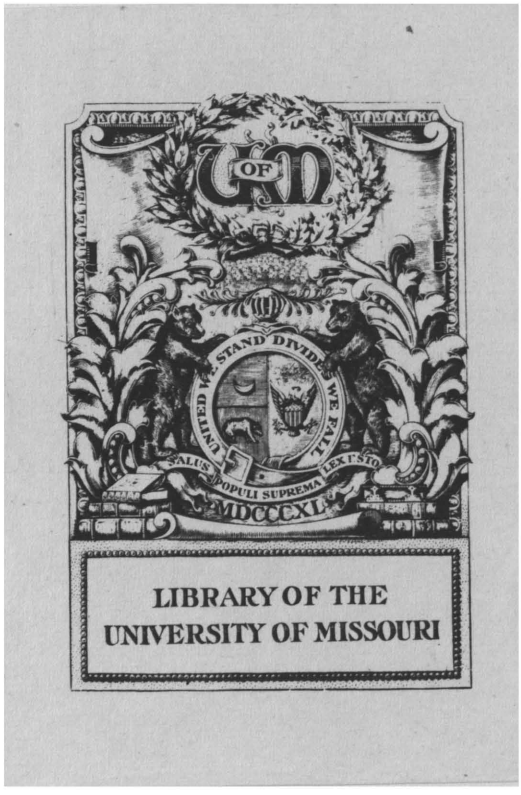

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A STUDY OF THE RELATION OF TYPE AND CONFORMATION TO PRODUCTION IN DAIRY CATTLE

by

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INTRODUCTION

The subject of dairy type and conformation is a question of vital importance to all breeders and students of dairy cattle.

It is a well known fact that from the standpoint of milk production there is no method of ascertaining the true value of a cow as satisfactory as that of keeping accurate records. Many breeders when purchasing a cow for their herd pay a great deal of attention to the pedigree. Pedigree ought to be an indication of the qualities inherited by the animal in question. However, an animal which has a large number of high producing ancestors may prove to be a very poor individual. A case of this kind is usually the exception and should be thot of as such.

There are times, however, when an animal must be chosen without reference to record or pedigree. For instance, when a group of animals are to be placed in the show ring. Here the judge must go entirely by dairy type.

Much has been written about dairy type, that is regarding the type of animal which produces the most from the same amount of food. The type of cow which uses all of her food above that used for maintenance for milk production is the type which will prove the most profitable producer while the cow that uses her food to build up body tissues, and not for milk is the one which is kept at a loss.

The type of our dairy cow of today has been developed thru many years of selection and breeding. If selection and breeding for high production has developed the present type of dairy cow it seems very reasonable to assume that a cow of the right type should be a high producer.

The various breeders associations have carefully prepared score cards for their respective breeds allowing a definite number of points for each point of conformation of the animal according to their judgment of the value of these points. These score cards of the different breeds differ in many respects as to the value of different points of conformation. For instance, the Holstein score card allows 12 points for the udder, the Jerseys 28, the Ayrshires 22, and the Gurnseys 20. If selection and breeding for high production has brot about our present ideal type of dairy cow, then these vital points according to the author's view of the matter should be of equal value irrespective of breed.

The following comparison indicates the wide variation in value given to various points by the score cards of the leading breeds.

A COMPARISON OF THE SCORE CARDS.

	Holsteins	Jerseys	Ayrshires	Gurnseys
Head	11	7	10	5
Neck	4	5	3	Neck, back bone, shoulders, hind and fore quarters 5
Body	51	35	34	25
Quality	8		6	3
Udder	12	28	22	20
Milk veins	10	4	5	8
Teats	2	8	8	6
Color			2	15
Escutcheon	2		2	2
Indications of quality of flow				6
Style and general appearance	2	10	4	3
Size and weight		3	4	2
Total	100	100	100	100

It is the object of this investigation to ascertain if possible, by actual measurements of the more vital points of conformation just what type of cow is best suited for high production; also to try to find out whether or not scoring according to the score cards of the various breeds is borne out by records.

WORK OF PREVIOUS INVESTIGATORS

In bulletin No.35 of the Minnesota Station, T. L. Haecker reports a study made of the relation of production to conformation, using the University herd. He divided the herd into four groups based upon conformation as judged by the eye. No measurements were taken.

The animals were in four groups as follows:

Group I Consisted of cows of strictly beef type, blocky and plump.

Group II Consisted of cows having a less tendendy to lay on flesh.

Group III consisted of cows spare and angular in shape, but lacking depth.

Group IV Consisted of cows spare and angular with deep bodies.

AVERAGE OF THE FOUR GROUPS

Group	Dry matter eaten per day	Dry matter per 1000 lbs live weight	Dry matter per lb. of butter fat	Butter fat for 100 lbs of dry matter	Cost of 1 lb. of butter fat
I	20.81	16.66	31.25	3.20	17.5
II	20.37	21.02	26.42	3.78	15.1
III	19.95	23.00	25.54	3.91	14.6
IV	21.86	23.58	21.15	4.72	13.1

He concludes that the productive capacity of a cow depends more upon type and conformation than upon size or breed. It will be noticed from the table that the cows in Group IV consumed the most feed daily, also more feed per 1000 pounds live weight. It is also shown that the cows in Group IV required less dry matter per pound of butter fat. Altho Group IV consumed the most feed it is shown in the last column that this group produced butter fat more economically than did any of the other groups. While it is not the object of this investigation to set forth the dollars and cents item, Mr. Haecker clearly shows which type of cow is the most economical producer.

In bulletin No.30 of the Storrs' Experiment Station, C.L. Beach sets forth a study of different types of cows from an economical standpoint which is quite similar to the work of Professor Haecker. The object of this work was to impress upon dairymen the importance and necessity of studying the individuality of their cows, and to illustrate the characteristics, which observations by the writer led him to consider of importance in judging dairy cows. The animals were placed in groups according to type without any reference being made to their records.

The results indicate that on the whole the dairy type is considerably more profitable than any other type. There were only two cows that gave negative results; one

was due to an injury to her udder during the trial; the other cow was of such a type that she would be considered an exception to the dairy type.

Professor Beach deducts the following conclusions:

"Among both ordinary and pure bred cows the ability to produce milk and butter varies with individual animals."

"Comparison of types and records of performance by individuals and by groups shows a decided advantage for cows of a distinct dairy type."

"According to observations made upon this herd it would appear that in the absence of actual records, which are the final tests of the merit in every cow, the type of a cow is a much better index of her ability for economical production than is her pedigree alone."

Dr. Attinger[1] has also studied this question and took measurement on 100 cows. The following data was collected.

1. Milk record for 365 days,
2. Height at withers,
3. Height of back,
4. Height at croup,
5. Height at tail head,
6. Length of body,
7. Width of chest,
8. Depth of chest,
9. Width of back.

1. Attinger, Hans. Beitrage zur Kenntnis von Korperform und Leistung des Rindes, Leipzig, 1909. Translation by Professor C. H. Eckles.

He also passed judgment upon the fineness of hair, size of milk wells and size of milk veins. His most important data will be found in a condensed form in the appendix, Tables 85 and 86.

The general table is divided into two parts, Class A, and Class B. Class A includes the animals which have the largest measurements and Class B those with the smallest measurements. In Table 85 of the appendix the general averages of Classes A and B are given also the averages of the ten best and the ten poorest of Classes A and B of all the body measurements taken. It will be seen from this table that Class A with the largest measurements also have the larger milk yield in all cases.

Taking the height at withers, the ten best of Class A show positive results while the ten best in Class B show negative results, the ten with the poorest measurements producing the largest amount of milk, also the largest amount of butter fat.

The measurements on the length of body all show positive results with the exception of the ten poorest in Class A. This class produced the most milk, but not so much butter fat.

The width of chest measurements all proved positive in the production of both milk and butter fat. The measurements of the depth of chest and width of back also proved positive.

By arranging the cows in groups according to the number of calves they have, the results are very much different. The figures are given in table 86 of the appendix. In this table the author has arranged the cows in order of milk production.

Of the cows with two calves the class with the lowest milk record had a greater average width of chest of .2 of a centimeter. They were also 3.8 centimeters wider in the back.

Cows with three calves showed negative results with the measurements on the height of tail head, length of body, width and depth of chest.

Cows with four calves showed negative results on height of tail head and length of body.

The measurements on the cows with six calves all proved to be positive.

Cows with seven calves showed negative results with the measurements on height of withers, height of back, height of rump, height at tail head.

It seems that where so small a number is taken that no definite conclusions can be drawn. If he had given the weights of these cows one might be able to see some reasons for such results. There is a possibility where one very large cow with a very poor record could cause many of these negative results.

Dr. Attinger states that a comparison of the scores made according to the Allgau method given in the following

table, showed that the scores compared on the average very well with the milk production of the animal. In this table the cows are divided into groups according to the number of calves they have had. When the table is condensed the results are not so favorable.

THE ALLGAU SCORE CARD

Head	10	Color and Breed	10
Neck	3	Udder and Milk Indications	14
Fore quarters	12	Symmetry	5
Barrel	12	Size and Indications of thrift	5
Hind quarters	12	Skin and hair	5
Bone	12		

TABLE SHOWING THE AVERAGES ACCORDING TO THE SCORES.

Cows scoring	No. of cows	Milk	Fat	%Fat
60 - 65	31	7327	267.7	3.65
66 - 70	127	7932	295.2	3.72
71 - 75	124	8047	288.2	3.58
76 and more	42	7961	293.7	3.68

It will be seen from the above table that the cows that scored 76 and more did produce the most milk, but not the most butter fat. The cows scoring between 66 and 70 produced the most butter fat and were second in the production of milk. The cows scoring the lowest - between 60 and 65 - were the lowest producers. In fact the greatest difference was between the two lowest groups, there not being a great deal of difference between the three higher groups.

The scores made on the udder and milking indication show up much better on the milk record than they do on the fat record.

Possible Points 14. All Mature Cows.

Cows Scoring	No. of Cows	Milk	Fat	%Fat
7	30	6914	256.5	3.71
8	55	7783	285.5	3.66
9	49	7803	284.4	3.64
10	61	6619	251.9	3.79
11	45	8197	306.6	3.74
12 and more	78	8375	294.5	3.51

It will be seen from the above table that with the exception of the cows that scored 10, the milk records are in order. It will also be seen that the cows scoring 10 are the lowest in butter fat. According to the table the butter fat records are quite irregular. Those having the highest record are not the highest scoring animals, and those with the lowest record are not the lowest scoring animals.

Dr. Attinger also measured the circumference of the chest, width of chest and depth of chest of 38 steers slaughtered at Nürenburg and weighed the heart and lungs. The averages in pounds and centimeters are given in the following table:

	Live Weight	Heart Girth	Width of Chest	Depth of Chest	Wt.of Lungs Grams	Wt.of Heart Grams
Average of 38 trials	1575	217	49.5	81.2	4261	2857
Ave.19 lightest	1421	210.9	46.9	79.3	4013	2524
Ave.19 heaviest	1727	224.3	52.0	83.2	4508	3189

The table shows that the steers which were the heaviest had the largest measurements also the heaviest heart and lungs.

Dr. Attinger's conclusions were as follows:

The largest and, as a rule, the heaviest cows produce by similar feeding more milk than the small light cows.

A smooth and level back is desirable for all purposes. Low or sway backs and hump backs were found most frequently among the inferior cows.

The least variation from the withers measurement in the group is found in the good and best milkers. There is no occasion to select cows with especially high tail heads and pelvic arches for breeding purposes. Too high croups and tail heads are found most frequently with the small cows.

Of the 100 cows measured the best were on the average, the longest and had the widest and deepest breasts. Wide and deep forms seem to go especially with high milk production.

A wide pelvic region is of importance for breeding and fattening and also for milk production.

Small animals have a smaller, and large animals have a larger heart girth.

Heavy animals have a larger chest, heavier lungs and heart, but in proportion to live weight the heaviest animals have lighter lungs but a heavier heart.

underline this whole statement

The absolute weight of the lungs and heart bear a direct relation to the measurements of the circumference, width and depth of the chest.

One can conclude from the outward form of the chest as to the organs contained.

The skin of the animal was found of no significance in connection with milk production.

The milk wells can only occasionally serve as guides to milk producing capacity.

The size and strength of the milk veins do not generally seem to bear any certain relation to milk producing capacity. They depend in size upon the age of the cow and the lactation period. In many cases very large milk veins go with small milk wells.

A comparison of the scores made according to the Allgau method showed that the scores compared on the average very well with the milk production of the animal.

The author concludes that it is possible to judge of the dairy quality of an animal accurately enough from external form that testing of individual cows is unnecessary, but a safe conclusion cannot be arrived at until thousands of body measurements have been taken. "But to believe as some authorities have stated that it is possible already from the material at hand, I believe I have shown to be without foundation".

1.

Dr. Jonas Schmidt, a German investigator, compiled the data of the following men: Bogdanow, Stegman, Kleberger, and Attinger and found that they had measured 372 cows. The following data was collected for each:

1. Body weight
2. Pounds of milk for one year
3. Pounds fat for one year
4. Per cent fat
5. Number of times freshened
6. Height at withers
7. Height at loin
8. Height of tail head
9. Depth and width of chest
10. Length of barrel
11. Circumference of chest
12. Length of neck
13. Length of shoulder
14. Width of hips
15. Width of pelvis in back
16. Width of pinbones
17. Length of head
18. Length of forehead
19. Width of forehead
20. Circumference of horns
21. Length of horns
22. Circumference of hind legs

All measurements were worked out in proportion to height at withers. Dr. Schmidt states that no single point of conformation is any sure indication of great milk production.m But, from the data of these men, he arrives at the following conclusions: A well developed udder gland, large veins and wells, fine flexible hide and wide eschutcheon when taken together, are good indications.

1. Schmidt, Jonas. Beziehungen zwishen Korperform und Liestung bei den Milchkuhen. 1909. Arbeiten der Deutschen Gesellschaft fur Zuchtungskunde. Abstract from the thesis of McNatt and McKellip.

1.

Dr. H. Rodenwald in taking the figures which Dr. Jonas Schmidt compiled has tried to figure mathematically in order to determine quantitatively as well as qualitatively the relation between form and function. Milk production was computed as a function of live weight, height, depth of chest and other measurements,and the results are presented in graphic form and as mathematical equations.

The calculations indicate that milk production is a function of live weight, and can be best represented by the formula: Milk production = 17.4 - 0.01933 X live weight. The results obtained by computing milk yields from this equation agree to a large extent with actual observations and with the results obtained by computing yields from equations which include a number of body measurements. It is stated that as body weight and linear dimensions are intra dependent, nothing can be gained by so modifying the equations as to include body measurements.

2.

Dr. C. Kronacher measured one hundred Baden and Swiss cows. The Baden cows are a large, coarse breed used largely for work. The following data was collected for each cow:

1. Rodenwald, H. Mathematische Beschreibung der Milchleistung der Milchkuh. Fühlings Landwirtschlattliche Zeitung - 58 (1909), No.9. Abstract from Experiment Station Record, Vol.21. No.8. p.778.

2. Kronacher, C. Korperbau und Milchleistung. Arbeiten der Deutschen Gesellscheft fur Zuchtungskunde, 1909, heft 2. Translation by Professor C. H. Eckles.

