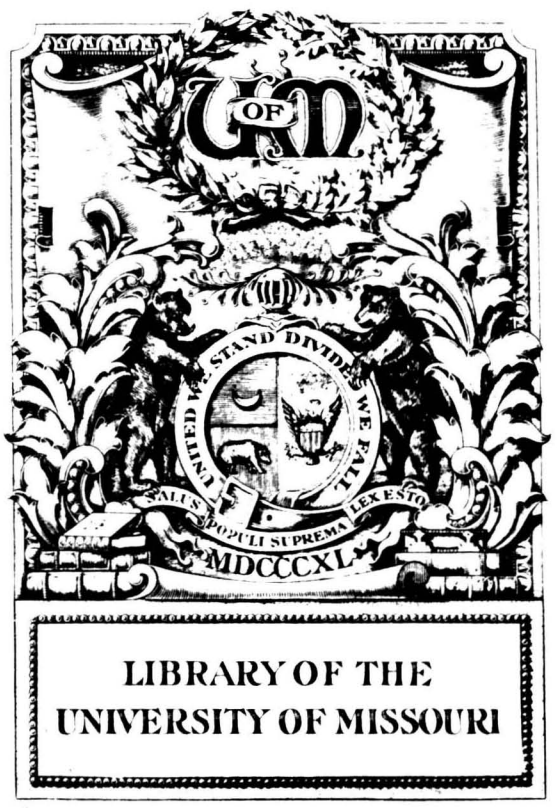

A Study of

THE EXTENT TO WHICH GROWTH RETARDED DURING THE EARLY LIFE OF THE BEEF ANIMAL CAN BE LATER REGAINED

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PART I

PLAN OF THE INVESTIGATION

The animals, 580 and 586, were two of a group of twelve animals that were selected as follows: they were one month old Shorthorn-Hereford Bull calves of similar breed, age, thrift, and condition.

These twelve animals were divided into three Groups, I, II and III, and were called the Retarded Growth Steers.

Group I. Two animals were fed for maximum growth without being permitted to fatten. This condition was maintained by frequent inspection and judging by the men in the Animal Husbandry Department. A gain of about 1 pound per day for the first year and 0.8 pounds per day for thessecond year was followed as near as possible since this had been found to be about what this condition required.

When two years old one of the steers was put on full feed and finished for best possible market condition. When this condition was reached the animal was slaughtered and a complete analysis was made. At present, the other animal in this Group is still alive.

Group II. In this Group the growth was restricted to one half pound per day. This was supposed to approximate the growth of animals maintained on a low plane of nutrition in actual farm practice. Steers matured on about this condition of growth show less skeletal developement than is obtained with steers on a higher plane of nutrition.

When two years old one of the steers in this Group was put on full feed and finished for choice beef. It was then

slaughtered and analyzed.

At present one animal in this Group is still alive and others have been added in an effort to determine the effect of the length of the retarding period.

Group III. The remaining animals, eight in number, were put on a very limited ration. The rate of growth was fixed at 10 pounds per month. The purpose was not to be as extreme as possible but to approximate the severest conditions found in actual farm practice.

Four of these animals died from various causes more or less dependent on their state of nutrition and corresponding lack of vitality.

After two years of retardation one of the animals was put on full feed, fattened, slaughtered and analyzed.

Six months later, another animal was put on full feed, fattened, slaughtered and analyzed. At the time this animal was killed, another one that had never been fattened was slaughtered as a check on the others.

At present there is one animal of the original Group III left alive. Other animals have been added to this Group.

The two animals 580 and 586 belonged to Group III, and were the ones killed at the same time, one fattened and the other still on its low plane of nutrition. These are the animals discussed.

RATIONS

All the calves received the same ration in various amounts according to their Grouping.

Milk. For the first and second ten day periods the calves received fresh whole Holstein milk. They were fed twice per day.

During the third ten day period one-third skimmed milk was used. During the fourth ten days two-thirds skimmed milk was used, and during the fifth ten day period all skimmed milk was used.

Grain. The grain consisted of a mixture of: corn chop , 6 parts; bran, 3 parts, linseed,1 part.

Hay. The first hay offered the calves was finely cut timothy. This was after the first ten days beginning with the seventh ten day period a mixture of finely cut alfalfa and oat straw in the ratio of three parts to two parts was substituted for one-half the timothy. After ten days of this feeding the timothy was replaced entirely by the mixture of alfalfa and oat straw.

After weaning, the group condition of the animals was maintained by regulating the amounts of grain and hay offered. The hay was sufficient to give reasonable bulk to the feed even with animals of Group III.

Group I received equal parts of grain and hay, Group II one-half as much grain as hay and Group III received no grain or at most one-fourth as much grain as hay.

Salt. Salt was placed before each animal every day and a record kept of the amount consumed by each animal.

Water. The animals had free access to hydrant water at all times.

SHELTER AND RANGE

The animals had access to a shed open to the south for protection. Each Group was yarded in a dry lot adjoining the shed. These lots had a liberal slope to the south with a shade at the south end. Hydrants for water were connected to troughs in each lot. Each animal was fastened in a stall at feeding time to insure that it secured only its own feed.

RECORDS

Feeding Records. All feeding records were individual. Feeding was twice daily at about six A. M. and five P. M. The feed fed at each feeding was recorded on blanks furnished for the purpose. These original barn records were preserved as the original data.

Weight Records. Each animal was weighed every morning after being fed and just before being turned into the lot.

Measurements. Every thirty days measurements were carefully taken with apparatus designed for the purpose.

Condition. Each thirty days a record was made of the condition of the animals.

Photographs were taken every thirty days showing: first, right side; second, front view; and third, rear view.

PART II

DESCRIPTION OF STEERS AND THEIR TREATMENT

Animal 580

Steer, 580 was born April 24, 1914. Both parents were Shorthorns. It was placed in the investigation on May 22, 1914, twenty-eight days later. Until this time it ran with its dam getting plenty of milk. For the first period in the investigation it was fed a small amount of finely cut timothy hay and whole milk. The timothy was not given until nine days had passed. The fat content of this milk was gradually decreased during this period and the first part of the second period until at the middle of the second period it was strictly skim milk. This ration was kept to the end of the second thirty day period.

Beginning with the third period one-half of the timothy is replaced by the had mixture of alfalfa 6 parts and oat straw 4 parts (finely cut.) After ten days of this ration the rest of the timothy is replaced by the alfalfa and oat straw mixture.

This ration was gradually increased until the seventh period in which the steer got 140 pounds of hay and was weaned from the milk ration.

For the next seven periods the steer was given only hay ration. In the fourteenth period he consumed 160 pounds of hay. During the fifteenth period a grain ration was introduced consisting of corn, 6 parts; bran, 3 parts; and linseed meal, 1 part. During this period it was given only 3.75

pounds of this mixture. However, in the sixteenth period it received 27.75 pounds of grain and 184 pounds of hay. From there on this feed was supposed to be so regulated that the animal gained ten pounds per month and the grain was never to exceed one-fourth of the amount of hay fed.

Thus the feed was gradually increased with the above plan in view until the thirty-sixth period in which the animal received 38.5 pounds grain and 210 pounds of hay. At this time it was decided to fatten the steer. During the next five periods the grain was gradually increased until during the forty-second period the animal was fed 423 pounds grain and 243.5 pounds of hay. The heavy increase in the per cent of grain was due to the fact that the feed had to be concentrated with little increase in bulk. This heavy feeding was continued thru the forty-third period, but during the forty-fourth was decreased to 220 pounds grain and 191 pounds hay. This ration with a gradual increase in grain and a gradual decrease in hay was continued to the end of its life on July 25, 1918 when it was slaughtered. During this last period it received 340 pounds of grain and 130 pounds of hay.

Animal 586

Steer 586 was born April 21, 1914. It was sired by a pure-bred Shorthorn bull and out of a high grade Shorthorn dam. It was placed in the investigation at the same time as Steer 580, May 22, 1914, or thirty-one days after his birth. During this thirty-one days it was allowed to be with

its dam and so received plenty of milk. In the first thirty day period of the investigation it received a little fine cut timothy hay and whole milk. The timothy was not given until after nine days had passed. The fat content of the milk was gradually decreased during this period and the first part of the second until at the middle of the second period it received strictly skim milk. This ration was kept up until the end of the second period.

In the first ten days of the third period one-half of the timothy hay was replaced by the hay mixture of 6 parts of alfalfa and 4 parts of oat straw. At the end of this ten days the rest of the timothy was replaced by the alfalfa and oat straw combination.

The hay ration was gradually increased while the milk ration remained practically the same until the seventh period in which the steer was weaned and at which time the hay had reached 140 pounds.

For the next seven periods the steer was given a strictly hay ration which was gradually increased as the animal grew. During the fourteenth- period the steer consumed 155 pounds of hay . For two periods during this time the feed was increased to 180 pounds since the animal was not doing well.

From the evening of May 29, 1915 thru the morning of June 8, 1915, the steer was on digestion trial.

During the fifteenth period a grain ration, consisting of corn, 6 parts; bran, 3 parts; and linseed meal, 1 part was introduced. In all, during this period 586 received 3.75 pounds of grain. This was greatly increased during the

sixteenth period, the steer consuming 27.75 pounds of grain. From this point on until the end of its life the grain and hay fed were in such proportion as to cause it to gain approximately ten pounds per period of thirty days. The grain never exceeded one-fourth of the hay ration and sometimes there was no grain at all. Thus, during the last period 221 pounds of hay were consumed and no grain.

Animals for Comparison

These were three animals, 500, 512, and 501, taken from the Use of Food Investigation. These animals were full fed from birth until about four months old when they were assigned to Group I, II, III.

Group I was full fed and crowded. It was far better than any animal would get in general farm practice. 501, a grade Hereford, belonged to this Group.

Group II was fed for maximum growth without laying on any appreciable fat. This Group would be found in good farm practice and corresponded to Group I in the Retarded Growth Investigation. It was supposed to make a gain of about 1 pound per day. 512, a grade Hereford, belonged to this Group.

Group III was fed so as to approximate the growth of animals maintained on a low plane of nutrition in actual farm practice. This Group corresponds to Group II Retarded Growth. It made a gain of about one-half pound per day. 500, a Hereford Shorthorn, belonged to this Group.

These animals were treated a little different from 580 and 586 in that they were given a good start for four months, while 580 and 586 had only a start of one month before they were put in the investigation.

They also received a different ration. Their grain ration was a mixture of the following constituents: 6 parts cornchop, 3 parts whole oats, and 1 part of old process linseed meal. For hay they received only good quality alfalfa.

These animals are included on order to see to what extent 580 recovered after it had been retarded.

586 was used as a check on 580.

PART III

FEEDING AND GROWTH DATA

The time of the investigation (approximately 1500 days) was divided into thirty day periods for convenience in calculating and to show a detailed feeding study.

The weights of the various feeds were recorded by their periods. The protein, fat, nitrogen free extract, crude fiber and ash were computed from these weights and the chemical analysis of the feeds. The weights of the feeds are shown in Tables No. 1 and 2. The weights of nutrients are shown in Tables No. 3 and 4.

The total dry matter shown in Tables No. 1 and 2 was derived by adding the protein, fat, nitrogen free extract, crude fiber and ash by periods.

The weight of the animals for the 30 day period shown in Tables No. 1 and 2 is an average of all thirty daily weights of the animals. The weight for the beginning of the period is the average of the first two weights in the period and the last three weights in the proceeding period. The first weight is the average of the first five weights. The last weight is the average of the last five weights.

Digestible Nutrients

Digestion trials were run on animals in various Groups. From the data on these trials it was decided that the digestion coefficient varies with the ration rather than grouping. Apparantly the more hay the lower it makes the digestion factor.

For the first six and one-third periods an average digestion factor (0.583) was used for the hay. This was derived by averaging the digestion trials of animals on a hay ration alone. For milk the factor of digestibility used was 0.950. The organic nutrients were calculated separatedly for this time, since the proportion of milk and hay varied pratically all the time.

The second factor for 580 and 586 was an average of two digestion trials on 586 and 582 at which time both were receiving only hay. This factor was applied to 586 again almost at the end of its life when it was receiving only hay.

The third factor derived from 580 was used for it, because at this time it was receiving part grain and a digestion trial was run on it at this time. The third factor on 586 was an average between the digestion trials of 580 and 583 at the time they received the same proportions of grain and hay as 586 did.

The fourth factor of 580 was taken from Steer 583 at a time when it was receiving a 1:1 ration of grain and hay. This was at the time that 580 was beginning to be fattened up.

The fifth factor for 580 was taken from 520 a Group I Steer because at this time 580 was receiving a Group I ration.

The amounts of digestible nutrients were computed by applying the factors derived from the digestion trials and explained just above. Table Nos. 5 to 7 show the results of this calculation.

Digestion Trials

Animal No	582	586	583	583	580
Date	May 15	May 15	Apr. 16	May 17	May 17
Ration	Hay only	Hay only	60 Hay 10 Grain	95 Hay 90 Grain	70 Hay 15 Grain
Factor for Protein	59.199	58.374	63.559	63.822	61.205
Factor for Fat	57.995	55.493	82.433	76.631	73.226
Factor for Nitrogen Free Extract	62.515	63.259	66.663	75.680	70.938
Factor for Crude Fiber	52.568	51.703	54.501	48.566	54.834
Factor for Ash	32.669	14.718	17.900	12.181	14.168
Factor for Organic Matter	58.399	58.238	62.285	67.969	64.515

Animal No.	587	587	579	520	520
Date	Apr.16	Apr. 17	Apr. 17	Apr. 16	Apr. 17
Ration	65 Hay 30 Grain	70 Hay 110 Grain	75 Hay 35 Grain	70 Hay 60 Grain	60 Hay 127 Grain
Factor for Protein	65.382	67.590	60.870	68.018	65.172
Factor for Fat	77.418	79.652	71.986	86.394	75.798
Factor for Nitrogen Free Extract	71.143	80.405	71.283	77.515	74.401
Factor for Crude Fiber	48.363	50.631	53.187	49.212	46.416
Factor for Ash	27.879	17.124		34.912	17.341
Factor for Organis Matter	63.827	73.022	64.861	69.557	68.552

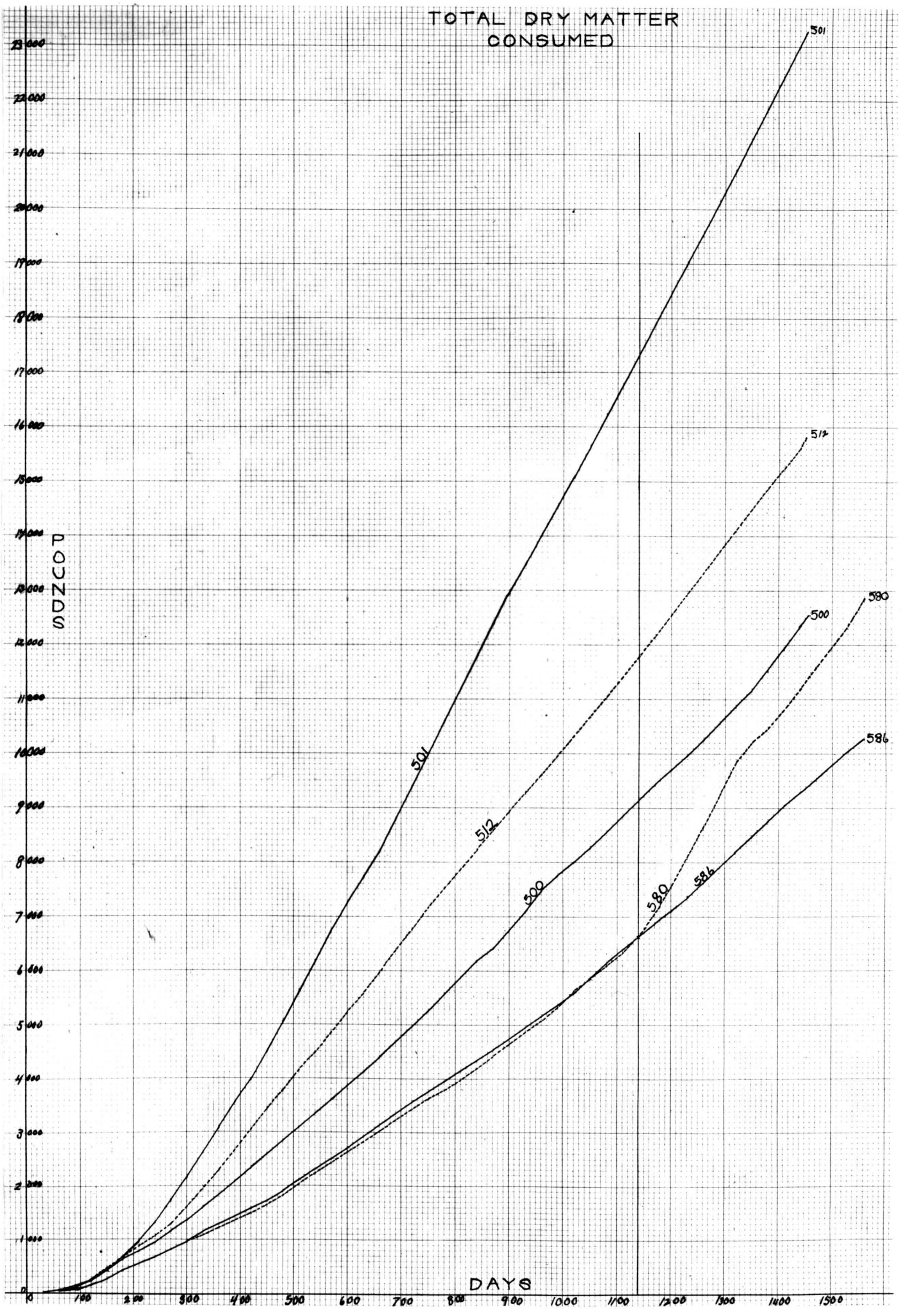
GENERAL FEED AND GROWTH COMPARISONS

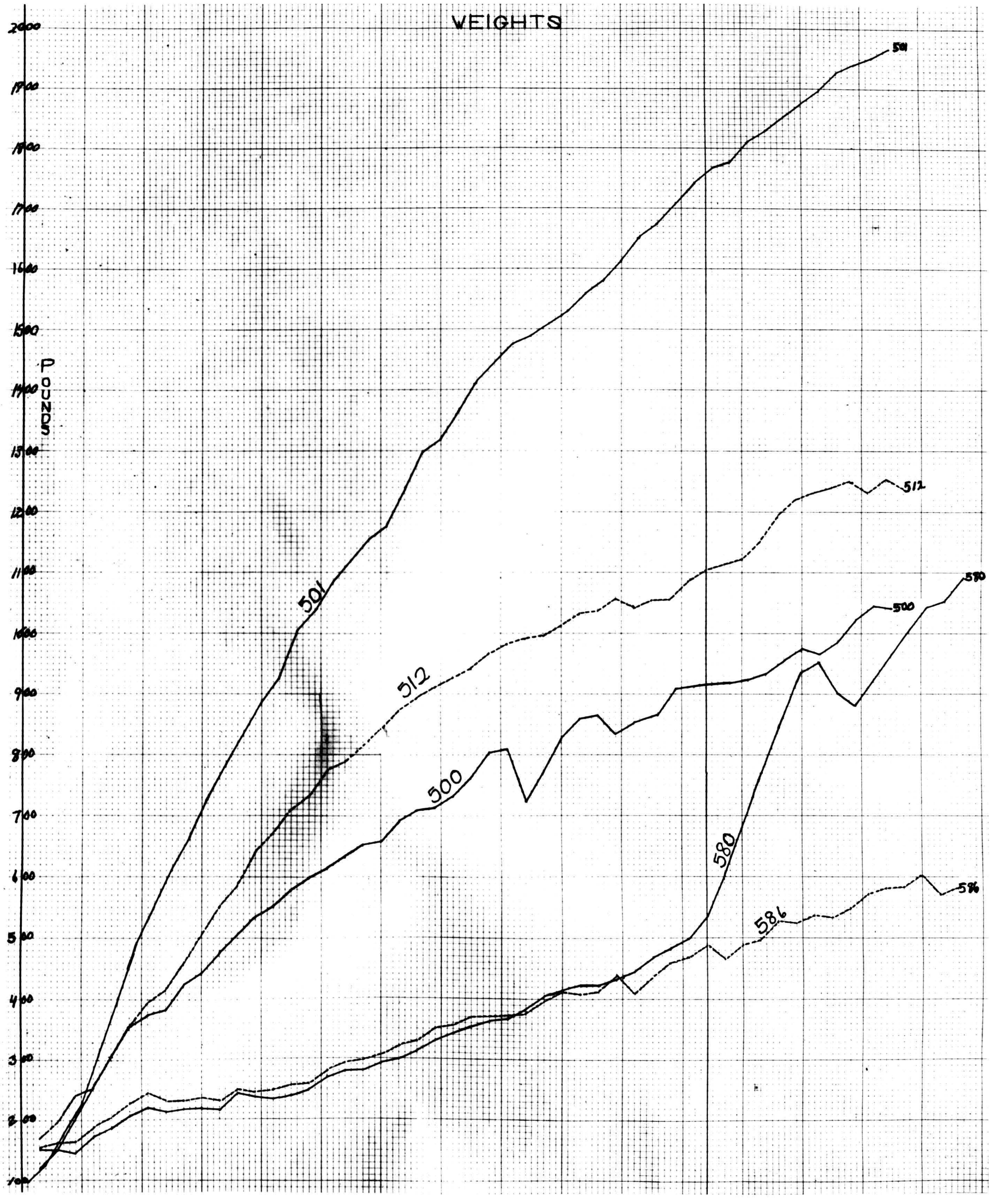
The curves show graphically the consumption of food or change in weight or measurements as the animal grew older. The units employed show the true weight or measurement, and so changes are only indicated by the curves. All animals were close to 1500 days old when slaughtered.

