mo.
Aug. 26, 1888	"Jean"	Angus	Dec. 20, 1888	Black	Mo. Experiment Station, Columbia, Mo.
Sept. 7, 1888	"Elbert" (9822)	Angus	Jan. 17, 1889	Black (white feet)	T. W. Harvey, Turlington, Nebraska.
Nov. 15, 1888	"Bonnie Blue Gift"	Angus	Jan. 15, 1889	Black	A. B. Matthews, Kansas City, Missouri.
April 10, 1888	"Bear"	Angus	Feb. 13, 1889	Black	Mrs. Whitfield, _____, Nebraska.
March 2, 1888	"Curley"	Hereford	Jan. 23, 1889	Red (white face)	Ed. Price, Columbia, Missouri.
April 26, 1888	"Dandy"	Hereford	Jan. 23, 1889	Red (white face)	Ed. Price, Columbia, Missouri.
May 12, 1888	"Zeno"	Hereford	March 6, 1889	Red (white face)	N. W. Leonard, Fayette, Missouri.
March 25, 1888	"Joe Wright"	Grade Shorthorn	Dec. 27, 1888	Red and White	Joe Wright, Columbia, Missouri.
April 5, 1888	"Nancy Wilhite"	Grade Angus	Dec. 27, 1888	Black	Mrs. N. Wilhite, Rocheport, Missouri.
April 7, 1888	"Wilkes"	Grade Hereford	Dec. 27, 1888	Red (white face)	.....
March 30, 1888	"N. Mitchell"	Grade Red Polled	Dec. 27, 1888	Red	N. Mitchell, Columbia, Missouri.
March 8, 1888	"Jack"	Serub	Oct. 20, 1888	Red and White	Newt. Cross, Steelville, Missouri.
March 28, 1888	"Slocum"	Serub	Oct. 20, 1888	Red and White	Newt. Cross, Steelville, Missouri.
April 4, 1888	"Quisenberry"	Serub	Oct. 20, 1888	Brindle	.....
April 12, 1888	"Young"	Serub	Oct. 20, 1888	Pale Red	.....

To complete the historical details of the experiment the following notes from the dairy kept during the trial are given:

DECEMBER 20, 1888. *Allan* arrived with sore eyes pronounced by Dr. Connaway as internal ophthalmia; recovered in a few days.

DECEMBER 21, 1888. Such steers as had arrived were weighed and put on the same kind of feed, without weighing quantity to them. Feed consisted of timothy hay *ad lib.* and a mixed grain ration composed of 3-7 corn and cob meal, 2-7 wheat bran, 1-7 cotton seed meal and 1-7 linseed or oil cake meal.

CASTRATION. *Sanborn, Francis, Allan, Bear, Bonnie, Elbert* and *Jean* were bulls when received. In each case they were allowed to remain in the barn forty-eight hours to recover from the fatigue of the shipment and become accustomed to their new quarters, when they were castrated by either Dr. Paquin or Dr. Connaway.

JANUARY 8, 1889. Grade steer *Nancy* was "off feed," lasting to January 28.

JANUARY 10, 1889. Scrub steer *Young* had poor appetite and appeared to be in poor health; hair bad color; veterinarian could discover no cause for it.

JANUARY 13, 1889. All animals on the ground at this time, consisting of five Shorthorns, four grades and four scrubs, were put on experimental feed; grain composed of 3-7 corn and cob meal, 2-7 wheat bran, 1-7 each of cotton seed and oil cake meal.

Daily rations for Shorthorns and grades:

8 pounds grain.

7 pounds cane ensilage.

8 pounds timothy hay.

Daily rations for scrubs:

4 pounds grain.

3 1-2 pounds ensilage.

3 pounds timothy hay.

Manner and time of feeding:

5 A. M., small amount of hay.

7 A. M., one half daily grain ration.

8 A. M., small amount of hay.

9 A. M., turned into dry, clean lot for exercise and water.

11:25 A. M., tied up and fed full allowance of ensilage.

3:30 P. M., small amount of hay.

5:30 P. M., remainder of daily grain ration.

6 P. M., rest of hay.

JANUARY 15, 1889. *Bonnie* arrived with his tail broken close to rump, by employes of express company, at Centralia, where he escaped from the crate and was delayed twelve hours, in shipment; he was nervous and irritated, which condition lasted for nearly a year.

JANUARY 22, 1889. Began feeding grain in three feeds, morning, noon and night.

JANUARY 28, 1889. Put two Herefords, *Curley* and *Dandy*, and three Angus, *Bonnie*, *Elbert* and *Jean*, on experimental feed; Herefords receive same amount of feed as Shorthorns and grades; Angus same amount as scrubs. It will be noticed, by reference to tables, that these amounts were in close accordance with the live weights of the animals.

FEBRUARY 6, 1889. Grain of Shorthorns, grades and Herefords is reduced to 7 pounds daily, and that of Angus and scrubs to 3 pounds, with addition of 3 pounds of cut oats for the former, and

- 1 1-2 pounds for the latter. Bundles of sheaf oats, cut into 1-2 inch lengths for the purpose.
- FEBRUARY 8, 1889. Ensilage of all steers changed from that made from sorghum to that made from sweet corn planted thick.
- FEBRUARY 10, 1889. Composition of grain rations of all changed to following: 2 parts corn and cob meal, 2 parts wheat bran, 2 parts linseed oil cake and 1 part cotton seed meal.
- FEBRUARY 11, 1889. Oats are discontinued and grain raised to 9 pounds for Shorthorns, grades and Herefords, and to 4 pounds for scrubs and Angus.
- FEBRUARY 13, 1889. Angus steer *Bear* was quite thin when received, having been wintered in a stalk field up to the time of shipment; all others had arrived in good, thrifty condition.
- FEBRUARY 15, 1889. Grain for three Angus and four scrubs raised to 6 pounds daily.
- FEBRUARY 21, 1889. Ensilage of three Angus and four scrubs raised to 5 pounds daily.
- FEBRUARY 25, 1889. Angus steer *Bear* put on experiment and began feeding 8 pounds of grain and of other feed same as for Shorthorns, grades and Herefords.
- FEBRUARY 26, 1889. Began mixing grain of all steers with about twice its bulk of moistened cut timothy hay; all ate it well at once.
- FEBRUARY 27, 1889. Changed cut hay for cut oats.
- MARCH 2, 1889. Ensilage again changed to sorghum cane.
- MARCH 4, 1889. Grain of Shorthorns, grades and Herefords increased to 10 pounds daily; that of Angus steers *Bonnie*, *Elbert* and *Jean*, and of the three scrubs *Jack*, *Slocum* and *Quisenberry*

- to 7 1-2 pounds; that of Angus *Bear* to 9 pounds and that of scrub *Young* to 6 pounds.
- MARCH 11, 1889. Grain of Shorthorns, grades and Herefords reduced to 9 pounds daily.
- APRIL 20, 1889. Ensilage discontinued. In lieu of it 3 1-2 pounds of bluegrass and timothy (green), given.
- APRIL 21, 1889. Grass raised to 7 pounds a head.
- APRIL 22, 1889. Grass discontinued. Mixing grain with cut oats moistened discontinued. Began feeding 3 pounds of oats, heads cut fine, at noon each day.
- APRIL 25, 1889. Began feeding shelled corn, for noon grain feed; composition of grain changed to 2 parts bran, 2 parts linseed oil cake meal and 1 part cotton seed meal. Fed to Shorthorns, grades, Herefords and Angus *Bear*, 6 pounds each daily of above mixed grain and 3 pounds of shelled corn; to three Angus, *Bonnie*, *Elbert* and *Jean*, and scrubs *Jack*, *Slocum* and *Quisenberry*, 5 pounds each of mixed grain and 2 1-2 pounds of shelled corn, and to the scrub *Young*, 4 pounds of mixed grain and 1 1-2 pounds shelled corn.
- MAY 1, 1889. Gave to three Angus *Bonnie*, *Elbert* and *Jean*, and to scrubs *Jack*, *Slocum* and *Quisenberry*, 5 pounds of mixed grain and 3 pounds of shelled corn each.
- MAY 3, 1889. At ten o'clock A. M. the barn in which steers were fed was burned and all feed scales and the whole equipment lost. The animals had been fed in the morning and were now turned on a good bluegrass pasture without grain feed.

MAY 10, 1889. Feed pens and feeding troughs were erected in a large bluegrass pasture southwest of farm house and feeding grain began again. Each breed was made a lot and the animals in it were fed together. They received:

Shorthorns, 9 pounds of grain daily.

Herefords, 9 pounds of grain daily.

Angus *Bear*, 9 pounds of grain daily.

Other Angus, 8 pounds of grain daily.

Grades, 9 pounds of grain daily.

Scrub *Young*, 6 pounds of grain daily.

Other Scrubs, 8 pounds of grain daily.

The grain consisted of equal parts of corn meal and bran, and was fed once a day, at six o'clock A. M.; the animals were kept confined until feed had been eaten, when they were turned into pasture until next morning.

MAY 11, 1889. Composition of grain changed to 2 parts wheat bran, 2 parts corn meal, 1 part cotton seed meal.

JUNE 10, 1889. Composition of grain changed to equal parts of corn meal and bran.

AUGUST 1, 1889. Grain ration of Angus *Bonnie*, *Elbert* and *Jean* raised to 9 pounds each.

AUGUST 15, 1889. Grain ration of all scrubs raised to 9 pounds each. During the time from May 3, 1889, to January 4, 1890, the Experiment Station was without facilities for weighing anything above 100 pounds, and the steers were driven to the stock yards of Columbia, a distance of one and one half miles from pasture, once each month at nine o'clock in the morning and weighed.

DECEMBER 24, 1889. All steers put in stalls in new barn and tied with swing stanchions; each animal was fed separately his daily allowance of grain, but all

run to rack containing timothy hay. Dr. E. D. Porter having assumed charge of the Experiment Station as director, his orders as to feeding were closely followed.

JANUARY 4, 1890. Began weighing animals in new barn on Fairbank's scales. Shorthorn steer, *Wilson*, slipped and fell heavily on approach to barn, which appeared to injure him quite seriously; for two weeks he was lame and his appetite very poor.

JANUARY 15, 1890. A skin disease, due presumably to a parasite, attacked all steers, affecting them about equally; they all had recovered by February 10.

MARCH 12, 1890. Began feeding 6 pounds of mangolds daily to each.

MARCH 25, 1890. Reduced amount of mangolds to 5 pounds.

MARCH 29, 1890. Changed to 4 1-2 pounds of carrots instead of mangolds.

APRIL 8, 1890. Fed 5 pounds of turnips each per day.

APRIL 10, 1890. Changed to 4 pounds of sugar beets instead of turnips.

APRIL 18, 1890. Discontinued feeding roots.

MAY 19, 1890. *Changed plan of feeding by giving to each animal all he would eat of grain and hay, keeping weights, and continuing this to end of experiment on March 9, 1891.* Began at same time cutting green clover and feeding it green to steers. Composition of grain, 60 per cent. of corn meal, 25 per cent. of bran, and 15 per cent. of linseed oil cake.

JUNE 2, 1890. Hereford *Dandy* broke his right horn in stanchion and was kept for five weeks in

box stall and treated; he was then permitted to run with other steers.

JUNE 20, 1890. Feeding hay and grass discontinued; steers turned out to good bluegrass pasture adjoining the barn and brought up for grain feed night and morning.

SEPTEMBER 14, 1890. All of the animals were affected with the malady commonly called Foot and Mouth disease that was raging throughout the country; they recovered in about five days.

OCTOBER 3, 1890. Changed from bluegrass pasture to timothy meadow south of Fair grounds, and from grain ration to ear corn, yet soft, *ad lib.*; no weights taken.

OCTOBER 9, 1890. Shorthorn *Wilson* had a second and much more severe attack of the Foot and Mouth disease, so-called; refused to eat for one and one half days and became very stiff.

OCTOBER 27, 1890. Steers tied up in barn and put on dry feed; grain weighed.

NOVEMBER 4, 1890. Grade *N. Mitchell* began to show signs of sore eyes and grew worse till November 10, when he was almost blind; appetite failed; shipped then to Chicago.

NOVEMBER 10, 1890. On afternoon all cattle shipped to Chicago divided into two lots, the one comprising Shorthorns *Sanborn* and *Francis*, Herefords *Curley* and *Zeno*, Angus *Bonnie* and *Bear*, grades *Joe* and *Nancy*, and scrubs *Jack* and *Slocum*, the other the remaining 10 animals. These latter were shipped to Holmes and Pattison for sale in open market and brought 4 cents a pound live weight (as a matter of fact 16 head of cattle were shipped to fill car, weighing in the aggregate 20,300 pounds and bringing \$812).

The first lot was taken to the Chicago Fat Stock show for exhibition and was intended then and there to be slaughtered. The cattle experts and Experiment Station officers, who had examined into the matter, advised, however, at the close of the show that a much more thorough and detailed investigation should be made, than could be done at the slaughterhouses at Chicago; to this the curators of the University assented, and the cattle were brought back, arriving in Columbia on November 21, when experimental feeding was resumed; the feed consisted of 81 1-4 per cent. of corn meal, 12 1-2 per cent. of bran and 6 1-4 per cent. of linseed oil cake with timothy hay ad lib.

NOVEMBER 24, 1890. Grade steer *Joe* had severe attack of wind colic; came near dying, but recovered fully in a few days.

NOVEMBER 26, 1890. Changed composition of grain feed to 80 per cent. of corn meal, 15 per cent. of wheat bran and 5 per cent. of linseed oil cake meal.

JANUARY 12, 1891. Changed corn meal for same amount of corn and cob meal.

JANUARY 14, 1891. Resumed composition of grain fed on November 26, and continued this to the close of the experiment.

1. ENTRY FROM CURATORS' BOOKS, OCTOBER 30, 1890.

“Dr. Porter, director, is authorized to select two choice specimens from each group of experimental cattle for exhibition at the Fat Stock Show, at Chicago, beginning on November 13 inst.; and also to select enough other fat cattle to fill out two cars, and to sell all on the market at Chicago.

2. LETTER TO CHAIRMAN OF BOARD OF CURATORS,
NOVEMBER 26, 1890.

SIR:—I have the honor to herewith present a brief statement of the present condition of the beef feeding experiments, which have been in progress at this Station for the past two years.

In accordance with the decision of the Board of Curators at their meeting in July last, and your instructions at your October meeting, I shipped the twenty head of experimental steers to Chicago, together with six head of our common stock in good marketable condition, in order to fill up our two cars engaged for their transportation. Ten head, two from each of the five groups of cattle under experiment, were entered at the "American Fat Stock Show" for exhibition. The remaining sixteen head were placed upon the market and sold for four cents per pound, the highest figures ruling at that time, yielding in gross, the sum of \$812.

The ten head placed on exhibition attracted a great amount of attention from representative stock men of the country, and was pronounced by the managers of "the Fat Stock Show," to be the best exhibit ever made there by any of our Agricultural Colleges.

The National Association of Agricultural Colleges and Experiment Stations in annual session at Champaign, Illinois, adjourned to attend this stock show, and their first visit was made to our exhibit. After an explanation of the objects to be obtained by our experiments, and an examination of the animals, they all expressed themselves as deeply interested in the work, and considered the benefits accruing to the stock interests of our country and the cause of Biological science throughout the world, of so much importance, that they asked that the experiments might be carried on still farther, and that in addition to the slaughter-

ing for "block tests" as originally contemplated, a complete chemical analysis of each animal should be made.

This request was made by the secretary of agriculture, through the assistant secretary, Dr. Willetts, by Dr. O. Atwater, Director of the United States Experiment Stations; by Dr. Armsby, and other distinguished chemists and experimenters of the country, who kindly proffered to us the use of their laboratories and scientific workers.

And two of them, Storrs Agricultural Stations of Connecticut and the Utah Station, agreed to bear each one third of the expenses of such investigations.

I did not feel warranted in sending away from our state and Station, work which could be done by ourselves, and as we had already incurred great expense of time, labor, and money, we should secure all the credit possible for our university. I therefore, after consultation with Dr. Schweitzer, our chemist, and all other parties interested, decided that it would be best to return the ten head of cattle to our own Station, slaughter and analyze them there where we had the facilities for the work, and where we could have it done at a minimum of expense.

As this action is contrary to our original plans as approved by you, and will require an additional expenditure of at least \$500, I refer the matter to your committee for consideration.

Yours respectfully,

E. D. PORTER.

Dean of College and Director of Experiment Station.

3. TO THIS FAVORABLE ACTION WAS TAKEN BY THE BOARD OF CURATORS.

It is in order here to give in full the directions for carrying out the plan, in so far as it is based upon an investigation of the carcasses of the animals upon which the recommendation to finish the work at Columbia was based.

POINTS TO BE OBSERVED IN SLAUGHTERING THE EXPERIMENTAL FEEDING CATTLE.

PRELIMINARY.

The day before slaughtering, have the veterinary department take specimens of the blood for microscopic examination.

1. The last feed to be the night before slaughtering.
2. The animal to be weighed at 8 A. M.
3. The animal to be killed at 8:15 A. M. by stunning with the killing hammer and bleeding from the neck, cutting both arteries and veins.
4. All blood to be carefully collected in the collecting pans, poured into the blood tub and weighed.
5. The blood to be forced from the animal as completely as possible by the process of pumping or "massage."
6. Two specimens of the fresh blood to be drawn for Dr. Schweitzer. (a) One for total constituents; (b) One for fibrin.
7. Animal carefully skinned and weight taken, including switch and horns.
8. Feet separated and weighed.
9. Stomach, intestines and contents of thoracic cavity removed, all fat carefully removed, and each organ weighed separately.
10. All fat and meat trimmings to be weighed separately.
11. After weighing stomach and intestines with their contents, have them emptied, washed and again weighed.
12. Separate the tongue from the head and weigh both separately.
13. Split the skull, extract the brains and weigh them.
14. Hoist the carcass, split it and let it remain on the hooks until the SECOND DAY.

MORNING OF THE SECOND DAY.

15. Arrange the sides properly and have photographs taken.
16. Lower the LEFT SIDE of each animal, separate the quarters, weigh them and send at once to the market.
17. Lower the RIGHT SIDE, separate the quarters, weigh each, and cut up carefully into butcher's joints as outlined on the diagram, and weigh each joint separately.
18. Arrange the joints on a table so as to best exhibit the grain or "marbling" of the meat and have photographs taken.
19. Cut sections of about one pound weight, for chemical analysis, from each of the following joints: (a) At the following joints, cutting in every case from the "rump" side, 1, 2, 3, 7, 8, 9, 10, 11, 13 and 14. (b) From centers of heart, liver, lungs, kidneys, spleen. (c) From the stomach, intestines and brain. (d) From blood, two samples. (e) From bones, one each from femur, and one long rib, the same in each animal, including the spinal process.
20. Have all the specimens taken for analysis put in "Mason's" or some other glass jars, sealed, and sent at once to the laboratory.
21. Have the legs washed, weighed, boiled, and the bones separated from the flesh and weighed.
22. Boil the head in the same manner.
23. Carefully dissect the flesh from each butcher's joint, weigh the bones, boil them, skim off the fat or oil, separate the bones from flesh, ligaments, and tendons, dry them (the bones) for 24 hours and weigh them.
24. Before boiling the bones, take a section from joints 5 and 14, the femur and tibia; from the shank or solid portions of each, six inches long, to test for crushing strength.
25. Arrange if possible to test the tensile strength of one of the largest and most readily dissected muscles,—as Gastrocnemius Externus.
26. Have veterinary department take specimens of the same joints as sent to Dr. Schweitzer,—to be frozen, sections made and photographs taken from the microscopic slides.

E. D. PORTER,
Director.

FOOD AND FEEDING.

To discuss properly the various questions involved it is necessary to give, in detail, the matters presented in subsequent tables; upon them rest the final conclusions.

TABLE II.

RECORD OF FOOD EATEN EACH MONTH BY SHORTHORN "SANBORN."