1. Number of times freshened
2. Body weight
3. Pounds of milk in one year
4. Percent fat in milk
5. Height at withers
6. Length of forehead
7. Length of nose
8. Width of forehead
9. Height of back
10. Height of small of back
11. Height of tail head
12. Depth of chest
13. Width of chest
14. Circumference of chest
15. Width of pelvis in front
16. Width of pelvis in back
17. Width of thruls
18. Length of pelvis
19. Length of barrel
20. Length of legs
21. Width of muzzle
22. Length of neck
23. Distance from hip to last rib
24. Circ. of shank of fore leg
25. Circ. of shank of hind leg
26. Size of left hunger hollow
27. Length of horns
28. Thickness of botton of horns
29. Shape and strength of horns
30. Marking by horn rings
31. Distance from curl of forehead to a horizontal line across the eyes
32. Thickness of pole
33. Curvature of rib
34. Distance between curl on back and head
35. Droop in under line
36. Position and slanting of back bone
37. Length and attachment of tail
38. Distance between vertibrae
39. Form, shape and position of of limbs
40. Age first calving
41. Constitution
42. Size of bone
43. Size of upper milk bag
44. Proportion of hoof to body development
45. Wrinkles of skin on neck and udder
46. Quality and flexibility of hide and hair

Dr. Kronacher gives the following conclusions:

He states that the class of cattle mentioned, - Highland breeds, Baden and Flechkvich used for draft and milk purposes are not to be compared with lowland cattle (Netherlands) since they are quite different type. The highest milk production on the average goes with:

1. with the smaller weight

2. with the smaller size or height at withers.

A pronounced hump back, that is curving above a horizontal line in most cases goes with a small milk production. Without claiming it as an indication of good milking qualities,Dr. Kronacher finds that a slightly swayed back often goes with a high milk production and is to be considered favorable rather than objectionable.

In most cases the cows with the most pronounced depth of chest are the best producers. The breadth of breast and heart girth are not so significant; in many cases high milk production goes with small and flat chests. The cows with the longest shoulders are generally the best producers.

The shape of the withers has no relation to production.

No relation could be detected between the length and breadth of back and milk production.

The longest rumped animals are the best producers. A long animal is generally desirable, especially favorable is

plenty of length between the last rib and the hip joint. The length of the rump is generally closely related to the length of the barrel and chest.

No relation was found between the length of neck and milk production. The best producers generally show a proportionally long and small head. The length, form, size and texture of bones was of no significance. The finer horns were more commonly found with the good producing cows.

The length of the bones is of no importance, but the smallest boned animals are decidedly the best milkers.

The small, tucked up barrel goes with small production.

Thickness and quality of skin seem to be of no significance.

Hair also is no indication of dairy quality. Still in most cases the best animals have the smoothest and most glossy hair.

Scoring in general does not seem to indicate any thing about milk production. Points on the udder and milk indications are, however, in every class, borne out by the records.

The most important indication of dairy quality is the udder and its surroundings. Good cows have large spongy but not fleshy udders, with large, long milk veins. Large milk wells, a fine light skin easily moved over the udder is

a good indication of high producing animals. No importance could be attached to the extra teats.

In general, rather early calving seems to be advantageous in its relation to dairy quality. The length of tail, the distance of the tail from the rear line of the body and the manner of growth of hair on the body (indications of growth) is of no significance.

Color of hair and skin is of no importance.

The value of the udder, milk veins and milk wells are in the first place as to indications of dairy quality.

Little evidence is found regarding any points of the body that serve to indicate the quality of the milk. As a rule, the small short animals with fine bones are a little higher in fat.

The escutcheon is no indication.

Dr. Kronacher quotes Fleishmann, Hansen, Backhaus, Kleberger, J.Schmidt, R. Kock, and H. Kraemer to the effect that the heavier animal on the average exceeds the smaller in both milk and fat yields. Dr. Kronacher explains that the same does not hold good with the breeds of cattle in question. His data shows what is believed by practical men that the largest animals of the breeds studied are not generally the best milk producers.

Dr. Kronacher quotes the following from R. Kock. - "It is certain that next in importance after the size of the udder comes the so-called milk veins and milk wells.

To be sure these cannot be taken as absolutely certain indications of high milk production as shown in my investigation. Large capacity in milk veins and large milk wells are superior indications of high milk capacity if the udder at the same time is rich in grandular substance, that is a good secreting udder gland."

McNatt and McKellip[1] collected the following data for each cow:

1. Owner and address
2. Breed
3. Name
4. Number
5. Age
6. Best twelve months
7. Best six months
8. Best thirty days
9. Best seven days record
10. Length of head from top of pole to end of nose
11. Width at the eyes
12. Muzzle circumference just above the nostrils
13. Circum. of jaws measured around heaviest parts and just over the eyes.
14. Length of neck from pole of head to where it joined the withers, when animal was standing in a natural position.
15. Circum. at junction of head.
16. Breast depth from highest point on withers to lowest point of brisket.
17. Width between front legs.
18. Distance between shoulder points
19. Height of withers from ground.
20. Depth, width, and circum. of chest
21. Depth, width and circum. of barrel
22. Length of barrel measured by means of parallel bars as the shortest distance from the hip point to middle of shoulder blade

1. McNatt, J.B. and McKellip, Ivan. Relation of Conformation of Dairy cows to Milk Production. Thesis prepared at Cornell University, 1912.

23. The flank girth
24. Distance from hip point to last rib
25. Height of hips, pelvic arch and tail head at pin bones
26. Width of hips
27. Length of rump
28. Length of tail
29. Width of thurls
30. Length of body
31. Distance from udder to last well

On account of the difficulties of measuring the udder, veins and wells, judgments were passed concerning their form, size, quality and capacity. Judgment was also passed on the texture and flexibility of the hide and hair.

The results of this investigation were worked out in ratios in order to get the relation between points of conformation and milk production. In making these ratios, it was the policy to select these relations, which are most commonly thought of in judging dairy cattle. For example, a ratio like the length of head to length of body is much more comparable than is the ratio like the length of head to the flank girth.

A review of the conclusions reached by the authors is as follows: In drawing our conclusions from what has been pointed out, we realize that in certain minor points of conformation, there are differences shown which are no doubt due to breed type and in reality have little relation to production.

"For example, the relative length of head to width, between Holsteins and Jerseys, is naturally different: Therefor,

the laws of each of these breeds which are termed first class cannot well be compared in such respects. In this investigation, we have found that not only breed, but classes of cows in a certain breed show different relations between the conformation of head and milk production. However, the best producers of the Holsteins holding age yearly records, have a tendency to long narrow heads while those holding short time records are prone to have heads of the opposite conformation."

"Since our results tend to show that the best short record Holsteins have a shorter and wider head than the most productive long record cows of this breed, it seems that this point of conformation might be taken into consideration by breeders who make a speciality of either the seven and thirty day or the yearly test. We have also found that best cows of both the Jersey and Gurnsey breeds have a tendency to a short wide head; and when all breeds are taken into consideration the same is shown."

"We have found that the best producers of both the Holsteins and Jerseys, when all cows are considered have the larger circumference of muzzle. A deep wide brisket, in proportion to the depth of chest, we have found to be most common among the better class of Holsteins holding long time records."

"No relation in this point of conformation is found with any other class of cows measured. Many breeders, never-

theless, prefer their animals to have deep briskets."

"The conformation of the chest is almost universally considered as a vital point in the make-up of a milch cow. The best judges of dairy cows prefer the chest to be very deep and rather flattened. Our figures prove this shape of chest to be most common among the heavy producers."

"We have found that the best producers in both the Holstein and Jersey classes have the greatest proportional width at hips. This is another point which most all judges consider; for width in this region is thought to be another indication of capacity."

"When the width of thurls is compared to the width at hips, we find that when all classes of the three breeds are averaged in this respect, there is practically a balance. With the long record Holsteins and Jerseys and the Holsteins and Jerseys averaged by breed, we find that widest thurls are associated with the best producers."

"We have found that the higher producers in general have the greatest tendency to a deep barrel."

"We have found that the best producers of the Holsteins and Jerseys have the longer barrels in proportion to length of body while with the Gurnseys the opposite is shown."

"We have found that a long rump is associated with the greatest production only with those Holsteins holding age yearly records. With practically all the other classes the total body length seems to be more important."

"By comparing the circumference of the chest to the circumference of the flank, we find that the heavier producers do not show the greatest wedge shape in barrel conformation. This is contrary to the general opinion as to the shape of the middle."

"We have found that the best cows of the Holstein breed have the largest 'hunger hollow' in proportion to their body length, with the Jerseys and Gurnseys, however, the reverse is found to be true. It seems, therefore, that the relative size of the 'hunger hollow' also varies with the breed."

"Taking the height at withers to height at hips into consideration we have found that this relation depends much upon breed. The larger producers among the Holsteins prove to have a slope in top line from hips to withers."

"We have found that there does exist a relation between height at pelvic arch and milk production in both the Holstein and Jersey breeds. With the Gurnseys, however, we find no relation. With the Holsteins and Jerseys as well as with the average of the three breeds we have found that the best producers are inclined to high pelvic arches."

"We have found that the best producers among both Holsteins and Jerseys as well as in the average of the three breeds to have the greatest tendency to high tail heads."

"As a final relation in regard to actual measurement, we have found that no two breeds show the same relation between the length of tail and milk production. We find that the best Holsteins have relatively the shortest tails, while the best Gurnseys have the longest tails, and with the Jerseys there is no relation. This point of conformation, however, may be due to differences in breed type."

"In our investigations upon the construction of the mammary system we have concluded that the majority of good cows have boxed or square udders. The reason for such a conclusion is that all animals scored in this respect were much above the average cow. We have also concluded that a pendulous udder is not objectionable, if it is capacious, for we have found above all that the udder of a cow must be capacious."

"We have found that the majority of good cows have balanced udders and that cows unbalanced in this respect must have this deficiency made up in capacity. We have also concluded that mellow udders are essential to a large milk flow for a long time."

"We have found that the best producers are more inclined to very large milk veins, and especially very large right veins. These, it was found, should best be very tortous and should enter as large milk wells as possible."

In regard to hide and hair it was found that a fine and flexible hide and fine hair are most common to the heaviest producers.

Mr. A. R. Mann[1] made a comparison between the ratios of measurements of two hundred and ten animals four years old and over. The majority of these figures were compiled from the Holstein Advanced Registry, when cows were admitted upon measurements.

The following data was used for each individual:

1. Name of cow
2. Name of breed
3. Herd book number
4. Advanced Registry number
5. Date of birth
6. Age at time of measurement
7. Height at shoulders
8. Height at hips
9. Length of body
10. Length of rump
11. Heart girth
12. Best 10 months milk production.

The proportions were taken as follows:

1. Height of shoulders to height of hips
2. Length of rump to length of body
3. Height of shoulders to length of body
4. Height of shoulders to circumference of chest

He found the best producing cows to have the highest proportion to height of hips. The largest heart girth to

1. Mann, A.R. Relation of Measurements of Cows to Milk Production. Thesis prepared at Cornell University. Abstract from McNatt's and McKillip's thesis.

height of shoulders was found with the greatest yielders. The proportion, the length of rump to length of body and height of shoulders to length of body were distributed practically equally among the high and low producers.

EXPERIMENTAL DATA

In this investigation eighty-eight cows were measured. The cows being representatives of the college herds of Missouri, Kansas, Nebraska, and South Dakota. There can be no doubt as to the reliability of the records. It was the idea in the first place to get measurements on as many cows as possible whether the records were good, poor or mediocre. The four leading dairy breeds are represented, 36 Holsteins, 32 Jerseys, 14 Ayrshires, 6 Gurnseys. The author regrets that there are so few available Ayrshires and Gurnseys.

By taking some trial measurements before and after watering it was found that the measurements of the barrel were effected to quite an extent. The circumference of the barrel varied from 3 to 8 centimeters, the depth of barrel varied from 1 to 4 centimeters, and the width of barrel varied from 2.5 to 5 centimeters. On account of such variations the cows were measured after feeding and before watering. In this way all animals were measured under like conditions. It was also found that the period of gestation had an influence upon the measurements, especially the measurements of the chest, barrel, udder and milk veins. Holstein cow No.4 was measured before calving, and again 16 days after calving. The measurements on the chest, barrel, udder and milk veins are the only measurements that show any appreciable variation. These measurements are as follows:

	Before Calving	After Calving
Circumference of chest	190	184
Circumference of barrel	252	225
Depth of chest	73	73
Depth of barrel	80	76
Width of chest	48	44
Width of barrel	82	68
Length of udder	60	58
Width of udder	44	35
Depth of udder	38	36
Diameter of veins	2.8	2.6

It will readily be seen that the measurements just before calving are larger than those taken a few days after calving, with the exception of the depth of chest. It was because of such results that the number of days since calving and the number of days since being bred were taken into consideration in the tables.

Explanation of data: The tables in the Appendix contain all the data available for this work. In the first place the cows are grouped according to breed. All the data for each breed being grouped together. Tables 1, 21, 41 and 61 contain the original measurements as taken from each cow. In these tables the cows are arranged according to their butter fat records, and are numbered 1,2,3,4,5 etc. accordingly. The highest producer of butter fat being first and the lowest producer being last. In tables 2-19, 22-39, 42-59, and 62-79 the cows are grouped according to measurements, special groupings of this kind being made for each measurement. The animal having the largest measurement

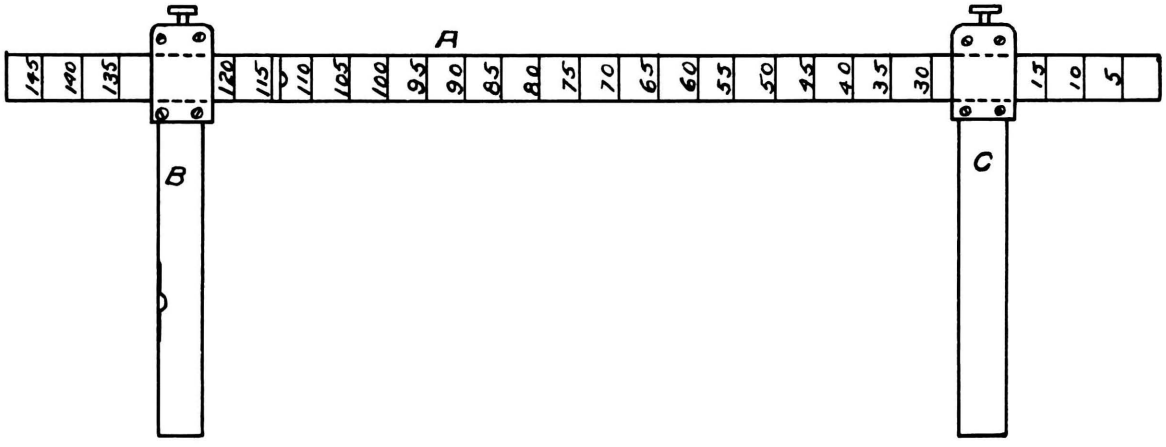
being at the top, and the one with the smallest being at the bottom of the list. The number and record of each cow accompany the measurement in all cases. These groupings were made in this way in order that the relation of the various points to production might more easily be studied. It would be very difficult to take the original data and get any results without some sort of grouping.

There were three averages made from the figures of the respective groupings. These averages are shown in the Appendix in tables 20, 40, 60 and 80. First, the general average was taken, that is, the average of all the animals, then the cows of the different breeds were divided into two parts, Class A and Class B. Class A representing those animals with the highest butter fat record or the highest measurements as the case may be, and Class B those with the lowest butter fat records or the smallest measurements.