In all measurements curves animals 580, 586, and 500 were plotted on the true scale. Animals 501, and 512 were lowered or raised as necessary so that their lines passed thru the starting point of 500. This was done so as to eliminate original differences in each animal at the start and to show the size attained as a result of of the treatment, rather than as a result of individuality. In doing this it was assumed that 580, 586 and 500 were treated the same before starting(which was not the case.) 500 had a better treatment for a longer time. Since no way could be found to estimate the effect of this it was decided to put them on the same basis. However since 501 and 512 had received the same previous treatment as 500 corrections could be made for their individuality and this was done. When 580 had reached 1140 days of age it was decided to fatten it. In the discussion of the curves the position of the lines will be given at 1140 days and their developement afterward shown.

Total Dry Matter Consumed

At 1140 days 580 had consumed about 6,614 pounds of dry matter; 586 had consumed about 6,614 pounds of dry matter; 500


TOTAL DRY MATTER
CONSUMED
POUNDS
DAYS
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000
17000
18000
19000
20000
21000
22000
23000
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
501
512
500
580
586


WEIGHTS
POUNDS
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
501
512
500
580
586
581
580
5%

had consumed about 9,133 pounds of dry matter; 512 had consumed about 11,950 pounds of dry matter; and 501 had consumed about 17,341 pounds of dry matter.

At the end of its life 580 had consumed 12,856.8 pounds of dry matter, 586 had consumed 10,217.6 pounds of dry matter, 500 had consumed about 12,552.3 pounds of dry matter, 512 had consumed about 15,808.3 pounds of dry matter, and 501 had consumed 23,260.2.

From this it can be seen that 580 consumed enough nutrients to place it as Group II Retarded Growth.

Weights

At the end of 1140 days 580 and 586 had gained approximately 350 pounds or about one-third of a pound per day. 500 had gained approximately 800 pounds or about two-thirds of a pound per day. 512 had gained 930 pounds or about four-fifths of a pound per day. 501 had gained 1650 pounds or about one and one-half pounds per day.

At the end of its life 586 had gained approximately 430 pounds or about three-tenths pounds per day. 580 had gained 940 pounds or about five-eighths pounds per day. 500 had gained 920 pounds per day or five-eighths pounds per day. 512 had gained 1080 pounds or about two-thirds pounds per day. 501 had gained 1860 pounds or about one and one fifth pounds per day.

At the end of their lives 580, 500, and 512 were not far apart. From this it can be said that 580 had recovered to

Group II Retarded Growth.

Girth of Paunch

At 1140 days of age 580 and 586 had gained approximately 70 cm. in heart girth. 500 had gained approximately 110 cm. 512 had gained 135 cm. 501 had gained 175 cm. in pounch girth.

At the end of its life 586 had gained 75 cm; 580, 135 cm., 500, 130 cm.; 512, 140 cm; 501, 180 cm.

580 gained between the amount gained by 500 and that gained by 512, and so was better than a Group II Retarded Growth but not as good as a Group I Retarded Growth.

Heart Girth

At 1140 days of age 580 and 586 had gained approximately 50 cm. in heart girth. 500 had gained 90 cm., 512 had gained 105 cm., and 501 had gained 130 cm.

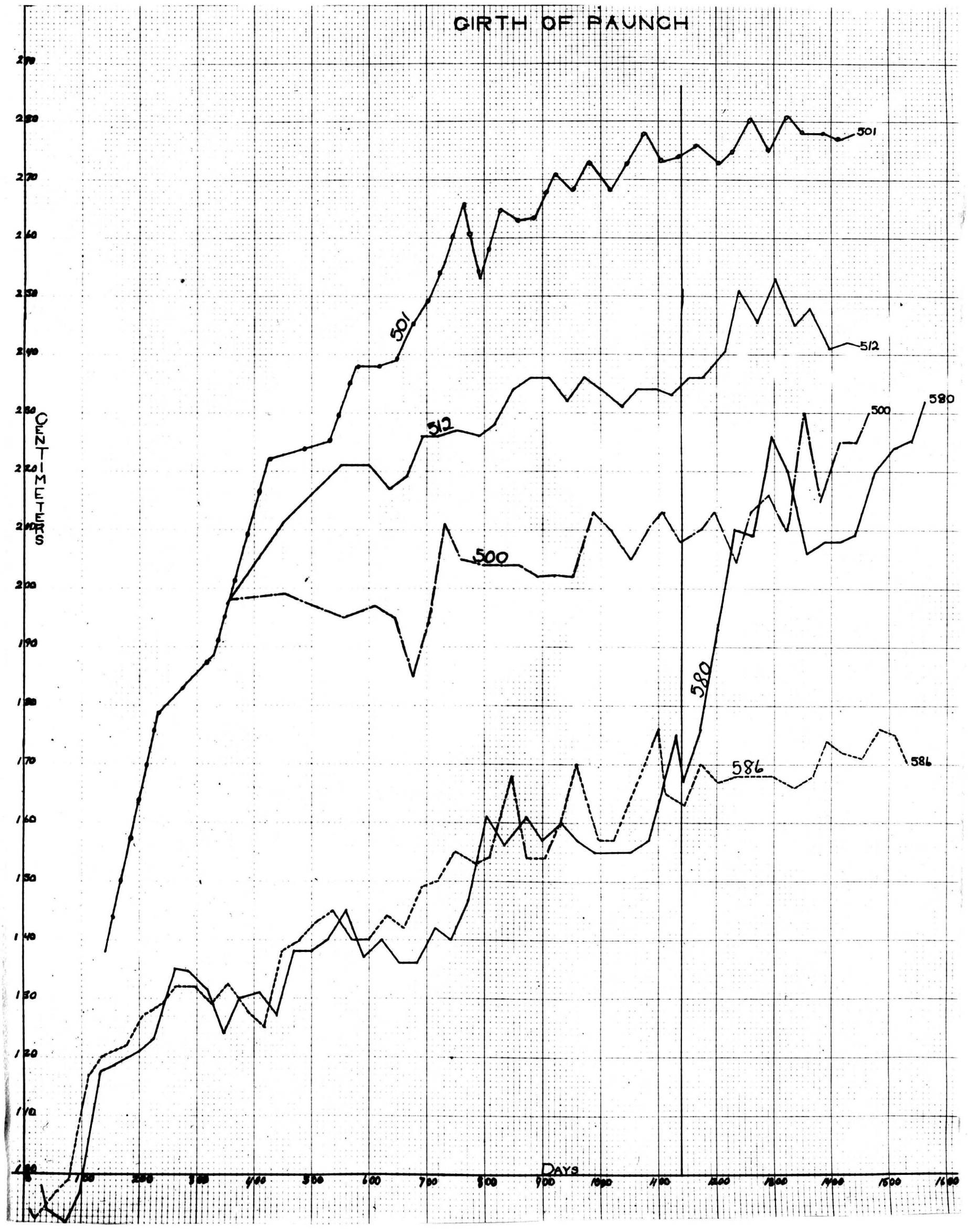
At the end of its life 586 had gained 60 cm. 580 had gained 98 cm., 500, 107 cm., 512, 114 cm.and 501, 140 cm.

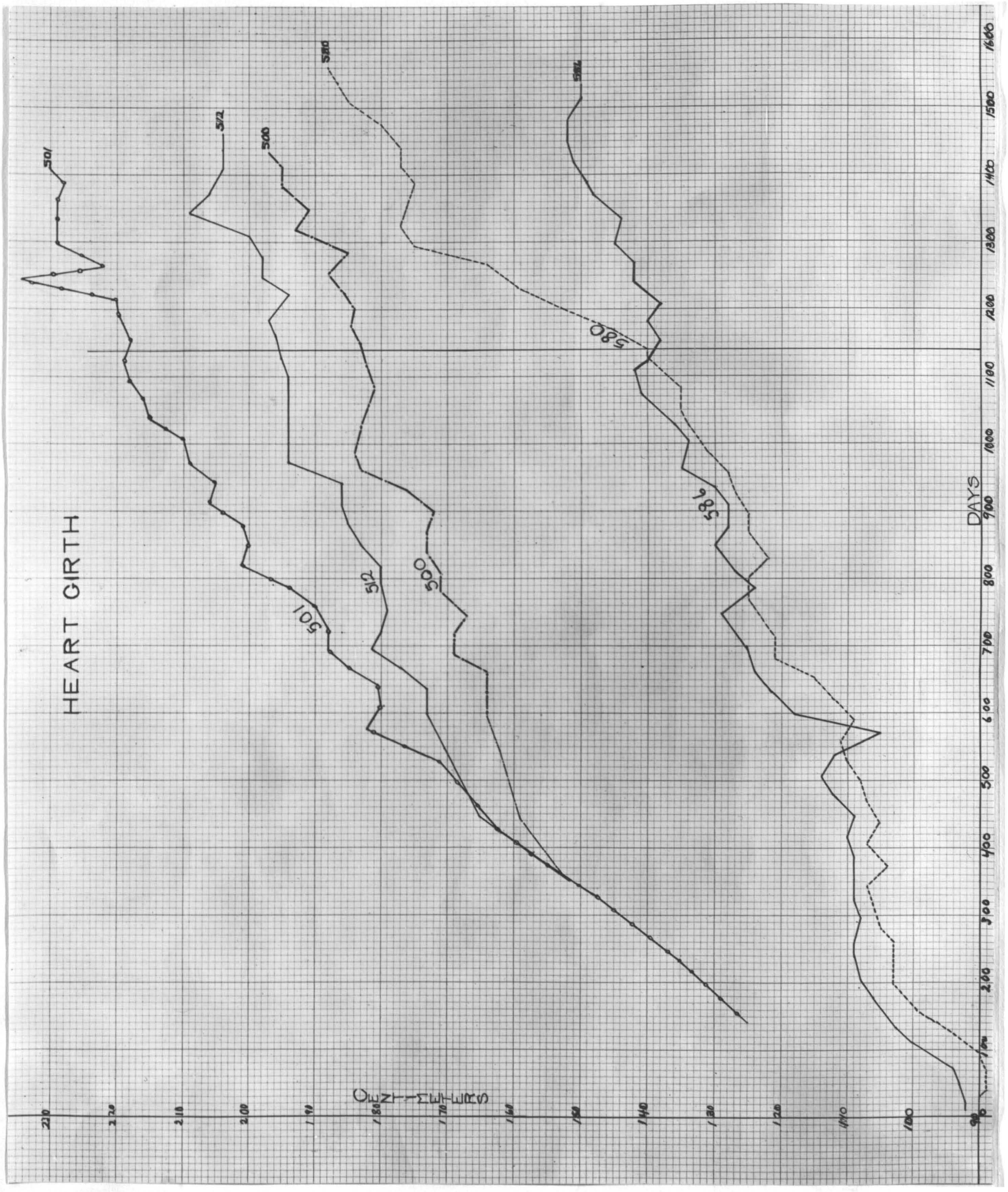
In this respect, then, it is apparant that 580 did not catch up with Group II. But it was far from 586, an animal similar to what it would have been.

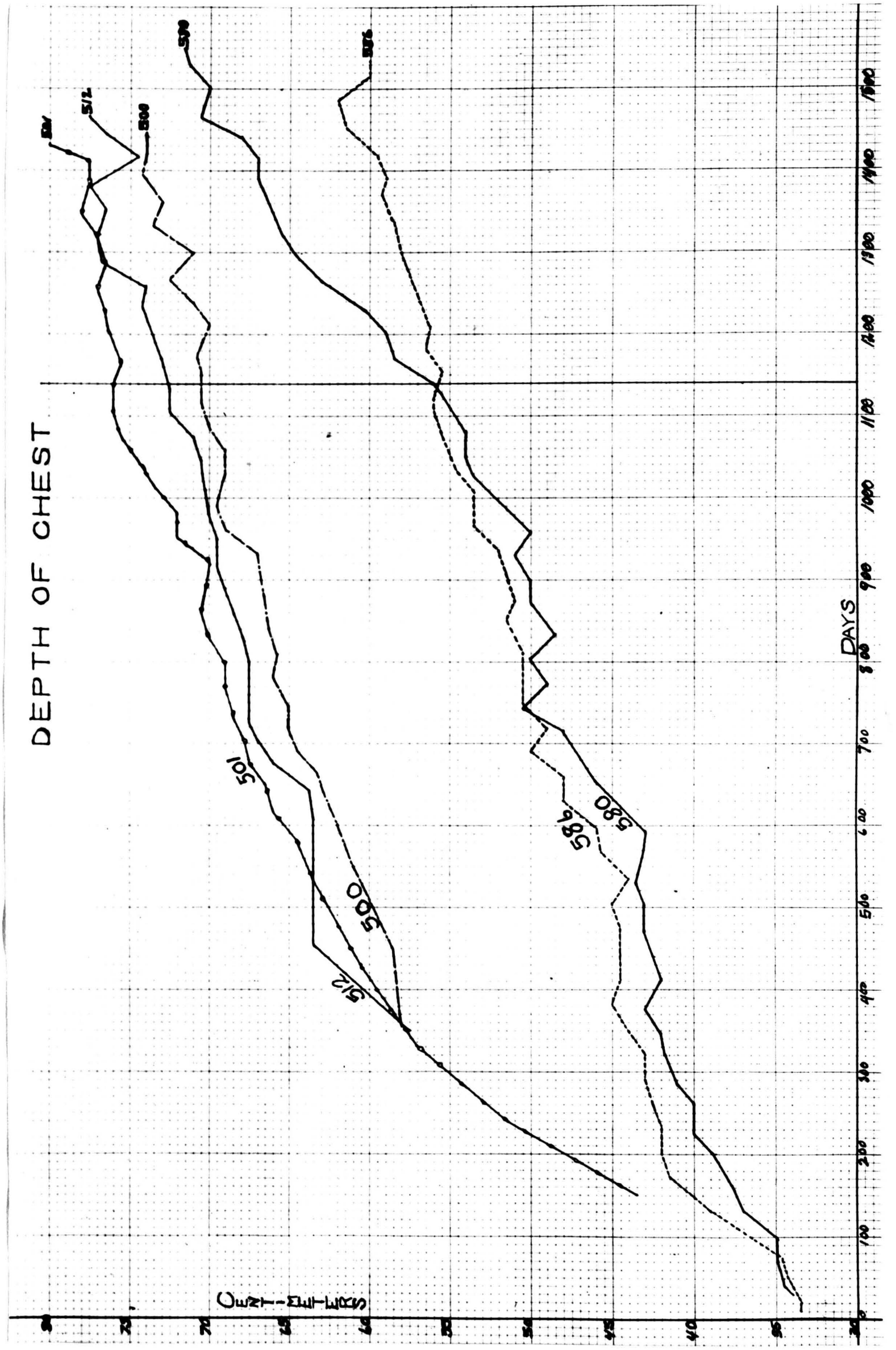
Depth of Chest
and

At 1140 days of age 586/ 580 had gained 22 cm. in depth of chest. 500 had gained 36 cm, 512 had gained 38 cm. and 501 had gained 42 cm.

At the end of its life 586 had gained 26 cm.; 580, 37 cm.; and 500, 39 cm., 512 had gained 42 cm. and 501 had gained 45 cm.


GIRTH OF PAUNCH
CENTIMETERS
DAYS
501
512
500
580
586


HEART GIRTH
CENTIMETRES
DAYS
501
502
500
510
504
580
585
506
512
500


DEPTH OF CHEST
DAYS
501
505
512
580
586
504
512
576
586

580 did not quite catch up with 500 so it may be said that 580 had almost reached only Group II Retarded Growth.

Length

At 1140 days of age 580 and 586 had gained approximately 35 cm. in length, and 512 and 500 had gained approximately 60 cm., and 501 had gained 67 cm.

At the end of their lives 586 had gained 44cm and 580 had gained 59 cm., 500 and 512 had gained approxiamtely 64 cm. and 501 had gained 75 cm.

580 did not catch up with 500 and 512 so did not recover to Group II Retarded Growth.

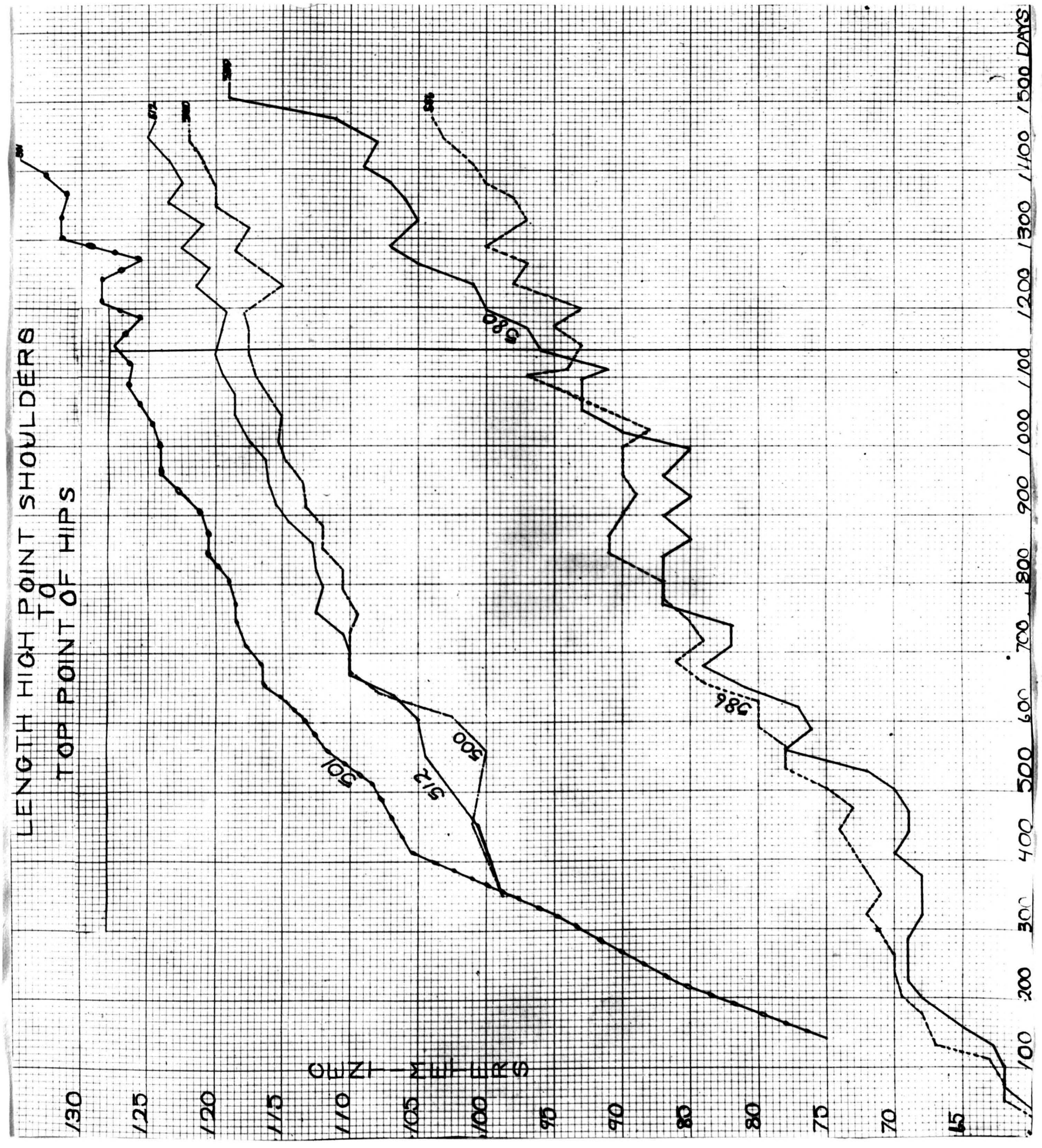
Height at Withers

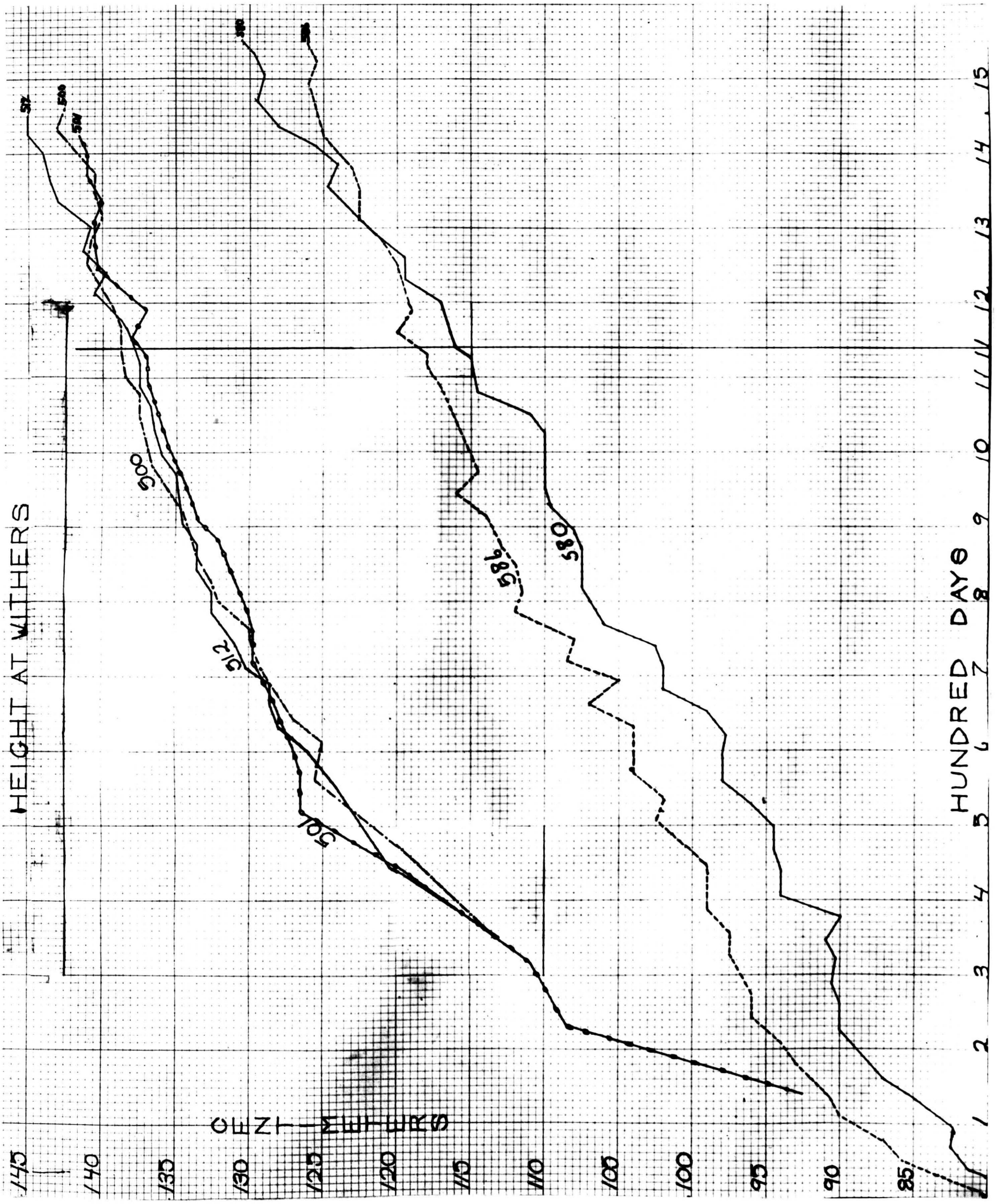
At 1140 days of age 580 and 586 had gained approximately 37 cm. 501, 500, and 512 had gained approximately 57 cm. At the end 586 had gained 47 cm. and 580 had gained 51 cm. The three animals 501, 500, 512, were all about together having gained approximately 62 cm.