MONTH.	No. of Days Fed.	Corn and Cob Meal.		Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.												
1889.															
January.....	19	69½		46½	23½	23	127	61							
February.....	28	81		60	57	34½	126	53	12						
March.....	31	82		82	82	41	217	68							
April.....	30	62	15	73	76	38	133	92	16	10½					
May.....	31		88½	86½	7	43½		17							24
June.....	30		127	127		16									30
July.....	31		139½	139½											31
August.....	31		139½	139½											31
September.....	30		135	135											30
October.....	31		139½	139½											31
November.....	30		135	135											30
December.....	31		139½	139½											24
1890.															
January.....	31		139½	139½											
February.....	28		126	126											
March.....	31		139½	139½											
April.....	30		135	135											
May.....	31		192	127	28					604½					
June.....	30		305½	127½	76½					522					10
July.....	31		301	125½	75										31
August.....	31		308½	129	77							98			31
September.....	30		244½	102	61										30
October.....	2		17½	7½	4½										26
Oct. 27-31 } †	14		174½	73	43½										
Nov. 1-9 }	9		173	32	11										
November 21-30 }	9		173	32	11										
December.....	31		650	121½	40½										
1891.															
January.....	31		657	130½	43½										
February.....	8		175	42½	1½										
		721	294½	4797	2870	707½	196	603	291	28	1137	45	98	32	5 359

†Between November 9 and 21, at Chicago Fat Stock Show.

TABLE III.

RECORD OF FOOD EATEN EACH MONTH BY SHORTHORN "FRANCIS."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs	lbs.	lbs	lbs.	lbs	lbs	lbs	lbs		
1889.																
January 12-31.	19	69½	.....	46½	23¼	23	125	81							
February	28	81	.....	69	57	34½	221	111½	15						
March	31	82	*18	82	82	41	217	122								
April	30	64		76	76	38	126	152	26	10						
May	31	.....	88½	86½	7	43½	...	18							24
June	30	.....	127	127		16	...								30
July	31	.....	139½	139½											31
August	31	.....	139½	139½											31
September	30	.....	135	135											30
October	31	.....	139½	139½											31
November	30	.....	135	135											30
December	31	.....	139½	139½				7 days ad lib.							24
1890.																
January	31	.....	139½	139½				ad lib.							.....
February	28	.....	126	126				"							.....
March	31	.....	139½	139½				"							.....
April	30	.....	135	135				"				58			.....
May	31	.....	193	128	28					66½					.....
June	30	.....	288	120	72					499½					10
July	31	.....	262½	110	68½										31
August	31	.....	311	129½	78										31
September	30	.....	273	114	68										30
October	2	.....	10½	8½	5										26
Oct. 27-31 } †	14	.....	171½	71½	43			ad lib.							
Nov. 1-9 } †	9	.....	173	32	11			"							
Nov. 21-30	9	.....	173	32	11			"							
December	31	.....	564½	116	35½			"							
1891.																
January	31	35	522½	104½	35			"								
February	26	.....	461	97	18			"							
		739	331½	4832	2885½	707¼	196	689	484½	41	1171	40	58	32	10	359

* Shelled corn.

† Between November 9 and 21, at Chicago Fat Stock Show.

TABLE IV.

RECORD OF FOOD EATEN EACH MONTH BY SHORTHORN "ALLAN."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
1889.																
January 12-31	19	69½	.....	46¼	23¼	23	101	80¾	13						
February	28	81	.....	69	57	34½	101	98¾							
March	31	82	.....	82	82	41	212	116							
April	30	64½	*18	76¼	76	38	94	158	20	10½						
May	31†	88½	.....	86½	7	43½	.....	15							28
June	30	127	.....	127	.....	16	.....	.....							30
July	31	139½	.....	139½	.....	.....	.....	.....							31
August	31	139½	.....	139½	.....	.....	.....	.....							31
September	30	135	.....	135	.....	.....	.....	.....							30
October	31	139½	.....	139½	.....	.....	.....	.....							31
November	30	135	.....	135	.....	.....	.....	7 days							30
December	31	139½	.....	139½	.....	.....	.....	ad lib.							24
1890.																
January	31	139½	.....	139½	.....	.....	.....	Hay ad lib.							.....
February	28	126	.....	126	.....	.....	.....	.....							.....
March	31	139½	.....	139½	.....	.....	.....	.....				87			.....
April	30	135	.....	135	.....	.....	.....	.....			40½		15½	2	.....
May	31	191	.....	127	27½	.....	.....	.....	440½						.....
June	30	293	.....	122½	73½	.....	.....	.....	484						10
July	31	285½	.....	118½	71	.....	.....	.....							31
August	31	320	.....	133	80	.....	.....	.....							31
September	30	316	.....	106½	79	.....	.....	.....							30
October	2	20	.....	8½	5½	.....	.....	.....							26
Oct. 27-31 } †																
Nov. 1-9 } †	14	170	.....	71	43	.....	.....	.....							.....
		642	297	3197	2542½	624¾	196	508	468½	33	935	40½	87	15½	2	363

* Shelled corn.

† Turned to pasture morning of May 3; no grain fed until morning of May 10. Grain fed actually only 24 days.

‡ Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE V.
RECORD OF FOOD EATEN EACH MONTH BY SHORTHORN "JAS. PARKER."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
January	19	69½	.....	64¼	23¼	23	115	87½							
February	28	81½	..	69	57	34½	123½	117¾	15						
March	31	82	.....	82	82	41	216	100							
April	30	64½	*18	76½	76	38	133	143	21	10½					
May†	31	.....	88½	86½	7	43½	.....	15	.....						28
June	30	.....	127	127	.....	16	.....	*	.....						30
July	31	.....	139½	139½	.....	.....	.....	.....	.....						31
August	31	.....	139½	139½	.....	.....	.....	.....	.....						31
September	30	.....	135	135	.....	.....	.....	.....	.....						30
October	31	.....	139½	139½	.....	.....	.....	.....	.....						31
November	30	.....	135	135	.....	.....	.....	.....	.....						30
December	31	.....	139½	139½	.....	.....	.....	7 days ad lib. Hay	.....						24
1890.															
January	31	.....	139½	139½	.....	.....	.....	ad lib.	.....						.....
February	28	.....	126	126	.....	.....	.....	"	.....						.....
March	31	.....	139½	139½	.....	.....	.....	"	.....			49			.....
April	30	.....	135	135	.....	.....	.....	"	.....			33½			.....
May	31	.....	215	137	33½	.....	.....	"	.....	614				20	7
June	30	.....	274	114	78½	.....	.....	.....	.....	518½					10
July	31	.....	293	122	73	.....	.....	.....	.....						31
August	31	.....	329	137	82	.....	.....	.....	.....						31
September	30	.....	305	127	76½	.....	.....	.....	.....						30
October, 1-2	2	.....	20	8½	5½	.....	.....	.....	.....						26
Oct. 27-31.	5	.....	152	63½	38½	.....	.....	.....	.....						.....
Nov. 1-9.	9	.....	.....	.....	.....	.....	.....	.....	.....						.....
	642	297½	3189½	2564¼	632¾	196	587½	463¼	36	1143	33½	49	20	7	363

* Shelled Corn.

† Turned to pasture morning of May 3; no grain fed until morning of May 10. Actually fed grain only 24 days.

‡ Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE VI.
RECORD OF FOOD EATEN EACH MONTH BY SHORTHORN "WILSON."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
January	19	69½		46¼	23¼	23	131	115							
February	28	81		69	57	34½	126	163	15						
March	31	82		82	82	41	217	233							
April	30	64½	*18	76	76	38	133	187	20	10½					
May	31		88½	86½	7	43½		17							24
June	30		127	127		16									30
July	31		139½	139½											31
August	31		139½	139½											31
September	30		135	135											30
October	31		139½	139½											31
November	30		135	135											30
December	31		139½	139½											24
1890.															
January	31		139½	139½					7 days ad lib.						
February	28		126	126											
March	31		139½	139½											
April	30		135	135											
May	31		198½	130	29½										
June	30		288½	120	72½					548½ 525½					10
July	31		249	104	62										31
August	31		265	110½	66½										31
September	30		222½	97	68										30
October	2		21½	9	5½										26
Oct. 27-31.. } †															
Nov. 1-9... } †	14		153	64	38				ad lib.						
	642	297	2999½	2489¼	587¼	196	607	715	35	1084½	40	92½	32	10	359

* Shelled Corn.

† Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE VII.
RECORD OF FOOD EATEN EACH MONTH BY HEREFORD "ZENO."

MONTH.	No. Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
March.....	21	51½		51½	51½	25¾	120	80							
April.....	30	64½	*18	76	76	38	116	133	31	10½					
May.....	31		88½	86½	7	43½		14							24
June.....	30		127	127		16									30
July.....	31		139½	139½											31
August.....	31		139½	139½											31
September.....	30		135	135											30
October.....	31		139½	139½											31
November.....	30		135	135											30
December.....	31		139½	139½											24
1890.								7 days ad lib.							
January.....	31		139½	139½				"							
February.....	28		126	126				"							
March.....	31		139½	139½				"				72			
April.....	30		135	135							44.		32	7	
May.....	31		211	135	32½			18 days ad lib.		495					10
June.....	30		297	124	74					492½					31
July.....	31		296½	124	74										31
August.....	31		310½	129½	77½										31
September.....	30		265½	110½	66½										30
October.....	2		18½	7½	4½										26
Oct. 27-31. } †	14		170	71	42										
Nov. 1-9					10½										
November 21-30	9		169	31	38										
December.....	31		608½	114½	34½										
1891.															
January.....	31	26	527	103½	34½										
February.....	4		70	16½	1½										
	660	142	4545	2676	590	123¼	236	227	31	998	44	72	32	7	359

* Shelled Corn.

† Between November 9 and 21, at Chicago Fat Stock Show.

TABLE VIII.

RECORD OF FOOD EATEN EACH MONTH BY HEREFORD "CURLEY."

MONTH.	No. of Days Fed.													Pasture—No. of Days.		
		Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.		Turnips.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
1889.																
January	4	15½		10½	5¼	5¼	20	15								
February	28	80		68	56½	34	96½	77	13							
March	31	82		82	82	41	215	85								
April	30	64¼	*18	76	76	38	133	135	21	10½						
May	31		88½	86½	7	43½		14								
June	30		127	127		16									24	
July	31		139½	139½											30	
August	31		139½	139½											31	
September	30		135	135											30	
October	31		139½	139½											31	
November	30		135	135											30	
December	31		139½	139½				7 days ad lib.							24	
1890.																
January	31		139½	139½				"								
February	28		126	126				"								
March	31		139½	139½				"						17	4	
April	30		135	135												
May	31		217	138	34			18 d'ys ad lib.					21½			
June	30		300	125	75					585 53½					10	
July	31		302	126	75½										31	
August	31		302½	126	75½										31	
September	30		243	101	61										30	
October	2		18½	7½	4½										26	
Oct. 27-31 } †.	14		174	72½	43½			ad lib.								
Nov. 1-9 } †.	9		173	32	11			"								
November 21-30 } †.	9		173	32	11			"								
December	31		585½	110	36½			"								
1891.																
January	31	33	510	102	34			"								
February	28		454½	94½	19			"								
March	1		17	3½	½											
		727	274¾	4898½	2856	696¾	177¾	464½	326	34	1127	21½	23½	17	4	359

* Shelled Corn.

† Between November 9 and 21, at Chicago Fat Stock Show.

TABLE IX.
RECORD OF FOOD EATEN EACH MONTH BY HEREFORD "DANDY."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
1889.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
January	4	15½		10¼	5¼	5¼	17	17								
February	28	73¼		63	52½	31½	61½	63¼	10½							
March	31	81		81	81	40¾	216	50								
April	30	64	*18	76	76	38	124½	113	33	10½						
May	31		88½	86½	7	43½		14								
June	30		127	127		16									24	
July	31		139½	139½											30	
August	31		139½	139½											31	
September	30		135	135											31	
October	31		139½	139½											30	
November	30		135	135											31	
December	31		139½	139½				7 days ad lib.							30	
1890.															24	
January	31		139½	139½											30	
February	28		126	126											31	
March	31		139½	139½											30	
April	30		135	135											31	
May	31		207½	134	31½										30	
June	30		335	139½	84				645½						10	
July	31		304	127	76				561		18½		11	3	31	
August	31		300½	125	75½										31	
September	30		252	105	63										30	
October	2		19	8	4½										30	
Oct. 27-31 } † . . .	4														26	
Nov. 1-9 } † . . .	14		178	74	43			ad lib.								
		627	233¾	3197½	2524¼	599¼	175	419	257¼	43½	1217	18½	34	11	3	359

* Shelled Corn.

† Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE X.
RECORD OF FOOD EATEN EACH MONTH BY ANGUS "BEAR."

MONTH.	No. of Days Fed.	Corn and Cob Meal.													Pasture—No. of days.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
1889.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
February	† 4	80						83								
March	31	64½				40	217	122								
April	30					38	93	12								
May	31		*18	80	80	76			32	10½						
June	30		88½	86½	7	43½									24	
July	31		127	127		16									30	
August	31		139½	139½											31	
September	30		139½	139½											31	
October	31		135	135											30	
November	30		139½	139½											31	
December	31		135	135											30	
			139½	139½					7 days						24	
									ad lib.							
1890.																
January	31		139½	139½												
February	28		126	126					ad lib.							
March	31		139½	139½					"							
April	30		135	135									92			
May	31		218½	138	34½							41	26½	7		
June	30		327	136	82						633				10	
July	31		295½	123	74				18 d'ys		535½				31	
August	31		329	137	82½				ad lib.						31	
September	30		301	125½	75½										30	
October	2		21½	9	5½										26	
Oct. 27-31 } †	14		156	65	39				ad lib.							
Nov. 1-9 } †	9		173	32	11				"							
November 21-30																
December	31		650½	122	40½											
1891.																
January	31	17	559	108	36											
February	19		354½	78	10½											
		689	161¼	4987	2811	654	137½	310	217	32	1179	41	92	26½	7	359

* Shelled Corn.

† Began weighing back refuse food March 1.

‡ Between November 9 and 21, at Chicago Fat Stock Show.

TABLE XII.
RECORD OF FOOD EATEN EACH MONTH BY ANGUS "ELBERT."

MONTH.	No. of Days Fed.	Corn and Cob Meal.		Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.												
1889.															
January.....	4	83 $\frac{3}{4}$		4 $\frac{3}{4}$	23 $\frac{3}{4}$	23 $\frac{3}{4}$	9	61 $\frac{1}{4}$							
February.....	28	48		41	34	20	107 $\frac{1}{2}$	61	71 $\frac{1}{2}$						
March.....	31	64 $\frac{1}{2}$		64 $\frac{1}{2}$	64 $\frac{1}{2}$	32 $\frac{1}{2}$	155	20							
April.....	30	43	*15	67	67	33	92 $\frac{1}{2}$	38	19	101 $\frac{1}{2}$					
May.....	31		77	75	4	36		3							24
June.....	30		113	113		14									30
July.....	31		124	124											31
August.....	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$											31
September.....	30		135	135											30
October.....	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$											31
November.....	30		135	135											30
December.....	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				7 days ad lib.							24
1890.															
January.....	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				ad lib.							
February.....	28		126	126				"							
March.....	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$								98			
April.....	30		135	135											
May.....	31		177	121 $\frac{1}{2}$	24 $\frac{1}{4}$			18 d'ys ad lib.		485 $\frac{1}{2}$ 510 $\frac{1}{2}$	40		24 4 $\frac{1}{2}$		
June.....	30		313 $\frac{1}{2}$	130 $\frac{1}{2}$	78 $\frac{1}{2}$										10
July.....	31		315 $\frac{1}{2}$	131 $\frac{1}{2}$	79										31
August.....	31		314	131	79										31
September.....	30		287	119 $\frac{1}{2}$	72 $\frac{1}{2}$										30
October.....	2		21 $\frac{1}{2}$	9	5 $\frac{1}{2}$										26
Oct. 27-31 } †	14		159	66	40			ad lib.							
Nov. 1-9 }															
	627	164 $\frac{1}{4}$	3145	2426 $\frac{3}{4}$	551	138 $\frac{1}{4}$	364	128 $\frac{1}{4}$	26 $\frac{1}{2}$	1006 $\frac{1}{2}$	40	98	24 4 $\frac{1}{2}$		359

*Shelled corn.

†Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE XIII.
RECORD OF FOOD EATEN EACH MONTH BY ANGUS "JEAN."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
1889.																
January	4	83 $\frac{3}{4}$		43 $\frac{1}{4}$	23 $\frac{3}{4}$	23 $\frac{3}{4}$	71 $\frac{1}{2}$	63 $\frac{3}{4}$								
February	28	48		41	34	20	110	59 $\frac{1}{2}$	7 $\frac{1}{2}$							
March	31	64 $\frac{1}{2}$		64 $\frac{1}{2}$	64 $\frac{1}{2}$	32 $\frac{1}{2}$	155	47								
April	30	43	*15	67	67	33	77	70	18 $\frac{1}{2}$	10 $\frac{1}{2}$						
May	31		77	75	4	36		4 $\frac{1}{2}$							24	
June	30		113	113		14									30	
July	31		124	124											31	
August	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$											31	
September	30		135	135											30	
October	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$											31	
November	30		135	135											30	
December	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				7 days ad lib.							24	
1890.																
January	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				ad lib.								
February	28		126	126				"								
March	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				"								
April	30		135	135				"								
May	31		218	138	34 $\frac{1}{2}$			18 d'ys		535	42	64	3	5		
June	30		342	142 $\frac{1}{2}$	85 $\frac{1}{2}$			ad lib.		467					10	
July	31		281	117	71										31	
August	31		309	129	77										31	
September	30		265	110 $\frac{1}{2}$	66 $\frac{1}{2}$										30	
October	2		21 $\frac{1}{2}$	9	5 $\frac{1}{2}$										26	
O ct. 27-31 } †.																
Nov. 1-9 }	14		147	61	37			ad lib.								
		627	164 $\frac{1}{4}$	3141	2424 $\frac{3}{4}$	549 $\frac{1}{4}$	138 $\frac{1}{4}$	349 $\frac{1}{2}$	187 $\frac{3}{4}$	26	1012 $\frac{1}{2}$	42	64	3	5	359

*Shelled corn.

†Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE XIV.
RECORD OF FOOD EATEN EACH MONTH BY GRADE "JOE."

MONTH.	No. Days Fed.	Corn and Cob Meal.		Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
		lbs.	lbs.													
1889.																
January.....	19	69½		46¼	23¼	23	108	82½								
February.....	28	81		69	57	34½	113½	103	13½							
March.....	31	82		82	82	41	217	124								
April.....	30	64	*15	75½	75½	37	107	133½	26	10½						
May.....	31		88½	86½	7	43½		8							24	
June.....	30		127	127		16									30	
July.....	31		139½	139½											31	
August.....	31		139½	139½											31	
September.....	30		135	135											30	
October.....	31		139½	139½											31	
November.....	30		135	135											30	
December.....	31		139½	139½				7 days ad lib.							24	
1890.																
January.....	31		139½	139½				ad lib.								
February.....	28		126	126				"								
March.....	31		139½	139½				"				89½				
April.....	30		135	135				"			40					
May.....	31		200	130½	30½			18 days		669						
June.....	30		309½	129	77½					602					10	
July.....	31		276	115	69										31	
August.....	31		327½	136½	82										31	
September.....	30		269½	112¼	69¼										30	
October.....	2		21½	9	5½										26	
Oct. 27-31..	} †	14	165	69	41½			ad lib.								
Nov. 1-9..																
November 21-30	9		141	26	9			"								
December.....	31		641½	120	40½			"								
1891.																
January.....	26	34	469	94	31½			"								
		708	330½	4419	2795½	701	195	545½	451	39½	1281½	40	89½	32	9	359

* Shelled Corn.

† Between November 9 and 21, at Chicago Fat Stock Show.

TABLE XV.
RECORD OF FOOD EATEN EACH MONTH BY GRADE "NANCY,"

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
January.....	18	69½		46¼	23¼	23	109	82½							
February.....	28	81		69	57	34½	113½	103	13½						
March.....	31	82		82	82	41	217	124							
April.....	30	64	*15	75½	75½	37	107	133½	26	10½					
May.....	31		88½	86½	7	43½		7							24
June.....	30		127	127		16									30
July.....	31		139½	139½											31
August.....	31		139½	139½											31
September.....	30		135	135											30
October.....	31		139½	139½											31
November.....	30		135	135											30
December.....	31		139½	139½				7 days ad lib.							24
1890.															
January.....	31		139½	139½				ad lib.							
February.....	28		126	126				"							
March.....	31		139½	139½				"				96			
April.....	30		135	135				"							
May.....	31		212	135	33			18 days		591	45		32	10	
June.....	30		304	127	76			ad lib.		434					10
July.....	31		246½	103	61½										31
August.....	31		311	130	77½										31
September.....	30		272	113	68										30
October.....	2		22	9	5										26
Oct. 27-31.....	14		165½	69	41½			ad lib.							
Nov. 1-9.....															
November 21-30	9		1+6	31	11			"							
December.....	31		593½	111½	37			"							
1891.															
January.....	31	17½	535½	103½	34½			"							
February.....	28		353½	71½	17			"							
March.....	8		139	26	9			"							
	748	314	4919	2883¾	715¾	195	546½	450	39½	1035½	45	96	32	10	359

* Shelled corn.