In tables 81 and 82 of the Appendix are given measurements on 18 Jersey and 6 Holstein cows taken at the University of Missouri a few years previous to this work. In these tables the cows are grouped entirely according to their butter fat records, and the measurements averaged in much the same way as those in the other tables. Hereafter in this work these measurements will be referred to as the measurements taken by Professor C. H. Eckles.

Instruments used in Measuring.

Figure 1.



These standards are so arranged that one end may be placed on the ground and the bar B can be raised or lowered and the height can be read from the scale on A. The standards are fitted with levels so that they may be set plumb when the measurements are taken.

Figure 2.

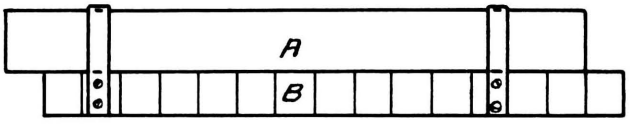


Figure 2 represents the rule used in measuring the depth of the veins. The piece B is placed against the abdomen of the cow, and the piece A is movable so that it can be placed against the vein and the depth can then be read from the scale on B.

Figure 3.

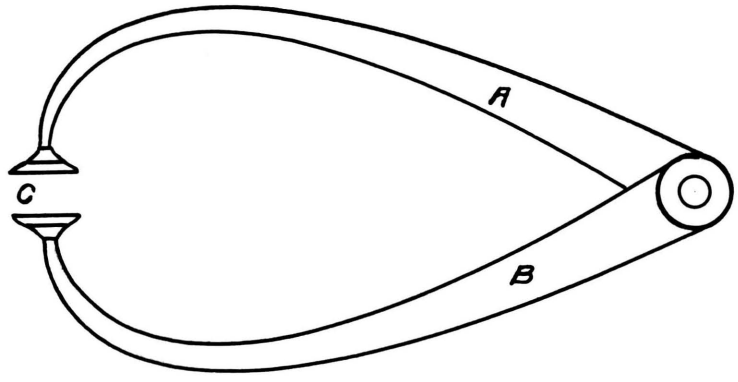


Figure 3 represents the calipers used in measuring the width of the vein. The ends of the calipers C are made broad in order to give more surface against the vein. The width was then measured off from the scale B on Figure 2.

Figure 4.

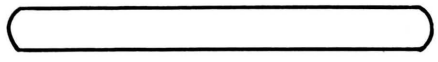
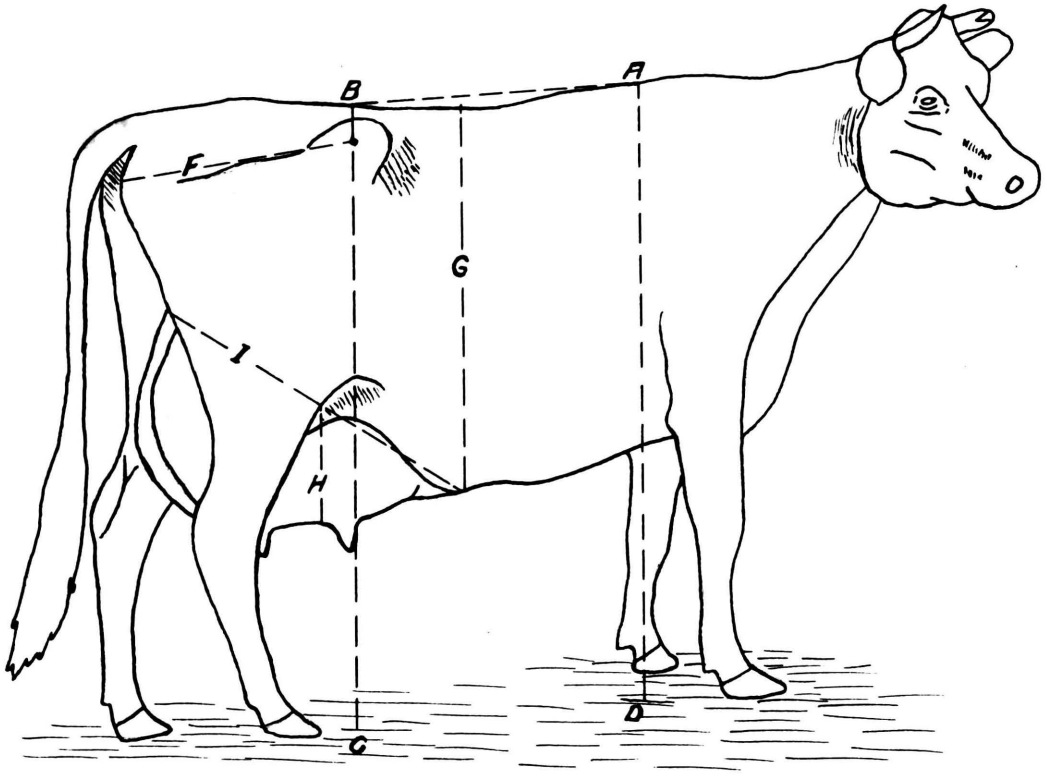
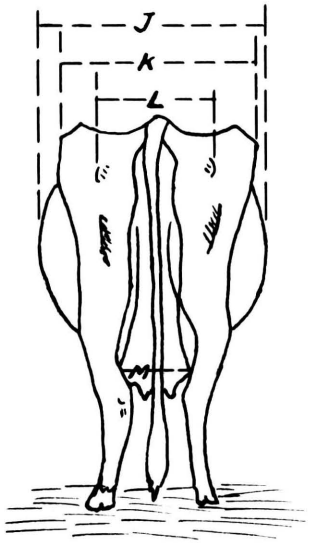


Figure 4 represents the plugs that were used in measuring the diameter of the milk wells. There were a number of these plugs, all of different sizes.

Method of taking measurements.

Figure 5.





A-D	Height at withers
B-C	Height at hips
A-E	Depth of chest
G	Depth of barrel
A-B	Length of back
F	Length of rump
I	Length of udder
H	Depth of udder
J	Width of barrel
K	Width of hips
L	Width of thurls
M	Width of udder

The circumference of the chest is taken at the same place that the depth of chest is taken. The circumference of the barrel is taken at the same place that the depth of barrel is taken.

The following data was collected for each animal:

1. Weight.
2. Age at time of measuring.
3. Age at time of first calving.
4. Number of days since calving.
5. Number of days since bred.
6. The height at withers was taken with the standards.
7. The height at hips was taken with the standards at a point where a line between the hips intersects the back line.
8. The width of hips was taken with the standards from the outside of the hip bones.
9. The width of thurls was taken with the standards from the outside of the thurl bones.
10. The length of rump was taken with the standards from the center of the hip bone to the end of the pin bone.
11. The length of back was taken with a tape from the vertebra which lies at the center of junction of the shoulder blades to a point where a line between the hip bones intersects the back line.
12. The circumference of chest was taken with the tape just behind the elbow joints.
13. The circumference of barrel was taken with the tape at the largest point.
14. The depth of chest was taken with the standards just behind the elbow joints.

15. The depth of barrel was taken with the standards at the point of the greatest depth.
16. The width of chest was taken with the standards at the same place that the depth was taken.
17. The width of barrel was taken with the standards at the widest point of the barrel.
18. The length of udder was taken with the standards from the point of attachment behind to the point of attachment in front.
19. The width of udder was taken with the standards at a point representing the average width.
20. The depth of udder was taken with a tape from the point of attachment under the flank to a point representing the bottom of the udder.
21. The length of veins was taken with a tape by following the contour of the veins.
22. The distance from udder to first well was taken with a tape.
23. The diameter of the veins was taken by first taking the width of the vein with the callipers shown in Figure 4, and by taking the depth by use of the rule shown in Figure 3, and calculating the diameter from these measurements.
24. The diameter of the milk wells was taken by having a set of measured plugs, Figure 5, and by inserting the different sized plugs into the well till one was found to fit. The best fitting plug representing the diameter of the well.

25. The best yearly record of milk and butter fat, and average test.
26. The score according to breed score card.

Note: The veins of many cows have extensions or branches which are too complicated to measure. Where these occur the length of veins in the tables are marked with a star. The metric system was used in taking all measurements, and the cow had to be standing in a natural position. All measuring and scoring was done without reference to the records.

Measurements by Professor C. H. Eckles: The figures show measurements on 18 Jerseys and 6 Holsteins. The following data was collected for each animal:

1. Number
2. Age at time of measuring
3. Weight
4. Height at withers was taken at the vertebra which lies at the center of the junction of the shoulder blades.
5. Height at croup was taken at the place where the line between the hips intersects the middle line of the back.
6. Height at hip points was taken at the point from which all other measurements are taken, which is the top inner angle of the haunch.

7. Depth of chest was taken with the standards, the lower bar fitting up close to the front legs, which were to be in a normal position. The perpendicular part of the rod should be set square by the use of the level on it.
8. Width of chest was taken at the same place the depth was taken from; in each case the pieces were fitted up snug to the body.
9. The width of hips was taken at the widest point of the hips with the standards.
10. The width of loin was taken about 4 inches in front of the hips and straight across.
11. The length of pole was taken from top of pole to lowest line on muzzle.
12. The width of forehead was taken at a spot about two inches above the eye of the animal.
13. The circumference of muzzle was taken at the widest part of muzzle.
14. The length from base of horns to withers was taken from base of horns, the point fixed over the withers as described in No.4; the animal was to be in normal position for this measurement.
15. The highest point of withers to a line between the hips; was taken from the fixed point on withers to the point established in taking the height of croup.

16. A line between hips to tail; taken from a point already designated between hips to right side of junction of tail with body.
17. Point of shoulder to point of hips; taken from front point of shoulder to the point of hips located as described in No.6.
18. Point of shoulder to point of ischium taken as described.
19. Point of hips to ischium.
20. From point of hips to last rib was taken from a fixed point on the hips to the rib following a line parallel to the loin.
21. The heart girth was taken just behind elbow joint when the animal was standing in a normal position, the tape being drawn snugly around the body.
22. The paunch girth was taken at the end of the last rib; taken with a tape and falling upon the ends of the last rib which has attachment.
23. Smallest circumference of shin bone of fore leg.
24. Smallest circumference of shin bone of hind leg.

Note: All measurements were taken by the metric system.

25. Yearly record of milk.
26. Yearly record of butter fat.
27. Average test.

Weight: In looking over the data at hand it was found that with all breeds measured, Class A, the best producing animals were on the average heavier than the poorer producers, or Class B. The data also shows that by taking all the measurements on the whole the cows with the larger measurements are on the average the best producers, or, in other words, capacity is the most important thing to consider in connection with the productiveness of a cow. As a usual thing a cow weighing a thousand pounds will have more capacity than one weighing but eight hundred, providing she is of dairy type. The following table shows the averages of the different groups of the four breeds.

Breed	Average	Class A	Class B	5 best	5 poorest
Holstein					
Weight	1206	1326	1086	1359	1035
Record, B.F.	365.8	484.6	246.3	607.0	172.1
Jersey					
Weight	912	931	893	935	881
Record, B.F.	361.7	453.4	270.1	596.5	206.2
				4 best	4 poorest
Ayrshire					
Weight	972	989	954	1004	960
Record, B.F.	311.2	381.2	241.3	432.0	216.0
				2 best	2 poorest
Gurnsey					
Weight	967	1000	935	985	939
Record, B.F.	305.4	370.8	239.5	404.9	236.0

Cows measured by Professor Eckles.

Jersey				4 best	4 poorest
Weight	868	880	856	886	796
Record, B.F.	380.4	456.4	304.2	579.6	225.9
				2 best	2 poorest
Holstein					
Weight	1243	1385	1098	1310	1087
Record, B.F.	441.9	545.9	254.6	678.6	241.3

The foregoing table shows that weight is a very important factor to bear in mind when estimating the worth of a cow as a producer. It will be noticed, however, in looking over Tables 1, 21, 41, 61 and 81 of the Appendix that the best producer is not necessarily the heaviest animal. Many of the poor and mediocre cows are heavy, but when all breeds are averaged, high production goes with the heavier cows.

Dr. Attinger states in this connection that the largest and, as a rule, the heaviest cows produce by similar feeding more milk than the small light cows. Dr.Kronacher quotes Fleishman, Hansen and others to the effect that the heavier animals on the average exceed the smaller in both milk and butter fat yields. However, Dr. Kronacher explains that the same does not hold true with the breeds with which he worked. (Baden and Fleckvick used for draft and milk purposes.) His data shows what is believed by practical men, that the largest animals of these breeds are not generally the best producers.

Height: A study of the measurements on the height at withers, Tables 2, 22, 45 and 62, and the height at hips, Tables 3, 23, 46, 63, and Tables 20, 40, 60 and 80, show that with all breeds, with the exception of the Gurnseys, Class A with the highest average measurements have the highest average production of both milk and butter fat. The reason that the results shown on these points with the

Gurnseys are negative is easily explained by the fact that there were but 6 representatives of the breed, and that number one, the cow with the largest record, was one of the smallest and her record being large enough that in most cases whichever class she happened to be in showed the largest average production accompanying her measurements. However, when the Gurnseys are grouped according to their butter fat records positive results are shown, that is, the first 3 cows with the best records have the largest average measurements in this respect. Class A when arranged according to butter fat records are higher both at hips and withers. It seems then from the data at hand, that high production is more often found with the larger rather than the smaller cows of the breed.

A ratio between the height at withers and the height at hips shows considerable uniformity for all breeds. All breeds measured are higher at hips than at the withers.

The ratios of height at withers to height at hips are as follows:

	General Average	Class A	Class B
Holsteins	1:1.021	1:1.011	1:1.024
Jerseys	1:1.019	1:1.015	1:1.018
Ayrshires	1:1.032	1:1.025	1:1.020
Gurnseys	1:1.019	1:1.018	1:1.018

These figures show that the Ayrshires measured had a more sloping back than any of the other breeds, while the Jerseys and Gurnseys, which have the same ratio, seem to have

the least variation in this respect. The ratio between the height at hips and the height at withers when worked out with Classes A and B of the 4 breeds show that with the Holsteins and Jerseys the highest producers have the least variation between the height at withers and the height at hips; with the Gurnseys there was no difference between Classes A and B. This is in accord with what Dr.Attinger found, and opposing what Dr. Kronacher reports. The results of McNatt and McKellip also agree to a certain degree with this finding. The Holsteins and Jerseys measured by Professor Eckles show much the same ratio.

The following table shows the difference in height of the different groups of the 4 breeds worked with. The records of these groups being the same as those given in the previous table.

	5 best Height at		5 poorest Height at	
	Withers	Hips	Withers	Hips
Holsteins	139.6	142.3	131.3	136.2
Jerseys	122.3	123.8	122.9	129.8
	4 best		4 poorest	
Ayrshires	125.5	128.6	123.2	126.5
	2 best		2 poorest	
Gurnseys	124.0	126.5	126.5	129.0

Cows measured by Professor Eckles

	4 best		4 poorest	
Jerseys	120.6	120.5	120.7	122.2
	2 best		2 poorest	
Holsteins	135.5	138.2	134.7	136.7

The table shows that,with all breeds with the exception of the Jerseys, there is a big difference between the best and the poorest producers as to height. The reason that negative results were shown with the Jerseys may be explained by the fact that the Jersey cow, No.1 was the lowest of all the Jerseys measured. It will be noticed that with the cows measured by Professor Eckles the 4 best cows were not as high at the withers as were the 4 poorest of the Jerseys. It will further be noticed that the 4 best Jerseys were lower at the hips than at the withers. This is exactly opposite to what was found in all other cases. The Holsteins, however, show the same results as were found with the other measurements.