This shows that height is not affected until the ration becomes very low. Then it is retarded and is very hard to recover. This is shown by the failure of 580 to much more than pass 586 in gain in height. Thus 580 compares to a Group III animal in height.

Width of Hips

At 1140 days of age 580 and 586 had gained approximately 17 cm. in width of hips. 500 and 512 had gained approximately


LENGTH HIGH POINT SHOULDERS
TO
TOP POINT OF HIP
CENTIMETERS
130
125
120
115
110
105
100
95
90
85
80
75
70
65
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500 DAYS
501
512
500
880
986


HEIGHT AT WITHERS
CENTIMETERS
HUNDRED DAYS
900
912
986
580
105
145
140
135
130
125
120
115
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6
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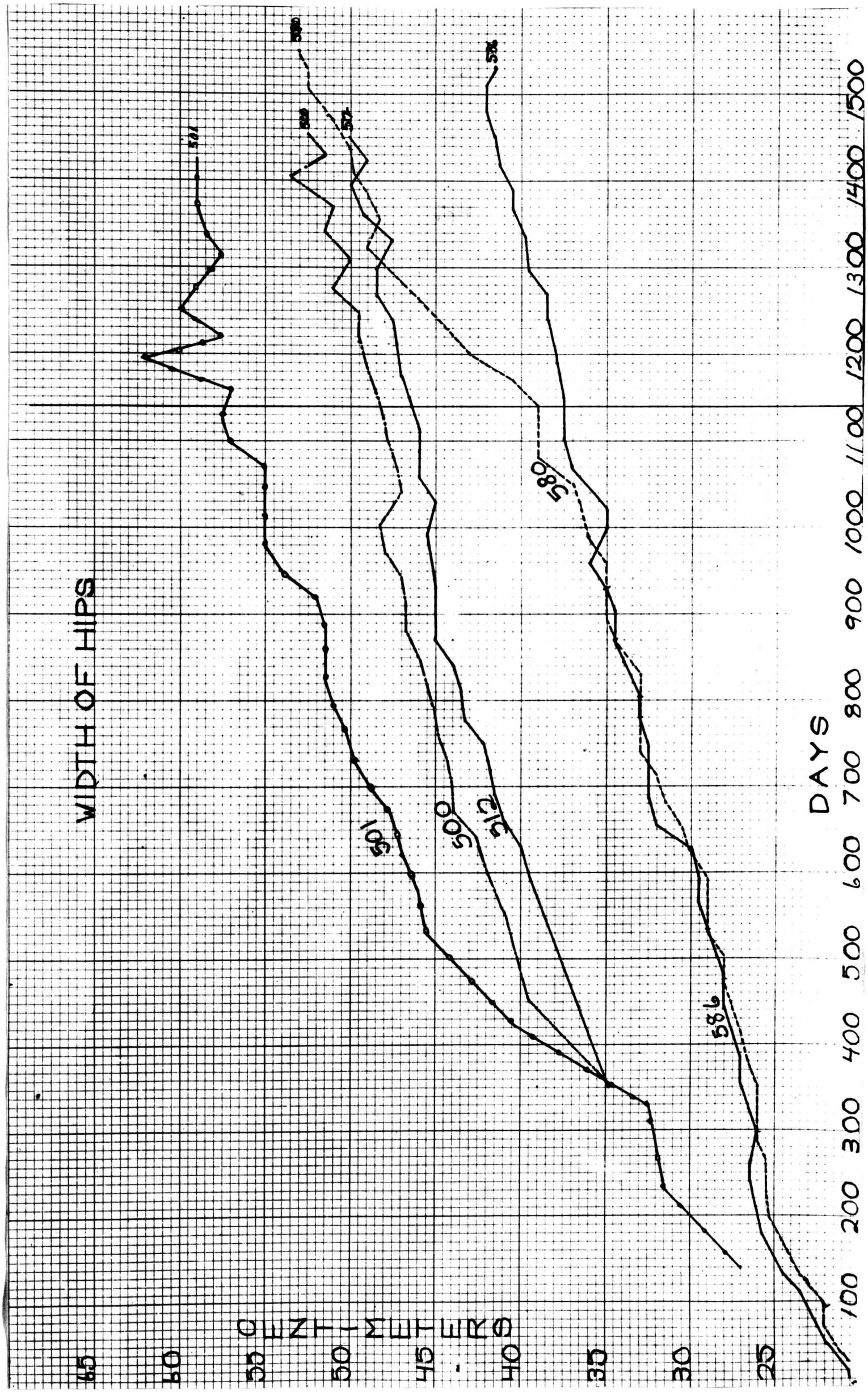
WIDTH OF HIPS
CENTIMETERS
DAYS
45
40
35
30
25
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
501
512
505
586
580

27 cm. and 501 had gained 37 cm. in width of hips.

At the end of its life 586 had gained 22cm. 580, 500, and 512 had gained 32 cm. 501 had gained 38 cm.

580 caught up with 512 and 500 so can be said to have recovered in this respect to Group II Retarded Growth.

On the whole it can be said that:

(1) 580 did not quite recover to Group II in most measurements.

(2) 580 did not change very much in height when fattened, and height is the hardest thing to retard and that once retarded hardest to regain its normal developement.

ENERGY CONSUMED AND RECOVERED IN GAIN

The method of calculating the energy consumption for these animals is that recommemded by Armsby and Fries in their Article in the Journal of Agricultural Research Volume III, No. 6, March 25, 1915, page 435 entitled, "Net Energy Values of Feeding Stuffs for Cattle."

The metabolizable energy was computed by applying the factors given by Armsby. Translated from the decimal system these values are: 1.769 therms per pound digestible organic matter in grain and 1.588 per pound digestible organic matter in hay. The metabolizable energy was derived by applying these two factors to the varying amounts of hay and grain.

From a chart put out by the U. S. Department of Agriculture, Office of the Experiment Station, entitled, Composition of Food Materials: Milk and milk products, the energy for one pound skim milk was found to be 165 Calories. Also for one pound milk containing four per cent fat it was found to be 315 Calories. Assuming milk 95 per cent digestible the metabolizable energy was calculated from the above data. For skim milk 1.753 therms per pound digestible organic matter was found and for 2.8 per cent milk 2.39 therms was found.

The heat increment was calculated by applying Armsby factors. For grain mixture No.2 we get 0.516 therms per pound dry matter, and this was used for the grain used. For timothy 0.356 therms per pound dry matter was obtained, for alfalfa 0.530 therms per pound dry matter, and for oat straw o.460 therms per pound dry matter. An average of all the concentrates was used

for the milk. This was 0.635 therms per pound of dry matter. The differance between the metabolizable energy and the energy expenditure gives the net available energy.

Energy Summary

Animal No.	580	586	500	512	501
Metabolizable Energy, Therms	12900.4	9508.2	15951.3	19688.9	27478.4
Energy Expenditure, Therms	6535.6	5185.2	6519.5	8207.2	12061.5
Net Energy	6364.7	4322.9	9431.7	11481.7	15416.9

Energy for Maintainance and Exercise

In computing the energy available for maintainance and exercise the total energy gained by the steer was calculated by computing the total protein and fat gained.

To get the total protein and fat gained it was necessary to use the analysis of a very young steer. The per cent of fat used was 4.403 and the per cent of protein was 20.181. This analysis was applied to the steers initial weight and the amounts of fat and protein at the start were thus determined. The per cent of fill was considered negligible since at this time they were on a milk ration. For this reason their initial live weight was used. The difference between this amount of fat and protein and the final amount of fat and protein respectively gives the total fat and protein gained. The value of 5.6776 Calories per gram was used for the protein gained and 9.4889 Calories per gram for the fat gained. These values are quoted by Moulton in the Journal of Biological Chemistry, Volume XXXI, No. 2

August, 1917, page 390.

Energy for Maintainance and Exercise

Animal No.	580	586	500	512	501
Final Wt. Fat Gms.	132,348	14,068	69,201	117,015	354,896
Initial Wt. Fat, Gms.	3,039.67	3,087.6	2,367	3,395	1,957
Fat Gained, Gms.	129,308	10,980	66834	113620	352,939
Therms Gained from Fat	1226.99	104.19	634.18	107813	3349.00
Final Wt. Protein, Gms.	70,825	37,681	79,166	87,121	97.205
Initial Wt. Protein, Gms.	13,932	14,152	10,847	15,562	8,971
Protein gained Gms.	56,893	23,529	68,319	71,559	88,234
Therms from Protein	323.01	133.59	387.89	406.28	500.96
Total Therms gained	1550.00	237.78	1022.07	1484.41	3849.96
Net Energy Fed	6364.72	4322.93	9231.74	11,481.7	15,416.9
Maintainance and Exercise	4814.72	4085,15	8409.67	9997.32	11,566.96

Maintainance and Exercise for 100 pound Steer per Day

Animal No.	Average Life Wt.	Maintainance and Exercise for Life Therms	Total Days	Therms per Day	Therms per day per 1000 Lbs. maintainanc and Exercise
500	686.40	8409.67	1427	5.893	7.4555
501	1231.97	11566.95	1422.5	8.132	7.2420
512	847.80	9997.32	1426	7.011	7.7732
580	465.06	4814.72	1524.5	3.158	5.0959
586	374.30	4085.15	1524.5	2.680	4.9530

The therms per day per 1000 pounds of live weight was derived by applying Moulton's formulae, (Journal of Biological Chemistry, Volume 24, No.3, page 313.).

Therms per 1000 pounds per day = Therms per day (1000 pounds divided by average weight))to the five-eighths power. In the case of 501 an extremely fat animal the five-ninths power was used.

The striking thing about the above data is the extremely low maintainance cost of 580 and 586. They are lower than the other three animals by two therms per day. This would mean a difference of about 3000 therms during their life, a difference by far too great to be laid to the method of calculation.

The above data is borne out by the actual fact that 580 made better gains than 500 on but little more dry matter fed, while 500 received a higher per cent of grain than did 580. In other words 580 made as good gains as 500 did on more roughage (which contains less energy) and less grain. 500 received

grain and hay in the ration of 2:1. A study of Table No. will show that 580 did not receive this much grain. The only way to account for this is to assume that 580 had a lower maintainance cost which the above data shows.

From this it can be said that the limited ration given 580 and 586 gave them a much lower maintainance cost and that when 580 was fattened up the maintainance cost did not increase, but remained low.

COST PER POUND OF GAIN

Dry Matter per Pound Gain

Animal No.	580	586	500	512	501
At 1140 days of age, Lbs.	17.350	19.912	11.466	12.615	10.433
From 1140 Days to end of Life	11.216	37.643	27.358	30.175	28.594
For Life	13.710	23.873	13.622	14.802	12.445

In terms of dry matter 501 made the cheapest gains for life. However 500 and 580 were not much more expensive. Again it must be remembered that 580 and 586 received more hay and less grain than the other animals did. 580 certainly was not stunted in its ability to handle food.

580 also made its cheapest gains in the latter part of its life while the other steers made their cheap gains early in life.

Net Energy per Pound Gain

Animal No.	580	586	500	512	501
At 1140 days Therms	7.332	8.674			
1140 days to end Life Therms	6.414	15.058			
At end of Life Therms	6.787	10.100	10.235	10.751	8.249

From the above data it can be easily seen that 580 made by far the cheapest gains due to its low maintainance costs.

Energy in a Pound of Gain

Animal No.	580	586	500	512	501
At 1140 days Therms	.607	.602			
1140 days to end of Life Therms	2.369	.393			
For Life Therms	1.653	.555	1.109	1.390	2.060

This depends on the varying per cent of water and fat. When fat replaces the water there is more energy per pound of gain. Using this as a measure of fatness 580 compares to a better than Group I Retarded Growth animal.

PART IV

SLAUGHTER HOUSE DATA

All animals were treated in practically the same way; so one description will apply to all.

The animal was weighed just before slaughtering. After this weighing all feces voided were collected and weighed. It was quickly stunned with the knocking hammer, shackled by the hind legs and hoisted clear of the floor. All vomit was collected and weighed. The suspended animal was stuck in the throat near the brisket so that both the jugular vein and carotid artery were severed where they branch. The blood was collected in a tared tub.

The forelegs were pumped to insure complete bleeding, while the blood was flowing freely. The samples for analysis were taken and a measured volume was weighed so that the specific gravity and the total volume might be calculated.

The head was skinned out in the usual manner and removed, the gullet being firmly tied. All dripping blood was caught in the tared tub with the rest of the blood. The head was immediately weighed.

The tongue with larynx and bones was removed and separated into tongue marketable, tongue base, tongue bones, larynx, and piece of gullet. The weights were recorded of the various pieces. The skull was split and the brain removed and weighed. The lean and fat of one half of the head was separated from the bone and weighed.

The carcass was lowered and skinned in the usual manner, the hide being weighed. In skinning out the feet, the dew

claws were removed. The hoofs were separated from the feet, the bones and tendons being treated as skeleton.

The usual packing house order was followed in skinning the carcass and removing the internal organs. The caul fat was removed before the carcass was hoisted. The bladder was weighed while full, then emptied and weighed again. The contents of the abdominal and thoracic cavities were caught in a large tub and weighed. The various organs were then separated out, cleaned where necessary, and weighed. The intestines were carefully run for removal of fat. The carcass was split in halves. The kidneys and spinal cord were removed and weighed. Tables 8 and 9 in the appendix gives the detailed data.

The Empty Animal

Animal No.	580	586	500	512	501
Live Wt.Kgm.	489.877	265.350	457.786	548.050	883.480
Warm Empty Wt. Kgm.	439.250	195.913	407.833	493.877	814.914
Per Cent Empty Wt. to Live Wt.	89.665	73.832	89.088	90.115	92.239

The per cent of fill in the animals varies inversely as the live weight and fatness of the animal. The heaviest and fattest animal had the lowest per cent of fill. The difference between the live and warm empty weight is fill.

580 had a per cent of fill between that of 500 and that of 512. This shows that 580 had recovered from what 586 was to almost the same condition as 512, an animal which corres-

ponds to Group I Retarded Growth.

The extremely low per cent of empty weight in the case of 586 can be accounted for, more or less, by the fact that it was receiving a much more bulky ration than the others, and also by the fact that to accomodate such a bulky ration he must have a large per cent of digestive organs--i.e. stomach and intestines--. Having such a large capacity, as will be seen later, he would have a higher per cent of fill.

The Carcass

Animal No.	580	586	500	512	501
Live Wt. Kgm.	489.877	265.350	457.786	548.050	883.480
Warm Empty Wt. Kgm.	439.250	195.913	407.833	493.877	814.914
Wt. Carcass Cooled Kgm.	289.617	116.114	271.732	338.675	609.185
Per Cent Carcass to Live Wt.	59.120	43.759	59.358	61.796	68.953
Per Cent Carcass to Empty Wt.	65.934	59.268	66.628	68.575	74.755

/The per cent of carcass varies directly as either the live weight or empty weight. The heaviest and fattest animal having the highest per cent of carcass.

580 compares with 500 better than any other animal so it can safely be said that in reference to carcass, 580 has reached at least Group II.

The big difference in 586 between the per cent of carcass to live weight and the per cent of the carcass to empty weight may be explained by the fact that 586 had such a high

per cent of fill, and also by the fact that in a thin animal the per cent of vital organs is always increased at the cost of the flesh.

Offal Fat and Carcass

Animal No.	580	586	500	512	501
Wt. Offal Fat, Kgm.	28.685	2.962	12.940	17.454	38.625
Wt. Carcass and O. F.Kgm.	318.302	119.076	284.672	356.129	647.810
Per Cent Carcassand O. F. to Live Wt.	64.976	44.875	62.185	64.981	73.325
Per Cent Carcass and O. F. to Empty Wt.	72.465	60.780	69.801	72.109	79.494

The per cent of carcass and offal fat varies directly either in relation to live weight or to empty weight. The heaviest and fattest animal has the highest per cent of carcass and offal fat.

580 is similar to 512 since they both have the same per cents. This shows that 580 had recovered to a Group I animal since 512 corresponds to a Group I Retarded Growth animal.

Hide and Hair

Animal No	580	586	500	512	501
Wt. Hide and Hair, Kgm.	35.552	16.102	35.938	41.268	50.090
Per Cent to Empty Wt.	8.094	8.219	8.812	8.356	6.147

The striking difference here is in the case of the extremely fat animal 501. It has a low per cent, three-fourths

of the per cent of the others. Evidently steers could be divided into two classes as regards hide and hair, extremely fat animals and all others. The variance in the others is due to individuality.

Blood

Animal No.	580	586	500	512	501
Wt. Blood, Kgm.	18.946	11.630	21.269	24.176	28.710
Specific Gravity	10.760	1.0422	1.0376	1.0345	1.0346
Volume Blood, Liters	17.607	11.149	20.497	23.369	27.749
Per Cent to Empty Wt. by Wt.	4.313	5.936	5.215	4.895	3.523

The per cent of blood in reference to the warm empty weight varies inversely as the warm empty weight. The lightest and thinnest animal had the highest per cent.

The per cent of blood in 580 is less than that of 512, so in reference to blood 580 had recovered to better than Group I Retarded Growth.

Heart

Animal No.	580	586	500	512	501
Wt. of Heart Marketable, Kgm.	1737	1043	1467	1955	2214
Per Cent to Empty Wt.	.395	.532	.360	.396	.272

The per cent marketable heart varies inversely as the warm weight of the animal. The heaviest and fattest animal has the lowest per cent.

Again 580 corresponds with 512 and so has recovered to Group I Retarded Growth.

Lungs and Trachea

Animal No.	580	586	500	512	501
Wt., Grams	3266	2172	4068	4256	4004
Per Cent to Empty Wt.	.744	1.109	.997	.862	.491

The per cent of lungs and trachea to the warm empty weight varies inversely as the warm empty weight, the heavier and fatter the animal, the lower per cent.

580 had a slightly lower per cent than 512 so it would be slightly better than Group I Retarded Growth.

Brain and Spinal Cord

Animal No.	580	586	500	512	501
Wt. of Brain and Spinal Cord, Gms.	780	807	832	666	757
Per Cent to Empty wt.	.178	.412	.204	.135	.093

The per cent of brain varies inversely as the warm empty weight. This is caused by the fact that the brain does not gain much in weight after it is one year old, while the body does. Hence the decrease in per cent. The brain is not affected in any way by nutrition. It is primarily a matter of individuality. A study of the weights of the brains of the five steers will show that there is no correlation with their method of treatment.

Stomaches

Animal No.	580	586	500	512	501
Wt. of Stomach, Gms.	11441	7621	10,995	11,089	14,185
Per Cent to Empty Wt.	2.605	3.890	2.696	2.245	1.741

The per cent of stomaches varies inversely as the warm empty weight, the heaviest and fattest animal having the lowest per cent. This can be explained by the fact that the vital organs are the last to suffer in starvation so the animal on the lower plane of nutrition would keep up these organs at the expense of the flesh. Also as an animal fattens the tissue that is laid on becomes more and more fat, and so less and less active, and consequently does not need its proportionate share of vital organs. Hence a higher per cent in reference to weight.