† Between November 9 and 21, at Chicago Fat Stock Show.

TABLE XVI.
RECORD OF FOOD EATEN EACH MONTH BY GRADE "NEWMAN M."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
January.	18	69½		46¼	23¼	23	109	82½							
February	28	81		69	57	34½	113½	103	13½						
March.	31	82		82	82	41	217	124							
April	30	64	*15	75½	75½	37	107	133½	26	10½					
May	31		88½	86½	7	43½		8							24
June	30		127	127		16									30
July.	31		139½	139½											31
August.	31		139½	139½											31
September.	30		135	135											30
October.	31		139½	139½											31
November.	30		135	135											30
December.	31		139½	139½				7 days ad lib.							24
1890.															
January.	31		139½	139½				ad lib.							
February	28		126	126				"							
March.	31		139½	139½				"							
April.	30		135	135				"				96			
May.	31		218	138	34½			18 days	734		41½		32	9	
June	30		315	131	79			ad lib.	616½						10
July.	31		327½	136½	81										31
August	31		333½	139	83										31
September.	30		300	125	75										30
October.	2		21½	9	5½										2
Oct. 27-31.	14		173½	72¼	44¼			14 days ad lib.							26
Nov. 1-9.															
	641	296½	3287½	2605	647	195	546½	451	39½	1361	41½	96	32	9	361

* Shelled corn.

† Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE XVII.

RECORD OF FOOD EATEN EACH MONTH BY GRADE "WILKES."

MONTHS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.	
1889.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
January	18	69½		46¼	23¼	23	108	82½								
February	28	81		99	57	34½	113½	103	13½							
March	31	82		82	82	41	217	124								
April	30	64	*15	75½	75½	37	107	133½	26	10½						
May	31		88½	86½	7	43½		8							24	
June	30		127	127		16									30	
July	31		139½	139½											31	
August	31		139½	139½											31	
September	30		135	135											30	
October	31		139½	139½											31	
November	30		135	135											30	
December	31		139½	139½				7 days ad lib.							24	
1890.																
January	31		139½	139½				ad lib.								
February	28		126	126				"								
March	31		139½	139½				"								
April	30		135	135				"								
May	31		189½	126½	27			18 d'ys		591	32	91½	22	2		
June	30		295¼	123	64			ad lib.		562						
July	31		294	122½	73										10	
August	31		311	129½	78½										31	
September	30		285	119	71										31	
October	2		22½	8½	3										30	
Oct. 27-31 } †	14		182	76	45			ad lib.							26	
Nov. 1-9. } †																
		641	296½	3177¾	2559¼	606¼	195	545½	451	39½	1163½	32	91½	22	2	359

* Shelled corn.

† Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE XVIII.

RECORD OF FOOD EATEN EACH MONTH BY SCRUB "JACK."†

MONTH.	No of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1889.															
January	18	37		24½	12¼	12¼	59	66							
February ...	28	44¾		38½	32¼	19	84¼	84	7½						
March	31	48½		48½	48½	24½	107½	53							
April.	30	41	*12½	47½	23½		64½	109	26	13					
May	31		76	76	5	36		4½							24
June	30		113	113		14									30
July	31		124	124											31
August	31		132½	132½											31
September ..	30		135	135											30
October	31		139½	139½											31
November...	30		135	135											30
December...	31		139½	139½											24
1890.								7 days ad lib.							
January	31		139½	139½				ad lib.							
February ...	28		126	126				"							
March	31		139½	139½				"							
April.	30		135	135				"							
May	31		173	119	23					670½	39	77½	4	7	
June	30		243½	101½	61					567½					10
July	31		209	87	52										31
August	31		222	92½	55										31
September ..	30		236½	98½	59										30
October	2		17	7	4										2
Oct. 27-31 } †	14		172	72	43			ad lib.							26
Nov. 1-9								"							
Nov. 21-30..	9		173	32	11			"							
December...	31		570½	107	35½			"							
1891.															
January	31		514	96½	32½										
February ...	1		13	2½	1										
		713	171¼	4090½	2509	522¼	129¼	315¼	316½	33½	1251	39	77½	4	7
															361

* Shelled corn.

† Between Nov. 9 and 21, at Chicago Fat Stock Show.

† From Jan. 13, 1889—Dec. 24, 1889, the scrubs were fed together and the feed consumed is equally divided in making up these tables. After Dec. 24, 1889, each animal was fed separately and an account kept with each individual.

TABLE XIX.

RECORD OF FOOD EATEN EACH MONTH BY SCRUB "SLOCUM."

MONTHS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
1889.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
January . . .	18	37		24½	12¼	12¼	59	66							
February . . .	28	44¾		38½	32	19	84¼	84	7½						
March	31	48½		48½	48½	24½	107½	53							
April	30	41	*12½	47½	47½	23½	64½	109	26	13					
May	31		76	76	5	36			4½						24
June	30		113	113		14									30
July	31		124	124											31
August	31		132½	132½											31
September . .	30		135	135											30
October	31		139½	139½											31
November . . .	30		135	135											30
December . . .	31		139½	139½				7 days ad lib.							24
1890.															
January	31		139½	139½				ad lib.							
February	28		126	126				"							
March	31		139½	139½				"				81			
April	30		135	135				"					29	4	
May	31		174	118	24		18 d'ys			562½	37½				
June	30		238¼	99¼	59½					476½					10
July	31		193	80½	48										31
August	31		182	76	45½										31
September . . .	30		168	70	42										30
October	2		13	5½	3½										26
Oct. 27-31 } Nov. 1-9 } †	14		113	47	28			ad lib.							
Nov. 21-30..	9		117½	22	7½			"							
December . . .	31		565	106	35½			"							
1891.															
January	31	17	439½	85½	28½			"							
February	28		361	76½	14			"							
March	4		63	12	4			"							
	744	188¼	4174¼	2491¾	485¼	1291¼	315¼	312	38	1052	37½	81	29	4	359

* Shelled corn.

† Between Nov. 9 and 21, at Chicago Fat Stock Show.

TABLE XX.

RECORD OF FOOD EATEN EACH MONTH BY SCRUB "QUISENBERRY."

MONTH.	No. of Days Fed.	Coll and Cob Meal.	Coll Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs	lbs	lbs	lbs	
1889															
January	18	37		24 $\frac{1}{2}$	12 $\frac{1}{4}$	12 $\frac{1}{4}$	59	66							
February	28	44 $\frac{3}{4}$		34 $\frac{3}{4}$	32	19	84 $\frac{1}{4}$	84	7 $\frac{1}{2}$						
March	31	48 $\frac{1}{2}$		48 $\frac{1}{2}$	48 $\frac{1}{2}$	24 $\frac{1}{2}$	107 $\frac{1}{2}$	53							
April	30	41	*12 $\frac{1}{2}$	47 $\frac{1}{2}$	47 $\frac{1}{2}$	23 $\frac{1}{2}$	64 $\frac{1}{2}$	109	26	13					
May	31		76	76		36		4 $\frac{1}{2}$							24
June	30		113	113		14									30
July	31		124	124											31
August	31		132 $\frac{1}{2}$	132 $\frac{1}{2}$											31
September	30		135	135											31
October	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				7 days							30
November	30		135	135				ad lib.							31
December	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$											24
1890															
January	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				ad lib.							
February	28		126	126				"							
March	31		139 $\frac{1}{2}$	139 $\frac{1}{2}$				"							
April	30		135	135				18 d'ys							
May	31		153 $\frac{1}{2}$	111	18 $\frac{1}{2}$			ad lib.		667 $\frac{1}{2}$	41	96	29	9	
June	30		183 $\frac{1}{2}$	76 $\frac{1}{2}$	46					601					
July	31		207 $\frac{1}{2}$	86 $\frac{1}{2}$	52										10
August	31		221 $\frac{1}{2}$	92 $\frac{1}{2}$	55 $\frac{1}{2}$										31
September	30		220	91	55										31
October	2		17	7	4										30
October 27-31 } †	14		119 $\frac{1}{2}$	50	30			ad lib.							26
November 1-9 } †															
	641	171 $\frac{1}{4}$	2669 $\frac{1}{2}$	2203 $\frac{1}{4}$	406 $\frac{1}{4}$	129 $\frac{1}{4}$	315 $\frac{1}{4}$	316 $\frac{1}{2}$	33 $\frac{1}{2}$	1281 $\frac{1}{2}$	41	96	29	9	359

* Shelled corn.

† Shipped to Holmes & Pattison Chicago, for sale in open market.

TABLE XXI.

RECORD OF FOOD EATEN EACH MONTH BY SCRUB "YOUNG."

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1889															
January	18	37		24½	12¼	12¼	59	66							
February	28	44¾		34¾	32	19	84½	84	7½						
March	31	48½		48½	48½	24½	107½	53							
April	30	41	*12½	47½	47½	23½	64½	109	26	13					
May	31		58½	58½	3	30		2½							24
June	30		105	105		10									30
July	31		93	93											31
August	31		118½	118½											31
September	30		135	135											30
October	31		139½	139½											31
November	30		135	135											30
December	31		139½	139½				7 days ad lib.							24
1890															
January	31		139½	139½				ad lib.							
February	28		126	126				"							
March	31		139½	139½				"				91½			
April	30		135	135				"			41½		32	6	
May	31		180½	122½	25					598					
June	30		240	100	60					525½					10
July	31		233	97	58½										31
August	31		194	81	48										31
September	30		173	72	43										30
October	2		13	5½	3½										26
October 27-31 } †															
November 1-9 } †	14		77	32	19			ad lib.							
		641	171¼	2587	2129¼	400¼	119¼	315½	314½	33½	1136½	41½	91½	32	6359

* Shelled corn.

† Shipped to Holmes & Pattison, Chicago, for sale in open market.

TABLE XXII.
RECORD OF POUNDS OF FOOD EATEN BY PERIODS.
SANBORN.

MONTH.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cakes.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
January to April..	108	294½	15	270½	238½	136½	603	274	28	10½					
May to December..	245		1043½	1041½	7	59½		17							231
January to April..	120		540	540							45	98	32	5	
May to October...	155		1369	618½	322					1126½					128
November to February } ..	93		1829½	399½	140										
	721	294½	4797	2870	707½	196	603	291	28	1137	45	98	32	5	359

FRANCIS.

January to April..	108	296½	18	273½	238¼	136½	689	466½	41	10					
May to December..	245		1043½	1041½	7	59½		18							231
January to April..	120		540	540							40	58	32	10	
May to October...	155		1338	610	319½					1161					128
November to February } ..	111	35	1892½	421	142½										
	739	331½	4832	2885½	707¼	196	689	484½	41	1171	40	58	32	10	359

ALLAN.

January to April..	108	297	18	273½	238¼	136½	508	453½	33	10½					
May to December..	245		1043½	1041½	7	59½		15							235
January to April..	120		540	540							40½	87	15½	2	
May to October...	155		1425½	616	336½					924½					128
October to November } ..	14		170	71	43										
	642	297	3197	2542	624¾	196	508	468½	33	935	40½	87	15½	2	363

JAS. PARKER.

January to April..	108	297½	18	273¾	238¼	136½	587½	448¼	36	10½					
May to December..	245		1043½	1041½	7	59½		15							235
January to April..	120		540	540							33½	49	20	7	
May to October 2..	155		1436	645½	349					1132½					128
October to November } ..	14		152	63½	38½										
	642	297½	3189½	2564¼	632¾	196	587½	463¼	36	1143	33½	49	20	7	363

TABLE XXIII.
RECORD OF POUNDS OF FOOD EATEN BY PERIODS.
WILSON.

PERIODS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Outs.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
January to April..	108	297	18	273 $\frac{1}{4}$	238 $\frac{1}{4}$	136 $\frac{1}{2}$	607	698	35	10 $\frac{1}{2}$					
May to December	245		1043 $\frac{1}{2}$	1041 $\frac{1}{2}$	7	59 $\frac{1}{2}$		17							231
January to April..	120		540	540							40	92 $\frac{1}{2}$	32	10	128
May to October..	155		1245	570 $\frac{1}{2}$	304					1074					
October to Nov..	14		153	64	38										
	642	297	2999 $\frac{1}{2}$	2489 $\frac{1}{4}$	587 $\frac{1}{4}$	196	607	715	35	1084 $\frac{1}{2}$	40	92 $\frac{1}{2}$	32	10	359

ZENO.

March to April...	51	116	18	128	127 $\frac{1}{2}$	63 $\frac{1}{2}$	236	213	31	10 $\frac{1}{2}$					
May to December	245		1043 $\frac{1}{2}$	1041 $\frac{1}{2}$	7	59 $\frac{1}{2}$		14							231
January to April..	120		540	540							44	72	32	7	128
May to October	2155		1399	630 $\frac{1}{2}$	329										
October to Feb..	89	26	1544 $\frac{1}{2}$	336 $\frac{1}{2}$	126 $\frac{1}{2}$					987 $\frac{1}{2}$					
	660	142	4545	2676 $\frac{1}{2}$	590	123	236	227	31	998	44	72	32	7	359

CURLEY.

January to April..	93	242	18	236 $\frac{1}{2}$	219 $\frac{3}{4}$	118 $\frac{1}{4}$	464 $\frac{1}{2}$	312	34	10 $\frac{1}{2}$					
May to December	245		1043 $\frac{1}{2}$	1041 $\frac{1}{2}$	7	59 $\frac{1}{2}$		14							231
January to April..	120		540	540							21 $\frac{1}{2}$	23 $\frac{1}{2}$	17	4	128
May to October	2155		1383	623 $\frac{1}{2}$	325 $\frac{1}{2}$										
October to March	114	33	1914	414 $\frac{1}{2}$	144 $\frac{1}{2}$					1116 $\frac{1}{2}$					
	727	275	4898 $\frac{1}{2}$	2856	696 $\frac{3}{4}$	177 $\frac{3}{4}$	464 $\frac{1}{2}$	326	34	1127	21 $\frac{1}{2}$	23 $\frac{1}{2}$	17	4	359

DANDY.

January to April..	93	234	18	230 $\frac{1}{4}$	214 $\frac{1}{2}$	115 $\frac{1}{2}$	419	243 $\frac{1}{4}$	43 $\frac{1}{2}$	10 $\frac{1}{2}$					
May to December	245		1043 $\frac{1}{2}$	1041 $\frac{1}{2}$	7	59 $\frac{1}{2}$		14							231
January to April..	120		540	540							18 $\frac{1}{2}$	34	11	3	128
May to October...	155		1418	638 $\frac{1}{2}$	334 $\frac{1}{2}$					1206 $\frac{1}{2}$					
October to Nov...	14		178	74	43										
	627	234	3197 $\frac{1}{2}$	2524 $\frac{1}{4}$	599	175	419	257 $\frac{1}{4}$	43 $\frac{1}{2}$	1217	18 $\frac{1}{2}$	34	11	3	359

TABLE XXIV.
RECORD OF POUNDS OF FOOD EATEN BY PERIODS.
BEAR.

PERIODS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
February to April	65	144 $\frac{1}{4}$	18	156	156	78	310	205	32	10 $\frac{1}{2}$					
May to December	245		1043 $\frac{1}{2}$	1041 $\frac{1}{2}$	7	59 $\frac{1}{2}$		12							231
January to April.	120		540	540							41	92	26 $\frac{1}{2}$	7	
May to October..	155		1592 $\frac{1}{2}$	668 $\frac{1}{2}$	354					1168 $\frac{1}{2}$					128
November to Feb.	104	17	1893	405	137										
	689	161 $\frac{1}{4}$	4987	2811	654	137 $\frac{1}{2}$	310	217	32	1179	41	92	26 $\frac{1}{2}$	7	359

BONNIE BLUE GIFT.

January to April.	93	164 $\frac{1}{4}$	15	177 $\frac{1}{4}$	168 $\frac{1}{4}$	88 $\frac{1}{4}$	363	185	28 $\frac{1}{2}$	10 $\frac{1}{2}$					
May to December	245		1002 $\frac{1}{2}$	1000 $\frac{1}{2}$	4	50		8							231
January to April..	120		540	540							27	5	7	30	
May to October...	155		1508	676	359 $\frac{1}{2}$					912 $\frac{1}{2}$					128
November to Feb.	109	33 $\frac{1}{2}$	1726	379 $\frac{1}{2}$	131 $\frac{1}{2}$										
	722	197 $\frac{3}{4}$	4791 $\frac{1}{2}$	2773 $\frac{1}{4}$	663 $\frac{1}{4}$	138 $\frac{1}{4}$	363	193	28 $\frac{1}{2}$	923	27	5	7	30	359

ELBERT.

January to April.	93	164 $\frac{1}{4}$	15	177 $\frac{1}{4}$	168 $\frac{1}{4}$	88 $\frac{1}{4}$	364	125 $\frac{1}{4}$	26 $\frac{1}{2}$	10 $\frac{1}{2}$					
May to December	245		1002 $\frac{1}{2}$	1000 $\frac{1}{2}$	4	50		3							231
January to April.	120		540	540							40	98	24	4 $\frac{1}{2}$	
May to October...	155		1428 $\frac{1}{2}$	643	338 $\frac{3}{4}$					996					128
October to Nov. ...	14		159	66	40										
	627	164 $\frac{1}{4}$	3145	2426 $\frac{3}{4}$	551	138 $\frac{1}{4}$	364	128 $\frac{1}{4}$	26 $\frac{1}{2}$	1006 $\frac{1}{2}$	40	98	24	4 $\frac{1}{2}$	359

JEAN.

January to April.	93	164 $\frac{1}{4}$	15	177 $\frac{1}{4}$	168 $\frac{1}{4}$	88 $\frac{1}{4}$	349 $\frac{1}{2}$	183 $\frac{1}{4}$	26	10 $\frac{1}{2}$					
May to December	245		1002 $\frac{1}{2}$	1000 $\frac{1}{2}$	4	50		4 $\frac{1}{2}$							231
January to April.	120		540	540							42	64	3	5	
May to October...	155		1436 $\frac{1}{2}$	646	340					1002					128
October to Nov. ...	14		147	61	37										
	627	164 $\frac{1}{4}$	3141	2424 $\frac{3}{4}$	549 $\frac{1}{4}$	138 $\frac{1}{4}$	349 $\frac{1}{2}$	187 $\frac{3}{4}$	26	1012 $\frac{1}{2}$	42	64	3	5	359

TABLE XXV.
RECORD OF POUNDS OF FOOD EATEN BY PERIODS.

JOE.

PERIODS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
January to April..	108	296½	15	272¾	237¾	135½	545½	443	39½	10½					
May to December	245		1043½	1041½	7	59½		8							231
January to April..	120		540	540							40	89½	32	9	
May to October...	155		1404	632¼	333¾					1271					128
November to Jan.	80	34	1416½	309	122½										
	708	330½	4419	2795½	701	195	545½	451	39½	1281½	40	89½	32	9	359

NANCY.

January to April..	107	296½	15	272¾	237¾	135½	546½	443	39½	10½					
May to December	245		1043½	1041½	7	59½		7							231
January to April..	120		540	540							45	96	32	10	
May to October...	155		1367½	617	321					1025					128
Nov. to March.....	121	17½	1953	412½	150										
	748	314	4919	2883¾	715¾	195	546½	450	39½	1035½	45	96	32	10	359

NEWMAN M.

January to April..	107	296½	15	272¾	237¾	135½	546½	443	39½	10½					
May to December	245		1043½	1041½	7	59½		8							231
January to April..	120		540	540							41½	96	32	9	
May to October...	155		1515½	678½	358					1350½					104
October to Nov. ...	14		173½	72¼	44¼										26
	641	296½	3287½	2605	647	195	546½	451	39½	1361	41½	96	32	9	361

WILKES.

January to April..	107	296½	15	272¾	237¾	135½	545½	443	39½	10½					
May to December	245		1043½	1041½	7	59½		8							231
January to April..	120		540	540							32	91½	22	2	
May to October...	155		1397¼	629	316½					1153					128
October to Nov. ...	14		182	76	45										
	641	296½	3177¾	2559¼	606¼	195	545½	451	39½	1163½	32	91½	22	2	359

TABLE XXVI.
RECORD OF POUNDS OF FOOD EATEN BY PERIODS.
JACK.