Of the 88 cows measured in this investigation the Jersey cow No.23 is the only cow that was lower at the hips than at the withers, and only 6 out of the 88 were of equal height at both hips and withers. Of the 18 Jerseys measured by Professor Eckles, 5 were lower at the hips than at the withers, and of the 6 Holsteins none were lower, but one was the same at both hips and withers.

As to the height at hips and withers the data agrees with the conclusions reached by McNatt and McKellip, and Dr.Attinger, but is the opposite to the results given by Dr. Kronacher. It should be kept in mind, however, that the latter worked with a different type of cattle.

Width of Hips and Thurls: The width of hips and width of thurls are two closely related points and may well be considered together in the same way as were the height at withers and the height at hips. By grouping all cows of all breeds worked with according to these measurements, Tables 5, 25, 42, 65 and Tables 6, 26, 43, 66; 20, 40, 60 and 80 positive results are shown in all breeds with the exception of the width of thurls with Gurnseys and the width of hips with the Jerseys where negative results are shown.

The ratios of width of thurls to width of hips are as follows:

	General Average	Class A.	Class B.
Holsteins	1:1.109	1:1.099	1:1.096
Jerseys	1:1.179		
Ayrshires	1:1.123	1:1.140	1:1.102
Gurnseys	1:1.177		

It will be seen from these ratios that the Holsteins have wider thurls in proportion to width of hips than do any of the other breeds, while the Jerseys and Gurnseys, which have practically the same ratio, have the narrowest thurls in proportion to width of hips. It will also be seen from the ratios that Class A of the Holsteins have narrower thurls in proportion to width of hips than do those of Class B. The same thing is true with the Ayrshires. A similar ratio could not be worked out with the Jerseys and Gurnseys as these two breeds showed negative

results in width of hips and width of thurls respectively. It would seem then from these figures that the ratio between width of thurls and width of hips was influenced a great deal by breed type.

Length of Back and Rump: The measurement on the length of back, Tables 4, 24, 47 and 64, gave positive results with the Holsteins and Jerseys, but negative with the Ayrshires and Gurnseys, according to the grouping; however, by grouping the Gurnseys according to their records and averaging the measurements the results would be positive. The measurements on the length of rump, Tables 7, 27, 44 and 67, were positive in all cases except with the Gurnseys, and by grouping this breed according to their records and averaging the measurements, Tables 20, 40, 60 and 80, the results would also be positive. These measurements being closely related may be given in ratios the same as those given above. The ratios of length of rump to length of back are as follows.

	General Average	Class A.	Class B.
Holsteins	1:1.838	1:1.827	1:1.826
Jerseys	1:1.778	1:1.778	1:1.775
Ayrshires	1:1.814		
Gurnseys	1:1.807	1:1.813	1:1.800

It will be seen from these figures that there is not a great deal of difference in the relation of length of rump to length of back in any of the breeds worked with. The Jerseys, however, have a little the longest rump in

proportion to length of back, while the Holsteins have the shortest rump in proportion to length of back. As stated above, the measurements on the length of back in the Ayrshire breed gave negative results. In a case of this kind a fair ratio cannot be shown that will indicate anything of importance. However, in the three remaining breeds the figures show that there is no significant relation between this ratio and production. The ratios in both Class A and Class B in the three breeds were nearly identical. What little difference there is shows that Class A of the three breeds have a little the longer rumps in proportion to length of back than do the cows of Class B.

The measurements taken by Professor Eckles at this station, Tables 81 to 84, show that with the Holstein breed, when the cows are grouped according to butter fat records, Class A have on the average the longest backs. The difference, however, is very slight, there being but one centimeter's difference in favor of Class A, while with the Jerseys there is practically no difference. The results are,however, negative by one-tenth of a centimeter.

The length of back and length of rump must have some relation to production because in all breeds the highest producing class have on the average the longest rumps and in all breeds, with the exception of the Ayrshires, the highest producing class have on the average the longest backs.

These results agree with those obtained by Dr. Kronacher and Dr. Attinger. McNatt and McKellip found the best classes of Holsteins and Jerseys to have the longest barrels, but the reverse was found with the Gurnseys.

Heart Girth: A study of the measurements of the heart girth of the animals worked with, Tables 8, 28, 48 and 68, show that with the Holsteins, Jerseys and Ayrshires, Class A, the animals with the larger measurements also have the largest average milk and butter records. The Gurnseys grouped according to this measurement show negative results. This is because No.1, the cow with the highest record, has the smallest heart girth. However, when the cows of this breed are grouped according to their records Class A would have on the average the largest heart girth. With the Holsteins and Jerseys measured by Professor Eckles, Class A, the cows having the highest records, have on the average the largest heart girth. In this respect the data agrees with the findings of McNatt and McKellip, Dr. Kronacher and Mr. Mann.

It is very essential to have a large heart girth in order to give plenty of room for a large heart and lungs. Dr. Attinger found that steers with the larger chest also had the heavier heart and lungs. This was worked out by measuring the heart girth of a number of steers before slaughtering, and weighing the heart and lungs. It seems quite reasonable that the same thing would hold true with dairy cows.

Barrel Girth: The circumference of the barrel is a point closely related to the circumference of the chest. Taking this measurement into consideration, Tables 9, 29, 49 and 69, show that Class A of all breeds when grouped according to this measurement, have on the average, Tables 20, 40, 60 and 80, the largest milk and butter fat records.

In looking over the tables it will readily be seen that Class A with the largest measurements of the barrel have on the average a larger record than does Class A when grouped according to the circumference of chest measurement. It also substantiates the theory that a large heart girth is a very important factor when considered along with production. The data also substantiates the theory that a large capacious barrel is a very important factor, in fact the figures show that a large barrel is of more importance than is a large chest.

The measurements taken by Professor Eckles at this station, Tables 81 to 84, show that Class A, the class having the highest records of the Holsteins have the largest average heart girth, also the largest average paunch girth, while with the Jerseys there is but little difference shown between Class A and Class B as to the heart girth, and Class B have on the average the largest paunch girth. However, if the Jerseys were to be grouped according to the measurement, Class A would have a much larger average record of milk and butter fat.

Depth of Chest: Measurements on the depth of chest, Tables 10, 30, 50, 70; 20, 40, 60 and 80, show that with all breeds except the Gurnseys, that Class A, with the larger measurements have on the average the largest production. If the Gurnseys were to be grouped according to their records Class A would have on the average the deeper chests. The measurements taken by Professor Eckles, Tables 81 to 84, show similar results on the depth of chest. By grouping the cows according to their records, Class A in both the Holstein and Jersey breeds have the deeper chests. These results agree with the work reported by McNatt and McKellip, and Dr. Kronacher.

Width of Chest: The measurements on the width of chest, Tables 12, 35, 53 and 72, show that with all breeds, with the exception of the Gurnseys, that Class A, when grouped according to this measurement, are on the average the heaviest producers, Tables 20, 40, 60 and 80. When all breeds are averaged the figures show that the cows in Class A, when grouped according to depth of chest, are on the average higher producers than are the average of Class A when grouped according to the width of chest measurement. This also agrees with the work of McNatt and McKellip. With the Jerseys and Holsteins measured by Professor Eckles Tables 81 to 84, it was found that with both breeds the higher producing Class have on the average the narrowest

chests. It would seem then, from the data, that a deep narrow chest often goes with high production. Dr.Kronacher's work shows that a large production often goes with small and flat chests.

A ratio between the width of chest and depth of chest show that Class A of the Holstein, Jersey and Ayrshire breeds have wider chests in proportion to depth than do Class B. The ratios are as follows:

	General Average	Class A.	Class B.
Holsteins	1:1.546	1:1.324	1:1.365
Jerseys	1:1.363	1:1.572	1:1.692
Ayrshires	1:1.549	1:1.333	1:1.574
Gurnseys	1:1.419		

The Gurnseys gave negative results with this measurement, therefore a ratio was not worked out for this breed. These ratios bear out the facts shown above on the measurements of the circumference of chest; that is, the fact that capacity is the necessary thing.

An interesting breed characteristic is brought out by these ratios. The figures show that the Holsteins and Ayrshires have nearly the same proportion, but have narrower chests in proportion to depth than do any of the other breeds. It will further be noticed that the cows in Class A have on the average, wider chests in proportion to depth than do Class B.

Depth and Width of Barrel: In taking up the measurement on the depth of barrel, Tables 11, 34, 51 and 71, it was found

with all breeds, with the exception of the Gurnseys, that Class A, the cows with the deeper barrels, have on the average, Tables 20, 40, 60 and 80, higher records than Class B. However, if the Gurnseys were to be grouped according to their butter fat records, Class A would, on the average, have a deeper barrel than Class B. With all breeds, with the exception of the Ayrshires, it was found that the cows of Class A have on the average higher records, when grouped according to width of barrel than the cows of Class B, Tables 13, 36, 52, 73; 20, 40, 60 and 80. The Ayrshires showing negative results with this measurement. The measurement on the depth and width of barrel show results very similar to those found with the measurements on the depth and width of chest. By averaging all breeds, the tables show that the cows in Class A, when grouped according to the depth of barrel measurement show a higher average production than do the cows of Class A when grouped according to width of barrel measurement. The ratios between the width of barrel and depth of barrel are as follows:

	General Average	Class A.	Class B.
Holsteins	1:1.078	1:1.051	1:1.112
Jerseys	1:1.056	1:1.033	1:1.081
Ayrshires	1:1.066		
Gurnseys	1:1.053	1:1.027	1:1.084

These ratios show much the same breed characteristics as were shown by the ratios of width of chest to depth of chest, that is, the Holsteins and Ayrshires have

narrower barrels in proportion to depth than do the Jerseys and Gurnseys. It will also be readily seen that the animals in Class A have wider barrels in proportion to depth than do Class B. This same characteristic was exhibited with the depth and width of chest measurements of the cows measured.

In summing up the measurements on the chest and barrel, the figures show that the principal thing to consider is capacity, and that depth in this respect is of more importance than width.

These results agree with Dr.Kronacher's statement that a small, tucked up barrel goes with a small production. They also agree with Dr. Attinger's statement that deep and wide forms seem to go especially with high milk production. McNatt and McKellip also report the same.

Professor T. L. Haecker of the Minnesota station found that the cows with deep wide forms produce more milk and butter fat and do it more economically than does the type which is lacking in depth. C. L. Beach of the Storr's station also shows that the strictly dairy type are heavier and more economical producers than is the type lacking depth.

Former Measurements: Before discussing the measurements on the mammary system it might be well to take up the body measurements taken by Professor Eckles which have not been heretofore discussed, Tables 81 to 84.

Width of Loin: The width of loin does not seem to have a great deal of bearing upon production. With the Holsteins the cows in Class A have on the average a trifle wider loin than those of Class B, while with the Jerseys there was no difference. This is somewhat contrary to the generally accepted theory that a wide loin is of great importance.

Dr. Attinger's investigation shows that the cows having the wider backs are the heaviest producers, while Dr. Kronacher found that there is no relation between this point of conformation and production. It is not known just how these measurements were taken, but it is quite probable that these men have reference to the loin.

Head: When the cows were measured from pole to muzzle the figures show that a long head is found more commonly among the higher producers of both the Holstein and Jersey breeds. The figures also show that a narrow head is found more commonly among the better producers, the cows of Class A having on the average narrower heads than Class B. These measurements substantiate the theory that a long narrow head is desirable. McNatt and McKellip found that the best producers of the Bolsteins have long narrow heads. These figures also agree with the findings of Dr. Kronacher.

Muzzle: The circumference of muzzle seems to be of some importance because with the Holsteins and Jerseys the larger muzzles are found more commonly with the cows of Class A.

The difference seems to be much more pronounced with the Jerseys than with the Holsteins. This agrees with the work of McNatt and McKellip, and with the general opinion of most dairy men.

Neck: By taking the length of the neck from the base of horns to the withers the figures show that the cows of Class A of both the Holsteins and Jerseys have on the average longer necks than do those of Class B. The greatest difference is shown with the Holsteins. This is the reverse to what Dr. Kronacher found,for he says that there is no relation between the length of neck and milk production. A long, slender neck is usually preferred to a short, thick one by most dairy men.

Hips to Tail: The distance from hips to tail is a measurement comparable to the length of rump described above. The figures show that the cows in Class A of both the Holstein and Jersey breeds are longer in this respect. This agrees with the measurements of length of rump described above.

Shoulder Points to Ischium: The measurement on shoulder points to ischium does not show anything of much importance. The figures show that the cows in Class A of the Holsteins are on the average longer in this respect than are the cows in Class B. With the Jerseys the opposite is found to be true. From point of hips to ischium seems to be of more importance, since with both breeds the cows of Class A have

on the average a greater length between these two points than do those of Class B. This measurement is also comparable to the measurement length of rump described above, and the results obtained are precisely the same.

Hunger Hollow: The measurement on the "hunger hollow" or the distance from hips to last rib does not seem to have a great deal of weight on the subject. With the Holsteins the cows of Class A have on the average the largest "hunger hollow". On the other hand, the Jerseys exhibit an entirely different characteristic. McNatt and McKellip also found the same thing to be true with these two breeds. With the cows measured by Dr. Kronacher a large "hunger hollow" favored a large production.

Shin Bones: As to the circumference of shin bone, it was found that the cows of Class A in both breeds have, on the average, a larger smallest circumference of shin bone of the fore leg than do those of Class B. The difference, however, is very small, being .2 of a centimeter in each case. As to the smallest circumference of shin bone of the hind leg the cows in Class A of the Jerseys have on the average the largest measurement in this respect, while with the Holsteins the opposite was found to be the case.

Udder: In looking over the measurements on the length, width and depth of udder, Tables 14, 31, 54, 74; 15, 32, 55, 75; 16, 33, 56 and 76, it will readily be seen that the cows of Class A of all the breeds have on the average

the highest production accompanying the larger measurements Tables 20, 40, 60 and 80, In nearly every case there is a great deal of difference in favor of Class A.

By averaging all breeds together it was found that the length and depth of udder are of a great deal more importance than the width. While the cows of Class A, when grouped according to width of udder have on the average a higher record than the cows of Class B, the degree is not nearly so pronounced as it is with the cows of Class A when grouped according to length and depth of udder. As to the length and depth of udder, there is not a great deal of difference between Classes A of these two measurements; however, there is a small difference in favor of Class A when grouped according to length of udder over Class A when grouped according to depth of udder. The measurements on the udder show much the same characteristics as were shown on the measurements of the chest and barrel, and that is that while capacity is the essential thing, depth is of much more importance than width. The ratios between the width of udder and length of udder show some very interesting facts. The ratios are as follows:

	General Average	Class A.	Class B.
Holsteins	1:1.254	1:1.617	1:1.619
Jerseys	1:1.713	1:1.639	1:1.814
Ayrshires	1:1.645	1:1.503	1:1.743
Gurnseys	1:1.752	1:1.733	1:1.774

These figures show that the Holsteins as a breed have on the average a wider udder in proportion to length than do any of the other breeds, and the Gurnseys have the narrowest udder in proportion to length; however, there is not a great deal of difference between the Gurnseys and Jerseys. The figures show also that with all the breeds the cows of Class A have on the average wider udders in proportion to length than do those of Class B. The difference, however, is very slight in the Holstein and Gurnsey breeds, but is quite marked with the Jerseys and Gurnseys.