580 compares to 500, an animal similar to Group II Retarded Growth. This may be explained by the fact that 580 was fed very heavily at the end of its life, so had need of a large digestive system, which he accordingly developed. This can be seen from the weight of its stomachs. He had slightly larger stomachs than 512, a heavier animal.

Intestines

Animal No.	580	586	500	512	501
Wt. Of Intestines	5171	4314	4535	5322	4875
Per Cent to Empty Wt.	1.177	2.202	1.112	1.078	.598

The per cent of intestines varies inversely as the warm empty weight. The lightest and the thinnest steer had the

highest per cent.

580 lies between 586 and 500. This seems to indicate that it has not covered from retardation. However, this may be explained by the fact that 580 had to have a large digestive system in order to handle the food presented it. Thus, first it had to prepare its digestive system toaaccomodate a large amount of food before it could make gains in proportion with its digestive system. It was slaughtered at the time when its degestive system had become emlarged but before the proportional gain had been made. This is borne out by the fact that at the time 580 was slaughtered its curves of growth are all steeper than any of the others.

Length of Intestines

Animal No.	580	586	500	512	501
Length of Intestines, Ctm.	4442	4389	4333	5548	4849
Ctm. Per Kilo. Empty Wt.	10.113	22.403	10.62	11.23	5.95

There seems to be about three classes here: extremely fat, extremely thin, and medium. The length seems to be more or less like the brain--a more or less constant thing for all animals, so the weight of the animal would be the varying factor causing the change in ratio.

Gall Bladder and Gall

Animal No.	580	586	500	512	501
Wt. Bladder and Gall, Gms.	253	137	300	300	266
Per Cent to Empty Wt.	.058	.070	.074	.061	.033

The per cent of gall bladder and gall to the empty weight is more or less of a constant thing with a general tendency to decrease as the animal becomes excessively fat.

Kidneys

Animal No.	580	586	500	512	501
Wt. of Kidneys, Grams	907	540	1.019	1.074	1.037
Per Cent to Empty Wt.	.206	.276	.250	.217	.127

The per cent of kidneys varies inversely as the warm empty weight , the heaviest and fattest having the lowest per cent.

580 corresponds to 512 and hence can be said to have recovered to Group I Retarded Growth.

Liver

Animal No.	580	586	500	512	501
Wt. Liver, Gms.	5076	1960	4634	4416	6161
Per Cent to Empty Wt.	1.156	1.000	1.136	-.894	-.756

The liver is one of the chemical laboratories of the body. 500, 512, and 501 show a tendency to vary inversely as the warm

empty weight.

580 had the highest per cent of any. It did the most rapid growing and hence needed the largest liver.

Spleen

Animal No.	580	586	500	512	501
Wt. Spleen, Gms.	694	399	1.054	1.255	1.178
Per Cent to Empty Wt.	.158	.204	.258	.254	.145

In 500, 512 and 501 there seems to be the tendency to vary inversely as the warm empty weight.

The spleen is one of the body's chemical laboratories. Steer 586 was undeveloped in this respect since it never has had much need for its spleen. 580 was underdeveloped in regard to spleen. When it began to grow the spleen did not develope much. In other words the effect of retarding on the spleen was permanent.

Pancreas

Animal No.	580	586	500	512	501
Wt. Pancreas, Gms.	640	250	625	736	836
Per Cent to Empty Wt.	.146	.128	.153	.149	.103

The per cent pancreas to empty weight shows a tendency to vary inversely as the warm empty weight, 501 the heaviest and fattest animal, having the lowest per cent.

This does not hold good in the case of 586. The pancreas is one of the chemical laboratoried and was under developed in this animal. 580 recovered in this respect and can be placed

as similar to 512 or as Group I Retarded Growth.

On the whole it may be said that:

(1) The per cent of fill, blood, marketable heart, lungs and trachea, stomachs, intestines and kidneys vary inversely with the warm empty weight and fatness of the animal.

(2) The per cent of carcass, and offal fat and carcass, varies directly as the live weight or warm empty weight and fatness of the animal.

(3) The per cent of hide and hair is more a case of individuality except in the case of extremely fat animals in which the per cent is lower by three-fourths than it is in others.

(4) The per cent of brain and spinal cord varies inversely as the empty weight and fatness of the animal, but this is due to the fact that the brain does not grow much in weight after one year of age.

(5) The relative length of the intestines seems to be purely an individual matter.

(6) The per cent of gall and gall bladder is more or less constant with a decreasing tendency in the case of a large and fat animal.

(7) The per cent of the liver, spleen, and pancreas show a tendency to vary inversely with the warm empty weight.

(8) That 580 had recovered to a Group I animal in per cent of fill, offal fat and carcass, blood, heart, lungs and trachea, gall bladder and gall, kidneys and pancreas.

(9) That 580 ~~s~~ showed stomachs, intestines and liver ~~were~~ larger for its empty weight, because it needed them large. This made its per cent of carcass to empty weight run low.

(10) That 580 never recovered its full developement of spleen.

(11) That the chemical laboratories (the liver, spleen and pancreas) were underdeveloped in 586.

THE CARCASS

The carcass was allowed to chill over night. The following day the right side was separated into the two quarters and these cut into the standard wholesale cuts, consisting of the shin, neck, chuck, plate, rib, loin, flank, rump, round and shank. These cuts were each weighed and separated with good knife separation into lean, fat and bone. Care was taken to keep the fat as free as possible of lean; it being impossible to keep the lean free from fat by hand separation. The various cuts were kept in closed containers and the exposure to loss by evaporation was limited as much as possible during the actual separation.

Photographs of the carcasses and typical cuts are shown.

	The Forequarter				
Animal No.	580	586	500	512	501
Wt. of Forequarters, Grams	152,406	61,144	142,590	180,416	304,706
Per Cent to Carcass	52.623	52.659	52.568	53.240	50.144

The per cent of forequarter to carcass is a relatively constant matter. In every case there seems to be a tendency for the forequarter to be slightly more than 50 per cent of the carcass. This depends on the breed to a large degree, and the Shorthorn-Hereford breed is known to be light in the hind quarter.

The Hindquarter

Animal No.	580	586	500	512	501
Wt. of Hindquarters, Grams	133,809	54,970	128,660	158,456	302,952
Per Cent to Carcass	46.202	47.341	47.432	46.760	49.856

The hindquarter to carcass was relatively constant. The differences were due to individuality. This depends of the breed.

Shin

Animal No.	580	586	500	512	501
Wts. of Shins	13,272	7,584	14,710	14,874	18,036
Per Cent to Carcass	4.583	6.532	5.423	4.389	2.968

The per cent of shin to carcass varies inversely as the weight and fatness of the animals, the heavier and fatter the lower the per cent.

580 has practically the same per cent as 512 and so is equal to a Group I Retarded Growth animal.

Neck

Animal No.	580	586	500	512	501
Weight of Neck	2432	934	3,320	3,200	3,682
Per Cent of Neck	.840	.804	1.224	.944	.606

The per cent of neck is relatively constant in all animals being close to one per cent. It shows a tendency, however to decrease as the animal gets very fat and heavy.

Chuck

Animal No.	580	586	500	512	501
Weight Chuck Grams	69,400	30,128	70,398	87,134	123,468
Per Cent to Carcass	23.963	25.947	25.953	25.713	20.319

The per cent of chuck is relatively constant until the animal becomes very fat, when it decreases.

501, the fattest animal had only four-fifths as much chuck as 586, 500, and 512 more or less thin animals.

Plate

Animal No.	580	586	500	512	501
Wt. of Plates	44,856	13,036	33,596	46,012	103,954
Per Cent to Carcass	15.488	11.227	12.386	13.578	17.107

The per cent of plate to carcass varies directly as the weight and fatness of the carcass. The heaviest and fattest animal had the highest per cent.

The per cent of plate in 580 is higher than 512 so 580 has recovered to more than Group I Retarded Growth animal but not to a Group I Use of Food.

Rib

Animal No.	580	586	500	512	501
Wt. of Ribs , Grams	23,134	9,790	20,642	29,054	55,566
Per Cent to Carcass	7.988	8.431	7.610	8.574	9.144

The per cent of rib shows a tending to remain more or less constant, increasing in the extremely fat animal.

Loin

Animal No.	580	586	500	512	501
Weight of Loins Grams	47,736	17,322	44,318	56,102	126,112
Per Cent to Carcass	16.482	14.918	16.338	16.556	20.754

The per cent of loin varies directly as the weight and fatness of the carcass. The lightest and thinnest animal had the lowest per cent.

580 compares to 512 and so is equal to a Group I Retarded Growth steer.

Kidney Fat

Animal No.	580	586	500	512	501
Wt. Kidney Fat, Grams	8278	272	2432	4740	19,544
Per Cent to Carcass	2.858	.234	.894	1.400	3.208

In per cent the kidney fat varies directly as the weight and fatness of the carcass. The heaviest and fattest animal had the highest per cent.

580 had recovered to better than Group I because its per is almost as high as Group I of the Use of Food Experiment.

Flank

Animal No.	580	586	500	512	501
Wt. Flank, Gms. to Per Cent Carcass	13,446 4.643	2,322 2.000	9,172 3.381	11,064 3.247	37,536 6.197

The tendency of the per cent of flank is to raise with the weight and fatness of the animal. 586, the lightest and thinnest, was lowest and 501, the heaviest and fattest, was highest.

Accordingly 580 would have a Group I Retarded Growth classification since its per cent was above that of 512.

Rump

Animal No.	580	586	500	512	501
Wt. of Rump, Gms.	10766	4482	10082	13740	26036
Per Cent to Carcass	3.717	3.860	3.717	4.055	4.285

The per cent of rump to carcass is relatively constant varying with the individual. All five were about four per cent.

Round

Animal No.	580	586	500	512	501
Wt. Round, Gms.	45496	23440	52146	61450	79,940
Per Cent to Carcass	15.709	20.187	19.224	18.134	13.139

The per cent of round varies inversely as the weight and fatness of the animal, the heaviest and fattest having the lowest per cent.

Since the per cent of 580 lay between that 512 and 501 it is easily seen that 580 had recovered to at least Group I Retarded Growth.

Shank

Animal No.	580	586	500	512	501
Wt. Shank Gms.	7838	5134	9314	10,142	12,762
Per Cent to Carcass	2.706	4.422	3.434	4.993	2.100

The per cent of shank varies inversely as the weight and fatness of the animal. The fattest and heaviest animal had the lowest per cent.

580 corresponds closer to 512 than to any other and so can be said to have recovered to Group I Retarded Growth.

Head (Exclusive of horn, teeth, brains and tongue)

Animal No.	580	586	500	512	501
Wt. of Head Grams	12936	9236	11824	13233	14702
Per Cent to Empty Wt.	2.945	4.714	2.899	2.679	1.804

The per cent of head varies inversely as the weight and fatness of the animal. The thinnest and lightest having the highest per cent.

580 corresponds to 500 and so should be said to have reached Group II Retarded Growth in this respect.

Tail

Animal No.	580	586	500	512	501
Wt. of Tail, Gms.	676	327	842	875	854
Per Cent to Empty wt.	.154	.167	.206	.177	.105

The per cent of tail evidently depends on the individ-

ual, 501, of course, was low due to the excessive fatness of the animal.

On the whole it can be said that:

(1) The per cent of forequarters, hindquarters, neck, chuck, rump and tail are more or less constant and the variance is due to individuality and to excessive fatness.

(2) The per cent of shins, round, shank and head varies inversely with the weight and fatness of the steer.

(3) The per cent of plate, loins, kidney, fat, and flank, varies directly as the weight and fatness of the animal.

(4) 580 recovered to Group I in every thing except the head where it was Group II.

DISTRIBUTION OF LEAN, FAT AND BONE

Shin

Animal No.	580	586	500	512	501
Wt. Shin Gms.	6636	3792	7355	7437	9018
Per Cent Lean	58.303	49.763	57.090	52.817	51.785
Per Cent Fat	6.977	4.299	4.297	6.199	13.562
Per Cent Bone	34.448	44.383	38.138	40.836	34.154

In the shin the per cents show a tendency toward increasing fatness and decreasing bone in proportion to the weight and fatness of the carcass. 501, the fattest and the heaviest carcass had the lowest per cent of bone and the highest per cent of bone and the highest per cent of fat. The bone of 512 was high because he was actually a big raw boned animal. The per cent of lean shows a tendency to decrease as the weight and fatness increases. The low per cent of lean in 586 is due to the fact that 586 was on such a low plane of nutrition that the bone developed at the cost of the lean.

Neck

Animal No.	580	586	500	512	501
Wt. of Neck Gms.	1216	467	1660	1600	1841
Per Cent of Lean	50.329	48.608	52.651	50.000	45.247
Per Cent of Fat	22.368	10.707	11.928	10.938	30.310
Per Cent of Bone	29.441	40.899	35.482	38.750	24.280

The per cent of bone in the neck varies inversely as the weight and fatness of the animal. 501, the heaviest and fattest had the lowest per cent. The high per cent of 512

can be explained by the fact that 512 was naturally a big raw boned steer.

The per cent of fat in the neck shows a tendency to increase as the animal becomes heavier and fatter. Animal 501 had the highest per cent and 586 had the lowest. The low cent of fat in 512 can be accounted for by the fact that he had much bone. This would decrease its per cent of fat.

The per cent of lean varies inversely as the weight and fatness of the animal. 586 developed bone at the cost of the lean because it did not have nutrients enough for both.

The per cent of lean, fat, and bone in 580 certainly compares with 512 if a correction is made on 512 to eliminate its individuality in being so big boned. At least, 580 is the animal whose per cent of lean, fat, and bone compare best to 501 so it can be said that 580 has recovered to slightly better than Group I Retarded Growth.

Chuck

Animal No.	580	586	500	512	501
Wt. of Chuck Gms.	34,700	15,064	35,199	43,567	61,734
Per Cent Lean	63.994	65.773	74.371	69.481	57.534
Per Cent Fat	18.288	5.543	6.276	12.647	30.106
Per Cent Bone	16.824	25.717	18.853	17.555	12.055

The per cent of bone varies inversely as the weight and fatness of the animal, 586, the lightest and thinnest having the highest per cent. Again 512 has a relatively high per cent caused by individuality.

The per cent of fat varies directly with the size and fatness of the animal. 501 the largest and fattest had the highest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. 586 was on such a low plane of nutrition that it did not develope the lean as it should. The larger part of the nutrients went to produce bone.

580 had a higher per cent of fat than 512 and a lower per cent of lean and bone so it is slightly better than a Group I Retarded Growth steer.

Plate

Animal No.	580	586	500	512	501
Wt. Plate Gms.	22,428	6518	16,798	23,006	51,977
Per cent Lean	44.128	57.625	63.406	50.339	34.810
Per Cent Fat	40.543	10.018	18.169	32.487	58.276
Per Cent Bone	15.066	31.881	18.419	16.635	6.709

The per cent of bone varies inversely as the weight and fatness of the animal, 501 having the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal, 501 having the highest per cent.

The per cent of lean varies inversely as the weight of the animal. 586 is low in per cent of lean, because it was on such a low plane of nutrition that it developed bone at the cost of the lean.

The per cent of lean, fat, and bone in 580 compares with 512, being slightly closer to 501 in every case. From

this it can be said that 580 has recovered to a Group I Retarded Growth condition.

Rib

Animal No.	580	586	500	512 501
Wt. of Rib, Gms.	11,567	4,895	10,321	14,527-27,783
Per Cent Lean	55.063	59.877	65.894	58.195-37.494
Per Cent Fat	24.864	4.454	8.739	18.579-50.970
Per Cent Bone	18.665	33.830	25.153	23.880-11.496

The per cent of bone varies inversely as the weight and fatness of the animal., 501, the heaviest and fattest had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the thinnest and lightest had the lowest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. 586 was lower than would be expected because it used its nutrients for a bone developement and did not have enough for corresponding lean developement. The per cent of lean, fat, and bone in 580 is similar to that of 512 being between it and 501. This would make 580 to correspond to a slightly better animal than a Group I Retarded Growth Steer.

Loin

Animal No.	580	586	500	512	501
Wt. Loin, Gms.	23,868	8,661	22,159	28,051	63,056
Per Cent Lean	51.823	66.043	66.998	57.149	36.472
Per Cent Fat	35.675	10.368	15.411	27.286	56.583
Per Cent Bone	11.765	23.565	17.537	15.593	6.830

The per cent of bone varies inversely as the weight and fatness of the animal, 501 having the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal, 586, the thinnest and lightest had the lowest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. 580 is low on account of its low plane of nutrition which did not allow it to develope its normal amount of lean.

The per cent of lean, fat, and bone in 580 compares with 512 being between it and 501. This shows that 580 has recovered to slightly better than Group I Retarded Growth.

Flank

Animal No.	580	586	500	512	501
Wt. of Flank	6,723	1,161	4,586	5,502	18,786
Per Cent Lean	35.683	62.102	61.164	33.570	24.211
Per Cent Fat	63.484	34.367	37.004	64.904	75.373
Per Cent Bone	.669	5.082	1.766	1.218	.250

The per cent of bone varies inversely as the weight and

fatness of the animal. 501 the heaviest and fattest animal had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal, 586 the thinnest and lightest had the lowest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. The fact that 586 was practically the same as 500 can be explained by the fact that on its low plane of nutrition it needed most of its food to develope its skeleton.

580 compares to 512 in per cent of lean, fat and bone and so compares to Group I Retarded Growth.

Rump					
Animal No.	580	586	500	512	501
Wt. Rump, Gms.	5,383	2,241	5,041	6,870	13,018
Per Cent Lean	44.919	52.432	49.018	44.454	29.313
Per cent Fat	29.333	11.959	20.988	31.849	56.053
Per Cent Bone	24.615	36.859	39.556	23.755	14.142

The per cent of bone varies inversely as the weight and fatness of the animal. For some reason 586, did not develope the boneexpected. On the other hand, it developed more lean than expected. This would lower its per cent of bone.

The per cent of fat varies directly as the weight and fatness of the animal. 501, the heaviest and fattest had the highest per cent of fat.

The per cent of lean varies inversely as the weight and fatness of the animal. 586, the thinnest and lightest had the highest per cent. From the other cut one would expect to have had a lower per cent than 500 but for some reason he apparently developed the lean at the cost of bone.

580 compares with 512 and so compares with Group I Retarded Growth.

Round

Animal No.	580	586	500	512	501
WT.of Round Gms.	22,748	11,720	26,073	30,725	39,970
Per Cent Lean	70.727	75.973	76.512	70.640	62.710
Per Cent Fat	17.087	5.691	9.466	16.176	27.876
Per Cent Bone	11.724	18.498	13.650	12.736	9.087

The per cent of bone varies inversely as the weight and fatness of the animal, 501, the fattest and heaviest having the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the thinnest and lightest, had the lowest.

The lean varies inversely as the weight and fatness of the animal. 586 had a lower per cent of lean because on its plane of nutritions it would receive enough nutrients to make a normal developement so the bone developed at the cost of the lean.

580 compares to 512 and so may be called a Group I Retarded Growth.

Shank

Animal No.	580	586	500	512	501
Wt. Shank, Gms.	3919	2567	4,657	5,071	6381
Per Cent of Lean	29.523	24.036	33.240	33.859	28.789
Per Cent Fat	5.665	2.298	3.973	4.871	15.358
Per Cent of Bone	65.757	75.107	61.735	60.698	55.853

The per cent of bone varies inversely as the weight and fatness of the animal. 501, the fattest and heaviest had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the thinnest and lightest had the lowest per cent.

The lean varies with the individual with a slight tendency to decrease as the weight and fatness increases.

In per cent of bone 580 would be between 586 and 500, but this can be said to be individuality since its per cent of lean agrees with 512 which makes it a Group I Retarded Growth.

Distribution of Lean, Fat, and Bone in the Entire Animal

Animal No.	580	586	500	512	501
Warm Empty Wt. Grams	439,250	195,913	407,833	493,877	814,914
Per Cent Lean	36.217	36.260	45.112	40.983	31.915
Per Cent Fat	19.292	4.738	8.307	15.271	35.389
Per Cent Bone	12.469	19.942	18.019	16.285	9.891

The per cent of bone varies inversely as the weight and fatness of the animal. 501, the heaviest and fattest had the lowest per cent.

The per cent of fat varies directly as the weight and fatnesso ff the animal. 586, the thinnest and lightest had the lowest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. 586, is off in this respect, because its low plane of nutrition did not supply it with nutrients enough to develope its skeleton and lean flesh, so the flesh suffered.

580 is considerably better than 512 thruout so one could say that 580 has recovered to better than Group I Retarded Growth Animal.

Distribution of Lean, Fat, and Bone in Carcass

Animal No.	580	586	500	512	501
Wt. Carcass, Gms.	289,617	116,114	271,250	-338,872	607,658
Per Cent Lean	53.440	58.493	66.597	58.658	42.060
Per Cent Fat	28.748	7.603	12.325	22.025	47.340
Per Cent Bone	16.188	28.427	20.730	18.688	10.218

The per cent of bone varies inversely as the weight and fatness of the animal. 501, the heaviest and fattest had the lowest per cent of bone.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the thinnest and lightest had the lowest per cent.

The per cent of lean varies inversely as the weight and fatness of the animal. 586 had a lower per cent than would be expected because he used most of his nutrients to develope bone.

580 is better thruout than 512 so can be called better than Group I Retarded Growth.

Fat

Animal No.	580	586	500	512	501
Wt. Total Fatty Tissue, Gms.	113,424	12,244	46,820	92,872	327,017
Per Cent Offal Fat to T. F. Tissue	25.290	24.191	27.638	18.794	11.811
Per Cent Offal Fat and K. F. to T. F. Tissue	32.588	26.413	32.832	23.897	17.788
Per Cent Total Fat Tissue to Empty Wt.	25.845	6.259	11.480	18.805	40.129

The per cent of total fatty tissue to empty weight varies inversely as the weight and fatness of the animal.