PERIODS.	No. of Days Fed.	Corn and Cob Meal.	Corn Meal.	Wheat Bran.	Linseed Oil Cake.	Cotton Seed Meal.	Ensilage.	Timothy Hay.	Cut Oats.	Green Grass.	Carrots.	Mangolds.	Sugar Beets.	Turnips.	Pasture—No. of Days.
January to April.	107	171 $\frac{1}{4}$	12 $\frac{1}{2}$	159	140 $\frac{1}{4}$	79 $\frac{1}{4}$	315 $\frac{1}{4}$	312	33 $\frac{1}{2}$	13					
May to December.	245		994 $\frac{1}{2}$	994 $\frac{1}{2}$	5	50		4 $\frac{1}{2}$							231
January to April.	120		540	540							39	77 $\frac{1}{2}$	4	7	
May to October.	169		1273	577 $\frac{1}{2}$	207					1238					130
November to Feb.	72		1270 $\frac{1}{2}$	238	80										
	713	171 $\frac{1}{4}$	4090 $\frac{1}{2}$	2509	522 $\frac{1}{4}$	129 $\frac{1}{4}$	315 $\frac{1}{4}$	316 $\frac{1}{2}$	33 $\frac{1}{2}$	1251	39	77 $\frac{1}{2}$	4	7	361

SLOCUM.

January to April.	107	171 $\frac{1}{4}$	12 $\frac{1}{2}$	159	140 $\frac{1}{4}$	79 $\frac{1}{4}$	315 $\frac{1}{4}$	312	33 $\frac{1}{2}$	13					
May to December.	245		994 $\frac{1}{2}$	994 $\frac{1}{2}$	5	50			4 $\frac{1}{2}$						231
January to April.	120		540	540							37 $\frac{1}{2}$	81	29	4	
May to October.	155		968 $\frac{1}{4}$	449 $\frac{1}{4}$	222 $\frac{1}{2}$					1039					128
Nov. to March....	117	17	1659	349	117 $\frac{1}{2}$										
	744	188 $\frac{1}{4}$	4174 $\frac{1}{4}$	2491 $\frac{3}{4}$	485 $\frac{1}{4}$	129 $\frac{1}{4}$	315 $\frac{1}{4}$	312	38	1052	37 $\frac{1}{2}$	81	29	4	359

QUISENBERRY.

January to April.	107	171 $\frac{1}{4}$	12 $\frac{1}{2}$	155 $\frac{1}{4}$	140 $\frac{1}{4}$	79 $\frac{1}{4}$	315 $\frac{1}{4}$	312	33 $\frac{1}{2}$	13					
May to December.	245		994 $\frac{1}{2}$	994 $\frac{1}{2}$	5	50		4 $\frac{1}{2}$							231
January to April.	120		540	540							41	96	29	9	
May to October.	155		1003	464 $\frac{1}{2}$	231					1268 $\frac{1}{2}$					128
October to Nov. . .	14		119 $\frac{1}{2}$	50	30										
	641	171 $\frac{1}{4}$	2669 $\frac{1}{2}$	2203 $\frac{1}{4}$	406 $\frac{1}{4}$	129 $\frac{1}{4}$	315 $\frac{1}{4}$	316 $\frac{1}{2}$	33 $\frac{1}{2}$	1281 $\frac{1}{2}$	41	96	29	9	359

YOUNG.

January to April.	107	171 $\frac{1}{4}$	12 $\frac{1}{2}$	155 $\frac{1}{4}$	140 $\frac{1}{4}$	79 $\frac{1}{4}$	315 $\frac{1}{2}$	312	33 $\frac{1}{2}$	13					
May to December.	245		924	924	3	40		2 $\frac{1}{2}$							231
January to April.	120		540	540							41 $\frac{1}{2}$	91 $\frac{1}{2}$	32	6	
May to October.	155		1033 $\frac{1}{2}$	478	238					1123 $\frac{1}{2}$					128
October to Nov. . .	14		77	32	19										
	641	171 $\frac{1}{4}$	2587	2129 $\frac{1}{4}$	400 $\frac{1}{4}$	119 $\frac{1}{4}$	315 $\frac{1}{2}$	314 $\frac{1}{2}$	33 $\frac{1}{2}$	1136 $\frac{1}{2}$	41 $\frac{1}{2}$	91 $\frac{1}{2}$	32	6	359

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1889.

1889 Feb. 21	1889 Feb. 25	1889 Mar. 4	1889 Mar. 11	1889 Mar. 19	1889 Mar. 21	1889 Mar. 26	1889 Apr. 2	1889 Apr. 9	1889 Apr. 16	1889 Apr. 23
	603	610	623	630	633	645	657	650	675	675
	636	657½	667½	667½	680	682½	705	702	707	720
	576	587½	594	595	607	610	622	620	632	648
	710	707	727½	722½	735	735	730	730	740	765
	695	707½	717	726	736	742	747	755	760	767
	....	.....	643	630	642½	660	671	675	692	715
	642	660	680	680	675	692	695	695	708	708
	552	577½	582½	597½	601	625	621	625	648	665
493	506	542	565	592	594	610	612½	610	635	649
	384	403	408	425	428	441	450	445	452	470
	392	407½	412	415	412½	422	432½	440	435	455
	380	400	405	410	411	430	437½	445	460	467
	627	651	652½	650	661	674	678	680	676	709
	540	563	567½	578	575	582	605	600	610	625
	622	645	643	640	650	660	686	670	684	685
	580	587	600	610	615	625	625	610	620	640
	416	432	437	443	450	451	457	468	488	505
	406	423	430	423	447	441	452	460	475	477
	421	445	443	432	438	451	446	468	470	475
	285	295	297	270	290	287	297	290	290	290

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1889-'90.

BREED.	NAME OF ANIMAL.	1889 Apr. 30	1889 June 10	1889 July 24	1889 Aug. 25	1889 Sept. 23	1889 Nov. 6	1890 Jan. 6	1890 Jan. 20
Short - horns...	Sanborn.	690	770	820	870	930	1000	1010	990
	Francis..	745	790	880	915	940	1020	1035	1010
	Allan ...	654	700	750	800	870	940	950	920
	J. Parker	765	790	780	945	1000	1025	1050	1045
	Wilson ..	761	830	910	960	1010	1060	1009	1020
Here- fords...	Zeno...	717½	780	820	850	920	985	1000	962
	Curley...	727½	745	820	950	1000	1050	1070	1055
	Dandy ..	686	760	840	908	960	1025	1000	994
Angus...	Bear	662½	750	825	887	960	1015	1000	969
	Bonnie Blue Gift ..	482	580	635	700	760	850	840	870
	Elbert...	463	520	600	610	650	700	740	730
	Jean	480	550	650	690	750	840	871	820
Grades and Crosses	Joe W...	726½	770	860	900	950	1015	1000	1010
	Nancy W	638	740	800	850	910	990	1000	1025
	N. Mitch- ell . . .	706	780	870	841	980	1010	1030	987
	Wilkes ..	645	750	830	882	940	1040	1075	1040
Scrubs..	Jack ...	523	570	655	705	770	845	841	863
	Slocum..	505	570	640	750	720	790	760	777
	Quisen- berry .	466	530	570	610	720	790	810	810
	Young...	297	360	470	525	580	660	690	675

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890.

1890 Jan. 27	1890 Feb. 3	1890 Feb. 10	1890 Feb. 17	1890 Feb. 24	1890 Mar. 3	1890 Mar. 10	1890 Mar. 17	1890 Mar. 24	1890 Mar. 31	1890 Apr. 7
985	965	990	1002	1010	1025	1010	1025	1022	1025	1020
1010	1017	1049	1055	1050	1065	1057	1060	1035	1025	1032
912	910	951	952	940	970	960	985	912	956	965
1056	1050	1067	1082	1090	1100	1092	1115	1110	1125	1130
1010	1015	1067	1095	1050	1070	1043	1080	1087	1095	1098
950	942	990	958	972	1000	980	980	965	1000	1005
1070	1055	1051	1075	1080	1080	1065	1080	1060	1090	1096
982	970	1005	1002	1000	1020	995	1000	1000	1020	1030
990	970	998	1020	1000	1035	1020	1040	1042	1040	1042
860	853	895	915	905	935	910	925	910	930	940
720	711	745	770	766	795	775	800	778	803	817
812	822	850	850	855	865	860	867	872	895	890
1034	1010	1055	1065	1060	1080	1053	1100	1070	1095	1110
1040	1010	1051	1055	1065	1065	1055	1070	1040	1100	1108
993	980	1001	1040	1040	1060	1030	1050	1045	1075	1080
1033	1030	1060	1065	1065	1090	1066	1000	1060	1090	1080
867	865	892	890	900	930	905	940	922	950	948
795	770	802	805	810	833	800	850	822	855	850
822	815	849	850	850	860	833	880	870	885	890
688	695	725	730	735	750	738	760	742½	780	793

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890.

BREED.	NAME OF ANIMAL.	1890 Apr. 14	1890 Apr. 21	1890 Apr. 28	1890 May 5	1890 May 12	1890 May 19	1890 May 26	1890 June 2
Short-horns ..	Sanborn..	1045	1055	1026	1055	1108	1100	1048	1192
	Francis..	1040	1050	1052	1065	1114	1112	1160	1155
	Allan ...	979	982	978	1000	1012	1036	1085	1075
	J. Parker	1140	1130	1125	1135	1208	1212	1225	1280
	Wilson ..	1095	1085	1078	1085	1140	1140	1155	1160
Here-fords...	Zeno	1001	1008	1000	1015	1045	1060	1100	1113½
	Curley ..	1090	1082	1062	1085	1105	1120	1160	1172
	Dandy...	1036	1045	1042	1025	1050	1058	1105	1110
Angus..	Bear	1045	1065	1070	1065	1135	1135	1175	1215
	Bonnie Blue Gift. .	945	940	930	930	968	1000	1022	1070
	Elbert...	820	817	815	810	868	875	868	890
	Jean... .	885	898	886	890	940	945	975	1020
Grades and Crosses	Joe W... .	1115	1102	1080	1068	1112	1125	1160	1192
	Nancy W	1110	1120	1116	1125	1152	1135	1188	1200
	N. Mitch- ell	1084	1085	1080	1090	1128	1115	1178	1240
	Wilkes ..	1078	1055	1042	1060	1080	1060	1100	1140
Scrubs. .	Jack	953	955	958	958	978	978	1020	1042
	Slocum. .	848	850	862	864	895	905	935	945
	Quisen- berry..	918	908	920	881	912	940	950	950
	Young... .	798	792	802	814	826	845	878	890

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890.

1890 June 9	1890 June 16	1890 June 23	1890 June 30	1890 July 7	1890 July 14	1890 July 21	1890 July 28	1890 Aug. 4	1890 Aug. 11	1890 Aug. 18
1208	1200	1245	1220	1235	1250	1258	1295	1300	1318	1332
1202	1218	1282	1185	1180	1228	1230	1265	1270	1272	1296
1085	1100	1135	1120	1112	1128	1135	1167	1168	1181	1180
1276	1260	1265	1270	1265	1300	1310	1336	1323	1340	1375
1128	1195	1252	1220	1190	1220	1220	1234	1220	1248	1250
1135	1130	1140	1130	1145	1168	1181	1218	1226	1242	1255
1208	1218	1200	1205	1240	1260	1270	1305	1310	1337	1340
1150	1176	1195	1170	1178	1192	1200	1222	1228	1261	1258
1205	1210	1250	1225	1220	1240	1256	1280	1278	1310	1305
1100	1085	1045	1095	1095	1130	1142	1165	1170	1202	1202
915	930	940	952	942	965	973	1000	995	1015	1025
1035	1046	1050	1040	1025	1032	1060	1085	1080	1110	1112
1220	1220	1270	1225	1225	1250	1260	1245	1290	1310	1312
1235	1242	1252	1252	1245	1245	1228	1252	1265	1305	1313
1240	1225	1271	1218	1230	1250	1265	1288	1280	1313	1311
1160	1155	1170	1190	1185	1204	1218	1252	1260	1282	1286
1075	1065	1050	1085	1080	1090	1090	1118	1118	1110	1127
960	982	970	980	980	1000	1000	1015	1001	1040	1048
1000	1000	987	1026	1000	1020	1018	1050	1040	1068	1075
900	905	910	930	940	960	970	991	985	1007	1012

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890.

BREED.	NAME OF ANIMAL.	1890 Aug. 25	1890 Sept. 1	1890 Sept. 8	1890 Sept. 15	1890 Sept. 22	1890 Sept. 29	1890 Oct. 3	1890 Oct. 14
Short- horns..	Sanborn.	1333	1335	1350	1330	1360	1370	1380	1420
	Francis..	1316	1335	1330	1295	1332	1345	1360	1430
	Allan....	1213	1235	1260	1240	1292	1290	1300	1340
	J. Parker	1390	1400	1417	1415	1445	1449	1470	1490
	Wilson...	1260	1277	1285	1285	1270	1302	1300	1300
Here- fords ..	Zeno ...	1262	1277	1290	1262	1265	1272	1272	1320
	Curley...	1358	1365	1377	1385	1400	1425	1420	1440
	Dandy...	1280	1287	1287	1285	1317	1327	1342	1340
Angus..	Bear	1331	1331	1373	1380	1375	1410	1422	1445
	Bonnie Blue Gift...	1225	1220	1230	1245	1240	1255	1255	1265
	Elbert ..	1042	1035	1065	1075	1187	1092	1112	1135
	Jean ...	1130	1140	1157	1170	1155	1165	1185	1222
Grades and Crosses	Joe W...	1330	1357	1347	1372	1390	1385	1400	1445
	Nancy ..	1331	1387	1340	1350	1350	1400	1405	1465
	N. Mitch- ell	1335	1340	1375	1375	1382	1385	1410	1465
	Wilkes...	1300	1297	1360	1335	1352	1372	1360	1410
Scrubs..	Jack	1150	1167	1175	1185	1200	1215	1220	1235
	Slocum..	1054	1060	1062	1070	1057	1067	1080	1114
	Quisen- berry..	1085	1104	1100	1117	1140	1145	1145	1216
	Young...	1010	1015	1030	1050	1057	1060	1055	1103

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890.

1890 Oct. 27	1890 Nov. 3	1890 Nov. 10	* 1890 Nov. 13	1890 Nov. 24	1890 Dec. 1	1890 Dec. 8	1890 Dec. 15
1475	1470	1495	1455	1480	1507	1470	1557
1432	1445	1452	1435	1450	1475	1462	1520
1375	1350	1372	.....	.....	.....	.....	.....
1545	1525	1539	.....	.....	.....	.....	.....
1365	1360	1360	.....	.....	.....	.....	.....
1355	1330	1365	1335	1365	1405	1430	1437
1495	1490	1470	1425	1475	1507½	1520	1551
1370	1375	1410	.....	.....	.....	.....	.....
1515	1460	1487	1460	1478	1530	1537	1555
1342	1315	1352	1310	1320	1350	1370	1400
1185	1160	1172	.....	.....	.....	.....	.....
1240	1225	1250	.....	.....	.....	.....	.....
1485	1480	1472	1435	1500	1496	1500	1535
1455	1445	1475	1430	1470	1495	1515	1532
1500	1475	1452	.....	.....	.....	.....	.....
1425	1432	1472	.....	.....	.....	.....	.....
1275	1270	1315	1260	1300	1360	1370	1393
1142	1130	1140	1085	1100	1140	1185	1182
1232	1212	1232	.....	.....	.....	.....	.....
1150	1105	1105	.....	.....	.....	.....	.....

* Weight at Chicago, at Fat Stock Show.

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1890-'91.

BREED.	NAME OF ANIMAL.	1890 Dec. 22	1890 Dec. 29	1891 Jan. 5	1891 Jan. 12	1891 Jan. 19	1891 Jan. 26	1891 Feb. 2	1891 Feb. 9
Short-horns..	Sanborn.	1590	1610	1625	1625	1660	1640	1691	1712
	Francis..	1540	1553	1566	1572	1575	1603	1633	1645
Here-fords..	Zeno....	1450	1472	1475	1490	1512	1522	1534	.....
	Curley...	1553	1565	1565	1580	1592	1603	1610	1618
Angus...	Bear....	1600	1597	1592	1632	1635	1660	1685	1685
	Bonnie..	1400	1407	1417	1430	1440	1470	1476	1500
Grades..	Joe.....	1580	1593	1615	1615	1616	1637½	.....	.....
	Nancy...	1530	1570	1580	1605	1626	1643	1628	1628
Scrubs..	Jack...	1400	1425	1425	1451	1467½	1482½	1475	.....
	Slocum..	1195	1216	1230	1233	1260	1255	1262½	1267

Joe.	Jan. 18, 1891—1620, Weight preparatory to slaughter. Jan. 21, 1891—1634, Weight preparatory to slaughter. Jan. 27, 1891—1633, Killed.
Jack.	Jan. 30, 1891—1481, Weight preparatory to slaughter. Jan. 31, 1891—1484, Weight preparatory to slaughter. Feb. 1, 1891—1483, Weight preparatory to slaughter. Feb. 2, 1891—1481, Killed.
Zeno.	Feb. 2, 1891—1534, Weight preparatory to slaughter. Feb. 5, 1891—1541, Killed.
Sanborn.	Feb. 7, 1891—1721, Weight preparatory to slaughter. Feb. 8, 1891—1722, Weight preparatory to slaughter. Feb. 9, 1891—1712, Killed.
Bear.	Feb. 18, 1891—1693, Weight preparatory to slaughter. Feb. 19, 1891—1695, Weight preparatory to slaughter. Feb. 20, 1891—1694, Killed.
Bonnie.	Feb. 25, 1891—1505, Killed.
Francis.	Feb. 27, 1891—1681, Killed.
Curley.	March 2, 1891—1630, Killed.
Slocum.	March 4, 1891—1275, Weight preparatory to slaughter. March 5, 1891—1278, Killed.
Nancy.	March 7, 1891—1638, Weight preparatory to slaughter. March 8, 1891—1647, Weight preparatory to slaughter. March 9, 1891—1642, Killed.

TABLE XXVII—CONTINUED.

WEIGHTS OF STEERS BY WEEKS. 1891.

1891 Feb. 16	1891 Feb. 20	1891 Feb. 23	1891 Feb. 24	1891 Feb. 25	1891 Feb. 26	1891 Feb. 27	1891 Feb. 28	1891 Mar. 1	1891 Mar. 2	1891 Mar. 3
.....										
1646½	1657	1667	1672	1683	1677	1683				
1597	1610	1619	1616	1626	1620	1620	1630	1620	1639	1630
1687	1694									
1507	1510	1507	1505							
1580	1657	1600							1633	
1279		1275							1278	1283

COST OF FOOD.

The actual cost of the feed of the experimental animals can not now, after the lapse of more than four years, be ascertained with certainty. Many of the papers, including the bills rendered, have been lost by fire and otherwise. The prices charged at the time would, probably, not differ much from those of the present day and these would, in any case, have to serve as a basis for calculation whenever the results of this trial were to be applied to present conditions. It is deemed best

therefore, to base all subsequent statements and deductions on the following valuations:

Corn meal and wheat bran	$\frac{3}{4}$	cent a pound.
Linseed and cotton seed meal	1	“ “
Corn and cob meal	$\frac{1}{3}$	“ “
Cut oats and timothy hay	$\frac{3}{10}$	“ “
Roots	$\frac{1}{4}$	“ “
Ensilage and cut grass	$\frac{1}{10}$	“ “
Pasture, per head	\$1.00	per month.

It is also proper to state that by *dry weight* of feed must be understood feed, not water free, but containing the average amount of moisture usually found in such air dry material, or about 10 to 12 per cent. and that the *total* dry weight of the feed consumed includes ensilage, roots and cut grass with 20 per cent. of such dry matter.

In arranging the values for subsequent comparison the total time of the experiment, nearly two years, is divided into five periods. This is done for two purposes: the first, to separate and perhaps eliminate the third or middle period* entirely, as the animals, during the

*The numerous difficulties under which the experiment was carried on renders it necessary to give a plain statement of the causes that led to the manner of feeding adopted for the third period; this is best done by communicating the following documents:

Letter from Prof. H. J. Waters, dated State College, Pennsylvania, July 3, 1895.

“DR. PAUL SCHWEITZER: I hasten to reply to your inquiry of the 29th by saying that the light feeding during the months of January, February, March and April, 1890, was occasioned by some doubt on the part of Dr. Porter and the Board of Curators, as to what should be done with the experimental steers, as to whether the experiment should be continued. Pending a settlement of this question, we were directed to feed as light rations as we could without losing any of the gain we had already secured, etc.”

The reason for this was the request, in May, 1889, on the part of the donors of the steers, for their return. Bearing upon it is the letter from Prof. J. W. Sanborn (without date) to

“*The Honorable Executive Committee:*

“GENTLEMEN: I pass the following letters to Mr. Waters to read to you, by his request, with the explanation due to myself to make, namely:

120 days which it lasted, were kept at a maintenance ration and gained practically no weight at all, and the second, to separate the periods of exclusively dry feeding from those in which pasturing, with a feeding of green grass or ensilage as a start, supplemented dry feed wholly or in part.