The ratios of width of udder to depth of udder are as follows:

	General Average	Class A.	Class B.
Holsteins	1:1.081	1:1.090	1:1.008
Jerseys	1:1.116	1:1.123	1:1.107
Ayrshires	1:0.996	1:1.014	1:0.972
Gurnseys	1:1.048	1:1.101	1:0.987

These figures show that the Jerseys have a narrower udder in proportion to depth, while the Ayrshires have on the average the widest udders in proportion to depth. In fact with the Ayrshires the width, on the average, exceeds the depth.

In considering the classes of the different breeds it will readily be seen that in all breeds the cows of Class B have on the average wider udders in proportion to depth than those of Class A. This is just exactly opposite to what was found to be the case when

the ratios between width and length were compared.

By comparing the ratios on the relation of depth to length of udder it was found that with all breeds Class A have on the average a longer udder in proportion to length than do those of Class B.

The ratios of depth to length of udder are as follows:

	General Average	Class A	Class B
Holsteins	1:1.500	1:1.475	1:1.606
Jerseys	1:1.535	1:1.459	1:1.638
Ayrshires	1:1.645	1:1.579	1:1.793
Gurnseys	1:1.670	1:1.576	1:1.798

It will readily be seen from these figures that the Holsteins have on the average the deeper udders in proportion to length than do any of the other breeds, while the Gurnseys show the opposite in this respect, with the Jerseys and Ayrshires coming in between.

Summary of Udder Measurements: In summing up the different measurements on the udder it seems that shape, that is, the proportion of width to depth, width to length, and depth to length, has not a great deal of bearing with relation to production. All the way through, the figures show that capacity is the most important thing to be considered in the udder in its relation to production. These figures agree with the generally accepted theory that the udder should be large, extending high behind and well forward. The figures bear out this point very well, for it will be

seen that the cows in Class A, when grouped according to length of udder are on the average nearly as high producers as the cows of Class A when grouped according to depth of udder, and much higher than Class A when grouped according to width.

The fact that capacity is the principal thing to be considered is brought out by these figures and by the investigations of other men. In his conclusions Dr.J. Schmidt states that a well developed udder and mass of glands is one of the best indications of a large producer. Dr.Kronacher states that the most important indication of dairy quality is the udder and its surroundings. McNatt and McKellip found that the majority of the best cows have balanced udders, and that cows unbalanced in this respect must have this deficiency made up in capacity.

Mammary System: In taking up the measurements on the milk veins, Tables 17, 37, 57, 77; 18, 38, 58, 78; 20, 40, 60 and 80 the figures show that when the cows are grouped according to these measurements, Class A, with all breeds have on the average a higher record than have the cows of Class B.

While the data shows that with all breeds, when the cows are grouped according to these measurements, Class A when grouped according to length of veins do not have on the average as high records as do those of Class A when the cows

are grouped according to diameter of veins. Since this feature was found with all breeds it cannot be laid to breed characteristics.

Udder to First Well: In working over these measurements, when the cows were grouped according to their records it was found that the distance from the udder at which the veins enter the abdomen has little or no relation to the productive capacity of a cow. The measurement, from the udder to the first well shows that on the average there was no difference between Classes A and B of the Holsteins. The Jerseys, on the other hand, seem to show somewhat different results in that Class A have on the average the first well a little further away from the udder than do those of Class B. With the Ayrshires the cows of Class A have on the average a little greater distance between the udder and first well with the right vein, but with the left vein the opposite was found to be the case. The Gurnseys show the same characteristics as the Jerseys in this respect, Class A having on the average the first well further from the udder than do the cows of Class B.

In summing up the data on this measurement the figures show that there is very little if anything to be gained by having the veins run extremely far forward before entering the abdomen. The figures show further that no evidence as to the productive capacity of a cow can be gained as to where the right or left vein enters the body.

Length of Veins: By comparing the length of veins of the different breeds and the different classes it was found that in all cases the cows of Class A have on the average longer veins than do those of Class B, Tables 20, 40, 60 and 80. However, the data does not show that either the right or left veins should be longer than the other.

The data shows that with all breeds, Class A have on the average a larger right vein than left, while with Class B of the Ayrshires and Jerseys, the left vein in the largest. McNatt and McKellip also found that the right vein was larger than the left among the best producers.

Table showing the average measurements on the milk veins and milk wells.

	Holsteins				Ayrshires.			
	Class A.		Class B.		Class A.		Class B.	
Udder to first well	R.	42.5	R.	42.5	R.	40.7	R.	39.4
	L.	43.0	L.	43.5	L.	37.4	L.	41.2
Length of veins	R.	50.0	R.	47.4	R.	47.7	R.	42.2
	L.	50.0	L.	49.0	L.	44.4	L.	42.0
Difference showing the tortuousness of veins	R.	7.5	R.	4.9	R.	7.0	R.	2.8
	L.	7.0	L.	5.5	L.	7.0	L.	.8
Diameter of veins.	R.	2.5	R.	1.81	R.	2.72	R.	1.72
	L.	2.41	L.	1.75	L.	2.28	L.	1.74
Diameter of wells	R.	.950	R.	.755	R.	.814	R.	.800
	L.	.972	L.	.805	L.	.857	L.	.785

	Jerseys		Gurnseys	
	Class A.	Class B.	Class A.	Class B.
Udder to first well	R. 41.3 L. 39.4	R. 39.8 L. 39.3	R. 46.0 L. 42.3	R. 37.6 L. 39.0
Length of veins	R. 49.1 L. 49.0	R. 43.1 L. 42.5	R. 50.3 L. 48.0	R. 40.0 L. 42.0
Difference showing the tortuousness of veins	R. 7.8 L. 9.6	R. 3.3 L. 3.2	R. 4.3 L. 5.7	R. 2.4 L. 3.0
Diameter of veins	R. 2.24 L. 2.11	R. 1.77 L. 1.79	R. 2.51 L. 2.50	R. 2.07 L. 2.03
Diameter of wells	R. .900 L. .906	R. .768 L. .875	R. .933 L. .966	R. .800 L. .866

It will be seen from the above table that the different breeds do not show a great deal of difference as to length of veins, neither do they show a great deal of difference as to the diameter of veins. However, the figures do show that by averaging the measurements on the right and left veins, as to length the Holsteins have on the average the longest veins, the Jerseys second, the Ayrshires third, while the Gurnseys have the shortest veins of any of the breeds. The figures show further that large veins do not necessarily go with long veins.

Tortuousness: By subtracting the distance from udder to first well from the actual length of the veins will give an idea as to the crookedness of the veins. The figures show that according to breed the Holsteins have on the average the most crooked veins, the Jerseys second,

the Ayrshires third, while the Gurnseys seem to have the straightest veins of any cows of the breeds worked with. With the different breeds and the different classes, the figures show that the cows of Class A have on the average a more tortuous vein than do those of Class B. The difference in this respect is not very great with the Holsteins and Gurnseys, but is very marked with the Ayrshires and Jerseys. Tables 1, 21, 41 and 61 of the Appendix show that with all breeds a greater percentage of straight veins are found among the cows of class B.

It is a generally accepted theory with most dairy men that the milk veins should be large and tortuous. This theory is proven very well by these figures and a great deal of stress should be laid on such a type of vein. The figures show that there is not a great deal to be gained by having the veins extend extra far forward before entering the abdomen, and not a great deal can be gained from extra long veins unless they be tortuous or show extensions. It is the size and crookedness which whould be given the most attention.

Extensions: As stated above, the measurements on the extension and branches of the veins were not taken, but the cows having these extension s, or branching veins, are marked with a star in Tables 1, 21, 41 and 61 of the Appendix. It will be seen by looking over these tables that the larger

percent of extension or branching veins are to be found among the higher producers. This is a vital point to be considered in estimating the productive capacity of a dairy cow.

Milk Wells: In looking over the measurements on the diameter of the milk wells, Tables 19, 39, 59 and 79, it will be noticed that when the cows are grouped according to this measurement, the cows in Class A, of all breeds have a much higher average record than those of Class B, Tables 20, 40, 60 and 80. By averaging the records of Class A of all breeds it was found that when the cows were grouped according to the diameter of wells the average production was nearly as high as that of Class A of all breeds when grouped according to the diameter of the veins.

When the cows were grouped according to their records it was found that on the average the Gurnseys have the largest milk wells, the Holsteins second, the Jerseys third and the Ayrshires fourth. In looking over the data on these measurements the figures show that a large milk well does not always go with a large milk vein. It often happens that a very small well goes with a very large vein.

In summing up the measurements on the milk veins and milk wells the data dhows that next in importante to the udder comes the size of the milk veins and the milk wells.

These results both agree and disagree with the results of Dr. H. Attinger. He states that the milk wells can only occasionally serve as guides to the milk producing capacity, and that the size of the milk veins does not generally seem to bear any certain relation to milk producing capacity. Dr. Attinger concludes that in many cases very large milk veins go with very small milk wells. In this respect the data agrees with Dr.Attinger's statement. The data also agrees with Dr.Schmidt's conclusion that large veins and large wells are good indications of a large producer. Dr. Kronacher states that long large milk veins and large milk wells are good indications of a large producing animal. Dr. Kronacher's quotation from R. Kock also agrees very well with the conclusions to be reached in the work when he says: "It is certain that next in importance after the size of the udder comes the so-called milk veins and milk wells. To be sure these cannot be taken as absolutely certain indications of high milk production as shown in my investigation. Large capacity in milk veins and large milk wells are superior indications of high milk capacity if the udder at the same time is rich in grandular substance, that is a good secreting udder gland".

Score Cards: In looking over the score cards of the various cows of the different breeds it was found that the scores on the udder and milk veins compare on the average very favorably with the records of production.

Scores on Udder and Milk Veins: The following is a condensed table of averages on the scores on the udder and milk veins of the different classes and breeds worked with. These figures were averaged when the cows were grouped according to their records. The scores were made according to the score cards of the respective breeds.

Holsteins

Possible points - 22

Average	Class A.	19.1
Average	Class B.	15.3
Ave. 9 best	Class A.	19.8
Ave. 9 poorest	Class A.	18.5
Ave. 9 best	Class B.	16.0
Ave. 9 poorest	Class B.	14.0

Jerseys

Possible points - 32

Average	Class A.	27.8
Average	Class B.	25.5
Ave. 8 best	Class A.	28.6
Ave. 8 poorest	Class A.	27.1
Ave. 8 best	Class B.	28.1
Ave. 8 poorest	Class B.	22.8

Ayrshires

Possible points - 27

Average	Class A.	22.7
Average	Class B.	21.4
Ave. 4 best	Class A.	23.3
Ave. 3 poorest	Class A.	21.9
Ave. 3 best	Class B.	21.3
Ave. 4 poorest	Class B.	21.5

Gurnseys

Possible points - 28

Average	23.9
Average	21.5
Ave. cows 1 & 2	24.4
Ave. cows 3 & 4	22.5
Ave. cows 5 & 6	21.2

The tables show that on the average the scores on the udder and milk veins compare very favorably with the productiveness of the different groups of cows. It will be noticed that with all breeds the cows of Class A on the average scored higher in this respect than did those of Class B. By dividing the cows of each breed into separate groups according to their records and averaging the scores

it was found with the Holsteins that the scores diminish as the productiveness of the individuals diminishes. It will also readily be seen that the 9 highest producing Holsteins have on the average a much higher score than do the 9 poorest. With the Jerseys the scores were not so uniform as with the Holsteins. The tables show that the 8 best cows have on the average a much higher score than do the 8 poorest, but the 8 best of Class B have on the average a little better score than the 8 poorest of Class A. The Ayrshires did not show any more uniformity than did the Jerseys. The 4 best had a higher average score than did the 4 poorest, and the 3 poorest of Class A had a higher average score than did the 3 best of Class B, but the 4 poorest cows of Class B had on the average a little higher score than did the 3 best of Class B. The Gurnseys show much the same uniformity as did the Holsteins. By grouping the cows in sets of twos the scores gradually decline as the productiveness of the individuals diminishes. Dr. H. Attinger found with the cows which he measured that the scores made on the udder and milk indications compared very well on the average with the average production of the animal. Dr. Kronacher found that scores on the udder and milk indications were borne out in all cases.

Scoring in General: It was found by averaging the scores of each cow, scored according to the score card of her breed

that the scores compared quite favorably with the production.

The following is a condensed table of averages of the scores of the different classes and breeds:

Holsteins

Possible score - 100

Average	Class A.	91.4
Average	Class B.	83.6
Ave. 9 best	Class A.	92.6
Ave. 9 poorest	Class A.	90.3
Ave. 9 best	Class B.	86.1
Ave. 9 poorest	Class B.	81.1

Jerseys

Possible score - 100

Average	Class A.	90.8
Average	Class B.	88.1
Ave. 8 best	Class A.	91.7
Ave. 8 poorest	Class A.	90.0
Ave. 8 best	Class B.	92.0
Ave. 8 poorest	Class B.	84.2

Ayrshires

Possible points - 100

Average	Class A.	90.4
Average	Class B.	88.7
Ave. 4 best	Class A.	91.4
Ave. 3 poorest	Class A.	89.0
Ave. 3 best	Class B.	90.1
Ave. 4 poorest	Class B.	87.8

Gurnseys

Possible points - 100

Average	Class A.	89.7
Average	Class B.	88.0
Ave. of cows 1 & 2		90.1
Ave. of cows 3 & 4		88.2
Ave. of cows 5 & 6		88.3

The table shows that on the average the scores compare quite favorably with the production of the different classes of the different breeds. It will be seen from the table that the cows in Class A of the Holsteins have on the average higher scores than those of Class B. The same thing is found to be the case with all the breeds; however, with the Holsteins there is a greater difference in this respect than there is with any of the other breeds. The Holsteins show that by grouping the cows in sets of nine the best nine

have the highest average score, while the other sets of nine have a lower score according to their records. The tables show that the 8 best cows of the Jerseys have on the average a higher score than do the 8 poorest; however, the 8 best cows of Class B have on the average a higher score than have the 8 poorest cows of Class A. This same thing was shown with the Jerseys in averaging the scores on the udder and milk veins. With the Ayrshires the table shows that the 4 best have a higher score than the 4 poorest, the scores however, are not any more consistent than they were with the Jerseys, for the 3 best cows of Class B have on the average a higher score than the 3 poorest of Class A. The scores on the Gurnseys do not show a great deal of variation. The 2 best cows have on the average a little higher score than the poorest 2, but the cows 5 & 6 have a trifle higher average score than the cows 3 & 4. The main trouble with the score cards is that the scores do not show variation enough. As stated above, it is quite possible that the cows were all scored a little too high; however, every effort was made to make the scores as consistent as possible; so, if they should be a little too high, they are comparable.

SUMMARY

1. Of all the cows measured the heavier animals were on the average the higher producers irrespective of breed.
2. The best producers are on the average the taller cows. Of the 112 cows measured, 6 were lower at the hips than at the withers, and 7 were of equal height at both hips and withers. All the rest of the cows were higher at the hips than at the withers. In regard to the variation between these two points much depends upon breed characteristics.
3. The width of hips and the width of thurls are of importance; however, the proportion of width of thurls to width of hips depends a great deal upon the breed.
4. With the exception of the Ayrshires, the higher producing cows had on the average longer backs than the poorer cows.
5. Of all the cows measured the higher producers have on the average the longer rumps.
6. Capacity is the principal thing to consider with the chest and barrel, and of special significance is depth in this connection. While width is not as important as depth, the results of this investigation show that with the cows measured the best producting animals have the greatest width in proportion to depth. Deep narrow chests are found to be very common among the good producers.