The per cent of offal fat to total fatty tissue and the per cent of offal fat and kidney fat to total fatty tissue varies inversely as the weight and fatness of the animal. 586 was low to what one would expect because it developed a high per cent of bone at the cost of the lean and fat. 580 ran higher than expected because it deposited a great deal of fat around its internal organs, rather than on its carcass.

In reference to total fatty tissue 580 would be a Group I Retarded Growth animal.

On the whole it may be said that:

(1) The per cent of bone varies inversely with the weight and fatness.

(2) The per cent of fat varies directly with the weight and fatness.

(3) The per cent of lean varies inversely with the weight and fatness.

(4) That 580 has recovered from its retarding until it compares with Group I Retarded Growth animal throughout.

PART V

CHEMICAL ANALYSIS

All five animals were analysed. The steers were first separated into the various parts. The different cuts were separated into lean, fat, and bone. From these the samples were composited as was seen fit to composite them.

The skeleton samples were run thru a Mann bone grinder and ground until they were in small bits not over one-fourth of an inch in diameter. This was mixed well and a sample sent to the chemical laboratory.

The lean and fat and offal samples were ground in a Buffalo Sausage Mill. This type of mill grinds the samples very fine. The large samples were ground in sections and later mixed by hand in a tub. Samples were now taken from various parts of the tub and reground and the final sample taken from this.

The work of preparing and grinding the samples was conducted as rapidly as possible until the samples were in a condition where there was no danger of decomposition. The samples were kept in cold storage at a temperature just above freezing.

Methods of Analysis for Bone Samples

Moisture. Samples for moisture were weighed out into tared glass bone-extraction cones. These cones were filled with the samples which weighed about 40 to 50 grams. They were run in triplicate and placed in vacuum desiccators, care being taken not to get two cones containing the same sample in the same desiccator. these samples were dried to constant weight within 50

milligrams. The weighing was done in tared weighing bottles to prevent the absorption of moisture.

Fat. These samples after drying were placed in Soxhlet extractors and extracted with ether for three days to be sure to remove most of the fat. They were again dried in vacuum desiccators to constant weight and the per cent fat calculated.

The residue from the extraction was saved., the triplicates were combined and the whole was ground in a steel mill until fine enough to pass through a millimeter sieve. This sample was air dried and determinations made for moisture, fat, nitrogen, ash and phosphorus.

Moisture and Fat in Air Dry. The moisture in the air dry was determined in paper extraction thimbles on duplicate 2 gram samples in vacuum desiccators. They were dries to constant weight within 5 milligrams and calculated for moisture. Fat was determined on the same sample by the usual Soxhlet extraction method. The samples were again dried to constant weight in vacuo and the per cent of fat calculated.

Ash. The ash was determined on duplicate 2 gram samples of the air dry bone. The ashing was done over a free flame in a porcelain crucible..

Phosphorous. The phosphorous was determined by getting the ash sample in solution with hydrochloric acid and driving off the excess with nitric acid. The phosphorous was determined by the usual gravimetric method.

Nitrogen. Nitrogen was determined on duplicate one-half gram air dry samples by the modified Kjeldahl-Gunning method.

Methods of Analysis for the Lean and Fat Samples

All these samples were analysed in triplicate except a few special samples which were analysed in duplicate.

All were weighed from weighing bottles and the weight determined by difference.

Moisture. The samples were weighed out and placed on a bit of cotton which had previously been tared in a glass extraction cone. The sample was mixed well with the cotton and placed back in the cone being sure to clean up well after mixing. These cones were placed in vacuum desiccators being careful not to get two of the triplicates in the same desiccator. Drying was carried to constant weight within 5 milligrams. From this data the moisture was calculated.

Fat. These cones were extracted in Soxhlets for 20 hours and then redried in vacuo to constant weight. This gave data to calculate the per cent of fat.

Ash. The ash was determined in porcelain crucibles over a very low free flame.

Phosphorous. Phosphorous was determined on the residue from the ash samples as it was in the bone samples.

Nitrogen. Nitrogen was determined by the modified Kjeldahl-Gunning method. Care was taken to prevent the frothing over of samples high in fat.

Methods of Feed Analysis

Moisture and Fat were determined on 2 gram duplicate samples the same as it was with the air dry bone.

Ash was determined on two gram duplicate samples in porce-

lain crucibles over a free flame.

Nitrogen was determined in duplicate on samples weighing from .5 to 2 grams by the usual modified Kjeldahl-Gunning method.

Crude Fiber was determined in the usual manner.

Nitrogen Free Extract was determined by difference.

COMPOSITION OF SAMPLES

The results of the analysis of the samples are shown in Tables 10 and 11 . Only certain samples or composites are selected for this discussion.

Lean of Round

Animal No.	580	586	500	512	501
Weight, Gms.	32,178	17,808	39,898	43,408	50,130
Per Cent Water	71.594	77.614	74.031	73.272	69.902
Per Cent Fat	6.429	1.405	3.485	4.557	9.356
Per Cent Ash	1.067	.989	1.011	1.024	.957
Per Cent Nitrogen	3.283	3.144	3.123	3.237	3.090
Per cent Phosphorus	.201	.176	.191	.192	.185

The per cent of water in the lean of the round varies inversely as the weoght and fatness of the animal. The fattest and heaviest animal had the lowest percentage.

The per cent of fat varies directly as the weight and fatness of the animal. The thinnest and lightest animal had the lowest per cent.

The per cent of nitrogen, ash and phosphorous are relatively constant in all the animals.

580 compares to better than 512 but not as good as 501 in per cent of water and fat. Therefore, it compares to better than Group I Retarded Growth, but not as good as Group I Use of Food.

Fat of Round

Animal No.	580	* 586	500	512	501
Weight, Gms.	7,775	3,565	4,936	9,940	22,284
Per Cent Water	19.283	44.623	27.767	22.030	16.846
Per Cent Fat	76.473	43.252	61.442	70.658	78.237
Per Cent Nitrogen	.954	1.684	1.590	.765	.667
Per Cent Ash	.283	.597	.377	.311	.218
Per Cent Phosphorus	.036	.070	.051	.040	.026

* Fat of Round, Rib and Loin

The per cent of water in the fat of the round varies inversely as the weight and fatness of the animal, 586 having the highest per cent.

The per cent of fat in the fat of the round varies directly as the weight and fatness of the animal, 501, the heaviest and fattest, having the highest per cent.

The per cent of nitrogen, ash and phosphorus varies inversely as the weight and fatness of the animal.

In water and fat 580 compares to 501 altho not quite as good. In nitrogen, ash and phosphorus 580 compares to 512. From this it may be said that 580 had recovered to Group I Retarded Growth.

Lean of Loin

Animal No.	580	586	500	512	501
Weight, Gms.	24,739	11,440	29,692	32,062	45,996
Per Cent Water	66.598	76.582	70.269	67.607	62.557
Per Cent Fat	12.874	2.483	7.737	11.040	17.934
Per Cent Nitrogen	3.299	3.100	3.113	3.076	2.863
Per Cent Ash	.978	.993	1.010	.918	.851
Per Cent Phosphorus	.187	.187	.185	.170	.163

The per cent of water varies inversely as the weight and fatness of the animal. 501, the heaviest and fattest, had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the lightest and thinnest, had the lowest per cent.

The per cent of nitrogen and ash is relatively constant with a slight tendency to vary inversely as the weight and fatness of the animal.

580 commpares to 512 in water and fat and so compares to a Group I Retarded Growth animal. However in nitrogen and phosphorus it seems to have remained close to Group III Retarded Growth and not have made any recovery.

Fat of Loin

The fat of the loin of 586 was composited and analysed with the fat of the round.

Animal No.	580	500	512	501
Wt. of Fat, Gms.	17,028	6,830	15,308	71,358
Per Cent Water	10.718	16.464	12.497	9.031
Per Cent Fat	86.750	76.508	83.354	88.682
Per Cent Nitrogen	.736	.598	.650	.388
Per Cent Ash	.230	.245	.180	.112
Per Cent Phosphorus	.032	.038	.026	.018

The per cent of water varies inversely as the weight and fatness of the animal. 501, the fattest and heaviest steer, had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 500, the thinnest and lightest animal in the above table, had the lowest per cent of fat.

The nitrogen is relatively constant showing more individual variations than anything else.

The per cent of ash and phosphorus varies inversely as the weight and fatness of the animal.

580 could be placed close to Group I Use of Food in regard to moisture and fat, but as regards ash and phosphorus could not be placed above Group II Retarded Growth.

Lean of Rib

Animal No.	580	586	500	512	501
Wt. of Lean Gms.	12,737	5,860	13,602	16,908	20,834
Per Cent Water	63.244	75.777	67.137	65.119	58.892
Per Cent Fat	17.098	3.154	12.323	14.950	22.409
Per Cent Nitrogen	3.005	2.992	3.196	2.967	2.759
Per Cent Ash	.930	.978	.929	.896	.791
Per Cent Phosphorus	.170	.172	.170	.157	.149

The per cent of water varies inversely as the weight and fatness of the animal, the heviest and fattest animal having the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal, the thinnest and lightest having the lowest per cent.

The per cent of nitrogen is relatively constant and varies more with the individual than with anything else.

The per cent of ash and phosphorus varies inversely as the weight and fatness of the animal.

According to the per cent of moisture and fat 580 would be placed as slightly better than Group I Retarded Growth, but according to ash and phosphorus would be placed as Group II Retarded Growth.

Fat of Rib

The fat of the rib of 586 was composited with the fat of the round and so 586 will not appear in this table.

Animal No.	580	500	512	501
Weight in Gms.	5,752	1,804	5,398	28,322
Per Cent Water	13.402	20.368	14.938	9.697
Per Cent Fat	82.771	71.084	80.367	87.439
Per Cent Nitrogen	.933	1.293	.840	.401
Per Cent Ash	.308	.370	.212	.134
Per Cent Phosphorus	.044	.060	.035	.020

The per cent of water, nitrogen, ash and phosphorus varies inversely as the weight and fatness of the animal. 501, the heaviest and fattest animal had the lowesr per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 500, the thinnest and lightest had the lowest per cent of fat.

580 compares to 512 better than to any other; so it can be said that 580 had recovered to Group I Retarded Growth.

Kidney Fat

Animal No.	580	586	500	512	501
Wt. gms.	8,278	272	2,432	4,740	19,544
Per Cent Water	3.855	19.681	7.026	4.482	5.462
Per Cent Fat	95.572	74.405	90.275	93.915	93.311
Per Cent Nitrogen	.171	.774	.410	.183	.190
Per Cent Ash	.102	.356	.134	.130	.067
Per Cent Phosphorus	.014	.037	.018	.020	.011

The per cent ot water, nitrogen, ash and phosphorus varies inversely as the weight and fatness of the animal except in the case of 501 when for some reason the per cent of water and nitrogen was higher than expected.

The per cent of fat varies directly as the weight and fatness of the animal except in the case of 501. Sincethis animal was higher in per cent of water than expected it was correspondingly lower in fat.

According to water, fat and nitrogen 580 would be placed as better than Group I Use of Food. The ash and phosphorus would place 580 as Better than Group I Retarded Growth.

Offal Fat

Animal No.	580	586	500	512	501
Wt. Gms.	28,685	2,962	12,940	17,454	38,625
Per Cent Water	10.758	47.447	13.501	11.212	7.488
Per Cent Fat	87.829	43.618	83.556	86.273	91.061
Per Cent Nitrogen	.243	1.132	.422	.369	.205
Per Cent Ash	.162	.587	.184	.144	.102
Per Cent Phosphorus	.016	.051	.020	.019	012

The per cents of water, nitrogen, ash and phosphorus vary inversely as the weight and fatness of the animal. 501, the heaviest and fattest steer, had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the thinnest and lightest animal had the lowest per cent.

580 compares to 512 thruout, and so had recovered to a Group I Retarded Growth condition.

Hide and Hair

Animal No.	580	586	500	512	501
Wt. Gms.	35,552	16,102	35,938	41,268	50,090
Per Cent Water	60.693	66.514	59.327	56.193	51.432
Per Cent Fat	7.940	.501	1.319	3.612	13.235
Per Cent Nitrogen	5.493	5.530	6.280	6.547	5.493
Per Cent Ash	1.250	1.129	1.072	1.163	1.522
Per Cent Phosphorus	.058	.058	.044	.047	.049

The per cent of water varies inversely as the weight and fatness of the animals. 501, the heaviest and fattest animal had the lowest per cent.

The per cent of fat varies directly as the weight and fatness of the animal. 501 had the highest per cent.

The per cent of nitrogen, ash and phosphorus varies with the individual.

580 is some what better than 512 in per cent of fat but not to 512 in per cent of water. It can be said to be a Group I Retarded Growth animal.

Blood

Animal No.	580	586	500	512	501
Wt, Gms.	18,946	11,630	21,269	24,176	28,710
Per Cent Water	77.966	81.832	79.041	79.949	77.977
Per Cent Fat			.192	.055	.176
Per Cent Nitrogen	3.436	2.808	3.193	3.073	3.290
Per Cent Ash	.670	.643	.789	.790	.857
Per Cent Phosphorus	.027	.021	.022	.023	.025

The per cent of water in the blood varies inversely as the weight and fatness of the animal. 586, the lightest and thinnest had the highest per cent.

The per cent of nitrogen in individualistic.

The per cents of ash and phosphorus vary directly as the weight and fatness of the animal, 501, the fattest and heaviest, having the highest per cent.

580 recovered to Group I Use of Food in per cent of water and phosphorus but remained practically a Group III Retarded Growth animal in per cent of ash.

Total Skeleton

Animal No.	580	586	500	512	501
Wt., Gms.	63,879	45,753	73,489	80,427	80,602
Per Cent Water	32.308	41.116	33.053	31.558	32.085
Per Cent Fat	19.850	11.553	22.146	20.306	17.722
Per Cent Nitrogen	3.413	4.122	3.185	3.231	3.358
Per Cent Ash	24.575	25.194	23.495	25.619	26.343
Per Cent Phosphorus	4.372	4.492	4.171	4.598	4.808

The composition of the skeleton in 580, 500, and 512 is more or less the same and has not been changed much by the plane of nutrition.

586 is abnormally low in per cent of fat with a corresponding increase in the per cent of the other constituents.

501 had to develope a sleleton with high breaking point in order to support its weight. This demanded a high per cent of ash. This caused the reduction in the other per cents except phosphorus which is dependent upon the ash.

580 is normal and compares to either 500 or 512. This shows that in compasition of bone 580 has recovered fron the extreme retarding it received.

Total Flesh

Animal No.	580	586	500	512	501
Wt. Gms.	243,825	84,087	217,860	277,824	548,474
Per Cent Water	49.545	73.780	63.113	54.959	36.250
Per Cent Fat	35.957	7.596	17.230	28.293	53.115
Per Cent Nitrogen	2.323	3.015	2.960	2.483	1.457
Per Cent Ash	.634	.942	.892	.772	.485
Per Cent Phosphorus	.135	.161	.157	.133	.087

The per cents of water, nitrogen, ash and phosphorus vary inversely as the weight and fatness of the animal. 501, the heaviest and fattest animal, had the lowest per cents.

The per cent of fat varies directly as the weight and fatness of the animal. 586, the lightest and thinnest animal, had the lowest per cent.

580 compares thruout to 512 and so compares to a Group I Retarded Growth animal.

Total Animal

Animal No.	580	586	500	512	501
Wt. Gms.	426, 190	182,878	398,494	481,559	793,833
Per Cent Water	48.412	65.702	57.239	51.999	38.750
Per Cent Fat	31.054	77.693	17.366	24.299	44.707
Per Cent Protein	16.619	20.606	19.869	18.094	12.244
Per Cent Ash	4.270	6.995	5.058	4.947	3.196
Per Cent Phosphorus	.754	1.221	.877	.881	.563

The per cents of water, protein, ash and phosphorus vary inversely as the weight and fatness of the animal except in the case of the phosphorus of 500 and 512 where they are practically the same.

The per cent of fat varies directly as the weight and fatness of the animal, 501, the heaviest and fattest, having the highest per cent.

580 compares thruout to slightly better than 512 and so compares to a Group I Retarded Growth Steer.

From the foregoing discussion it may be concluded that:

(1) In every case, except that of the blood and total sleleton, the per cent of fat varies directly as the weight and fatness of the animal.

(2) In every case, except that of the total skeleton, the per

cent of water varies inversely as the weight and fatness of the animal.

(3) The per cent of nitrogen varies with the individual in the lean of the round, lean of the loin, fat of the loin, lean of the rib, hide and hair and blood and that in all other cases it varies inversely as the weight and fatness of the animal.

(4) The per cent of ash varies with the individual in the lean of the round and lean of the loin, it varies directly with the weight and fatness of the animal in the blood, and in all other samples it varies inversely as the weight and fatness of the animal.

(5) The per cent of phosphorus corresponds to that of the ash except in the case of the lean of the loin where it varies inversely as the weight and fatness of the animal.

(6) The composition of the total skeleton is hard to change but it will change in extreme cases.

(7) 580 recovered to Group I Retarded Growth in practically every thing but it showed a tendency to remain low in ash and phosphorus.

PART VI

Summary

From the foregoing data it can be concluded that:

(1) 580 recovered from Group III to Group I Retarded Growth in quality.

(2) 580 recovered from Group III to Group II Retarded Growth in quantity and received only enough dry matter to do this. The indications were that it would have caught up with the others if fed for a longer time.

(3) The maintainance cost of the animal on the lowest plane of nutrition was considerably lower than that of those on the higher planes.

(4) 580 made the cheapest gains of any in reference to net energy consumed.

Acknowledgement

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PART VII

PHOTOGRAPHS AND TABLES

Slaughter House Cuts

The accompanying Plate shows the division of the carcass in cutting up the carcass for this Experiment.

The two loin cuts and two plate cuts were combined.