Taking now the case of the Shorthorn steer, "Sanborn," we find, from the tables given, weight and cost of food to have been as follows:

First month, 19 days.

69½ pounds of corn and cob meal at ½ cent.....	34.75 cents
46½ pounds of wheat bran at ¾ cent.....	34.88 "
46½ pounds of oil cake meal at 1 cent	46.50 "
61 pounds of hay at ¼ cent.	18.30 "
<hr/>	
223½ pounds of dry feed costing	134.43 "
127 pounds of ensilage at 1/10 cent.	12.70 "
<hr/>	
248.9 pounds of total dry feed costing.....	147.13 "

that these calves were obtained largely of personal acquaintances, who gave them into my hands for certain distinct purposes.

I am confident that those ends are not likely to be secured. In discharge of what I regarded an honorable obligation, I informed them of the fire and of my coming change of position, etc."

(Prof. Sanborn's chair was declared vacant on June 3, 1889.)

One of the letters referred to, dated May 27, 1889:

"*J. W. Sanborn, Esq.:*

"DEAR SIR: I quite agree with you that it would be most desirable that the calves which were placed in your charge to experiment with should be returned, and I will at once address the Secretary of our association and have him see to the matter, if there is yet time before the third of June, etc."

Record of Board of Curators:

"(ST. LOUIS, August 2, 1889.

"*Resolved*, That the claims of (mentioning them), donors of cattle, for the return of their gifts, be, and they are, hereby, declined, on the ground that said cattle were given unconditionally, and that the Board of Curators have no right to return the same."

"UNIVERSITY, COLUMBIA, August 29, 1889.

"The letters of * * * , concerning calves donated to the Agricultural College, are submitted to the committee, and it is ordered that the secretary, Mr. Babb, be instructed to write ———, stating that the matter will be laid before the Board at its December meeting."

(No further entries were made, and, it is to be presumed, the difficulties were adjusted by April, 1890.)

In a similar way weight and cost of the feed consumed is found for the five periods:

First period, 108 days.

1,257 pounds of dry feed costing.....	827.47	cents
1,380 pounds of total dry feed costing.....	888.77	“

Second period, 245 days.

2,166½ pounds of dry feed costing.....	1,633.35	“
--	----------	---

Third period, 120 days.

1,080 pounds of dry feed costing.....	810.00	“
1,116 pounds of total dry feed costing.....	853.00	“

Fourth period, 128 days.

2,309½ pounds of dry feed costing.....	1,813.00	“
2,534 pounds of total dry feed costing.....	1,926.00	“

Fifth period, 93 days.

2,369 pounds of dry feed costing.....	1,811.70	“
---------------------------------------	----------	---

From this we find the average cost in cents of one pound of feed to be for:

First month (part of month, 19 days).....	.60	cents	total	.59	cents
First period, 108 days.....	.66	“	“	.64	“
Second period, 245 days.....	.75	“	“		“
231 days on pasture (*).					
Third period, 120 days.....	.75	“	“	.76	“
Fourth period, 128 days.....	.78	“	“	.76	“
128 days on pasture (†).					
Fifth period, 93 days (not counting hay).....	.76	“	“		

It is seen that after the first period the lower priced and consequently inferior feed is omitted or at least reduced in amount and that the average price in the case of the others may safely be taken at 3-4 cents per pound

* Counting in the price of the pasture, the total cost of feed during the period was 2,308.65 cents; if now the cost of dry feed is taken uniformly at 0.75 cents a pound, a total of 3,198 pounds of dry feed was consumed. The amount actually weighed out was 2,166½ pounds which leaves 1,031½ pounds derived from pasture. We took the green food to contain 20 per cent. of dry matter, which gives for this period and age of the animal a daily consumption of 22.5 pounds of grass from pasture.

† In a similar way the daily consumption for this period and age of the animal is 44 pounds of grass.

for all the feed consumed, calculated, of course, for ordinary air dry material. This would, likewise, be the price per pound of the feed consumed by all the other animals since the proportion of the ingredients that made up the feed was about the same for all. Sight, however, must not be lost of the fact that during the fifth and last period hay was fed *ad libitum* without weighing; this would in reality decrease the cost per pound of the feed consumed while increasing the cost of production; but, while a fault in the experiment, it is probably of comparatively little importance.

In glancing over the values giving the number of pounds of (*dry*) food to make one pound of increase in live weight, those for the third or middle period, already spoken of, are significant. Since there was practically no growth, in the sense of increase of weight, the whole of the food consumed was employed for sustaining the vital functions, and by dividing the number of days into the pounds of dry food eaten we get a factor which for all of the 20 animals ranges from 9.1 to 9.3 pounds of dry feed eaten per day. This was, however, nearly all corn meal and wheat bran, as the hay eaten was not weighed, and means that the limit below which animals of the weight of ours can not be made to put on flesh is about 9 1-4 pounds of corn meal or bran per day. In calculating this for actual live weight we find the animals in question to demand a daily ration, besides hay, of 1 pound of corn meal and wheat bran for each 9 1-2 to 11 1-2 pounds of live weight, the lighter animals apparently requiring less than the heavier ones.

TABLE XXVIII.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

SHORTHORN—"SANBORN."

	No. of days fed.. . . .	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds	Increase per day.....	Pounds of food to make 1 pound of increase.
1889.								
January to April.....	108	1257	613½	.....	690	155	1.44	9.0
May to December.....	245	2168½	.....	231	1010	320	1.31	6.8
Counting grass from pasture as indicated in note								10.0
1890.								
January to April.....	120	1080	180	.....	1026	16	0.13	69.8
May to October.....	155	2309½	1126½	128	1380	354	2.29	7.2
Counting grass from pasture as indicated in note								10.3
1891.								
November to February...	93	2369	(hay <i>ad libit.</i>)		1712	332	3.57	7.1
Whole period... ..	721	9184	1928	359	.....	1177	1.63	10.0
Including pasturage	Omit	ting m	ainten	ance	period			
		(9 pou	nds of	feed	per da	y)..	1.93	9.1

SHORTHORN—"FRANCIS."

1889.								
January to April.....	108	1429	749	.....	745	192	1.78	8.2
May to December.....	245	2169½	.....	231	1035	290	1.18	7.0
Counting grass from pasture as indicated in note								11.3
1890.								
January to April.....	120	1080	140	.....	1052	17	0.14	63.5
May to October.....	155	2267½	1161	128	1360	308	1.99	8.1
Counting grass from pasture as indicated in note								11.8
1891.								
November to February...	111	2456	(hay <i>ad libit.</i>)		1683	323	2.91	7.6
Whole period	739	9402	2050	359	.	1130	1.53	10.6
Including pasturage.....	Omit	ting m	ainten	ance	period			
		(9 pou	nds of	feed	per da	y)..	1.80	9.8

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

SHORTHORN—"ALLAN."

	No. of days fed.....	Pounds of dry food eaten.	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds ...	Increase per day.....	Pounds of food to make 1 pound of increase...
1889.								
January to April	108	1449 $\frac{3}{4}$	518 $\frac{1}{2}$	.....	654	163	1.51	9.5
May to December	245	2166 $\frac{1}{2}$	.....	235	950	296	1.21	7.3
Counting grass from pasture as indicated in note								10.9
1890.								
January to April	120	1080	145	.....	978	28	0.23	42.6
May to October	155	2378	924 $\frac{1}{2}$	128	1300	322	2.08	8.0
Counting grass from pasture as indicated in note								11.4
November	14	284 (hay ad libit.)			1372	72	5.14	3.9
Whole period.....	642	7358 $\frac{1}{4}$	1588	363	.....	881	1.37	11.2
Including pasturage.....	Omitting maintenance (9 pounds of feed per day) ..						1.63	10.3

SHORTHORN—"JAS. PARKER."

1889.								
January to April	108	1448 $\frac{3}{4}$	598	.....	765	135	1.25	11.6
May to December	245	2166 $\frac{1}{2}$	.....	235	1050	285	1.16	7.6
Counting grass from pasture as indicated in note								11.3
1890.								
January to April	120	1080	109 $\frac{1}{2}$	...	1125	75	0.62	14.4
May to October	155	2430	1132 $\frac{1}{2}$	128	1470	345	2.22	7.7
Counting grass from pasture as indicated in note								11.0
November	14	254 (hay ad libit.)			1539	69	4.93	3.7
Whole period..	642	7179 $\frac{1}{4}$	1840	363	.....	909	1.42	10.7
Including pasturage.....	Omitting maintenance (9 pounds of feed per day) ..						1.60	10.3

TABLE XXVIII.—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

SHORTHORN—"WILSON."

	No. of days fed. . . .	Pounds of dry food eaten	Pounds of green food eaten	No. of days on pasture.	Weight of animal at end of period.	Increase in pounds . . .	Increase per day.	Pounds of food to make 1 pound of increase. . .
1889.								
January to April	108	1696	617½	....	761	148	1.37	12.3
May to December	245	2168½	.....	231	1009	248	1.01	8.7
Counting	grass	from p	asture	as in	dicat	e	d in	note
1890.								
January to April	120	1080	174½	...	1078	69	0.57	15.9
May to October	155	2119½	1074	128	1300	222	1.43	10.6
Counting	grass	from p	asture	as in	dicat	e	d in	note
November	14	255	(hay ad	libit.)	1360	60	4.29	4.0
Whole period.	642	7319	1866	359	....	747	1.16	13.2
Including pasturage. . . .	Omit	ting m	ainten	ance	period			
	(9 pou	nds of	feed	per da	y)..	1.30	12.9	

AVERAGE OF ALL SHORTHORNS.

1889.								
January to April	108	1456	619	....	723	158	1.46	10.0
May to December	245	2168	.....	233	1011	288	1.18	7.5
Counting	grass	from p	asture	as in	dicat	e	d in	note
1890.								
January to April	120	1080	150	....	1052	41	0.34	26.7
May to October	155	2301	1084	128	1430	310	2.00	8.1
Counting	grass	from p	asture	as in	dicat	e	d in	note
November	49	1117	(hay ad	libit.)	1533	171	3.49	6.5
Whole period.	677	8122	1853	361	....	968	1.43	11.0
Including pasturage. . . .	Omit	ting m	ainten	ance	period			
	(9 pou	nds of	feed	per da	y)..	1.66	10.3	

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

HEREFORD—"ZENO."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture..	Weight of animal at end of period.....	Increase in pounds..	Increase per day	Pounds of food to make 1 pound of increase..
1889.								
March to April.....	51	697	246½	.....	717	74	1.45	10.1
May to December.....	245	2165½	.....	231	1000	283	1.16	7.7
Counting grass from pasture as indicated in note								11.3
1890.								
January to April.....	120	1080	155	.....	1000	..	.....	.....
May to October.....	155	2358½	987½	128	1272	272	1.76	9.4
Counting grass from pasture as indicated in note								13.5
1891.								
October to March.....	89	2033½	(hay ad libit.)	1534	262	2.94	7.8	
Whole period.....	660	8334½	1389	359	.....	891	1.35	12.1
Including pasturage....	Omitting maintenance (9 pounds of feed per day)..						1.70	10.8

HEREFORD—"CURLEY."

1889.								
March to April.....	93	1180½	475	.....	727½	127	1.37	10.0
May to December.....	245	2165½	.....	231	1070	343	1.40	6.3
Counting grass from pasture as indicated in note								9.3
1890.								
January to April.....	120	1080	66	.....	1062	-8	.....	.....
May to October.....	155	2332	1116½	128	1420	358	2.31	7.1
Counting grass from pasture as indicated in note								10.3
1891.								
October to March.....	114	2506	(hay ad libit.)	1630	210	1.84	11.9	
Whole period....	727	9264	1657½	359	.....	1030	1.42	11.4
Including pasturage.....	Omitting maintenance (9 pounds of feed per day)..						1.71	10.3

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

HEREFORD—"DANDY."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture..	Weight of animal at end of period.....	Increase in pounds....	Increase per day.....	Pounds of food to make 1 pound of increase...
1889								
March to April.....	93	1099	429½	.....	686	151	1.62	7.8
May to December.....	245	2165½	.....	231	1000	314	1.28	6.9
Counting grass from pasture as indicated in note								10.2
1890								
January to April.....	120	1080	66½	...	1042	42	0.35	25.9
May to October.....	155	2391	1206½	128	1342	300	1.94	8.8
Counting grass from pasture as indicated in note								12.5
October to November ...	14	295 (hay ad libit.)			1410	68	4.85	4.3
Whole period.....	627	7030½	1702½	359	...	875	1.39	10.9
Including pasturage.....	Omitting maintenance (9 pounds of feed per day)						1.64	10.2

AVERAGE OF ALL HEREFORDS.

1889								
March to April.....	79	992	384	...	710	117	1.48	9.1
May to December.....	245	2165½	.....	231	1023	313	1.28	6.9
Counting grass from pasture as indicated in note								10.2
1890								
January to April... ..	120	1080	96	.....	1035	12	0.10	91.0
May to October.....	155	2360	1103	128	1345	310	2.00	8.3
Counting grass from pasture as indicated in note								12.0
1891								
October to March.....	72	1611 (hay ad libit.)			1525	180	2.50	8.9
Whole period.....	671	8208½	1583	359	...	932	1.39	11.5
Including pasturage.....	Omitting maintenance (9 pounds of feed per day)						1.67	10.4

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

ANGUS—"BEAR."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds.....	Increase per day.....	Pounds of food to make 1 pound of increase...
1889								
February to April.....	65	789 $\frac{1}{4}$	320 $\frac{1}{2}$	.....	662	172	2.65	5.0
May to December.....	245	2163 $\frac{1}{2}$	.....	231	1000	338	1.30	6.4
Counting	grass	from p	asture	as in	dicat	d in	note	9.5
1890								
January to April.....	120	1080	166 $\frac{1}{2}$	.....	1070	70	0.58	15.7
May to October.....	155	2515	1168 $\frac{1}{2}$	128	1422	352	2.27	7.8
Counting	grass	from p	asture	as in	dicat	d in	note	11.0
1891								
November to February...	104	2452	(hay <i>ad libit.</i>)	1694	272	2.61	9.0	
Whole period.....	689	8999 $\frac{3}{4}$	1655 $\frac{1}{2}$	359	.....	1204	1.74	9.5
Including pasturage.....	Omit	ting m	ainten	ance	period			
	(9 pou	nds of	feed	per da	y)..	1.99	9.1	

ANGUS—"BONNIE."

1889								
February to April.....	93	826 $\frac{1}{2}$	373 $\frac{1}{2}$	...	482	166	1.78	5.4
May to December.....	245	2065	.....	231	840	358	1.46	5.7
Counting	grass	from p	asture	as in	dicat	d in	note	8.7
1890								
January to April... ..	120	1080	69	.....	930	90	0.75	12.1
May to October.....	155	2543 $\frac{1}{2}$	912 $\frac{1}{2}$	128	1255	325	2.10	8.4
Counting	grass	from p	asture	as in	dicat	d in	note	11.9
1891								
November to February...	109	2270 $\frac{1}{2}$	(hay <i>ad libit.</i>)	1505	250	2.29	9.1	
Whole period.....	722	8785 $\frac{1}{2}$	1355	359	.....	1189	1.51	9.4
Including pasturage.....	Omit	ting m	ainten	ance	period			
	(9 pou	nds of	feed	per da	y)..	1.82	9.2	

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

ANGUS—"ELBERT."

	No. of days fed.....	Pounds of day food eaten.....	Pounds of green food eaten.....	No. of days on pasture..	Weight of animal at end of period.....	Increase in pounds.....	Increase per day.....	Pounds of food to make 1 pound of increase..
1889								
February to April.....	93	764 $\frac{3}{4}$	374 $\frac{1}{2}$	.....	463	107	1.15	7.9
May to December.....	245	2060	.....	231	740	277	1.13	7.5
Counting grass from pasture as in dicated in note								11.2
1890								
January to April.....	120	1080	166 $\frac{1}{2}$	.....	815	75	0.63	14.6
May to October.....	155	2410 $\frac{1}{4}$	996	128	1112	297	1.92	8.8
Counting grass from pasture as in dicated in note								12.6
October to November....	14	265 (hay <i>ad libit.</i>)	.....	.....	1172	60	4.29	4.4
Whole period.....	627	6580	1537	359	.....	816	1.30	11.1
Including pasturage....	Omitting maintenance (9 pounds of feed)	.....	.....	.....	.....	.....	.....	.....
							1.46	10.7

ANGUS—"JEAN."

1889								
February to April.....	93	822 $\frac{1}{4}$	360	.....	480	178	1.92	5.0
May to December.....	245	2061 $\frac{1}{2}$	.....	231	871	391	1.60	5.3
Counting grass from pasture as in dicated in note								7.9
1890								
January to April.....	120	1080	114	.....	886	150	1.3	72.7
May to October.....	155	2422 $\frac{1}{2}$	1002	128	1185	299	1.93	8.8
Counting grass from pasture as in dicated in note								12.5
October to November....	14	245 (hay <i>ad libit.</i>)	.....	.....	1250	65	4.64	3.8
Whole period.....	627	6631	1476	359	.....	948	1.51	9.6
Including pasturage.....	Omitting maintenance (9 pounds of feed)	.....	.....	.....	.....	.....	.....	.....
							1.84	8.6

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

AVERAGE OF ALL ANGUS.

	No. of days fed.	Pounds of dry food eaten.	Pounds of green food eaten.	No. of days on pasture.	Weight of animal at end of period.	Increase in pounds.	Increase per day.	Pounds of food to make 1 pound of increase.
1889								
February to April.	86	801	357	.....	522	156	1.82	5.6
May to December.	245	2062	.....	231	863	341	1.39	6.0
Counting grass from pasture as indicated in note								9.1
1890								
January to April.	120	1080	129	....	925	62	0.52	17.6
May to October.	155	2473	1020	128	1243	318	2.05	8.4
Counting grass from pasture as indicated in note								12.0
1891								
November to February.	60	1308 (hay ad libit.)	.....	.....	1405	162	2.70	8.1
Whole period.	666	7724	1506	359	.....	1039	1.56	9.8
Including pasturage.	Omitting maintenance (9 pounds of feed per day)	.....	.....	.....	.....	.....	1.79	9.3

GRADE—"JOE."

1889								
January to April.	108	1440	556	.....	726	113	1.05	13.7
May to December.	245	2159½	.....	231	1000	274	1.12	7.9
Counting grass from pasture as indicated in note								11.7
1890								
January to April.	120	1080	170½	....	1080	80	0.67	13.7
May to October.	155	2370	1271	128	1400	320	2.07	8.2
Counting grass from pasture as indicated in note								11.8
1891								
November to January.	80	1882 (hay ad libit.)	.....	.....	1637	237	2.96	7.9
Whole period.	708	8931½	1997½	359	.....	1024	1.45	11.2
Including pasturage.	Omitting maintenance (9 pounds of feed per day)	.....	.....	.....	.....	.....	1.60	11.0

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

GRADE—"NANCY."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds....	Increase per day.....	Pounds of food to make 1 pound of increase..
1889.								
January to April	107	1440	557	.....	638	118	1.10	13.1
May to December	245	2158½	.....	231	1000	362	1.48	5.9
Counting grass from pasture as in dicat								8.9
1890.								
January to April	120	1080	183	.....	1116	116	0.97	9.5
May to October	155	2305½	1025	128	1405	289	1.87	8.7
Counting grass from pasture as in dicat								12.6
1891.								
November to March . . .	121	2533 (hay <i>ad libit.</i>)			1633	228	1.88	11.1
Whole period.....	748	9517	1765	359	.....	1113	1.49	10.9
Including pasturage.....	Omitting maintenance period (9 pounds of feed per day)						1.59	10.9

GRADE—"NEWMAN M."