7. The width of the loin is no indication of the productive capacity of a cow.
8. As to the shape of the head, much depends upon breed characteristics; however, with the animals measured, a long, narrow head was found to be more common among the higher producers.
9. A large muzzle was found more prevalent among the better producers than among the poorer ones.
10. The best producing animals have a tendency to longer necks than the poorer producers.
11. From shoulder to ischium is of no importance.
12. The best producers of the Holsteins measured have on the average the largest "hunger hollow", while the opposite was found to be the case with the Jerseys.
13. The size of the shin bone is of no importance.
14. The data shows that with the cows measured the udder and mammary system are the most important indications of a good dairy cow. The data shows that capacity is the thing to consider in this connection, and particularly as to depth and length. An unbalanced udder cannot be considered as a serious drawback if it has capacity.
15. Next in importance to the udder come the milk veins. Nothing is to be gained by having the veins run far forward before entering the abdomen. The most important things to consider in connection with the milk veins

are to have them large in diameter, very tortuous and entering as many large wells as possible. As a general rule the right vein is larger than the left among the higher producers.

16. The size of the milk wells are also good indications of the productiveness of a good dairy cow. Large milk wells are found more commonly among the better producers than among the poorer ones. A large milk well is not always associated with a large vein.

17. On the average scoring compares quite favorably with production; however, many of the poorer cows were high scoring animals. The scores on the udder and milk veins also show up quite favorably.

CONCLUSIONS

As a final conclusion to be reached from what has been set forth in this investigation, type and conformation do have a relation to production. Some of the points of conformation are of very great importance, while others have little or no relation to production.

It would be a hard matter to state in actual figures just how large a cow should be, or how much a cow should weigh for the reason that a heavy cow is not always of the best dairy type. However, of two cows of the same breed and the same type and conformation, the larger one of the two is almost sure to be the better producer.

The type of cow best suited for high production is the large cow with great capacity in the chest and barrel; especially important is depth in these regions. A long neck is also to be desired for the reason that it adds capacity to the barrel of the cow. A cow should be wide in the regions of the hips and thurls and have a long rump. The udder and mammary system are the most important indications of a good dairy cow and too much stress cannot be laid on these points. The udder should show capacity especially as to length and depth. The veins should be large, tortuous and branching, entering as many large wells as possible.

No one point of conformation alone can serve as a sure guide to the productive capacity of a cow. However,

by taking all the different points of conformation discussed in this work one should be able to estimate the value of a cow with a great deal of accuracy.

While scoring in general compares quite favorably with production the score cards do not show the wide variation that they should. The data in this investigation shows that the more important points of conformation are as important with one breed as another. With these more important points of conformation there can be no logical reason for the wide diferences of the value of these points as allowed by the different score cards. If the udder is worth 28 points with one breed, it should be worth as much to the other breeds. And all of the other important points should be valued the same with all breeds. The more important points should be allowed a large number of points while the less important points should bear little or no weight with the score card.

REMARKS

The author regrets that so few animals were available for this work, and that the cows measured have such a wide variation as to age. However, the fact that there was a wide variation as to productiveness made the results more out-standing than if all cows could have been classes as good producers.

The author suggests that this work be continued. That a definite method of taking measurements be adopted and the work carried on where every opportunity will permit. If the work could be carried on in co-operation with the various colleges and the Government and cow testing associations under the direction of a competent superintendent, there is no doubt but that sufficient data could be obtained to draw some very reliable conclusions.

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Professor L. Larsen, Professor of Dairy Husbandry, South Dakota State College.

Key to Cows Measured.

Missouri Herd

Holsteins		Jerseys		Ayrshires	
Reference Number	Herd Book Number	Reference Number	Herd Book Number	Reference Number	Herd Book Number
3	209	1	16	5	301
4	211	2	124	7	305
5	210	3	50	8	303
18	208	4	41	13	306
19	223	5	27		
22	220	6	54		
26	215	7	19		
27	219	9	317		
31	221	11	10		
33	226	14	3		
34	213	19	59		
35	222	26	57		
36	225	28	11		
37	218	29	17		
		31	2		
		32	8		

Kansas Herd

Holsteins		Jerseys		Ayrshires	
1	Maid Henry	12	Owl's Design	1	College Maude
16	College Josephine	27	Cleara	3	Canary
17	2	30	Grace Briggs	4	Bangara
20	12			6	Elizabeth
23	8			9	Johanna
24	18	**Gurnseys**		10	Fear Not
25	35			11	College Maude II.
28	13	2	Bernice	12	Rose of Oakdale
29	7	3	23		
30	5	4	34		
32	36	5	Glenwood		
		6	Frances		

Nebraska Herd

Holsteins

Reference Number	Herd Book Number
2	La May
8	Yeta
12	Merry Eyes
13	Quincey
21	Katy

Jerseys

Reference Number	Herd Book Number
10	Edith
13	Tilda
17	Brownie
20	Bove
21	Ona
22	Ursa
23	Gold

Ayrshires

Reference Number	Herd Book Number
14	Letta

Gurnseys

Reference Number	Herd Book Number
1	Cherry

South Dakota Herd

Holsteins

Reference Number	Herd Book Number
6	4
7	3
9	9
10	7
11	8
14	10
15	5

Jerseys

Reference Number	Herd Book Number
8	57
15	56
16	53
18	55
24	59
25	54

Cows Measured by Professor Eckles

Holsteins

1	207
2	204
3	206
4	205
5	214
6	216

Jerseys

1	1
2	16
3	34
4	43

Jerseys

5	4
6	51
7	63
8	32
9	20
10	6
11	44
12	99
13	35
14	48
15	47
16	55
17	62
18	39

HOLSTEINS

TABLE I.

Number		1	2	3	4	5	6
Weight		1577	1325	1300	1275	1320	1180
Age		12-9	10	8-11	7-10	7-10	8-8
Age first calving		----	2	2-5	3	3-1	4-11
Days since calving		379	324	410	16	231	70
Days since bred		109	91	144	---	---	4
Height of withers		146.5	142.5	140	130	139	135
Height of hips		146.5	144	144	133	144	137
Width of hips		66	61.5	56	53	56.5	59
Width of thurls		56	53	54.5	51	56.5	52.5
Length of rump		53	54	50	51	52	51
Length of back		98	98	90	95	104	92
Circ. of chest		220	198	197	184	199	189
Circ. of barrel		260	248	234	225	232	218
Depth of chest		71	80	76	73	78	75.5
Depth of barrel		74	84	81	76	77	75
Width of chest		54	46	44	44	44	44.5
Width of barrel		77	71	67.5	68	68	64.5
Length of udder		66	59	53	58	47	50.5
Width of udder		31	28	25	35	24	27
Depth of udder		41	42	35	36	30	40
Udder to first well	R	37	37	46	46	40	45
	L	35	40	43	49	50	38
Length of veins	R	49*	47*	61	64*	48*	50
	L	48	48	69	58	56	48
Diam. of veins	R	3	3.5	2.6	2.6	2.2	2.75
	L	2.8	3.1	3.0	2.7	2.4	2.75
Diam. of wells	R	1.2	1.3	1.0	1.0	0.8	0.70
	L	1.1	1.1	1.1	0.9	0.9	0.80
Record of milk		19712	19161	20148	17694	15686	13823
Record of B.F.		717.9	665.1	642.7	519	490.5	488.4
Average test		3.64	3.33	3.19	2.85	3.12	3.53
Score		94.4	93.4	94.4	96.3	91.1	92.2

HOLSTEINS

TABLE I.(Continued)

Number		7	8	9	10	11	12
Weight		1400	1210	1300	1400	1400	1450
Age		9-4	6-11	4-2	6-6	5-10	5-4
Age first calving		---	2-2	2-8	2-2	2	2-7
Days since calving		231	276	23	231	200	281
Days since bred		123	151	---	174	160	135
Height of withers		133	138	139	143	138	135
Height of hips		133.5	142	142.5	145	138	137
Width of hips		60	60	59	64	59	58
Width of thurls		54	55	55	58	53.5	54
Length of rump		52	52	54.5	55	54	53
Length of back		96	93	97	97	96	92
Circ. of chest		204	200	200	201	197	207
Circ. of barrel		245	238	229	237	236	249
Depth of chest		78	75.5	78	78	79	76
Depth of barrel		83	79	78	78	79	80
Width of chest		53	54.5	46	49	49.5	54
Width of barrel		74.5	71	67	73	73.5	80
Length of udder		47	44	55.5	45	45	46.5
Width of udder		25	30	37.5	22.5	25	30
Depth of udder		42	38	29	38	30	34
Udder to first well	R	46	42	28	50	48	45
	L	37	39	46	38	48	48
Length of veins	R	53*	53	37	52	48	48
	L	42	48	54	42	48	50
Diam. of veins	R	2.8	2.15	2.5	2.5	2.3	2.8
	L	3.3	1.3	2.6	1.7	2.7	2.2
Diam. of wells	R	1.1	1.0	0.9	1.1	1.0	0.9
	L	1.0	1.0	0.7	1.0	0.9	0.9
Record of milk		13700	14746	13917	12698	13755	12979
Record of B.F.		479.3	476.2	468.6	456.4	446.9	446.4
Average test		3.50	3.23	3.37	3.59	3.24	3.44
Score		91.2	92.8	88.2	94.5	89.8	86.5

TABLE I. (Continued)

HOLSTEINS

		13	14	15	16	17	18
Number		13	14	15	16	17	18
Weight		1320	1350	1375	1253	1094	1350
Age		6-9	4-1	8-8	7-9	7	5-3
Age first calving		2	2-8	4-7	----	----	2
Days since calving		327	15	338	15	311	280
Days since bred		69	---	52	----	----	44
Height at withers		140	142	136	133.5	128	140.5
Height at hips		143	146	136.5	135	132.5	142.5
Width of hips		59	60	62.5	58	57.5	56.5
Width of thurls		54	56	55.5	52	50.5	52.5
Length of rump		52	53	52.5	50	51	50.5
Length of back		93	97	97	93	95	97
Circ. of chest		200	200	197	196	196	197
Circ. of barrel		245	230	228	230	228	238
Depth of chest		76	80	75	75	73.5	76.5
Width of barrel		78	78	75.5	78	75	78.5
Width of chest		49	48	54	54	51	48
Width of barrel		78	68	71	55.5	77	71
Length of udder		43	53	40	53.5	44	42.5
Width of udder		34	35.5	23.5	35	25.5	28.5
Depth of udder		33	33	37	30	24	26
Udder to first well	R	43	33	46	37	42	54
	L	42	40	46	38	40	58
Length of veins	R	49*	34	48	53	46	60*
	L	45	42	46	46	44	66
Diam. of veins	R	2.5	2.2	2.4	2.0	1.7	2.4
	L	2.2	2.25	2.1	2.1	1.7	2.5
Diam. of wells	R	.8	.8	1.1	.7	.7	1.0
	L	.8	1.0	1.0	.8	.7	1.0
Record of milk		13797	12765	12572	10185	10465	10499
Record of B.F.		444.2	438.8	428.9	385.7	379.8	347.6
Average test		3.22	3.41	3.41	3.78	3.63	3.31
Score		90.2	94.4	89.4	91.4	92.7	87.7

TABLE I. (Continued)

HOLSTEINS

Number		19	20	21	22	23	24
Weight		1150	1000	1210	1100	1257	1065
Age		3-4	7	5-8	4-8	7	7
Age first calving		2-6	----	2-5	2-10	----	----
Days since calving		58	106	34	293	152	135
Days since bred		---	----	---	198	12	23
Height of withers		133	126	140	138	134	129.5
Height of hips		136	131	140	138	137	134
Width of hips		56	53	58	54.5	57.5	56
Width of thurls		53	46.5	51	48	51.5	49
Length of rump		50.5	50	49.5	53	54	49
Length of back		94	88	94	91	88	92
Circ. of chest		191	180	200	190	191	189
Circ. of barrel		225	234	247	217	231	226
Depth of chest		75	69	76	75	71.5	70
Depth of barrel		77	75.5	80	75	75	74
Width of chest		48	42	54	44.5	48	46
Width of barrel		64.5	78.5	78	59	67	62
Length of udder		42	43	52.5	35	57	45
Width of udder		30.5	27.5	35.5	24	31	28
Depth of udder		31	25	35	23	26	29
Udder to first well	R	42	44	39	43	36	35
	L	41	44	35	46	43	46
Length of veins	R	50*	53	50*	43	45	44
	L	52	48	46	49	48	48
Diam. of veins	R	1.9	2.0	3.25	1.7	1.9	1.7
	L	1.75	1.95	2.7	2.05	2.3	1.25
Diam. of wells	R	.9	.7	.9	.5	.7	1.0
	L	1.0	.8	1.0	.5	.8	1.0
Record of milk		11420	8779	14552	9040	8677	7644
Record of B.F.		341.5	334.8	334.4	297.4	291.2	270.9
Average test		3.86	3.72	2.99	3.27	3.36	3.54
Score		89.8	84.7	95.1	79.6	92.2	93.2

TABLE I. (Continued)

HOLSTEINS

Number	25	26	27	28	29	30
Weight	1016	1107	1060	1088	1187	1025
Age	4	5-8	4-9	7	7	7
Age first calving	----	2-7	3	----	----	----
Days since calving	73	161	306	358	75	205
Days since bred	----	----	200	----	2	22
Height of withers	128	136	136.5	122.5	131	119
Height at hips	130	139	128.5	125.5	137	121
Width of hips	54	56	53.5	54.5	55.5	53
Width of thurls	48.5	52	48	48	49.5	46.5
Length of rump	49	50.5	48	46.5	53	47
Length of back	86	94	89	95	94	88
Circ. of chest	183	185	178	188	192	186
Circ. of barrel	211	220	225	232	240	223
Depth of chest	69	71.5	68.5	79.5	73	70
Depth of barrel	70	72	71.5	76	82	72.5
Width of chest	45	46	46	46.5	48.5	46.5
Width of barrel	62	71.5	73	79	70	77.5
Length of udder	38	33.5	35	35	47	39
Width of udder	26	22.5	22	19	31	25
Depth of udder	22	23	20	20	26	22
Udder to first well	R 31	51	46	45	41	39
	L 38	50	53	40	44	48
Length of veins	R 31*	51*	46	48	50	43
	L 38	54	53	46	55	54
Diam. of veins	R1.55	2.0	1.35	1.8	2.3	1.65
	L1.35	1.65	1.8	1.7	2.15	1.75
Diam. of wells	R .6	1.0	.5	.8	1.0	.8
	L .6	.9	.7	.8	.9	.9
Record of milk	7717	7811	8136	6113	6834	6778
Record of B.F.	265.7	262.1	251.4	241.7	235.7	234.2
Average test	3.44	3.10	3.09	3.95	3.45	3.46
Score	81.6	78.6	79.9	84.7	89.9	87.8

TABLE I. (Continued)