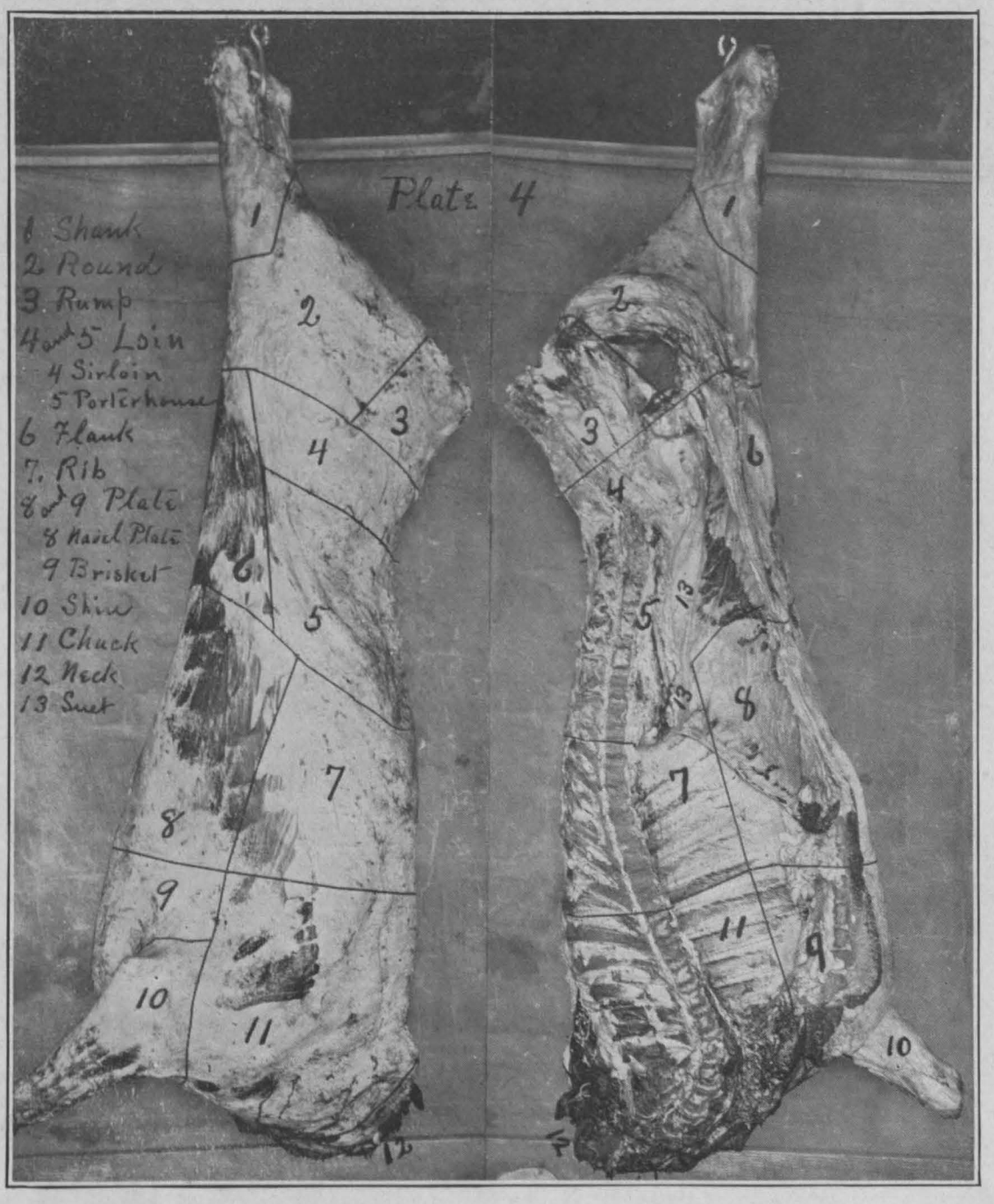
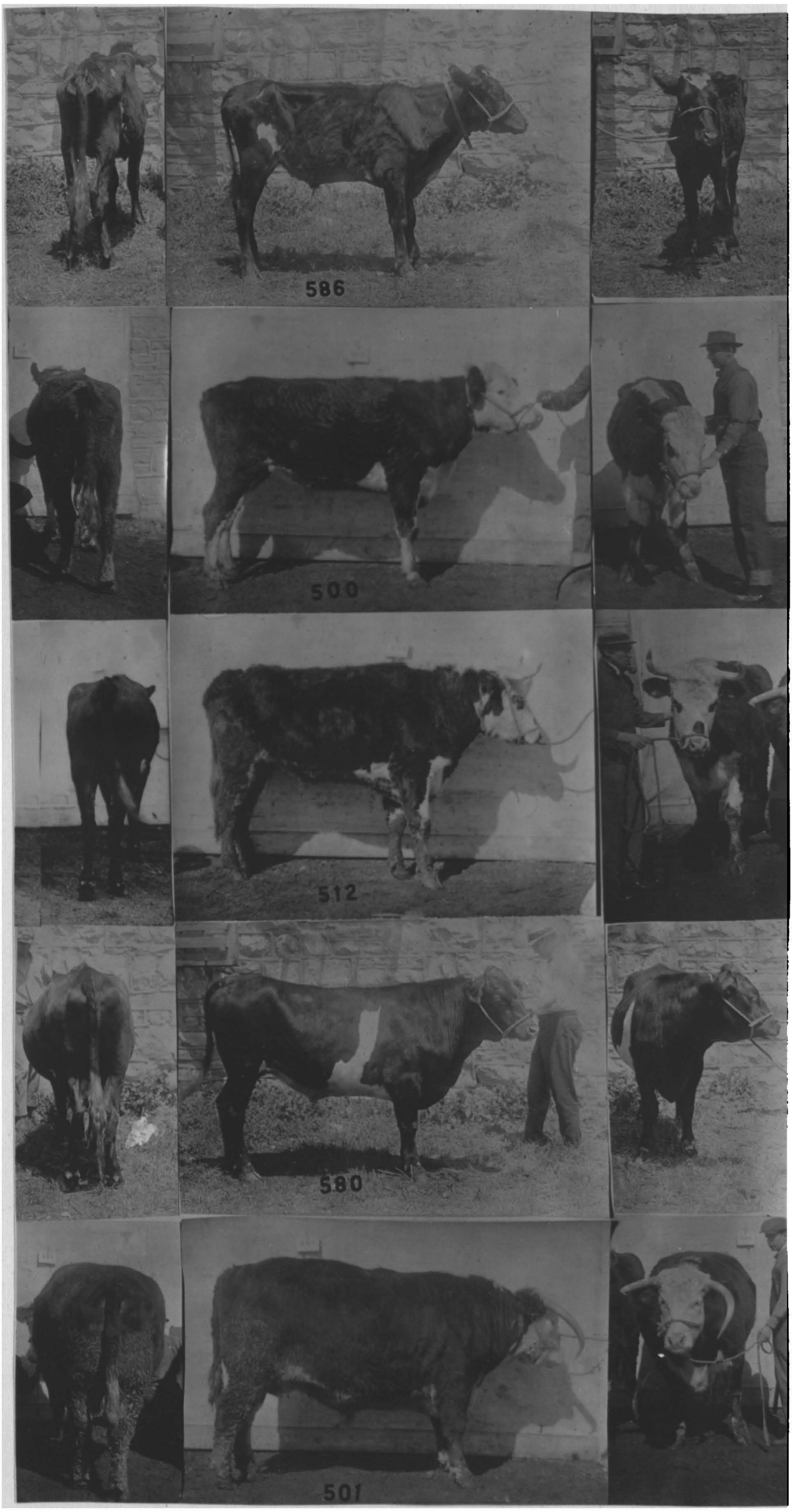


Plate 4
1 Shank
2 Round
3 Rump
4 and 5 Loin
4 Sirloin
5 Porterhouse
6 Flank
7 Rib
8 and 9 Plate
8 Navel Plate
9 Brisket
10 Shin
11 Chuck
12 Neck
13 Suet

Condition at End of Life

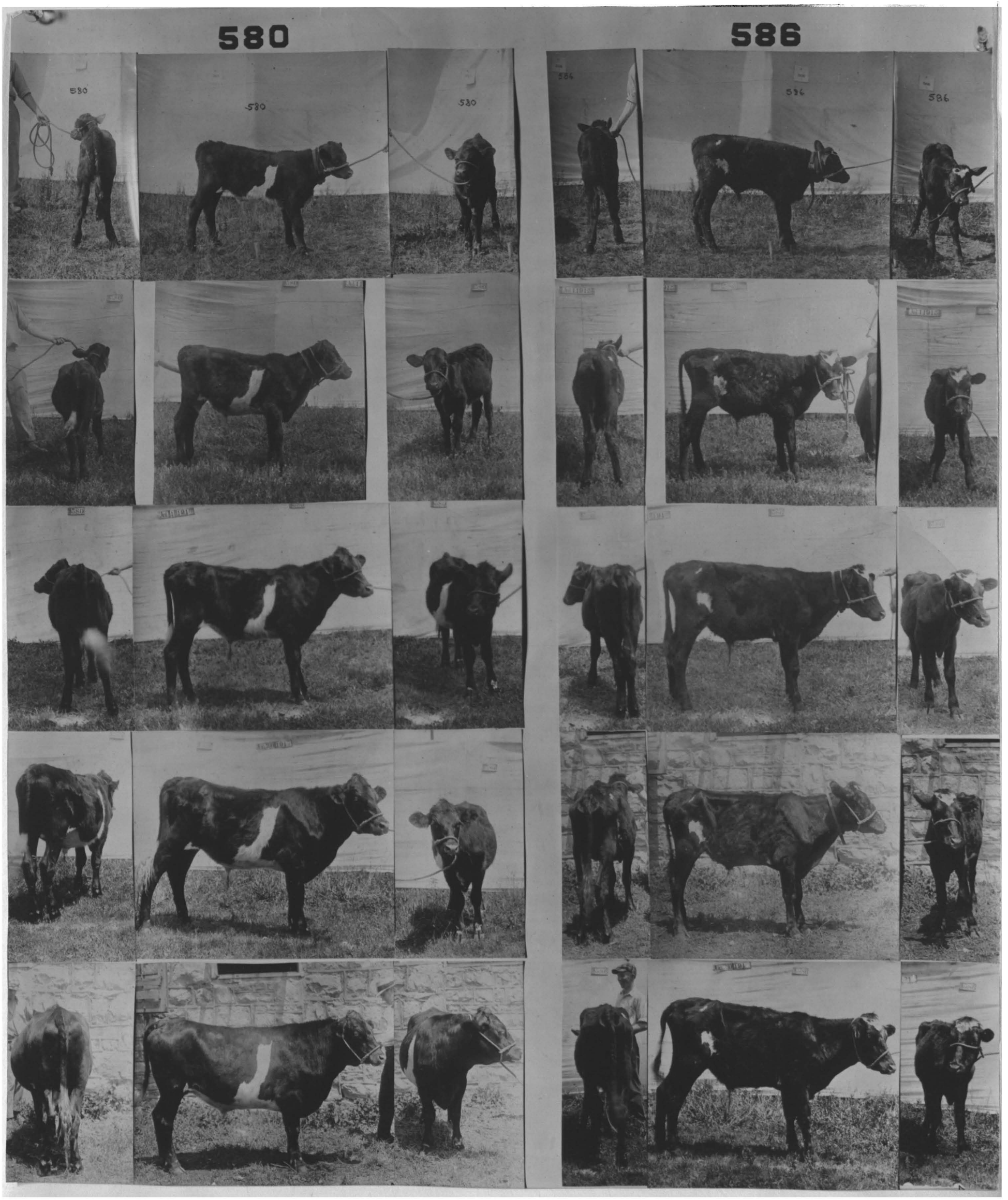
In the accompanying plate the steers are arranged in order of their condition, the thinnest animal at the top.

This shows that 580 has recovered to a condition better than that of 512, an animal corresponding to a Group I Retarded Growth Steer.


586
500
512
580
501

Developement thru Life

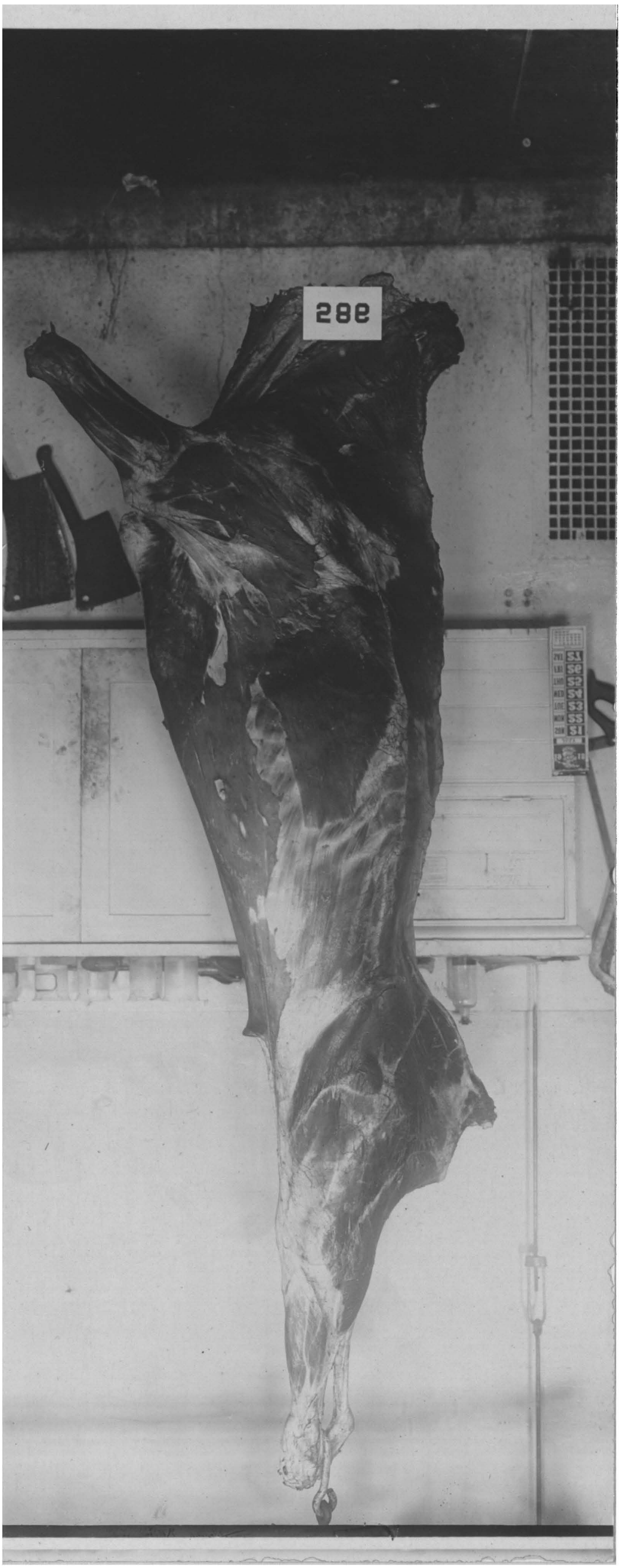
The following plate shows the relative developement of 580 and 586 during their lives. The photographs are taken at intervals of about one year.

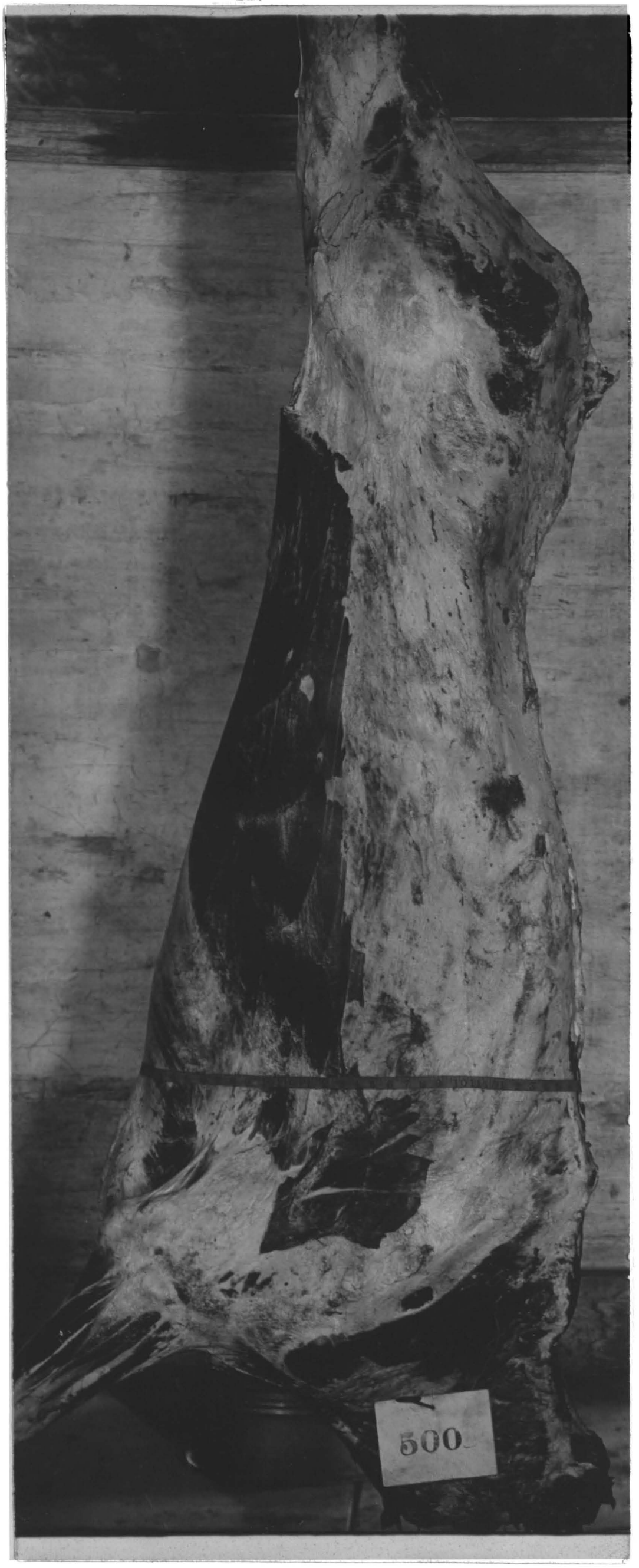

580
586

Outer Side of Carcass

In the following Plates the photographs have been arranged in order of their fatness, 586 being the thinnest and 501 the fattest.

580 compares to 512 being slightly better covered with fat. Thus, the photographs of the outer side of the carcass shows that 580 has recovered to a Group I Retarded Growth Animal.


288


500


512


580

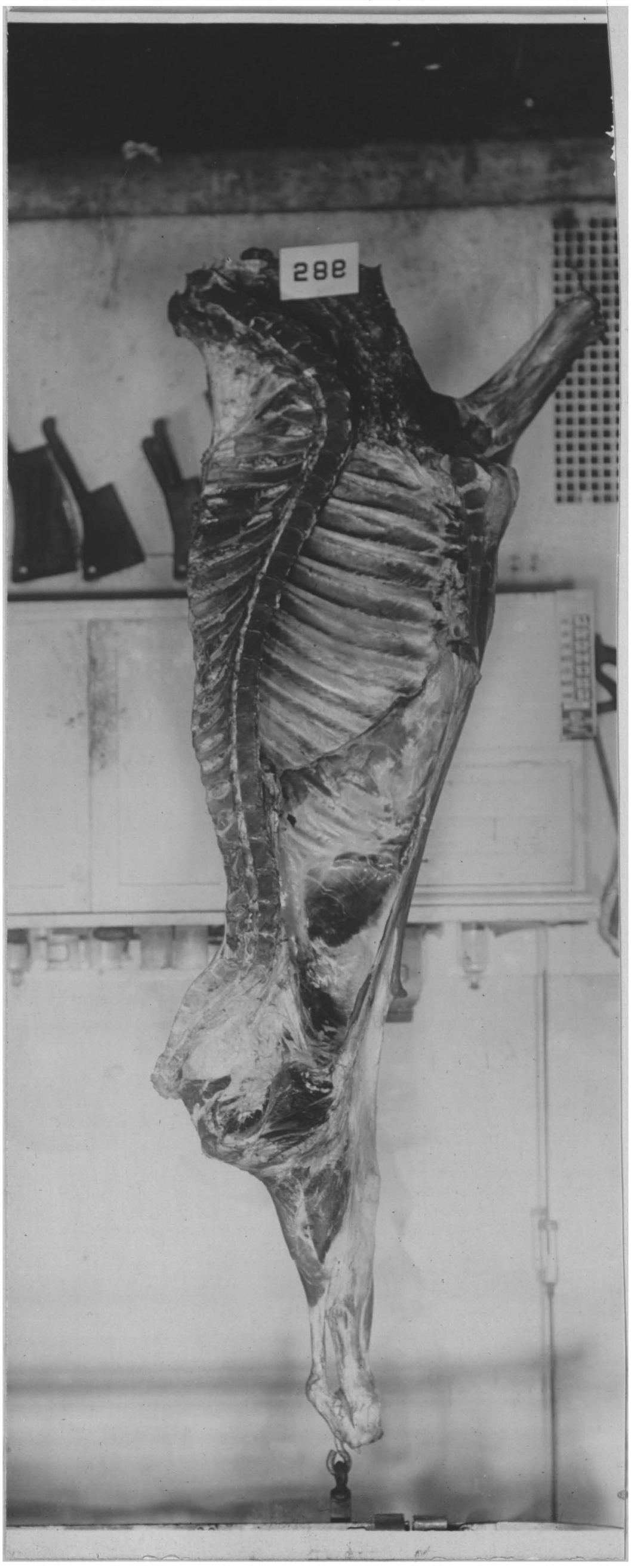

501

Inner Side of Carcass

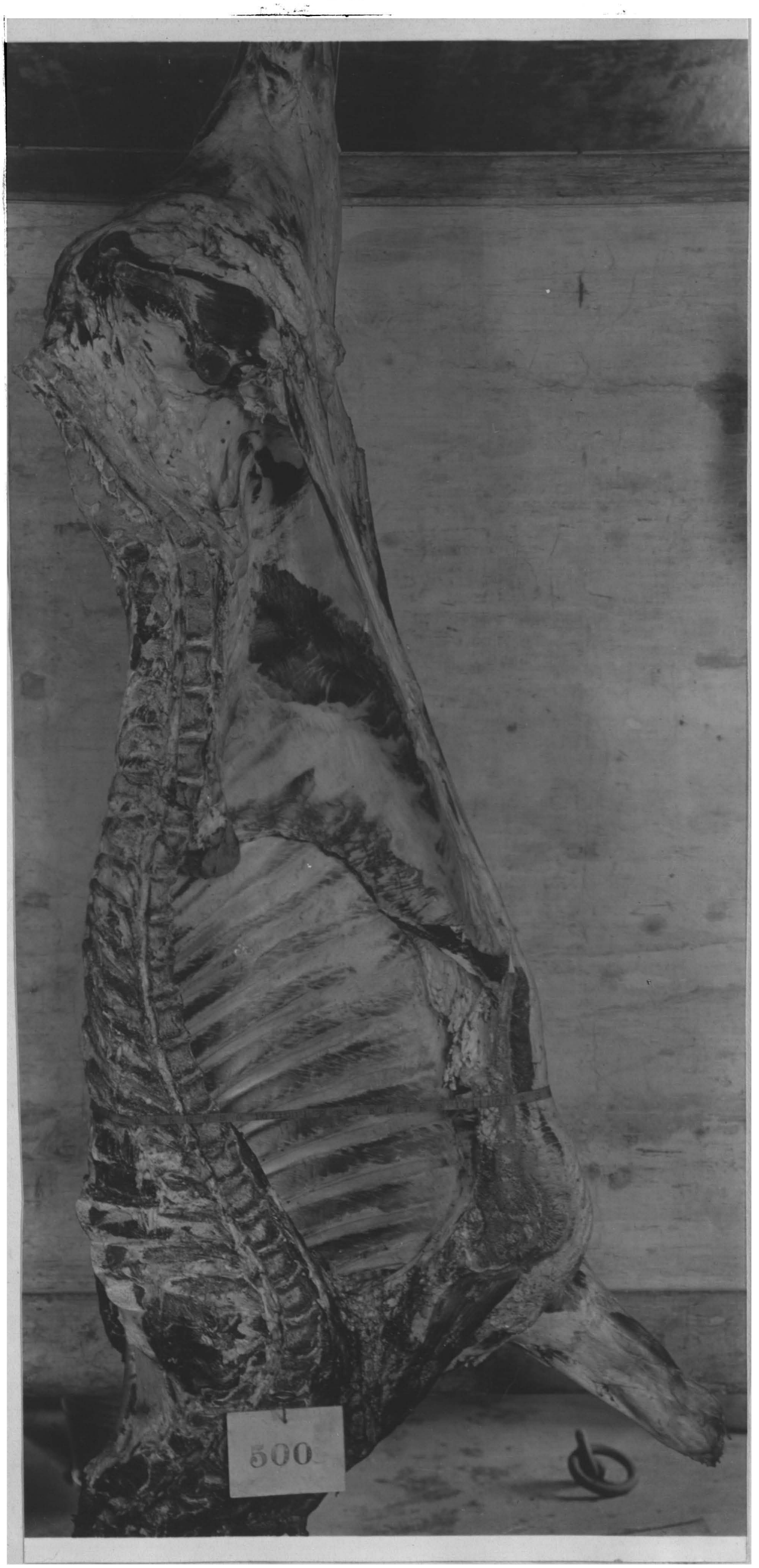
The following Plates show the inner sides of the carcasses. They are arranged in order of their fatness, 586 being first and 501 last. 580 was placed between 512 and 501 because, in internal fat it compares to 501 and the covering of the fat over the round, the cod fat and the brisket is similar to that of 512.