1889.								
January to April	107	1440	557	.....	706	183	1.70	8.6
May to December	245	2159½	.....	231	1030	324	1.32	6.7
Counting grass from pasture as in dicat								9.9
1890.								
January to April	120	1080	178½	.....	1080	50	0.42	22.0
May to October	155	2552	1350½	104	1410	330	2.13	8.6
Counting grass from pasture as in dicat								11.3
1891.								
October to November . . .	14	290 (hay <i>ad libit.</i>)			1452	42	3.00	7.0
Whole period.....	641	7521½	2086	335	.....	927	1.44	10.7
Including pasturage.	Omitting maintenance period (9 pounds of feed per day)						1.63	10.1

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

GRADE—"WILKES."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds....	Increase per day.....	Pounds of food to make 1 pound of increase..
1889.								
January to April.....	107	1440	556	....	645	140	1.31	11.1
May to December.....	245	2159½	....	231	1075	430	1.73	5.0
Counting grass from pasture as indicated in note								7.4
1890.								
January to April.....	120	1080	147½	....	1042	33	....	....
May to October.....	155	2342¾	1153	128	1360	318	2.05	8.1
Counting grass from pasture as indicated in note								11.7
October to November....	14	303 (hay <i>ad libit.</i>)			1472	112	8.00	2.7
Whole period..	641	7325¼	1856½	359	...	967	1.51	10.2
Including pasturage....	Omitting maintenance period (9 pounds of feed per day)					....	1.86	8.7

AVERAGE OF ALL GRADES AND CROSSES.

1889.								
January to April.	107	1440	557	....	678	138	1.29	11.2
May to December.....	245	2159½	.....	231	1026	348	1.42	6.2
Counting grass from pasture as indicated in note								9.2
1890.								
January to April....	120	1080	170	....	1079	53	0.44	20.7
May to October.....	155	2392	1200	122	1394	314	2.03	8.4
Counting grass from pasture as indicated in note								11.8
1891								
November to February...	57	1252 (hay <i>ad libit.</i>)			1549	155	2.72	8.1
Whole period.....	684	8323½	1927	353	....	1008	1.47	10.7
Including pasturage....	Omitting maintenance period (9 pounds of feed per day)					....	1.69	10.2

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

SCRUB—"JACK."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds...	Increase per day....	Pounds of food to make 1 pound of increase...
1889.								
January to April.....	107	907 $\frac{3}{4}$	328 $\frac{1}{4}$	.....	523	183	1.71	5.3
May to December.....	245	2048 $\frac{1}{2}$	.....	231	841	318	1.30	6.5
Counting grass from pasture as indicated in note								9.7
1890.								
January to April.....	120	1080	127 $\frac{1}{2}$	.....	958	117	0.97	9.4
May to October.....	169	2147 $\frac{1}{2}$	1238	130	1220	262	1.55	9.1
Counting grass from pasture as indicated in note								13.5
1891.								
November to February...	72	1588 $\frac{1}{2}$	(hay <i>ad libit.</i>)	1475	255	3.54	6.2	
Whole period.....	713	7772 $\frac{1}{4}$	1693 $\frac{3}{4}$	361	.....	1135	1.59	9.1
Including pasturage.....	Omitting maintenance period (9 pounds of feed per day)					....	1.72	9.0

SCRUB—"SLOCUM."

1889.								
January to April.....	107	907 $\frac{3}{4}$	328 $\frac{1}{4}$	.....	505	180	1.69	5.4
May to December.....	245	2048 $\frac{1}{2}$	.....	231	760	255	1.04	8.0
Counting grass from pasture as indicated in note								12.1
1890.								
January to April.....	120	1080	151 $\frac{1}{2}$	...	826	66	0.55	16.9
May to October.....	155	1040	1039	128	1080	254	1.64	7.3
Counting grass from pasture as indicated in note								11.7
1891.								
November to March ...	117	2142 $\frac{1}{2}$	(hay <i>ad libit.</i>)	1283	203	1.74	10.5	
Whole period.....	744	7818 $\frac{3}{4}$	1518 $\frac{3}{4}$	359	.....	958	1.29	10.7
Including pasturage.....	Omitting maintenance period (9 pounds of feed per day)					...	1.43	10.3

TABLE XXVIII—CONTINUED.

RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.

SCRUB—"QUISENBERRY."

	No. of days fed.....	Pounds of dry food eaten.....	Pounds of green food eaten.....	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds....	Increase per day.....	Pounds of food to make 1 pound of increase..
1889.								
January to April.....	107	904	328 $\frac{1}{4}$	.....	466	103	0.96	9.4
May to December.....	245	2048 $\frac{1}{2}$	.....	231	810	344	1.40	5.9
Counting grass from pasture as in dicat								9.0
1890.								
January to April.....	120	1080	175	.....	920	110	0.92	10.0
May to October.....	155	1698 $\frac{1}{2}$	1268 $\frac{1}{2}$	128	1145	225	1.45	8.7
Counting grass from pasture as in dicat								13.7
October to November....	14	199 $\frac{1}{2}$	(hay <i>ad libit.</i>)	1232	87	6.22	2.3	
Whole period.....	641	5930 $\frac{1}{2}$	1771 $\frac{5}{8}$	359	.....	869	1.35	9.7
Including pasturage.....	Omitting maintenance period (9 pounds of feed per day)						1.46	8.4

SCRUB—"YOUNG."

1889.								
January to April.....	107	904	328 $\frac{1}{4}$	.....	297	52	0.49	18.6
May to December.....	245	1893 $\frac{1}{2}$	.....	231	690	393	1.60	4.8
Counting grass from pasture as in dicat								7.5
1890.								
January to April.....	120	1080	171	.....	802	112	0.93	16.9
May to October.....	155	1749 $\frac{1}{2}$	1123 $\frac{3}{4}$	128	1055	253	1.63	7.8
Counting grass from pasture as in dicat								12.3
October to November....	14	128	(hay <i>ad libit.</i>)	1105	50	3.57	2.6	
Whole period.....	641	5755	1622 $\frac{3}{4}$	359	.....	860	1.34	9.6
Including pasturage.....	Omitting maintenance period (9 pounds of feed per day)						1.43	9.5

TABLE XXVIII—CONTINUED.
RATE OF INCREASE AND POUNDS OF FOOD TO MAKE IT.
AVERAGE OF ALL SCRUBS.

	No. of days fed.....	Pounds of dry food eaten	Pounds of green food eaten	No. of days on pasture.	Weight of animal at end of period.....	Increase in pounds....	Increase per day ..	Pounds of food to make 1 pound of increase..
1889.								
January to April.....	107	906	328 $\frac{1}{4}$	.....	448	130	1.21	7.5
May to December.....	245	2010	.....	231	775	327	1.33	6.1
Counting grass from pasture as indicated in note								9.3
1890.								
January to April.....	120	1080	156	.....	877	102	0.85	10.7
May to October.....	158	1809	1167	129	1150	273	1.73	7.5
Counting grass from pasture as indicated in note								11.7
1891.								
November to February...	54	1015	(hay <i>ad libit.</i>)	1274	124	2.20	8.2	
Whole period.....	684	6820	1651 $\frac{1}{4}$	360	.. .	956	1.39	9.8
Including pasturage	Omitting maintenance period (9 pounds of feed per day)						1.51	9.6

TABLE XXIX.

COMPARISON OF RATE OF INCREASE AND POUNDS TO MAKE IT FOR THE DIFFERENT BREEDS OF CATTLE (OMITTING MAINTENANCE PERIOD).

	Shorthorns..	Herefords..	Angus.....	Grades.	Scrubs
First period, daily increase in pounds.	10.0	9.1	5.6	11.2	7.5
Second " " " " "	11.2	10.2	0.1	9.2	9.3
Fourth " " " " "	11.8	12.0	12.0	11.8	11.7
Fifth " " " " "	6.5	8.9	8.1	8.1	8.2
Whole experimental daily increase in pounds	*11.0	11.5	9.8	10.7	9.8
Pounds of feed to make one pound of increase	10.3	10.4	9.3	10.2	9.6
Cost in cents to make 1 pound of increase	7.72	7.80	6.98	7.65	7.20

* It must be borne in mind that the periods were unequal in length of time and consequently not of equal value in finding the average.

From the preceding table an answer to the second and fifth questions of the inquiry might now be ventured; but since such, on account of the importance attaching to it, must be the correct interpretation of fairly correct data, it is thought best to enter into further details of fact to support the evidence already submitted.

To this end a tabulation has been made of the cost in cents of the feed required to produce one pound of increase in body weight, omitting therefrom the third period as not fitting into the sphere of this inquiry, but giving, in addition, the totals with it included. These totals are, of course, not the averages from the values obtained for the periods, since these are of unequal length, but the averages obtained directly from the values given in the tables.

An additional table giving age in days and weight of the experimental animals at the time of slaughter follows for the sake of completeness.

TABLE XXX.

COST OF FEED IN CENTS MAKING ONE POUND OF GROWTH DURING THE DIFFERENT PERIODS OF THE EXPERIMENT.

	Sanborn	Francis	Allan	Parker	Wilson	Average
First period.	5.73	5.02	5.15	7.12	6.93	5.91
Second "	7.49	8.26	8.15	8.38	9.63	8.38 pasture
Fourth "	5.72	7.33	7.40	7.09	9.88	7.48 pasture
Fifth "	5.46	5.87	3.11	3 00	3.35	4.16
Total.....	6.33	5.70	6.76	6.60	7.58	6.79
Total including third period.	7.06	7.45	7.72	7.52	8.73	7.70
	Zeno	Curley	Dandy			Average
First period.	6.17	6.32	5.05			5.85
Second "	8.47	6.96	7.64			7.70 pasture
Fourth "	8.72	6.47	8.07			7.75 pasture
Fifth "	6.05	10.41	3.41			6.62
Total.....	7.61	7.25	6.64			7.17
Total including third period.	8.56	8.05	7.59			8.07
	Bear	Bonnie	Elbert	Jean		Average
First period.	3.15	3.50	5.23	3.26		3.79
Second "	7.08	6.47	8.39	5.93		6.97 pasture
Fourth "	7.14	7.72	8.13	8.10		7.27 pasture
Fifth "	6.87	6.90	3.48	3.00		5.06
Total.....	5.88	6.00	6.76	5.82		6.12
Total including third period.	6.58	6.68	7.78	6.71		6.94
	Joe	Nancy	Newman	Wilkes		Average
First period.	6.18	5.91	3.86	4.99		5.23
Second "	8.74	6.62	7.39	5.57		7.08 pasture
Fourth "	7.50	8.08	7.76	7.46		7.70 pasture
Fifth "	6.05	8.47	5.43	2.12		5.52
Total.....	7.01	6.83	6.61	6.15		6.64
Total including third period.	7.84	7.59	7.53	7.02		7.49
	Jack	Slocum	Quisenberry	Young		Average
First period.	3.10	3.15	5.47	10.85		5.64
Second "	7.26	9.06	6.71	5.58		7.15 pasture
Fourth "	8.20	7.13	8.36	7.53		7.81 pasture
Fifth "	4.75	8.03	1.81	2.02		4.15
Total.....	5.58	7.37	5.54	5.54		6.01
Total including third period.	6.32	8.36	6.64	6.53		6.96

TABLE XXXI.

AGE IN DAYS AND WEIGHT IN POUNDS OF EXPERIMENTAL ANIMALS AT
CLOSE OF EXPERIMENT.

Name	Period of Life.	Age in days	Weight in pounds
Sanborn. . .	May 2, 1888, to February 9, 1891.	1013	1712
Francis . . .	May 18, 1888, to February 27, 1891.	1015	1683
Allan	May 29, 1888, to November 10, 1890.	911	1372
Parker. . . .	May 8, 1888, to November 10, 1890.	932	1539
Mitchell. . .	May 10, 1888, to November 10, 1890.	930	1360
Average of	all Shorthorns	960	1533
Zeno.	May 12, 1888, to February 2, 1891.	996	1534
Curley	March 2, 1888, to March 2, 1891.	1095	1630
Dandy	April 26, 1888, to November 10, 1890.	944	1410
Average of	all Herefords.	1012	1525
Bear	April 10, 1888, to February 20, 1891.	1046	1694
Bonnie.	November 15, 1888, to February 25, 1891.	822	1505
Elbert	September 7, 1888, to November 10, 1890.	810	1172
Jean	August 26, 1888, to November 10, 1890.	822	1250
Average of	all Angus.	875	1405
Joe.	March 25, 1888, to January 27, 1891.	1038	1637
Nancy.	April 5, 1888, to March 9, 1891.	1068	1642
Newman. . . .	March 30, 1888, to November 10, 1890.	971	1452
Wilkes	April 7, 1888, to November 10, 1890.	963	1472
Average of	all grades.	1010	1551
Jack.	March 8, 1888, to February 2, 1891.	1061	1457
Slocum	March 28, 1888, to March 5, 1891.	1072	1283
Quisenberry. .	April 4, 1888, to November 10, 1890.	960	1232
Young	April 12, 1888, to November 10, 1890.	968	1105
Average of	all scrubs.	1015	1269

The last table disproves what, within certain limits, might seem to be a natural relation between age and weight of an animal; the scrubs being the oldest, yet weighed the least, and, even omitting them, no connection is apparent between the others:

ORDER OF BREEDS.

IN POINT OF AGE.	IN POINT OF WEIGHT.
Angus (875 days).....	Scrub (1269 pounds).
Shorthorn (960 days).....	Angus (1405 pounds).
Grade (1010 days).....	Hereford (1525 pounds).
Hereford (1012 days).....	Shorthorn (1533 pounds).
Scrub (1015 days).....	Grade (1551 pounds).

The average cost in cents of growing a pound of flesh in the animals of the breeds experimented upon is, then, for the different periods, as follows:

1 PERIOD.	2 PERIOD.	4 PERIOD.	5 PERIOD.	WHOLE TIME.
Angus....3.79	Angus. . .6.97	Angus....7.27	Scrub....4.15	Scrub.... 6.01
Grade....5.23	Grade....7.08	Shorthorn.7.48	Shorthorn 4.16	Angus.... 6.12
Scrub....5.64	Scrub....7.15	Grade....7.70	Angus....5.06	Grade....6.64
Hereford..5.85	Hereford..7.70	Hereford..7.75	Grade....5.52	Shorthorn. 6.79
Shorthorn.5.91	Shorthorn,8.38	Shorthorn,7.81	Hereford.6.62	Hereford. 7.17

And considering the final results merely, it is plain that to raise one pound of Shorthorn costs less than to raise one pound of Hereford, and so down to one pound of scrub, which is the cheapest and might, at first glance, seem to indicate a superiority of this over all other breeds; but cheapness of production *alone* no more determines the merit of a breed of cattle than it does of any other manufactured product, and where, as in this case, scrubs at three years old weigh yet from 130 to 280 pounds less than the animals of other breeds which, besides, are younger, the slight advantage of 1-10, 6-10, 8-10 and 12-10 of a cent a pound of live weight produced counts for nothing, or, at best, for very little. Comparing f. e. the scrub with the Angus and Shorthorn, we find the two latter weighing respect-

ively 130 and 260 pounds more, while being 140 and 55 days younger than the former; this means that to produce 130 pounds additional live weight of Angus, or 260 pounds of Shorthorn, costs respectively 13 cents, or \$2.08 more than to raise the same weight of scrub, with a gain in time, however, of nearly five months for the former and two months for the latter, which, in labor saved and in reduced risk of accident, makes amply up for it. Besides, the price per pound, paid in open market, for a 1,400 or 1,550 pound well bred steer of improved breed is sufficiently higher than that paid for a 1,270 pound scrub, to cover not only the difference in cost of production, but to leave a surer and at all times more certain profit, if for no other reason than an always ready market to absorb this grade of cattle.

It is proper here to make a judicious comparison of the cost of cattle, *as given*, with their price in open market; the farmer's experience has probably proven the latter to be more than the former, a fact which might seem to argue against our experiment, were it not that a number of circumstances must be taken into account which do not enter into this investigation. These are:

1. That the cost of raising calves, say during the first year of their lives, is less than that of a later period. That, consequently, the cost of production calculated for the whole of their lives is less than that of the later period alone.

2. That the cost of the feed has been given at market price, allowing a profit to one or two middle men, which the farmer who produces it should retain himself.

3. That the manure produced by the animals has not been given any value at all, while, in reality, it is a most important element in farm economy, and worth a good many dollars, even on fertile western lands.

There is no doubt that the foregoing considerations, when properly converted into actual cash, would reduce our cost of production below the market price; yet, as a basis of comparison of the breeds, the figures given are perfectly appropriate and serviceable, and no reduction from them need be made.

While, then, the individual values, expressive of the cost of feed to make one pound of growth for the different periods of life, may be studied with advantage, and, under certain conditions, be followed as guides; and while other factors, indeed,* should also receive their due attention, it appears to the writer that what may be called the specific daily increase, obtained by dividing the age in days into the increase or live weight in pounds, gives, in reality, the proper expression of the value of a breed.

SPECIFIC DAILY INCREASE OF BREED.

(In pounds per day of life.)

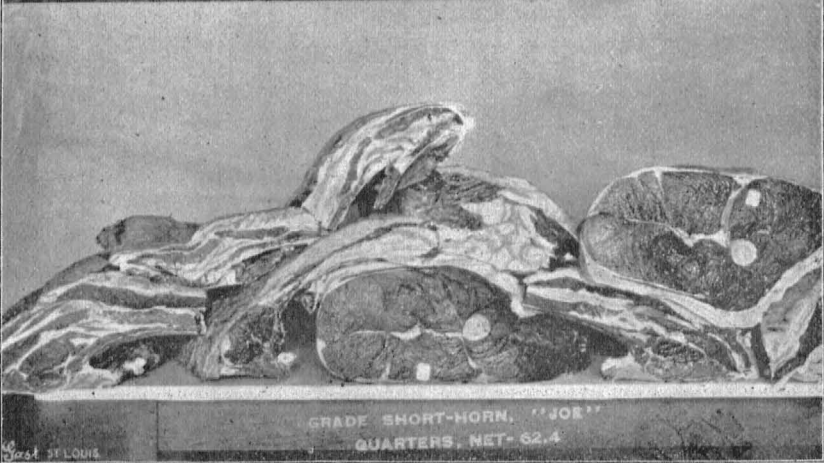
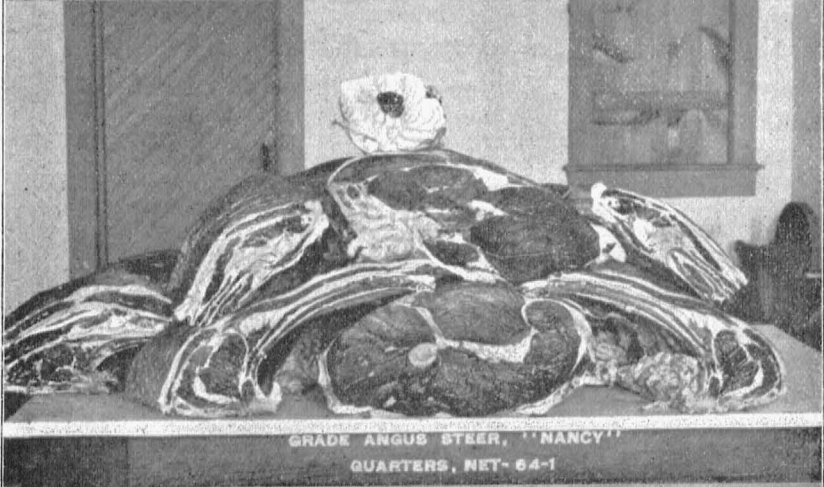
ANGUS.....	1.606
SHORTHORN.....	1.597
GRADE.....	1.536
HEREFORD.....	1.507
SCRUB.....	1.250

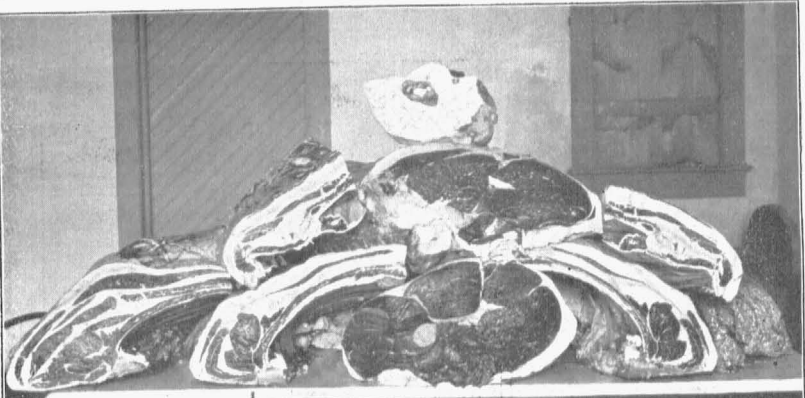
I would affirm, then, that *in point of early maturity, in power of attaining heavy weight, and in certainty of commanding a market at profitable prices, the breeds stand in the following order: Angus, Shorthorn, Grades, Herefords, and Scrubs.*

*Such f. e. as the cost per pound of increase during the dry feed and pasture period; there are two of each kind, which, for comparison, may be united:

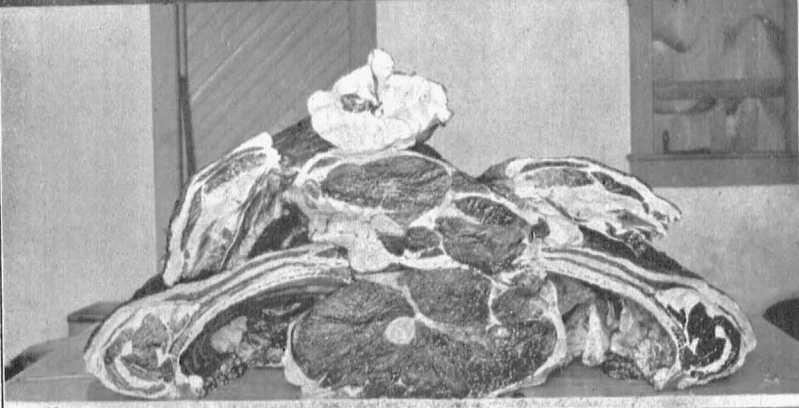
	SHORTHORN.	HEREFORD.	ANGUS.	GRADE.	SCRUB.
2d and 4th periods....	8.38	7.70	6.97	7.08	7.15
Pasture.....	7.48	7.75	7.27	7.70	7.81
Average.....	7.93	7.72	7.12	7.39	7.48
1st and 5th periods...	5.91	5.85	3.79	5.23	5.64
Dry feed.....	4.16	6.62	5.06	5.52	4.15
Average.....	5.03	6.23	4.42	8.38	4.89

Now, while the cost of the hay, fed during the fifth period, does not enter into the value given for it, because no weights were taken, it yet seems plain that it costs more to raise beef at pasture, even when supplemented by dry feed, than by dry feed alone; the physical exercise taken at pasture may, perhaps, account for it.