HOLSTEINS

Number		31	32	33	34	35	36
Weight		1105	1036	1010	1210	992	930
Age		4-4	4	3-4	6-8	4-5	3-4
Age first calving		2-10	----	2-6	2	2-9	1-7
Days since calving		150	141	269	281	120	151
Days since bred		34	27	171	178	74	---
Height at withers		139.5	133.5	129	134	129	131
Height at hips		141	137	133	145	131.5	134.5
Width of hips		54.5	53	51	59	53	49.5
Width of thurls		50	48.5	50	50.5	49	49.5
Length of rump		51.5	47	46	49.5	46.5	47.5
Length of back		97	86	88	96	89	87
Circ. of chest		189	182	181	192	177	171
Circ. of barrel		214	224	220	225	218	196
Depth of chest		73	68	71	74	69	67
Depth of barrel		73.5	69	73	73	71	66
Width of chest		47.5	44	45	48	43	41.5
Width of barrel		62	78.5	68	67	69	58.5
Length of udder		36	44.5	35	39	29.5	28.5
Width of udder		25.5	25.5	19	26	25.5	21
Depth of udder		26	24	14	30	27	19
Udder to first well	R	41	45	45	43	51	48
	L	40	42	43	42	49	40
Length of veins	R	41	50	46	59	55	48
	L	41	49	51	59	51	40
Diam. of veins	R	1.6	1.75	1.4	2.0	1.4	1.4
	L	1.25	2.05	1.6	1.65	1.2	1.3
Diam. of wells	R	.5	.7	.6	.8	1.0	.6
	L	.8	.7	.7	.9	1.0	.5
Record of milk		5901	5998	6059	3397	4963	4863
Record of B.F.		211.9	195.3	192.6	162.7	158.5	151.4
Average test		3.59	3.24	3.18	4.77	3.19	3.11
Score		81.2	83.3	75.2	85.9	79.1	73.4

TABLE 2

HOLSTEINS

Height at Withers

Height	No.	Milk	Fat	%Fat
146.5	1	19712	717.9	3.64
143.0	10	12698	456.4	3.59
142.5	2	19161	665.1	3.33
142	14	12765	438.8	3.41
140.5	18	10499	347.6	3.31
140	3	20148	642.7	3.19
140	13	13797	444.2	3.22
140	21	14552	334.4	2.99
139.5	31	5901	211.9	3.59
139	5	15686	490.5	3.12
139	9	13917	468.6	3.37
138	8	14746	476.2	3.23
138	11	13755	446.9	3.24
138	22	9040	297.4	3.27
136	15	12572	428.9	3.41
136	26	7811	262.1	3.10
135	6	13823	488.4	3.53
135	12	12979	446.4	3.44
134	23	8677	291.2	3.36
134	34	3397	162.7	4.77
133.5	16	10185	385.7	3.78
133.5	32	5998	195.3	3.24
133	7	13700	479.3	3.50
133	19	11420	341.5	3.86
130	4	17694	519	2.85
130	29	6834	235.7	3.45
130	36	4863	151.4	3.11
129.5	24	7644	270.9	3.54
129	33	6059	192.6	3.18
129	35	4963	158.5	3.19
128	17	10465	379.8	3.63
128	25	7717	265.7	3.44
126.5	27	8136	251.4	3.09
126	20	8779	334.8	3.72
122.5	28	6113	241.7	3.95
119	30	6778	234.2	3.46

TABLE 3.

Height at Hips

Height	No.	Milk	Fat	%Fat
146.5	1	19712	717.9	3.64
146.0	14	12765	438.8	3.41
145.0	10	12698	456.4	3.59
145	34	3397	162.7	4.77
144	2	19161	665.1	3.33
144	3	20148	642.7	3.19
144	5	15686	490.5	3.12
143	13	13797	444.2	3.22
142.5	9	13917	468.6	3.37
142.5	18	10499	347.6	3.31
142	8	14746	476.2	3.23
141	31	5901	211.9	3.59
140	21	14552	334.4	2.99
139	26	7811	262.1	3.10
138	11	13755	446.9	3.24
138	22	9040	297.4	3.27
137	6	13823	488.4	3.53
137	12	12979	446.4	3.44
137	23	8677	291.2	3.36
137	29	6834	235.7	3.45
137	32	5998	195.3	3.24
136.5	15	12572	428.9	3.41
136	19	11420	341.5	3.86
135	16	10185	385.7	3.78
134.5	36	4863	151.4	3.11
134	24	7644	270.9	3.54
133.5	7	13700	479.3	3.50
133	4	17694	519	2.85
133	33	6059	192.6	3.18
132.5	17	10465	379.8	3.63
131.5	35	4963	158.5	3.19
131	20	8779	334.8	3.72
130	25	7717	265.7	3.44
128.5	27	8136	251.4	3.09
125.5	28	6113	241.7	3.95
121	30	6778	234.2	3.46

HOLSTEINS

TABLE 4

Length of Back

Length	No.	Milk	Fat	%Fat
104	5	15686	490.5	3.12
98	1	19712	717.9	3.64
98	2	19161	665.1	3.33
97	9	13917	468.6	3.37
97	10	12698	456.4	3.59
97	14	12765	438.3	3.41
97	15	12572	428.9	3.41
97	18	10499	347.6	3.31
97	31	5901	211.9	3.59
96	7	13700	479.3	3.50
96	11	13755	446.9	3.24
96	34	3397	162.7	4.77
95	4	17694	519	2.95
95	17	10465	379.8	3.63
95	28	6113	241.7	3.95
94	19	11420	341.5	3.86
94	21	14552	334.4	2.99
94	26	7811	262.1	3.10
94	29	6834	235.7	3.45
93	8	14746	476.2	3.23
93	13	13797	444.2	3.22
93	16	10185	385.7	3.78
92	6	13823	488.4	3.53
92	12	12979	446.4	3.44
92	24	7644	270.9	3.54
91	22	9040	297.4	3.27
90	3	20148	642.7	3.19
89	27	8136	251.4	3.09
89	35	4963	158.5	3.19
88	20	8779	334.8	3.72
88	23	8677	291.2	3.36
88	30	6778	234.2	3.46
88	33	6059	192.6	3.18
87	36	4863	151.4	3.11
86	25	7717	265.7	3.44
86	32	5998	195.3	3.24

TABLE 5

Width of Hips

Width	No.	Milk	Fat	%Fat
66	1	19712	717.9	3.64
64	10	12698	456.4	3.59
62.5	15	12572	428.9	3.41
61.5	2	19161	665.1	3.33
60	7	13700	479.3	3.50
60	8	14746	476.2	3.23
60	14	12765	438.8	3.41
59	6	13823	488.4	3.53
59	9	13917	468.6	3.37
59	11	13755	446.9	3.23
59	13	13797	444.2	3.22
59	34	3397	162.7	4.77
58	12	12979	446.4	3.44
58	16	10185	385.7	3.78
58	21	14552	334.4	2.99
57.5	17	10465	379.8	3.63
57.5	23	8677	291.2	3.36
56.5	5	15686	490.5	3.12
56.5	18	10499	347.6	3.31
56	3	20148	642.7	3.19
56	19	11420	341.5	3.86
56	24	7644	270.9	3.54
56	26	7811	262.1	3.10
55.5	29	6834	235.7	3.45
54.5	22	9040	297.4	3.27
54.5	28	6113	241.7	3.95
54.5	31	5901	211.9	3.59
54	25	7717	265.7	3.44
53.5	27	8136	251.4	3.09
53	4	17694	519	2.85
53	20	8779	334.8	3.72
53	30	6778	234.2	3.46
53	32	5998	195.3	3.24
53	35	4963	158.5	3.19
51	33	6059	192.6	3.18
49.5	36	4863	151.4	3.11

TABLE 6

HOLSTEINS

Width of Thurls

Width	No.	Milk	Fat	%Fat
58	10	12698	456.4	3.59
56.5	5	15686	590.5	3.12
56	1	19712	717.9	3.64
56	14	12765	338.8	3.41
55.5	15	12572	428.9	3.41
55	8	14746	476.2	3.23
55	9	13917	468.6	3.33
54.5	3	20148	642.7	3.19
54	7	13700	479.3	3.50
54	12	12979	446.4	3.44
54	13	13797	444.2	3.22
53.5	11	13755	446.9	3.24
53	2	19161	665.1	3.33
53	19	11420	341.5	3.86
52.5	6	13823	488.4	3.53
52.5	18	10499	347.6	3.31
52	16	10185	385.7	3.78
52	26	7811	262.1	3.10
51.5	23	8677	291.2	3.36
51	4	17694	519	2.85
51	21	14552	334.4	2.99
50.5	17	10465	379.8	3.63
50.5	34	3397	162.7	4.77
50	31	5901	211.9	3.59
50	33	6059	192.6	3.18
49.5	29	6834	235.7	3.45
49.5	36	4563	151.4	3.11
49	24	7644	270.9	3.54
49	35	4963	158.5	3.19
48.5	25	7717	265.7	3.44
48.5	32	5998	195.3	3.24
48	27	8136	251.4	3.09
48	28	6113	241.7	3.95
48	22	9040	297.4	3.27
46.5	20	8779	334.8	3.72
46.5	30	6778	234.2	3.46

TABLE 7.

Length of Rump

Length	No.	Milk	Fat	%Fat
55	10	12698	456.4	3.59
54.5	9	13917	468.6	3.33
54	2	19161	665.1	3.33
54	11	13755	446.9	3.24
54	23	8677	291.2	3.36
53	1	19712	717.9	3.64
53	12	12979	446.4	3.44
53	14	12765	438.8	3.41
53	22	9040	297.4	3.27
53	29	6834	235.7	3.45
52.5	15	12572	428.9	3.41
52	5	15686	490.5	3.12
52	7	13700	479.3	3.50
52	8	14746	476.2	3.23
52	13	13797	444.2	3.22
51.5	31	5901	211.9	3.59
51	4	17694	519	2.85
51	6	13823	488.4	3.53
51	17	10465	379.8	3.63
50.5	18	10499	347.6	3.31
50.5	19	11420	341.5	3.86
50.5	26	7811	262.1	3.10
50	3	20148	642.7	3.19
50	16	10185	385.7	3.78
50	20	8779	334.8	3.72
49.5	21	14552	334.4	2.99
49.5	34	3397	162.7	4.77
49	24	7644	270.9	3.54
49	25	7717	265.7	3.44
48	27	8136	251.4	3.09
47.5	36	4863	151.4	3.11
47	30	6778	234.2	3.46
47	32	5998	195.3	3.24
46.5	28	6113	241.7	3.95
46.5	35	4963	158.5	3.19
46	33	6059	192.6	3.18

HOLSTEINS

TABLE 8.

Cir. of Chest

Cir.	No.	Milk	Fat	%Fat
220	1	19712	717.9	3.64
207	12	12979	446.4	3.44
204	7	13700	479.3	3.50
201	10	12698	456.4	3.59
200	8	14746	476.2	3.23
200	9	13917	468.6	3.37
200	13	13797	444.2	3.22
200	14	12765	438.8	3.41
200	21	14552	334.4	2.99
198	2	19161	665.1	3.33
197	3	20148	642.7	3.19
197	11	13755	446.9	3.24
197	15	12572	428.9	3.41
197	18	10499	347.6	3.31
196	16	10185	385.7	3.78
196	17	10465	379.8	3.63
192	29	6834	235.7	3.45
192	34	3397	162.7	4.77
191	19	11420	341.5	3.86
191	23	8677	291.2	3.36
190	22	9040	297.4	3.27
189	5	15686	490.5	3.12
189	6	13823	488.4	3.53
189	24	7644	270.9	3.54
189	31	5901	211.9	3.59
188	28	6113	241.7	3.95
188	30	6778	234.2	3.46
185	26	7811	262.1	3.10
184	4	17694	519	2.85
183	25	7717	265.7	3.44
182	32	5998	195.3	3.24
181	33	6059	192.6	3.18
180	20	8779	334.8	3.72
178	27	8136	251.4	3.09
177	35	4963	158.5	3.19
171	36	4863	151.4	3.11

TABLE 9.

Cir. of Barrel

Cir.	No.	Milk	Fat	%Fat
260	1	19712	717.9	3.64
249	12	12979	446.4	3.44
248	2	19161	665.1	3.33
247	21	14552	334.4	2.99
245	7	13700	479.3	3.50
245	13	13797	444.2	3.22
240	29	6834	235.7	3.45
238	8	14746	476.2	3.23
238	18	10499	347.6	3.31
237	10	12698	456.4	3.59
236	11	13755	446.9	3.24
234	3	20148	642.7	3.19
234	20	8779	334.8	3.72
232	5	15686	490.6	3.12
232	28	6113	241.7	3.95
231	23	8677	291.2	3.36
230	14	12765	438.8	3.14
230	16	10185	385.7	3.78
229	9	13917	468.6	3.37
228	15	12572	428.9	3.41
228	17	10465	379.8	3.65
226	24	7644	270.9	3.54
225	4	17694	519	2.85
225	19	11420	341.5	3.86
225	27	8136	251.4	3.09
225	34	3397	162.7	4.77
224	32	5998	195.3	3.24
223	30	6778	234.2	3.46
220	26	7811	262.1	3.10
220	33	6059	192.6	3.18
218	6	13823	488.4	3.53
218	35	4963	151.5	3.19
217	22	9040	297.4	3.27
214	31	5901	211.9	3.59
211	25	7717	265.7	3.44
198	36	4863	151.4	3.11

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TABLE 10.

Depth of Chest

Depth	No.	Milk	Fat	%Fat
80	2	19161	665.1	3.33
80	14	12765	438.8	3.14
79.5	28	6113	241.7	3.95
79	11	13755	446.9	3.24
78	5	15686	490.5	3.12
78	7	13700	479.3	3.50
78	9	13917	468.6	3.37
78	10	12698	456.4	3.59
76.5	18	10499	347.6	3.31
76	3	20148	642.7	3.19
76	12	12979	446.4	3.44
76	13	13797	444.2	3.22
76	21	14552	334.4	2.99
75.5	6	13823	488.4	3.53
75.5	8	14746	476.2	3.23
75	15	12572	428.9	3.41
75	16	10185	385.7	3.78
75	19	11420	341.5	3.86
75	22	9040	297.4	3.27
74	34	3397	162.7	4.77
73.5	17	10465	379.8	3.66
73	4	17694	519	2.85
73	29	6834	235.7	3.45
73	31	5901	211.9	3.59
71.5	23	8677	291.2	3.36
71.5	26	7811	262.1	3.10
71	1	19712	717.9	2.64
71	33	6059	192.6	3.18
70	24	7644	270.9	3.54
70	30	6778	234.2	3.46
69	20	8779	334.8	3.72
69	25	7717	265.7	3.44
69	35	4963	158.5	3.19
68.5	27	8136	251.4	3.09
68	32	5998	195.3	3.24
67	36	4863	151.4	3.11

TABLE 11.

Depth of Barrel

Depth	No.	Milk	Fat	%Fat
84	2	19161	665.1	3.33
83	7	13700	479.3	3.50
82	29	6834	235.7	3.45
81	3	20148	642.7	3.19
80	12	12979	446.4	3.44
80	21	14552	334.4	2.99
79	8	14746	476.2	3.23
79	11	13755	446.9	3.24
78.5	18	10499	347.6	3.31
78	9	13917	468.6	3.37
78	10	12698	456.4	3.59
78	13	13797	444.2	3.22
78	14	12765	438.8	3.41
78	16	10185	385.7	3.78
77	5	15686	490.5	3.12
77	19	11420	341.5	3.86
76	4	17694	519	2.85
76	28	6113	241.7	3.95
75.5	15	12572	428.9	3.41
75.5	20	8779	334.8	3.72
75	6	13823	488.4	3.53
75	17	10465	379.8	3.63
75	22	9040	297.4	3.27
75	23	8677	291.2	3.36
74	1	19712	717.9	3.64
74	24	7644	270.9	3.54
73.5	31	5901	211.9	3.59
73	33	6059	192.6	3.18
73	34	3397	162.7	4.77
72.5	30	6778	234.2	3.46
72	26	7811	262.1	3.10
71.5	27	8136	251.4	3.09
71	35	4963	158.5	3.19
70	25	7717	265.7	3.44
69	32	5998	195.3	3.24
66	36	4863	151.4	3.11

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TABLE 12.