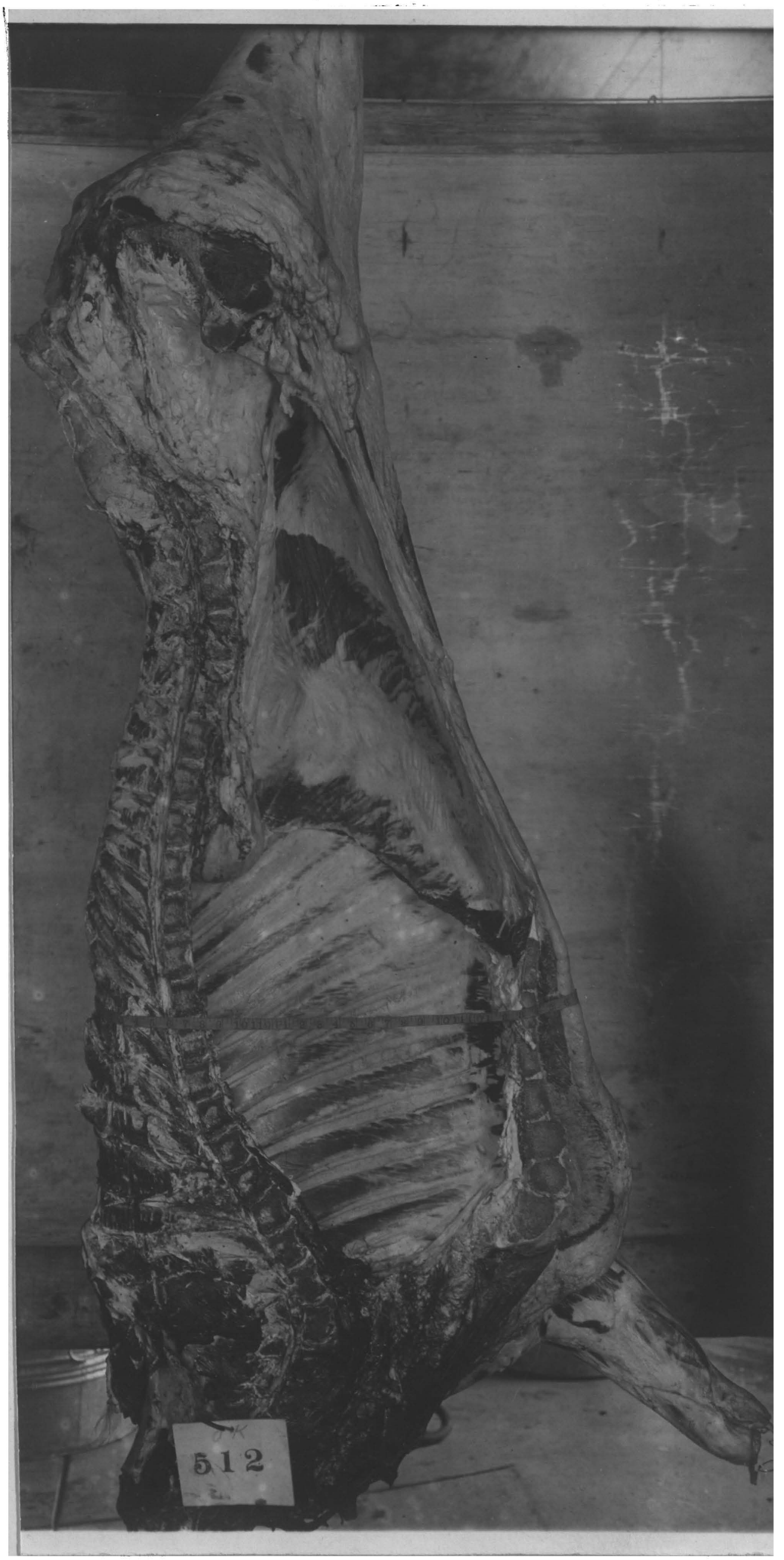
Photographs of the inner side of the carcasses show that 580 had recovered to at least a Group I Retarded Growth Animal.

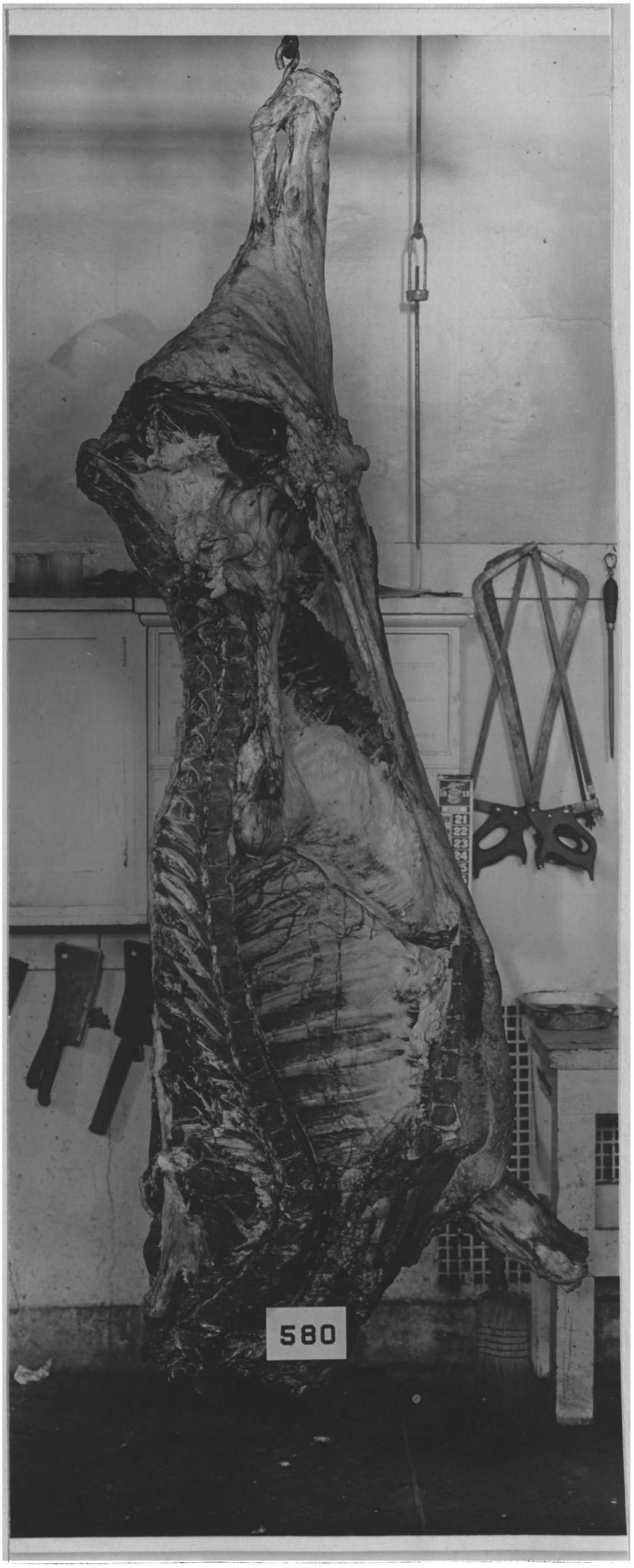
986



92


500


512


580

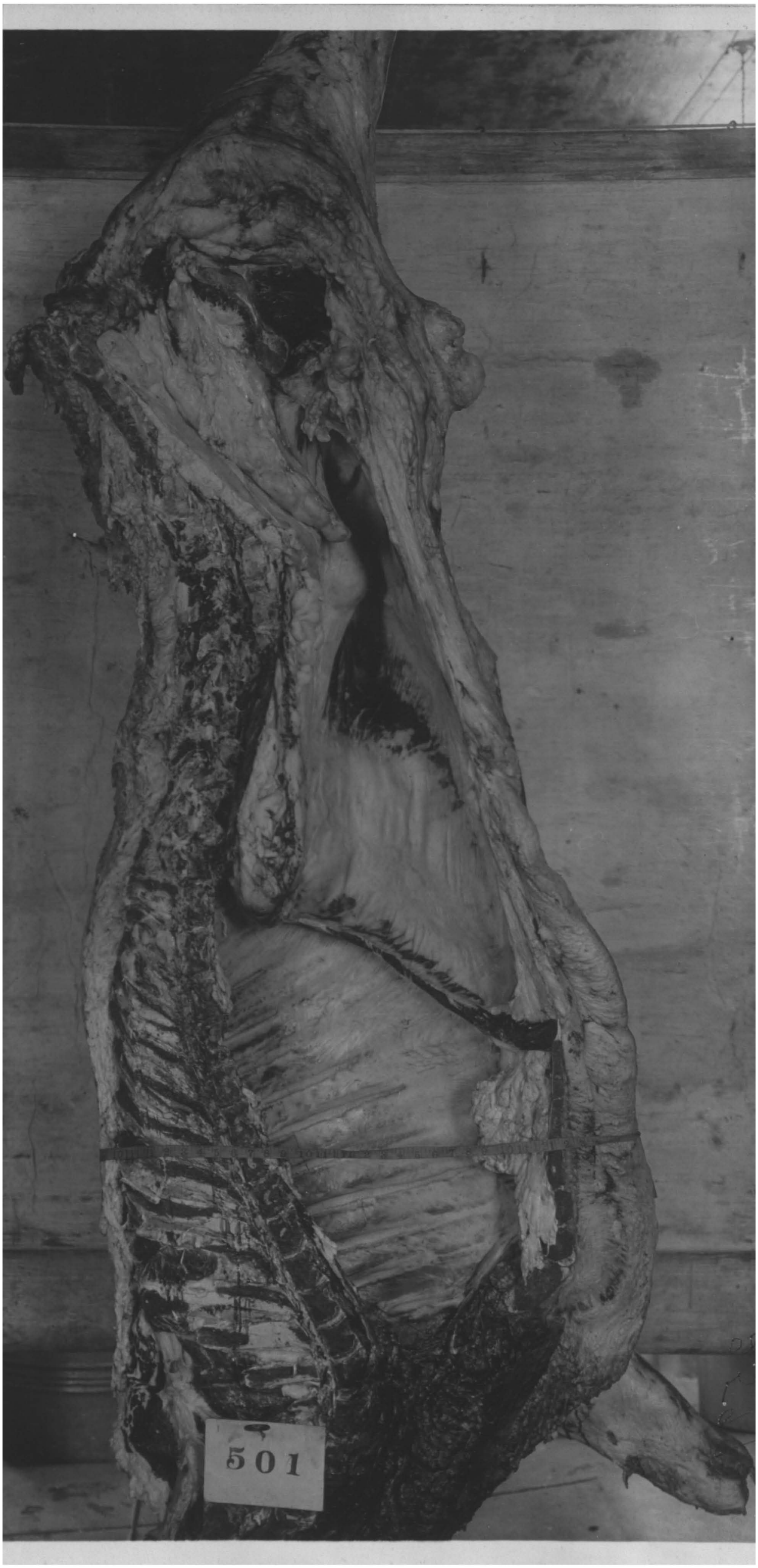

501

Table 1 FEED AND WEIGHT RECORD - 580

Period	Weight at Beginning of Period	Average 30 days Weight Pounds	Milk Fed Lbs.	Hay Fed Lbs.	Total Dry Matter Lbs.
1	152.2	149.8	248.5	7.0	34.020
2	150.4	146.8	297.5	14.0	41.032
3	145.6	157.3	300.0	59.5	82.783
4	171.4	173.9	300.0	90.-	111.682
5	186.4	197.9	300.0	118.0	138.257
6	206.0	213.4	290.0	120.0	137.510
7	219.0	216.9	100.0	140.0	137.234
8	213.8	215.0		150.0	136.095
Total			1836.000		
9	217.8	212.9		150.0	136.095
10	218.2	215.8		150.0	136.095
11	215.6	226.9		150.0	136.095
12	241.6	237.3	Grain	150.0	136.095
13	235.2	236.0	Fed	150.0	136.095
14	232.8	232.7	Lbs.	160.0	148.507
15	239.8	245.7	3.75	180.0	170.848
16	249.0	259.0	27.75	184.0	195.998
17	269.8	279.3	25.5	196.0	205.340
18	278.4	283.7	17.5	180.0	183.194
19	280.8	287.8	34.5	180.0	198.464
20	292.2	296.4	45.0	180.0	206.822
21	298.4	306.9	45.0	180.0	205.091
22	312.0	323.2	45.0	180.0	205.035
23	330.8	339.5	34.0	180.0	195.213
24	341.4	349.3	30.0	180.0	192.261
25	353.8	360.1	30.0	180.0	192.274
26	364.8	369.8	30.0	180.0	192.941
27	366.8	377.1	30.0	197.3	209.307
28	384.0	394.1	30.0	210.0	221.037
29	404.2	403.7	30.0	210.0	221.037
30	414.6	409.9	37.5	207.5	225.123
31	421.6	414.0	45.0	201.0	225.519
32	421.2	415.9	50.0	211.5	238.859
33	431.8	436.4	75.0	225.0	273.018
34	445.0	459.7	66.5	218.5	259.522
35	468.6	480.8	55.5	210.0	241.973
36	482.0	496.1	38.5	210.0	226.921
37	498.0	512.8	80.0	228.5	281.158
38	533.4	568.4	228.5	245.5	429.425
39	597.4	638.0	287.0	243.0	479.211
40	680.4	718.4	323.0	265.5	532.005
41	763.4	800.7	373.5	259.5	571.560
42	845.0	890.9	423.0	242.5	602.774
43	935.0	939.0	428.5	232.0	598.802

Table 1 FEED AND WEIGHT RECORD- 580 (concluded)

Period	Weight at Beginning of Period	Average 30 days Weight Pounds	Milk Fed Lbs.	Hay Fed Lbs.	Total Dry Matter lbs
44	952.4	924.0	220.0	191.0	372.774
45	901.4	887.6	122.5	169.5	264.359
46	880.2	910.2	199.5	180.0	342.515
47	922.6	945.7	234.0	181.0	374.135
48	964.6	985.5	250.0	184.0	391.612
49	1002.2	1026.7	286.5	180.0	420.390
50	1044.4	1061.3	331.0	169.0	449.864
51	1054.6	1087.6	340.0	180.0	412.813
At Slaughtering	1090.0				
Total		*465.06	4953.000	8980.300	12,856.809

*Average Life Wt.

Table 2 FEED AND WEIGHT RECORD -586

Period	Weight at Beginning of Period	Average 30 days Weight Pounds	Milk Fed Lbs.	Hay Fed Lbs.	Total Dry Matter lbs.
1	154.6	156.7	248.5	5.75	32.875
2	161.4	160.2	297.5	13.50	40.474
3	163.4	174.4	298.0	59.5	82.602
4	189.8	197.6	300.0	88.0	109.884
5	204.6	217.4	300.0	118.0	138.260
6	227.0	238.0	300.0	120.0	138.437
7	245.0	241.3	100.0	140.0	135.174
Total			1844.0		
8	231.8	232.6		150.0	136.095
9	231.4	232.0		178.0	161.488
10	236.0	232.2		180.0	163.315
11	230.2	240.8		170.0	154.240
12	249.8	247.1	Grain	150.0	136.095
13	245.2	245.5	Fed	150.0	135.053
14	247.8	261.6	Lbs.	155.0	143.864
15	255.4	258.2	3.75	176.5	167.303
16	258.8	269.8	27.75	180.0	192.299
17	280.6	287.8	25.5	190.0	199.661
18	294.8	296.6	15.0	195.0	194.853
19	297.4	300.9	27.5	195.0	206.034
20	305.8	315.7	45.0	195.0	220.686
21	321.0	322.8	45.0	195.0	218.635
22	328.0	341.1	45.0	195.0	218.560
23	351.4	356.2	34.0	184.0	198.845
24	356.4	363.7	30.0	180.0	192.279
25	369.0	372.1	29.0	180.0	191.373
26	370.6	373.4	17.0	180.0	181.211
27	372.6	372.3	32.9	180.0	195.944
28	375.6	389.5	45.0	180.0	206.866
29	395.8	397.9	45.0	180.0	206.866
30	411.0	400.1	45.0	187.5	213.422
31	407.2	403.3	45.0	201.0	225.499
32	412.0	411.9	59.8	156.0	196.555
33	440.6	400.6	65.5	175.5	219.152
34	409.0	426.3	80.5	225.0	277.687
35	435.0	449.6	60.0	224.5	259.275
36	459.2	467.7	53.5	225.0	254.245
37	468.8	479.0	37.5	225.0	239.999
38	487.0	472.8	30.0	225.0	233.369
39	465.4	480.3	43.5	225.0	245.417
40	489.2	491.8	45.0	225.0	246.755
41	496.8	509.0	67.5	225.0	266.835
42	527.4	517.1	81.5	234.0	291.196
43	524.6	535.2	66.0	240.0	284.499
44	537.2	527.6	72.0	240.0	286.149
45	532.4	545.3	82.5	240.0	293.368

Table 2 FEED AND WEIGHT RECORD - 586 (continued)

Period	Weight at Beginning of Period	Average 30 days Weight Pounds	Milk Fed Lbs.	Hay Fed Lbs.	Total DRY Matter Lbs.
46	548.8	565.1	64.5	240.0	277.354
47	572.8	576.0	35.0	240.0	251.095
48	581.2	571.7	36.0	236.0	252.674
49	582.6	595.0	3.5	268.5	250.245
50	601.0	588.4		207.0	248.236
51	570.0	578.9		221.0	203.204
At Slaughter	582.6				
Total		*374.3	1541.2	9349.25	10,217.593

*Average Wt. for Life.

Table No. 3 NUTRIMENTS CONSUMED BY 580

Period No.	Protein lbs.	Fat lbs.	Nitrogen Free Extract lbs.	Crude Fiber lbs.	Ash lbs
1	7.858	6.506	15.045	2.537	2.074
2	10.473	1.570	21.088	5.075	2.826
3	16.221	0.913	38.163	20.072	7.414
4	19.757	1.379	50.010	30.176	10.360
5	23.192	1.810	60.745	39.565	12.945
6	23.571	2.246	60.269	38.669	12.755
7	20.621	2.830	57.346	43.635	12.802
8	21.145	3.967	53.855	44.529	12.599
9	21.145	3.967	53.855	44.529	12.599
10	21.145	3.967	53.855	44.529	12.599
11	21.145	3.967	53.855	44.529	12.599
12	21.145	3.967	53.855	44.529	12.599
13	21.145	3.967	53.855	44.529	12.599
14	21.381	3.887	59.217	50.573	13.449
15	24.615	4.520	69.000	57.169	15.544
16	27.251	5.262	84.669	63.006	15.810
17	24.599	4.410	86.520	74.360	15.451
18	23.972	4.218	76.332	62.119	16.553
19	26.588	4.969	86.914	62.836	17.157
20	27.535	5.561	93.608	62.548	17.570
21	26.351	5.701	94.984	60.504	17.551
22	26.335	5.572	95.324	60.372	17.432
23	24.667	5.144	88.376	59.885	17.141
24	24.595	3.986	84.741	61.887	17.052
25	24.609	3.963	84.714	61.938	17.050
26	22.792	3.707	85.649	65.096	15.697
27	23.424	3.796	92.625	73.215	16.247
28	24.660	3.972	97.348	77.832	17.225
29	24.660	3.972	97.348	77.832	17.225
30	25.519	4.343	100.639	77.305	17.317
31	25.990	4.687	102.418	75.321	17.103
32	29.137	5.191	112.901	72.424	19.206
33	34.854	6.530	135.356	74.470	21.808
34	32.943	6.076	127.551	72.003	20.949
35	30.460	5.483	117.420	68.781	19.829
36	28.034	4.767	106.974	67.932	19.214
37	35.840	6.589	140.705	75.835	22.189
38	58.759	12.678	240.556	88.625	28.807
39	66.650	14.937	276.214	90.773	30.637
40	74.157	16.700	307.694	99.651	33.803
41	80.651	18.600	336.952	100.300	35.057
42	86.138	21.170	362.443	97.992	35.031

Table No. 3 NUTRIMENTS CONSUMED BY 580 (concluded)

Period No.	Protein lbs.	Fat lbs.	Nitrogen Free Extract lbs.	Crude Fiber lbs.	Ash lbs.
43	83.642	18.734	366.555	95.936	33.935
44	53.020	10.157	219.043	66.981	23.571
45	38.380	6.630	147.719	53.307	18.323
46	50.271	9.103	201.057	60.266	21.818
47	55.127	10.144	223.430	62.361	23.073
48	55.831	12.378	227.334	71.896	24.173
49	61.029	14.669	247.238	72.285	25.169
50	66.118	16.206	270.806	70.955	25.779
51	61.877	15.629	257.753	55.611	21.943
Total	1,781.024	355.096	6631.925	3149.085	939.679