SHORT HORN STEER, "SANBORN"
QUARTERS, NET- 65-5

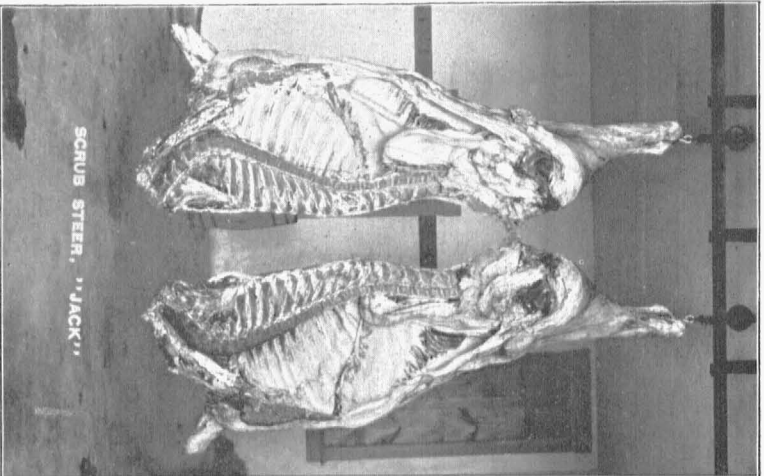


ABERDEEN ANGUS STEER, "BEAR"
QUARTERS, NET- 63-

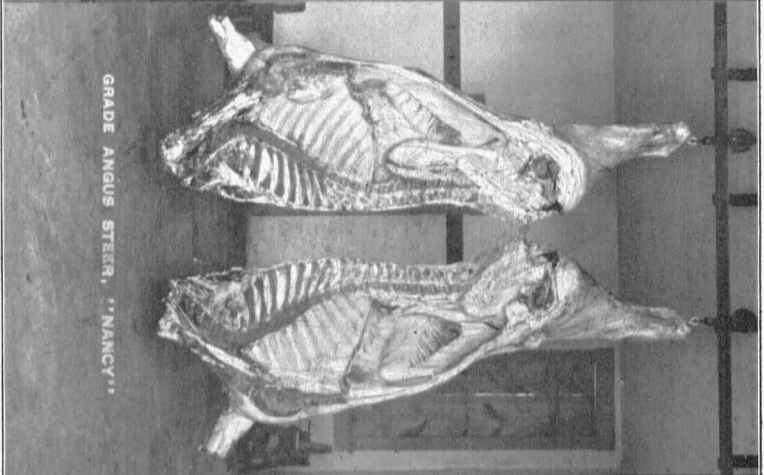


BRED HEREFORD STEER, "ZE40"
QUARTERS, NET- 63-3

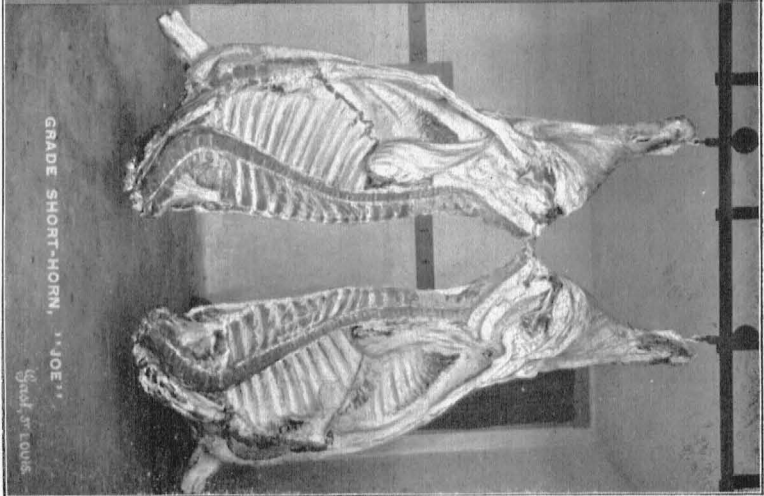
Jan, ST. LOUIS



SCRUB STEER, "JACK"

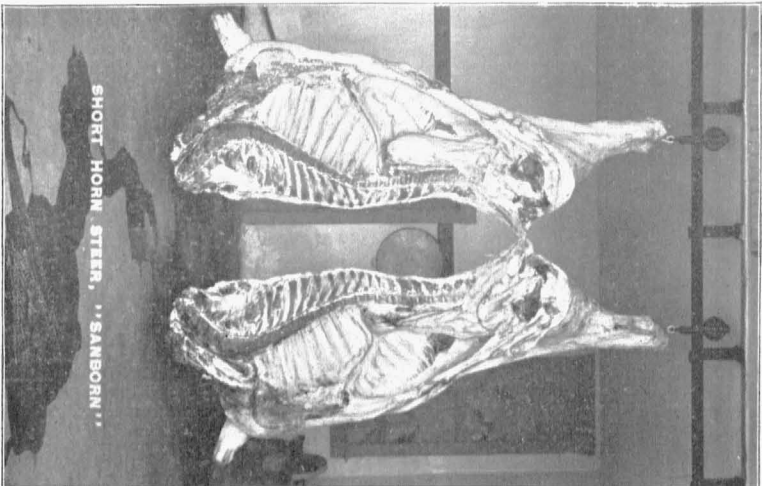


GRADE ANGUS STEER, "NANCY"

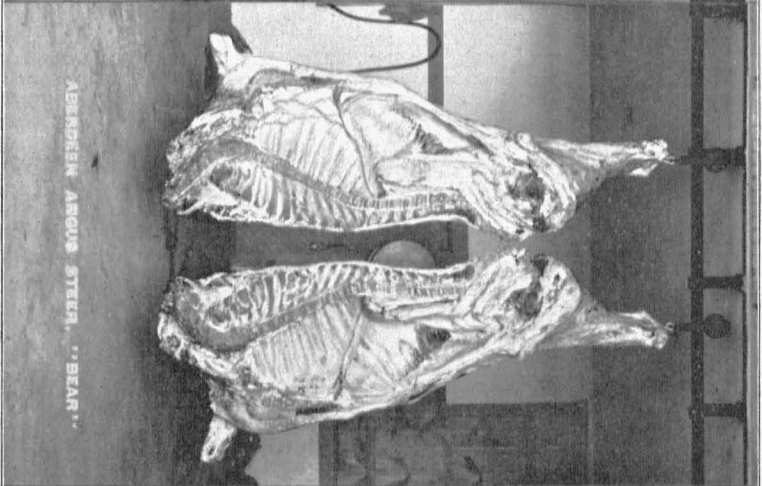


GRADE SHORT-HORN, "JOE"

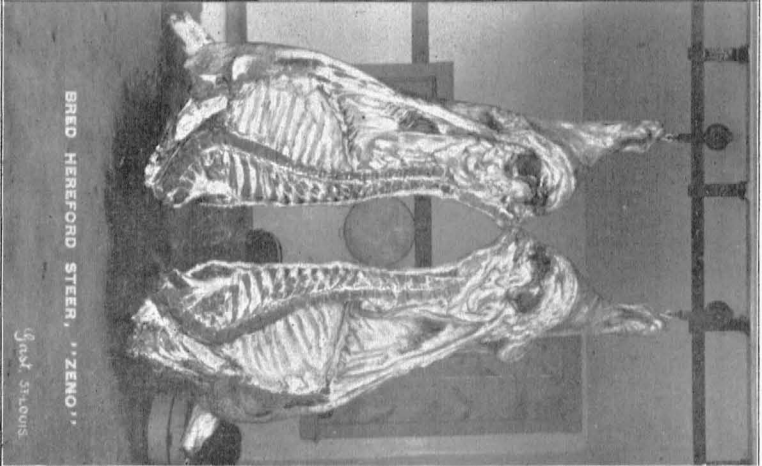
Small, square



SHORT HORN STEER, "SAMBORN"

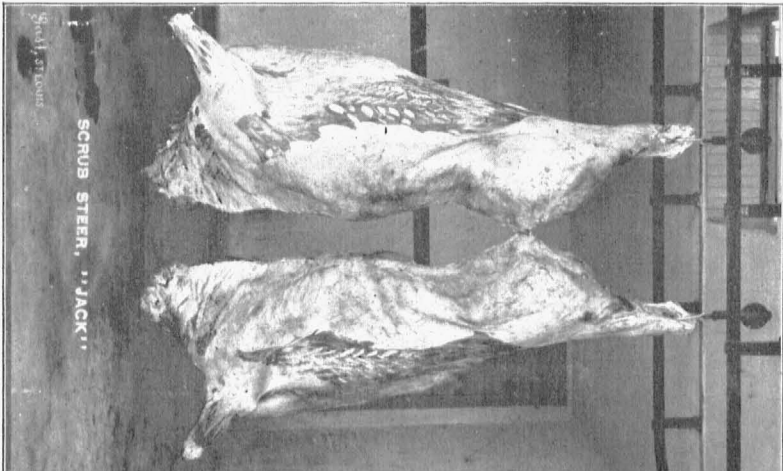


ABERDEEN ANGUS STEER, "BEAR"



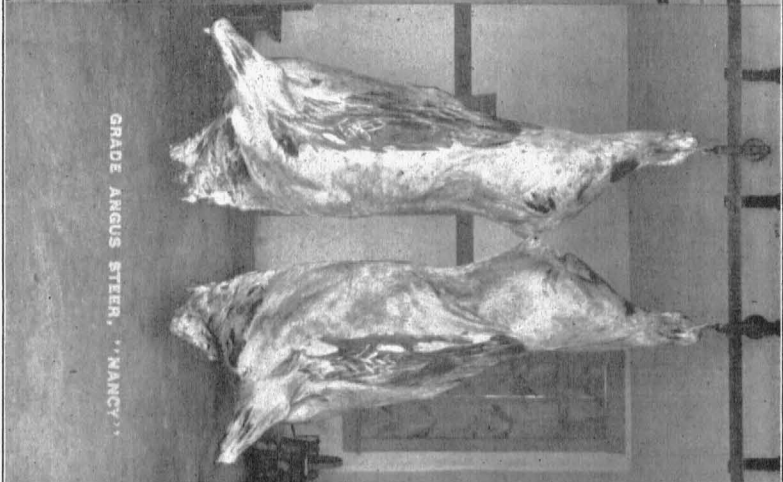
BRED HEREFORD STEER, "ZENO"

W. H. STUBBS

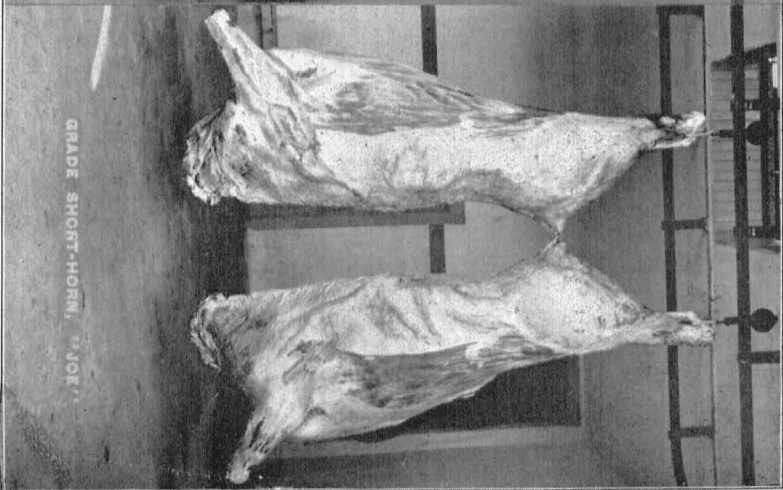


Grade, steers

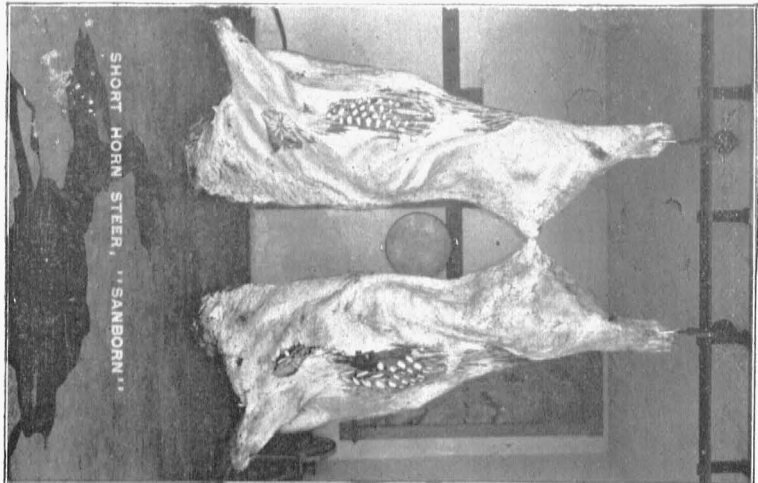
SCRUB STEER, "JACK"



GRADE ANGUS STEER, "NANCY"



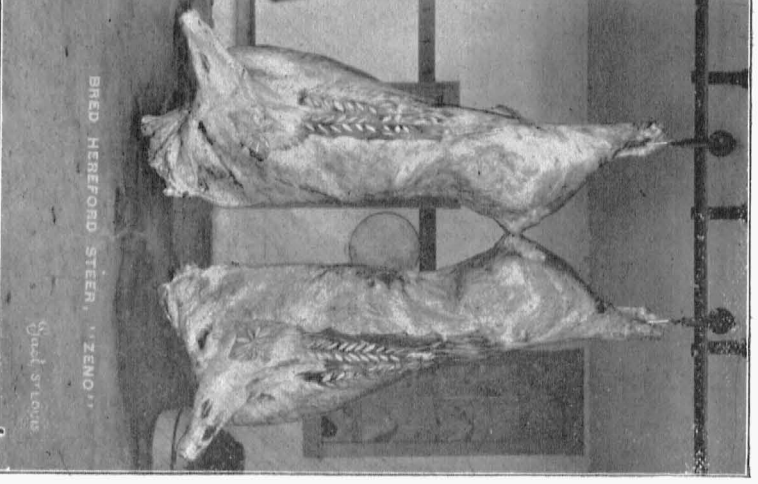
GRADE SHORT-HORN, "JOE"



SHORT HORN STEER, "SAMBORN"



ABERDEEN ANGUS STEER, "BEAR"



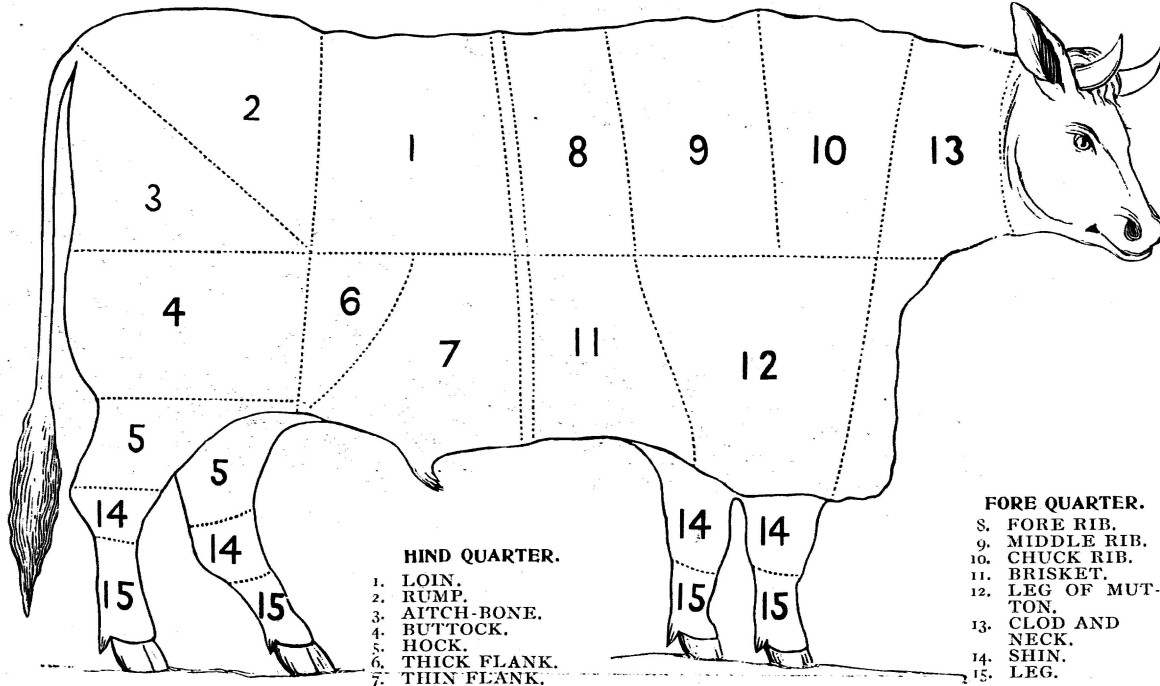
BRED HEREFORD STEER, "ZENO"

Quail steers

Sections of the Carcass of the Ox.

HIND QUARTER.

FORE QUARTER.



HIND QUARTER.

1. LOIN.
2. RUMP.
3. AITCH-BONE.
4. BUTTOCK.
5. HOCK.
6. THICK FLANK.
7. THIN FLANK.

FORE QUARTER.

8. FORE RIB.
9. MIDDLE RIB.
10. CHUCK RIB.
11. BRISKET.
12. LEG OF MUTTON.
13. CLOD AND NECK.
14. SHIN.
15. LEG.

BLOCK TESTS (Butchers' Tests).

The block tests, or butchers' tests, were made with the greatest accuracy at the station, where a room had been fitted up with all the conveniences and requirements to do the work properly. The details to be observed were given already on page 18, and may be omitted here. The outline of the figure gives the location of the cut on the body, and the prints display, in a uniform way, the appearance of the quarters and some of the cuts; these were selected from the large number of photographs taken of each animal before and after slaughter, and are intended to exhibit the appearance of the flesh, the fat and lean being easily recognized.

In arranging the diagrams for the most convenient inspection a sort of reverse order has been adopted. It was presumed that the appearance of quarters and cuts would be studied in the aggregate, comparing one with the other, while the location of the cuts on the body would be referred to by turning back from the tables, thereby placing the latter diagram at the end instead of in front of the others; no apology for it seems necessary.

The division of the body itself into the various cuts whose names are given was adopted by Dr. Porter; it is different from the system of cutting up the carcass adopted in the large American packing houses and no direct comparison can, therefore, be made between the net yield of the butcher's cuts of the experimental animals with the average results obtained by these houses. This is unfortunate since it would be of interest to learn by what percentage such animals, as made up our test, exceeded the average of the animals killed in the slaughterhouses.

TABLE XXXII.—BLOCK TESTS.

WEIGHT IN POUNDS OF THE DIFFERENT

	Sanborn.	G. Francis
Live weight	1712	1681
Right fore quarter	301.5	283.
Left fore quarter	282.5	279.
Right hind quarter	252.	237.
Left hind quarter	265.	244.5
Trimmings	10.	6.7
Feet	22.	21.
Head	31.5	35.
Tongue	8.4	6.2
Hide	96.	100.
Blood	60.5	59.5
Heart	5.9	6.7
Lungs	9.8	7.6
Liver	21.4	21.7
Kidneys	(2)	2.3
Spleen	2.5	2.4
Paunch, empty	36.9	34.5
Paunch, contents of	104.	124.
Guts, empty	21.5	21.
Guts, contents of	24.	23.
Gut fat	105.5	132.
Loss	49.1	33.9
Total	1712	1681
Bones, green	150.	150.
Bones, dry .....	..	76.

NOTE: The bracketed values are averages, the weights in the cases not having been taken.

TABLE XXXII.—CONTINUED—BLOCK TESTS.

PORTIONS OF THE EXPERIMENTAL ANIMALS.

Zeno.	Curley.	Bear.	Bonnie.	Joe.	Nancy.	Jack.	Slocum
1541	1630	1694	1505	1633	1642	1481	1278
269.	284.5	288.	258.	271.5	303.5	249.5	213.
253.	271.5	290.5	248.5	273.	290.	238.5	206.5
219.	233.	245.	221.5	241.5	223.	207.5	173.
234.	252.	246.5	230.	235.	237.5	215.	181.5
8.7	9.	8.7	3.5	15.	8.	8.5	7.5
19.	22.	21.5	21.1	21.5	22.	17.5	18.5
31.5	37.	30.5	29.	30.	31.5	30.5	31.5
4.8	6.2	10.	7.2	6.5	5.7	5.2	6.
120.5	104.5	106.5	103.	86.	103.	93.	80.
51.5	50.	59.5	50.5	59.3	56.	52.	46.5
6.6	5.2	6.1	5.2	5.6	6.4	5.7	4.6
6.9	7.9	9.5	9.8	9.2	9.9	6.5	7.2
16.8	13.9	17.2	14.7	17.5	17.4	18.	12.5
1.8	(2)	2.1	2.5	2.6	(2)	2.1	(2)
2.2	2.	2.7	2.	2.5	2.5	2.5	1.9
27.2	109.	33.	31.4	33.	{ 105.	33.	{ 100.
81.	.....	101.	93.	127.	85.	85.	100.
22.2	21.2	20.	21.5	21.	22.7	19.	19.5
26.	24.	20.	22.	28.	23.	20.	14.
104.	135.5	128.5	95.5	118.5	112.	131.2	119.
35.3	39.6	46.2	35.1	28.8	60.9	40.8	33.3
1541	1630	1694	1505	1633	1642	1481	1278
106.	159.	162.	146.	188.	170.	151.	146.
72.	75.	70.	70.	93.	.....	74.	.....

TABLE XXXIII.—BLOCK TESTS.

WEIGHT IN POUNDS AND PERCENTAGES OF DIFFERENT

	Sanborn.	G. Francis.
Live weight.....	1712	1681
Weight of quarters.....	1101.	1043.5
Butcher's cut No. 1.....	91.	89.5
“ “ “ 2.....	23.	26.5
“ “ “ 3.....	32.5	17.5
“ “ “ 4 and 5.....	72.	66.5
“ “ “ 6.....	9.	6.5
“ “ “ 7.....	14.	18.
“ “ “ 8.....	36.	38.
“ “ “ 9.....	37.5	35.5
“ “ “ 10.....	105.5	99.
“ “ “ 11.....	53.	49.
“ “ “ 12.....	40.5	37.5
“ “ “ 13.....	20.	12.5
“ “ “ 14.....	8.	8.5
Weight of all butcher's cuts.....	542.	504.5
Weight of butcher's cuts for both halves of animal..	1084.	1009.
Loss of cutting up quarters into cuts (pounds).....	17.	34.5
Quarters, per cent. of live weight.....	64.4	62.1
Cuts, “ “ “.....	63.4	60.
Feet, “ “ “.....	1.28	1.25
Head, “ “ “.....	1.84	3.08
Hide, “ “ “.....	5.61	5.99
Bones, green, “ “ “.....	8.76	8.92
Blood, heart, lungs, per cent. of live weight.....	4.45	4.39
Feet, head, hide, “ “ “.....	8.73	9.32
Feet, head, hide, bones, “ “ “.....	20.36	20.26

TABLE XXXIII.—CONTINUED—BLOCK TESTS.

PARTS OF THE BODIES OF THE EXPERIMENTAL ANIMALS.

Zeno.	Curley.	Bear.	Bonnie.	Joe.	Nancy.	Jack.	Slocum.
1541	1630	1694	1505	1633	1642	1481	1278
975.	1041.	1070.	958.	1021.	1054.	910.5	774.
67.	86.	78.	76.5	47.5	79.	55.5	58.
20.	24.5	22.	23.	43.	24.5	28.	13.5
23.5	25.5	25.	17.5	42.	22.	23.5	17.5
80.	80.5	81.	77.5	69.	76.	68.7	55.
7.5	8.	9.	6.	8.5	5.	7.5	5.5
19.	16.5	18.	7.	9.	15.	15.	14.5
33.	31.5	32.	32.	26.5	35.5	27.7	22.
32.5	33.	41.	32.5	30.5	32.	32.5	26.5
84.5	111.5	110.	106.	83.5	119.	79.5	73.
47.5	51.	50.5	37.	50.5	50.	46.	44.
48.	41.5	33.	30.	42.	44.	38.	38.
(12.4)	7.5	11.	8.5	21.5	11.	(12.4)	7.5
(8.7)	7.5	8.	8.	15.5	8.	(8.7)	6.
483.6	523.5	518.5	461.5	489.	521.	442.8	381.
967.2	1047.	1037.	923.	978.	1042.	885.6	762.
7.8	...	33.	35.	43.	12.	24.9	12.
66.3	63.9	63.2	63.6	62.5	64.2	61.5	60.6
62.8	64.2	61.2	61.	59.8	63.4	59.8	59.6
1.23	1.35	1.27	1.40	1.32	1.44	1.18	1.45
2.04	2.27	1.80	1.93	1.84	1.92	2.06	2.46
7.82	6.41	6.29	6.84	5.27	6.28	6.28	6.26
6.88	9.75	9.56	9.70	11.51	10.35	10.19	11.42
4.22	3.87	4.43	4.35	4.54	4.40	4.33	4.56
11.09	10.03	9.36	10.17	8.43	9.54	9.52	10.17
20.26	20.21	21.65	22.20	21.70	23.60	21.47	24.19

An examination of the two previous tables may serve, again, for a means of weighing the relative merits of the different breeds of animals tested. If we consider the quarters or cuts obtained from them, as we doubtlessly may, the really valuable portion of the carcass, it follows that their percentage must, in one direction at least, measure the merit of the animal. The two sets of figures—for quarters and for cuts—are not exactly identical, the Angus and Shorthorn exchanging position through unequal loss in cutting up; but whether this is by accident or inherent in the condition of the two kinds of carcasses must be left undecided. I give simply the facts:

AVERAGE PERCENTAGE OF QUARTERS AND CUTS TO LIVE WEIGHT
OF ANIMALS.

Quarters.		Cuts.	
Hereford.	63.6	Hereford.	63.5
Angus	63.4	Shorthorn.. ...	61.7
Grade	63.3	Grade	61.6
Shorthorn.. ...	63.2	Angus	61.1
Scrub	61.0	Scrub	59.7

The difference of the four better breeds of cattle from one another is but slight, but measurable from the scrubs. The Herefords head the list and must be pronounced to butcher out better than the rest; yet the advantage is not large and may, in reality, be only fictitious. In calculating the cost of an animal from its cost per pound of increase, we commit, as already stated, an error and obtain too high a value; but the error is uniform and may for the purpose of the present computation be neglected; in like manner we may neglect the value of all other portions of the animal body and take its entire cost to lie in the cuts. We then find the cost per pound of butcher's cuts and, making allowance for the amount of fat which they contain, that of the lean meat in them as follows:

	Cost of animal.	Cost in cents per pound	
		of butcher's cuts.	of lean meat in them.
Sanborn	\$116.25	10.7	16.5
Francis	114.14	11.3	17.3
Average.....	\$115.20	11.0	16.9
Zeno	\$110.49	11.4	19.7
Curley.....	116.87	11.2	20.5
Average.....	\$113.68	11.3	20.1
Bear.....	\$103.67	10.0	16.6
Bonnie	92.11	10.0	15.5
Average.....	\$97.89	10.0	16.0
Joe	\$108.43	11.1	16.4
Nancy.....	109.03	10.5	16.3
Average..	\$108.73	10.8	16.4
Jack.....	\$89.01	10.5	15.3
Slocum.....	76.81	10.1	16.5
Average.....	\$82.91	10.3	15.9

Can it be still asserted that the Herefords, though butchering out better, are the more profitable than the others? The answer is not difficult to give and must be given by every intelligent breeder and feeder of cattle for himself.

The average cost per pound of butcher's cuts, which has been given in the foregoing in the aggregate for each of the breeds, should be compared with the retail price of each; to do this properly a request, accompanied with a diagram of the cuts, was sent to a number of intelligent butchers, asking them to indicate the price or prices at which they sold these meats to their customers; following is a tabulation of the replies:

TABLE XXXIV.

RETAIL PRICE OF THE MEAT OF BUTCHER'S CUTS.

No. of cut.	1. (St. Louis)	2. (Minneapolis)	3. (Baltimore)	4. (Philadelphia)	5. (Philadelphia)
1	12 $\frac{1}{2}$ cents	10-15 cents	20 cents	23 cents	16-25 cents
2	8 "	10-12 "	8 "	12 "	15-18 "
3	8 "	5-6 "	12 "	12 "	8 "
4	4 "	8-10 "	.. "	12 "	10-16 "
5	4 "	2 "	3 "	5 "	.. "
6	5 "	8 "	12 "	4 "	6 "
7	5 "	4-5 "	10 "	4 "	3 "
8	15 "	10-15 "	16-18 "	18 "	14-18 "
9	12 $\frac{1}{2}$ "	6-18 "	16-18 "	18 "	12-14 "
10	10 "	4-18 "	8-10 "	10 "	6-8 "
11	5 "	4 "	8-10 "	5 "	3 "
12	12 $\frac{1}{2}$ "	4 "	10 "	5 "	3 "
13	6 "	3 "	8 "	8 "	5 "
14	5 "	20(each) "	30(each) "	5 "	.. "
15	3 "	.. "	.. "	3 $\frac{1}{2}$ "	.. "

It seems that, as a matter of fact, prices are lowest in St. Louis and rise going north and east.

PHYSIOLOGICAL TESTS.

Three sets of such tests were made at the close of the experiment, viz:

1. To find the crushing weight of the *femur*.
2. To find the crushing weight of the *tibia*.
3. To find the tensile strength of the *gastrocnemius externus*.

The *femur*, or thigh bone, is the strongest and longest bone in the body, and extends from the pelvis to the tibia. The *tibia*, or leg bone, long, triangular and irregular, supports at its upper end the femur and rests with its lower end upon the bones of the foot; it is there where the *gastrocnemius externus*, a powerful muscle supporting the hind part of the body, is attached, fastening with the upper end to the femur. The two bones evidently carry the weight of the body while the muscle, by its contractions, lifts it to give it forward motion; the bones, therefore, must resist a weight which tends to crush them, while the muscle works in opposition to one which tends to stretch and tear it. These three weights, two for the bones and one for the muscle, have been determined, using for the purpose the accurate and costly machine then in the possession of the Engineering Department of the University, which enabled the operator to gradually and slowly increase the pressure until the bones were crushed, or the muscle was rent and torn. The table, giving the data, explains itself and follows.

No attempt is made at this time to draw from it any general deductions; these as well as a large mass of material in the form of microscopic sections of flesh and organs of the experimental animal, are left to other hands and may eventually be worked up in proper shape. It is but just, however, to state that the defects and shortcomings in this work, of which the writer himself is perfectly conscious, should, in fairness, be attributed to their proper causes.

TABLE XXXV.

CRUSHING WEIGHT OF FEMUR AND TIBIA

(linear measures in inches)

	Sanborn.	Francis.
FEMUR, length of section.....		$1\frac{1}{2}$, $1\frac{1}{2}$, $1\frac{1}{2}$,
major and minor diam. of upper section..	$2 \times 1\frac{0}{16}$	$2\frac{1}{4} \times 2$
" " " " " middle "	$2\frac{1}{8} \times 1\frac{3}{4}$	$1\frac{7}{8} \times 1\frac{7}{8}$
" " " " " lower "	$2\frac{5}{8} \times 2\frac{1}{4}$	$1\frac{3}{4} \times 1\frac{3}{4}$
thickness of bone..... upper "	$\frac{1}{2}$	$\frac{1}{4}$
" " " " " middle "	$\frac{1}{6}$	$\frac{1}{4}$
" " " " " lower "	$\frac{1}{4}$	$\frac{1}{4}$
first break..... upper "	22500	11000
" " " " " middle "	16970	13620
" " " " " lower "	19210	12990
crush..... upper "	22500	17440
" " " " " middle "	16970	13900
" " " " " lower "	19210	12990
TIBIA, length of section.....		$\frac{1}{2}$
major and minor diam. of upper section.....	$3 \times 2\frac{1}{2}$	
" " " " " middle "	2×2	$2 \times 1\frac{1}{8}$
" " " " " lower "	3×2	
thickness of bone..... upper "	$\frac{1}{4}$	
" " " " " middle "	$\frac{1}{4}$	$\frac{3}{8}$
" " " " " lower "	$\frac{1}{4}$	
first break..... upper "	12000	
" " " " " middle "	15760	11470
" " " " " lower "	19130	
crush..... upper "	13670	
" " " " " middle "	15760	21460
" " " " " lower "	19130	
Gastrocnemius Externus		
breaking strain.....	1560	1690
weight in pounds after breaking and freed from femur attachment.....	7 lb 2 oz	6 lb 7½ oz

RESTATEMENT OF THE CONCLUSIONS REACHED:

1. In point of *early maturity and power of beef production* breed exerts an influence and from a commercial point of view, beginning with the most meritorious, breeds range in the following order: *Angus, Shorthorn, Grade, Hereford, Scrub.*

2. The cost of fattening beef at pasture with dry feed in addition is greater than at the barn with dry feed alone.

TABLE XXXV.—CONTINUED.

AND TEARING WEIGHT OF GASTROCNEMIUS EXTERNUS.
weights in pounds).

Zeno.	Curley.	Bear.	Bonnie.	Nancy.	Slocum.
.....	$1\frac{3}{4}, 1\frac{3}{4}, 1\frac{3}{4}$	$1\frac{5}{8}, 1\frac{3}{4}, 1\frac{3}{4}$	$1\frac{3}{4}, 1\frac{3}{4}, 1\frac{3}{4}$	$1\frac{3}{4}, 1\frac{3}{4}, 1\frac{5}{8}$	—, $1\frac{5}{8}, 1\frac{5}{8}$
$3x2\frac{1}{4}$	$2\frac{1}{6}x1\frac{7}{8}$	$2\frac{1}{4}x2$	$2\frac{1}{8}x1\frac{7}{8}$	$2\frac{1}{2}x2\frac{1}{4}$	.....
$2x1\frac{5}{8}$	$1\frac{7}{8}x1\frac{7}{8}$	$2x1\frac{3}{4}$	$2x2\frac{7}{8}$	$2\frac{1}{2}x1\frac{7}{8}$	$1\frac{1}{8}x2\frac{1}{8}$
$1\frac{7}{8}x1\frac{7}{8}$	$1\frac{7}{8}x1\frac{7}{8}$	$1\frac{7}{8}x1\frac{3}{4}$	$1\frac{7}{8}x2$	$1\frac{3}{4}x2$	$1\frac{1}{8}x1\frac{7}{8}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}-\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}-\frac{3}{8}$	.....
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}-\frac{1}{6}$	$\frac{1}{6}-\frac{3}{8}$	$\frac{1}{6}-\frac{1}{6}$	$\frac{3}{8}-\frac{1}{4}$
$\frac{1}{2}$	$\frac{3}{8}-\frac{5}{8}$	$\frac{3}{8}-\frac{1}{6}$	$\frac{1}{6}-\frac{3}{8}$	$\frac{1}{6}-\frac{1}{6}$	$\frac{3}{8}-\frac{1}{6}$
15730	19820	19840	18950	21610	.....
15040	15860	16030	14310	13790	15800
10640	6300	17720	16450	17060	16290
16420	19820	19840	18950	21610	.....
15050	15860	16390	14310	18620	.....
13708	8710	17720	19350	17060	.....
.....	$1\frac{3}{4}$	.....	.....	.....	.....
$3x2$	.....	.....	.....	.....	.....
$2\frac{1}{4}x1\frac{3}{4}$	$3\frac{1}{4}x2$	.....	.....	.....	.....
$3x1\frac{3}{4}$	.....	.....	.....	.....	.....
$\frac{1}{2}$	$\frac{3}{6}-\frac{5}{6}$	.....	.....	.....	.....
$\frac{1}{2}$	.....	.....	.....	.....	.....
$\frac{1}{4}$	.....	.....	.....	.....	.....
13500	.....	.....	.....	.....	.....
13800	10100	11650	7160	19320	15730
13740	.....	.....	.....	.....	.....
15060	.....	.....	.....	.....	.....
16200	11710	12260	7160	19330	18600
13740	.....	.....	.....	.....	.....
1090	1950	1730	1690	1800	1750
5lb 12 $\frac{1}{2}$ oz	8lb 3 $\frac{1}{2}$ oz	6lb 14 $\frac{1}{2}$ oz	5lb 7oz	7lb 12oz	5lb 5oz

3. The improved breeds differ but slightly from each other in butchering out; but each is decidedly superior in this respect to scrubs.

4. A maintenance ration for a 1000 pounds steer consists of 9.1 to 9.3 pounds of dry feed per day in addition to hay, or of 1 pound of such feed per day for each 9 1-2 to 11 1-2 pounds of live weight.

CONTENTS.

	PAGE.
Group of experimental animals	2
Scope of experiment.	3
History of it.	4
Number and kind of animals selected.	5
Their origin and age.	7
Running diary as to feeding and treatment.	8
Barn burned.	11
Dr. Porter takes charge.	12
Shipment to Chicago fat stock fair.	16
Points in slaughtering cattle.	18
Food and feeding	19
Record of food eaten each month	19
Sanborn	19
Francis.	20
Allan	21
Parker	22
Wilson	23
Zeno	24
Curley	25
Dandy	26
Bear	27
Bonnie.	28
Elbert.	29
Jean	30
Joe.	31
Nancy	32
Newman	33
Wilkes	34
Jack	35
Slocum.	36
Quisenberry.	37
Young.	38
Record of food eaten by periods.	39
Sanborn, Francis, Allan, Parker	39
Wilson, Zeno, Curley, Dandy.	40
Bear, Bonnie, Elbert, Jean.	41
Joe, Nancy, Newman, Wilkes.	42
Jack, Slocum, Quisenberry, Young	43
Weight of steers by weeks.	44
Cost of food.	53

Statement regarding third period.....	54
Cost of food eaten by "Sanborn".....	55
Average cost of food per pound.....	56
Maintenance ration.....	57
Rate of increase and pounds of food to make it.....	58
Sanborn, Francis.....	58
Allan, Parker.....	59
Wilson, all Shorthorns.....	60
Zeno, Curley.....	61
Dandy, all Herefords.....	62
Bear, Bonnie.....	63
Elbert, Jean.....	64
All Angus, Joe.....	65
Nancy, Newman.....	66
Wilkes, all Grades.....	67
Jack, Slocum.....	68
Quisenberry, Young.....	69
All Scrubs.....	70
Comparison of rate of increase and food to make it.....	70
Cost of feed to make one pound of increase.....	72
Age and weight of animals at close of trial.....	73
Average cost of making one pound of increase.....	74
Specific daily increase of breed.....	76
Photographic prints of cuts.....	
Jack, Nancy, Joe.....	
Sanborn, Bear, Zeno.....	
Photographic prints of split carcass.....	
Inside view.....	
Jack, Nancy, Joe.....	
Sanborn, Bear, Zeno.....	
Outside view.....	
Jack, Nancy, Joe.....	
Sanborn, Bear, Zeno.....	
Diagram of sections (cuts).....	
Block tests (Butchers' tests).....	77
Weight of different portions of animals.....	78
Weight and percentages of portions.....	80
Average percentage of quarters and cuts.....	82
Cost of animal and cost per pound of cuts.....	83
Retail price of meat in butchers' cuts.....	84
Physiological tests.....	85
Crushing weight of femur and tibia and tearing weight of gastrocnemius externus.....	86
Summary.....	88