Table No. 4 Nutrients Consumed by 586

Period No.	Protein lbs.	Fat lbs.	Nitrogen Free Extract lbs.	Crude Fiber lbs.	Ash lbs.
1	7.813	6.484	14.472	2.084	2.022
2	10.455	1.461	20.859	4.894	2.805
3	16. 155	0.914	38.063	20.071	7.399
4	19.548	1.350	49.299	29.506	10.181
5	23.192	1.811	60.747	39.565	12.945
6	23.915	2.271	60.761	38.659	12.831
7	20.621	2.830	55.285	43.635	12.803
8	21.145	3.967	53.855	44.529	12.599
9	25.091	4.708	63.908	52.841	14.950
10	25.374	4.761	64.626	53.435	15.119
11	23.964	4.496	61.036	50.466	14.278
12	21.145	3.967	53.855	44.529	12.599
13	20.310	3.916	54.691	43.713	12.423
14	20.716	3.766	57.365	48.989	13.028
15	24.146	4.435	67.704	56.061	14.957
16	26.839	5.197	83.232	61.516	15.515
17	23.971	4.310	84.255	72.122	15.003
18	25.363	4.375	80.217	67.086	17.812
19	27.281	4.943	87.963	67.580	18.267
20	29.271	5.872	99.067	67.561	18.915
21	27.805	6.037	100.531	65.367	18.895
22	27.787	5.898	100.887	65.224	18.764
23	25.108	5.231	89.860	61.149	17.497
24	24.613	3.991	84.737	61.886	17.652
25	24.468	3.927	84.073	61.889	17.016
26	20.963	3.240	77.315	64.453	15.240
27	22.147	3.662	88.048	67.069	15.018
28	23.849	4.097	95.806	67.668	15.446
29	23.849	4.097	95.806	67.668	15.446
30	24.627	4.339	98.009	70.404	16.043
31	25.990	4.667	102.418	75.321	17.103
32	24621	4.778	97.002	55.271	14.883
33	28.185	5.389	109.878	58.436	17.264
34	35.639	6.762	138.734	74.546	22.006
35	32.659	5.892	125.938	73.564	21.222
36	31.783	5.623	122.413	73.397	21.029
37	29.460	4.871	112.650	72.604	20.414
38	28.386	4.550	108.065	72.229	20.139
39	30.295	5.080	116.523	72.907	20.612
40	30.506	5.141	117.463	72.981	20.664
41	33.687	6.031	131.558	74.110	21.449
42	36.949	7.577	146.086	78.190	22.394
43	35.370	7.059	140.224	79.667	22.179
44	38.875	6.661	145.179	72.731	22.703
45	41.877	6.690	151.261	70.687	22.853
46	39.410	6.156	139.803	69.743	22.242
47	35.367	5.280	121.024	68.185	21.239

Table No. 4 NUTRIENTS CONSUMED BY 586 (concluded)

Period	Protein lbs.	Fat lbs.	Nitrogen Free Extract lbs.	Crude Fiber lbs.	Ash lbs.
48	32.166	5.866	114.099	78.991	21.552
49	30.752	5.242	104.418	86.709	23.124
50	30.423	5.133	102.805	87.019	22.856
51	24.902	4.202	84.147	71.226	18.727
Total	1,358,834	239,002	4, 660,083	3100,133	859,542

Table 5 DIGESTIBLE NUTRIENTS - 580

Period	Organic Matter in Hay	Digestible Organic Matter in Hay	Organic Matter in Milk	Digestible Organic Matter in Milk
Digestion Factor		0.583		0.95
1	6.123	3.570	25.823	24.532
2	12.247	7.140	25.959	24.661
3	50.434	29.403	24.935	23.688
4	76.090	44.360	25.232	23.940
5	99.760	58.160	25.552	24.274
6	100.037	58.322	24.718	23.482
7_1	33.111	19.304	8.677	8.243

DIGESTIBLE NUTRIENTS - 586

Period	Organic Matter in Hay	Digestible Organic Matter in Hay	Organic Matter in Milk	Digestible Organic Matter in Milk
Digestion Factor		0.583		0.95
1	5.030	2.932	25.823	24.532
2	11.810	6.885	25.859	24.566
3	50.435	29.404	24.768	23.530
4	74.401	43.376	25.302	24.037
5	99.763	58.162	25.552	24.274
6	99.029	57.734	26.557	25.229
7_1	33.111	19.304	8.676	8.242

Table No. 6 DIGESTIBLE NUTRIENTS - 580

Period	Protein	Fat	Nitrogen Free Extract	Crude Fiber	Total
Digestion Factor	58.787	56.744	62.887	52.136	
7a	7.279	1.121	23.442	16.165	48.007
8	12.431	2.251	33.868	23.216	71.766
9	12.431	2.251	33.868	23.216	71.766
10	12.431	2.251	33.868	23.216	71.766
11	12.431	2.251	33.868	23.216	71.766
12	12.431	2.251	33.868	23.216	71.766
13	12.431	2.251	33.868	23.216	71.766
14	12.569	2.206	37.240	26.367	78.382
15	14.470	2.565	43.392	29.806	90.233
Digestion Factor	61.205	73.226	70.938	54.834	
16	16.679	3.853	60.062	34.549	115.143
17	15.056	3.229	61.376	40.775	120.436
18	14.672	3.089	54.148	34.062	105.971
19	16.273	3.639	61.655	34.455	116.022
20	16.853	4.072	66.404	34.298	121.627
21	16.128	4.175	67.380	33.177	120.860
22	16.118	4.080	67.621	33.104	120.923
23	15.097	3.767	62.692	32.837	114.393
24	15.053	2.919	60.114	33.935	112.021
25	15.062	2.902	60.094	33.963	112.021
26	13.950	2.714	60.758	35.695	113.117

Table No.6 Digestible Nutrients - 586 (continued)

Period	Protein	Fat	Nitrogen Free Extract	Crude Fiber	Total
27	14.337	2.780	65.706	40.147	122.970
28	15.093	2.909	69.057	42.678	129.737
29	15.093	2.909	69.057	42.678	129.737
30	15.619	3.180	71.391	42.389	132.579
31	15.907	3.432	72.653	41.302	133.294
32	17.833	3.801	80.090	39.713	141.437
33	21.332	4.782	96.019	40.835	162.968
34	20.163	4.449	90.482	39.482	154.576
35	18.643	4.015	83.295	37.715	143.668
36	17.158	3.491	75.885	37.250	133.784
37	21.936	4.825	99.813	41.583	168.167
Digestion Factor	63.822	76.631	71.143	48.566	
38	37.501	9.715	171.139	43.042	261.397
39	42.537	11.446	196.507	44.085	294.575
40	47.328	12.797	218.903	48.397	327.425
41	51.473	14.253	239.718	48.712	354.156
42	54.975	16.223	257.853	47.591	376.642
Digestion Factor	65.172	75.798	74.401	46.416	
43	54.511	14.200	272.721	44.530	385.962
44	34.554	7.699	162.970	31.090	236.313
45	25.013	5.025	109.904	24.743	164.685
46	32.763	6.900	149.588	27.973	217.224
47	35.927	7.689	166.234	28.945	238.795
48	36.386	9.382	169.139	33.371	248.278
49	39.774	11.119	183.948	33.552	268.393
50	43.090	12.284	201.482	32.934	289.790
51	40.326	11.846	191.771	25.812	269.755
Total	1136.190	262.776	4749.382	1617.659	7766.007

DIGESTIBLE NUTRIENTS - 586

Table No. 7

Period	Protein	Fat	Nitrogen Free Extract	Crude Fiber	Total
Digestion Factor	58.787	56.744	62.887	52.136	
7_a	7.279	1.121	23.442	16.165	48.007
8	12.431	2.251	33.868	23.216	71.766
9	14.750	2.672	40.190	27.549	85.161
10	14.917	2.702	40.641	27.859	86.119
11	14.088	2.551	38.384	26.311	81.334
12	12.431	2.251	33.868	23.216	71.766
13	11.940	2.222	34.394	22.790	71.346
14	12.178	2.137	36.075	25.541	75.931
15	14.195	2.517	42.577	29.228	88.517
Digestion Factor	62.382	77.830	68.801	54.668	
16	16.743	4.045	57.264	33.630	111.682
17	14.954	3.354	57.968	39.428	115.704
18	15.822	3.405	55.190	36.675	111.092
19	17.018	3.847	60.519	36.945	118.329
20	18.260	4.570	68.159	36.934	127.923
21	17.345	4.699	69.166	35.735	126.945
22	17.334	4.590	69.411	35.657	126.992
23	15.663	4.071	61.825	33.429	114.988
24	15.354	3.106	58.300	33.832	110.592
25	15.264	3.056	57.843	33.833	109.996
26	13.077	2.522	53.193	35.235	104.027
27	13.816	2.850	60.578	36.665	113.909
28	14.877	3.189	65,915	36.993	120.974
29	14.877	3.189	65.915	36.993	120.974
30	15.363	3.377	67.431	38.488	124.659
31	16.213	3.632	70.465	41.176	131.486
32	15.359	3.719	66.738	30.216	116.032
33	17.582	4.194	75.597	31.946	129.319
34	22.232	5.263	95.450	40.753	163.698
35	20.373	4.586	86.647	40.216	151.822
36	19.827	4.376	84.221	40.125	148.549
37	18.378	3.791	77.504	39.691	139.364
38	17.708	3.541	74.350	39.486	135.085
39	18.899	3.954	80.169	39.857	142.879
40	19.030	4.001	80.816	39.897	143.744
41	21.015	4.694	90.513	40.514	156.736
42	23.050	5.897	100.509	42.745	172.201
43	22.065	5.494	96.476	43.552	167.587
44	24.251	5.184	99.885	39.761	169.081

Table No. 7 DIGESTIBLE NUTRIENTS - 586 (concluded)

Period	Protein	Fat	Nitrogen Free Extract	Crude Fiber	Total
44	24.251	5.184	99.885	39.761	169.081
45	26.124	5.207	104.069	38.643	174.043
46	24.585	4.791	96.186	38.127	163.689
47	22.063	4.109	83.266	37.275	146.713
Digestion Factor	58.787	56.744	62.887	52.136	
48	18.909	3.329	71.753	41.183	135.174
49	18.078	2.975	65.665	45.207	131.925
50	17.885	2.913	64.651	45.368	130.817
51	14.639	2.384	52.918	37.134	107.075
Slaughter					
Total	855.320	175.996	3163.615	1659.276	5854.207

Table No. 8 SLAUGHTER HOUSE WEIGHTS

Offal Parts	Steer 580 Grams	Steer 586 Grams
Live weight at Slaughtering	489877	265350
Blood	18946	11630
Hide and Hair (Total)Excl. of Dew Claws	35552	16102
Circulatory System	3869	2068
Heart Marketable	1737	1043
Heart Fat	272	118
Lungs	2558	1610
Trachea	708	562
Nervous System	780	807
Brain	463	431
Spinal Cord	318	377
Digestive and Excretory System Incl.Tongue bones	28163	17930
Tongue Marketable, Bones out	1297	1057
Tongue Base, Bones out	481	231
Tongue Bones, Total	68	73
Gullet, total, Clean	699	508
Intestine, Large, Clean	2155	2300
Intestine, Small, Clean	3016	2014
Length of Small Intestine Ctm.	3578	3492
Length of Large Intestine Ctm.	864	897
Heart Sweet Bread	286	50
Neck Sweet bread	454	145
Spleen	694	399
Pancreas	640	250
Bladder Empty	272	218
Penis	240	254
Liver less Gall Bladder	5076	1960
Gall Bladder Empty	99	64
Contents of Gall Bladder	154	73
Diaphragm , Skirt	186	177
Stomach rumen	6378	3443
Stomach retinulum	726	826
Stomach Omasum	3103	2472
Stomach Abomasun	1234	880
Stomaches	11441	7621
Kidneys(right and left)	907	540
Offal Fat	28685	2962
Stomach Fat	6804	
Intestinal Fat	11689	
Caul Fat	10192	
Teeth (right)	284	250
Horns (right)	--	
Hoofs (right fore)	539	240
Hoofs (right hind)		186
Dew Claws(right fore)	113	95

Table No. 8 SLAUGHTER HOUSE WEIGHTS (continued)

Offal Parts	Steer 580 Grams	Steer 586 Grams
Foot, Right fore with Hoof	2098	1533
Foot, Right hind with Hoof	1851	1429
Fore Quarter, right	76203	30572
Hind Quarter, right not incl. Kidney	66451	27215
Left Half	146056	
Contents of Digestive and Excretory Tract	50627	69437
Warm Empty Weight	439,250	195,913
Weight Carcass Cooled	289,617	116,114
Specific Gravity Blood	1.0760	1.0422
Volume of Blood, c.c.	17,607	11,149
Carcass Parts		
Shin	6636	3792
Lean	3869	1887
Fat	463	163
Bone	2286	1683
Head Excl. Teeth	12936	9236
Total Lean	3974	2876
Total Fat	1479	454
Total Bone Excl. Teeth	7484	5807
Neck	1216	467
Lean	612	227
Fat	272	50
Bone	358	191
Chuck	34700	15064
Lean	22206	9908
Fat	6346	835
Bone	5838	3874
Plate	22428	6518
Lean	9897	3756
Fat	9063	653
Bone	3379	2078
Rib	11567	4895
Lean	6369	2931
Fat	2876	218
Bone	2159	1656
Loin	23868	8661
Lean	12369	5720
Fat	8515	898
Bone	2808	2041
Flank	6723	1161
Lean	2399	721
Fat	4268	399
Bone	45	59
Rump	5383	2241
Lean	2418	1175
Fat	1579	268
Bone	1325	826

Table No.8 SLAUGHTER HOUSE WEIGHTS (concluded)

Carcass Parts	Steer 580 Grams	Steer 586 Grams
Round	22748	11720
Lean	16089	8904
Fat	3887	667
Bone	2667	2168
Shank	3919	2567
Lean	1157	617
Fat	222	59
Bone	2577	1928
Tail Total	676	327
Total Lean	340	145
Total Fat		
Total Bone	336	181
Kidney Fat	4139	136
Hanging Tender		458

Table No. 9 SLAUGHTER HOUSE WEIGHTS

Offal Parts	Steer 500 Grams	Steer 512 Grams	Steer 501 grams
Live Wt. At Slaughtering	457.786	548.050	883.480
Blood	21.269	24.176	28.710
Hide and Hair(Total) Excl. of Dew Claws	35.938	41.268	50,090
Circulatory System	3414	5158	6,177
Heart Marketable	1467	1955	2214
Heart Fat	183		
Heart Lean		1555	1882
Lungs and Trachea	4068	4256	4004
Nervous System	832	666	757
Brain	422	466	459
Spinal Cord	410	200	298
Digestive and Excretory System Incl.Tongue Bones			
Tongue Marketable, bones out	1619	1766	2153
Tongue base, bones out	1483	1298	2972
Gullet, total, clean	909	973	1051
Tongue bones , total	118	151	169
Intestine, large, clean	1890	2255	2079
Intestine, small, clean	2645	3067	2796
Length of small Intesines Ctm.	3388cm.	4481 cm.	3848 Cm
Length of large Intestine Cm.	945	1067 cm.	1001 Cm
Heart Sweet bread	288	276	449
Neck Sweet bread	250	235	335
Spleen	1054	1255	1178
Pancreas	625	736	836
Bladder Empty	331	366	275
Penis	271	302	339
Liver less Gall Bladder	4634	4416	6161
Gall Bladder Empty	59	88	90
Contents of Gall Bladder	241	212	176
Diaphragm, Skirt	692	672	779
Stomach rumen	6446	5867	8769
Stomach reticulum	1045	1068	933
Stomach omasum	2419	2643	2976
Stomach abomasun	1085	1511	1507
Stomachs	10995	11089	14185
Kidneys (right and left)	1019	1074	1037
Offal fat	12940	17454	38625
Stomach Fat	2968	3658	7432
Intestinal Fat	6042	8251	16503
Caul Fat	3930	5545	14688
Teeth (right and left)	852	710	778
Horns		1810	3354
Hoofs (all 4 Hoofs)	1848	1490	2192

Table No. 9 SLAUGHTER HOUSE WEIGHTS (concluded)

Offal Parts	Steer 500 Grams	Steer 512 Grams	Steer 501 Grams
Dew Claws (all 4)	247	234	331
Foot, right fore with Hoof	2226	2210	2466
Foot, right hind with Hoof	2117	2043	2502
Fore quarter, right	71295	90208	152,353
Hind quarter, right Incl. Kidney	64330	79228	151,476
Left Half	136107	169239	305,356
Contents of Digestive and Excretory tract			
Warm Empty Weight	407833	493877	814914
Weight Carcass Cooled	271732	338675	609185
Specific Gravity Blood	1.0376	1.0345	1.0346
Volume of Blood, c.c.	20,497	23,369	27,749

Table No. 10 COMPOSITION OF SAMPLES - 580

Composition of samples - 580

	Laboratory No.	Weight Grams	Nitrogen	Water	Ash	Fat	Phosphorus
Blood	18 - 7 - 101	18,946	3,436	77,966	0.670		0.027
Respiratory, Nervous and Circulatory Systems	18 - 7 - 102	7,208	2,194	59.306	0.895	26.229	0.160
Digestive and Excretory Systems	18 - 7 - 105	28,095	2,330	75.373	0.974	7.432	0.183
Offal Fat	18 - 7 - 111	28,685	0.243	10.758	0.162	87.829	0.016
Hair and Hide	18 - 7 - 112	35,552	5.493	60.693	1.250	7.940	0.058
Lean and Fat of Head, Tail, Flank, Plate, Rump, Chuck, Neck, Shin And Shank	18 - 7 - 113	135,338	2.322	50.851	0.558	34.617	0.135
Lean of Round	18 - 7 -117	32,178	3.283	71.594	1.067	6.429	0.201
Fat of Round	18 - 7 - 118	7,775	0.954	19.283	0.283	76.473	0.036
Lean of Loin	18 - 7 - 119	24,739	3.299	66.598	0.978	12.874	0.187
Fat of Loin	18 - 7 - 120	17,028	0.736	10.718	0.230	86.750	0.032
Lean of Rib	18 - 7 - 121	12,737	3.005	63.244	0.930	17.098	0.170
Fat of Rib	18 - 7 - 122	5,752	0.933	13.402	0.308	82.771	0.044
Kidney Fat	18 - 7 - 123	8,278	0.171	3.855	0.102	95.572	0.014
Skeleton of Feet, Head, Tail Flank, Plate, Rump, Chuck, Neck, Shin and Shank	18 - 7 - 125	47,078	3.320	32.875	25.022	19.283	4.439
Skeleton of Round	18 - 7 - 129	5,334	2.634	30.495	21.279	29.506	3.828
Skeleton of Loin	18 - 7 - 130	5,616	3.407	27.923	26.337	23.019	4.743
Skeleton of Rib	18 - 7 - 131	4,318	3.460	30.170	29.657	16.408	5.319
Hoofs, Horns, and Dew Claws	18 - 7 - 136	1,533	8.929	43.228	1.484	1.730	.211

Table No. 11 COMPOSITION OF SAMPLES - 586

	Laboratory No.	Weight Grams	Nitrogen	Water	Ash	Fat	Phosphorus
Blood	18 - 7 -,201	11,630	2.808	81.832	0.543		0.021
Lungs, Nervous and Circulatory Systems	18 - 7 - 202	4,486	2.539	71.986	1.021	11.275	0.178
Digestive and Excretory Systems	18 - 7 - 205	17,858	1.359	80.873	0.861	2.879	0.124
Offal Fat	18 - 7 - 211	2,962	1.132	47.447	0.587	43.618	0.051
Hair and Hide	18 - 7 - 212	16,102	5.530	66.514	1.129	0.501	0.058
Lean and Fat of Head, Tail, Flank, Plate, Rump, Chuck, Neck, Shin and Shank	18 - 7 - 213	45,142	3.064	73.922	0.936	5.008	0.156
Lean of Round	18 - 7 - 217	17,808	3.144	77.614	0.989	1.405	0.176
Fat of Round, Loin and Rib	18 - 7 - 218	3,565	1.684	44.623	0.597	43.252	0.070
Lean of Loin	18 - 7 - 219	11,440	3.100	76.582	0.993	2.483	0.187
Lean of Rib	18 - 7 - 221	5,860	2.992	75.777	0.978	3.154	0.172
Kidney Fat	18 - 7 - 223	272	0.774	19.681	0.356	74.405	0.037
Skeleton of Round incl. marrow	18 - 7 -229	4,336	5.024	34.254	36.161	25.133	6.413
Skeleton of Loin	18 - 7 - 230	4,082	5.501	38.788	37.199	14.629	6.712
Skeleton of Rib	18 - 7 - 231	3,311	3.881	43.219	22.694	8.289	4.038
Skeleton of Feet, Head, Tail, Plate, Rump, Chuck, Neck, Shin and Shank	18 - 7 - 229	32,981	3.697	42.013	23.264	10.056	4.140
Hoofs, Horns and Dew Claws	18 - 7 - 236	1,043	9.227	43.769	1.670	.726	.344

UNIVERSITY OF MISSOURI
COLUMBIA

ZOOLOGICAL LABORATORY

Columbia, Missouri.

April 3, 1919.

Dean Walter Miller,

University of Missouri.

My dear Dean Miller:- I have read the thesis, entitled "The Extent to which Growth Retarded during the Early Life of the Beef Animal Can be Later Regained" and submitted by Samuel Bryan Shirkey in partial fulfilment of the requirements for the degree of Master of Arts, and beg to report: that, in my opinion, it meets the general standard established by the University of Missouri for the Master's Degree.

Very truly yours,

W. C. Curtis

Professor of Zoology, Univ. of Mo.