Width of Chest

Width	No.	Milk	Fat	%Fat
54.5	8	14746	476.2	3.23
54	1	19712	717.9	3.64
54	12	12979	446.4	3.44
54	15	12572	428.9	3.41
54	16	10185	385.7	3.78
54	21	14552	334.4	2.99
53	7	13700	479.3	3.50
51	17	10465	379.8	3.63
49.5	11	13755	446.9	3.24
49	10	12698	456.4	3.59
49	13	13797	444.2	3.22
48.5	29	6834	235.7	3.45
48	14	12765	438.8	3.41
48	18	10499	347.6	3.31
48	19	11420	341.5	3.86
48	23	8677	291.2	3.36
48	34	3397	162.7	4.77
47.5	31	5901	211.9	3.59
46.5	28	6113	241.7	3.95
46.5	30	6778	234.2	3.46
46	2	19161	665.1	3.33
46	9	13917	468.6	3.37
46	24	7644	270.9	3.54
46	26	7811	262.1	3.10
46	27	8136	251.4	3.09
45	25	7717	265.7	3.44
45	33	6059	192.6	3.18
44.5	6	13823	488.4	3.53
44.5	22	9040	297.4	3.27
44	3	20148	642.7	3.19
44	4	17694	519	2.85
44	5	15686	490.5	3.12
44	32	5998	195.3	3.24
43	35	4963	158.5	3.19
42	20	8779	334.8	3.72
41.5	36	4863	151.4	3.11

TABLE 13.

Width of Barrel

Width	No.	Milk	Fat	%Fat
80	12	12979	446.4	3.44
79	28	6113	241.7	3.95
78.5	20	8779	334.8	3.72
78.5	32	5998	195.3	3.24
78.0	13	13979	444.2	3.22
78	21	14552	334.4	2.99
77.5	30	6778	234.2	3.46
77.0	1	19712	717.9	3.64
77	17	10465	379.8	3.65
74.5	7	13700	479.3	3.50
73.5	11	13755	446.9	3.24
73	10	12698	456.4	3.59
73	27	8136	251.4	3.09
71.5	26	7811	262.1	3.10
71.0	2	19161	665.1	3.33
71	8	14746	476.2	3.23
71	15	12572	428.9	3.41
71	18	10499	347.6	3.31
70	29	6834	235.7	3.45
69	35	4963	158.5	3.19
68	4	17694	519	2.86
68	5	15686	490.5	3.12
68	14	12765	438.8	3.41
68	33	6059	192.6	3.18
67.5	3	20148	642.7	3.19
67.0	9	13917	468.6	3.37
67.0	23	8677	291.2	3.36
67	34	3397	162.7	4.77
64.5	6	13823	488.4	3.53
64.5	19	11420	341.5	3.86
62	24	7644	270.9	3.54
62	25	7717	265.7	3.44
62	31	5901	211.9	3.59
59	22	9040	297.4	3.27
58.5	36	4863	151.4	3.11
55.5	16	10185	385.7	3.78

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TABLE 14.

Length of Udder

Length	No.	Milk	Fat	%Fat
66	1	19712	717.9	3.64
59	2	19161	665.1	3.33
58	4	17694	519	2.85
77	23	8677	291.2	3.36
55.5	9	13917	468.6	3.37
55.5	16	10185	385.7	3.78
53	3	20148	642.7	3.19
53	14	12765	438.8	3.41
52.5	21	14552	334.4	2.99
50.5	6	13823	488.4	3.53
47	5	15686	490.5	3.12
47	7	13700	479.3	3.50
47	29	6834	235.7	3.45
46.5	12	12979	446.4	3.44
45	10	12698	456.4	3.59
45	11	13755	446.9	3.24
45	24	7644	270.9	3.54
44.5	32	5998	195.3	3.24
44	8	14746	476.2	2.23
44	17	10465	379.8	3.63
43	13	13797	444.2	3.22
43	20	8779	334.8	3.72
42.5	18	10499	347.6	3.31
42	19	11420	341.5	3.86
40	15	12572	428.9	3.41
39	30	6778	234.2	3.46
39	34	3397	162.7	4.77
38	25	7717	265.7	3.44
36	31	5901	211.9	3.59
35	22	9040	297.4	3.27
35	27	8136	251.4	3.09
35	28	6113	241.7	3.95
35	33	6059	192.6	3.18
33.5	26	7811	262.1	3.10
29.5	35	4963	158.5	3.19
28.5	36	4863	151.4	3.11

TABLE 15.

Width of Udder

Width	No.	Milk	Fat	%Fat
37.5	9	13917	468.6	3.37
35.5	14	12765	438.8	3.41
35.5	21	14552	334.4	2.99
35	4	17694	519	2.85
35	16	10185	385.7	3.78
34	13	13797	444.2	3.22
31	1	19712	717.9	3.64
31	23	8677	291.2	3.36
31	29	6834	235.7	3.45
30.5	19	11420	341.5	3.86
30	8	14746	476.2	2.23
30	12	12979	446.4	3.44
28.5	18	10499	347.6	3.31
28	2	19161	665.1	3.33
28	24	7644	270.9	3.54
27.5	20	8779	334.8	3.72
27	6	13823	488.4	3.53
26	25	7717	265.7	3.44
26	34	3397	162.7	4.77
25.5	31	5901	211.9	3.59
25.5	32	5998	195.3	3.24
25.5	35	4963	158.5	3.19
25	3	20148	642.7	3.19
25	7	13700	479.3	3.50
25	11	13755	446.9	3.24
25	30	6778	234.2	3.46
24	5	15686	490.5	3.12
24	22	9040	297.4	3.27
23.5	15	12572	428.9	3.41
22.5	10	12698	456.4	3.59
22.5	17	10465	379.8	3.63
22.5	26	7811	262.1	3.10
22	27	8136	251.4	3.09
21	36	4863	151.4	3.11
19	28	6113	241.7	3.95
19	33	6059	192.6	3.18

HOLSTEINS

TABLE 16.

Depth of Udder

Depth	No.	Milk	Fat	%Fat
42	2	19161	665.1	3.33
42	7	13700	479.3	3.50
40	1	19712	717.9	3.64
40	6	13823	488.4	3.53
38	8	14746	476.2	2.23
38	10	12698	456.4	3.59
37	15	12572	428.9	3.41
36	4	17694	519	2.85
35	3	20148	642.7	3.19
35	21	14552	334.4	2.99
34	12	12979	446.4	3.44
33	13	13797	444.2	3.22
33	14	12765	338.8	3.41
31	19	11420	341.5	3.86
30	5	15686	490.5	3.12
30	11	13755	446.9	3.24
30	16	10185	385.7	3.78
30	34	3397	162.7	4.77
29	9	13917	468.6	3.37
29	24	7644	270.9	3.54
27	35	4963	158.5	3.19
26	18	10499	347.6	3.31
26	23	8677	291.2	3.36
26	29	6834	235.7	3.45
26	31	5901	211.9	3.59
25	20	8779	334.8	3.72
24	17	10465	379.8	3.63
24	32	5998	195.3	3.24
23	22	9040	297.4	3.27
23	26	7811	262.1	3.10
22	25	7717	265.7	3.44
22	30	6778	234.2	3.46
20	27	8136	251.4	3.09
20	28	6113	241.7	3.95
19	36	4863	151.4	3.11
14	33	6059	192.6	3.18

TABLE 17.

Length of Veins

Length	No.	Milk	Fat	%Fat
65	3	20148	642.7	3.19
63	18	10499	347.6	3.31
61	4	17694	519	2.85
59	34	3397	162.7	4.77
53	35	4963	158.5	3.19
52.5	26	7811	262.1	3.10
52.5	29	6834	235.7	3.45
52	5	15686	490.5	3.12
51	19	11420	341.5	3.86
50.5	8	14746	476.2	3.23
50.5	20	8779	334.8	3.72
49.5	16	10185	385.7	3.78
49.5	27	8136	251.4	3.09
49.5	32	5998	195.3	3.24
49	6	13823	488.4	3.53
49	12	12979	446.4	3.44
48.5	30	6778	234.2	3.46
48.5	1	19712	717.9	3.64
48.5	33	6059	192.6	3.18
48	11	13755	446.9	3.24
48	21	14552	334.4	2.99
47.5	2	19161	665.1	3.33
47.5	7	13700	479.3	3.50
47	10	12698	456.4	3.59
47	13	13797	444.2	3.22
47	15	12572	428.9	3.41
47	28	6113	241.7	3.95
46.5	23	8677	291.2	3.36
46	22	9040	297.4	3.27
46	24	7644	270.9	3.54
45.5	9	13917	468.6	3.37
45	17	10465	379.8	3.63
44	36	4863	151.4	3.11
41	31	5901	211.9	3.59
34.5	25	7717	265.7	3.44
34	14	12765	438.8	3.41

HOLSTEINS

TABLE 18.

Diam. of Veins

Diam.	No.	Milk	Fat	%Fat
3.3	2	19161	665.1	3.33
3.05	7	13700	479.3	3.50
2.97	21	14552	334.4	2.99
2.9	1	19712	717.9	3.64
2.8	3	20148	642.7	3.19
2.75	6	13823	488.4	3.53
2.65	4	17694	519	2.85
2.55	9	13917	468.6	3.37
2.5	11	13755	446.9	3.24
2.5	12	12979	446.4	3.44
2.45	18	10499	347.6	3.31
2.35	13	13797	444.2	3.22
2.3	5	15686	490.5	3.12
2.25	15	12572	428.9	3.41
2.22	14	12765	438.8	3.41
2.22	29	6834	235.7	3.45
2.1	10	12698	456.4	3.59
2.1	23	8677	291.2	3.36
2.05	16	10185	385.7	3.78
1.97	20	8779	334.8	3.72
1.9	32	5998	195.3	3.24
1.82	19	11420	341.5	3.86
1.87	22	9040	297.4	3.27
1.82	26	7811	262.1	3.10
1.82	34	3397	162.7	4.77
1.75	28	6113	241.7	3.95
1.70	17	10465	379.8	3.63
1.70	30	6778	234.2	3.46
1.62	8	14746	476.2	2.23
1.57	27	8136	251.4	3.09
1.50	33	6059	192.6	3.18
1.47	24	7644	270.9	3.54
1.45	25	7717	265.7	3.44
1.42	31	5901	211.9	3.59
1.35	36	4863	151.4	3.11
1.30	35	4963	158.5	3.19

TABLE 19.

Diam. of Wells

Diam.	No.	Milk	Fat	%Fat
1.2	2	19161	665.1	3.33
1.15	1	19712	717.9	3.64
1.05	3	20148	642.7	3.19
1.05	7	13700	479.3	3.50
1.05	10	12698	456.4	3.59
1.05	15	12572	428.9	3.41
1.00	8	14746	476.2	2.23
1.00	18	10499	347.6	3.31
1.00	24	7644	270.9	3.54
1.00	35	4963	158.5	3.19
.95	4	17694	519	2.85
.95	11	13755	446.9	3.24
.95	19	11420	341.5	3.86
.95	21	14552	334.4	2.99
.95	26	7811	262.1	3.10
.95	29	6834	235.7	3.45
.90	12	12979	446.4	3.44
.90	14	12765	438.8	3.41
.85	5	15686	490.5	3.12
.85	30	6778	234.2	3.46
.85	34	3397	162.7	4.77
.80	9	13917	468.6	3.37
.80	13	13797	444.2	3.22
.80	28	6113	241.7	3.95
.75	6	13823	488.4	3.53
.75	16	10185	385.7	3.78
.75	20	8779	334.8	3.72
.75	23	8677	291.2	3.36
.70	17	10465	379.8	3.63
.70	32	5998	195.3	3.24
.65	31	5901	211.9	3.59
.65	33	6059	192.6	3.18
.60	25	7717	265.7	3.44
.60	27	8136	251.4	3.09
.55	36	4863	151.4	3.11
.50	22	9040	297.4	3.27

TABLE 20

HOLSTEINS

Height at Withers	Height	Milk	Fat	%Fat
General average	134.3	10916	365.8	3.35
Average class A.	139.3	13531	448.2	3.31
Average class B.	129.3	8301	282.8	3.40

Height at Hips	Height	Milk	Fat	%Fat
General average	137.2	10916	365.8	3.35
Average class A.	141.9	13021	433.2	3.32
Average class B.	132.5	8811	297.6	3.37

Length of Back	Length	Milk	Fat	%Fat
General average	93.2	10916	365.8	3.35
Average class A.	96.5	12323	410.7	3.33
Average class B.	88.8	9509	320.1	3.36

Width of Hips	Width	Milk	Fat	%Fat
General average	56.8	10916	365.8	3.35
Average class A.	59.6	13142	433.3	3.29
Average class B.	54.0	8688	286.3	3.29

Width of Thurls	Width	Milk	Fat	%Fat
General average	51.7	10916	365.8	3.35
Average class A.	54.2	13854	468.1	3.37
Average class B.	49.2	7978	262.7	3.29

Length of Rump	Length	Milk	Fat	%Fat
General average	50.7	10916	365.8	3.35
Average class A.	52.8	13192	444.6	3.37
Average class B.	48.6	8640	297.4	3.44

Cir. of Chest	Circum.	Milk	Fat	%Fat
General average	192.1	10916	365.8	3.35
Average class A.	199.6	13104	442.1	3.37
Average class B.	184.6	8728	288.8	3.30

TABLE 20 (Continued)

HOLSTEINS

Circ. of Barrel	Circum	Milk	Fat	%Fat
General average	229.9	10916	365.8	3.35
Average class A.	239.2	13043	437.5	3.34
Average class B.	220.6	8788	292.2	3.32

Depth of Chest	Depth	Milk	Fat	%Fat
General average	73.4	10916	365.8	3.35
Average class A.	77.0	13474	445.7	3.30
Average class B.	70.9	8359	285.1	3.41

Depth of Barrel	Depth	Milk	Fat	%Fat
General average	75.6	10916	365.8	3.35
Average class A.	79.0	13369	436.7	3.26
Average class B.	72.2	8352	294.1	3.52

Width of Chest	Width	Milk	Fat	%Fat
General average.	47.6	10916	365.8	3.35
Average class A.	50.6	11592	390.3	3.36
Average class B.	44.6	10220	340.5	3.33

Width of Barrel	Width	Milk	Fat	%Fat
General average	70.0	10916	365.8	3.35
Average class A.	75.1	11792	396.7	3.36
Average class B.	64.9	10040	334.0	3.32

Length of Udder	Length	Milk	Fat	%Fat
General average	44.1	10916	365.8	3.35
Average class A.	50.3	13329	442.9	3.32
Average class B.	37.8	8503	287.9	3.38

TABLE 20 (Continued)

HOLSTEINS

Width of Udder	Width	Milk	Fat	%Fat
General Average	27.2	10916	365.8	3.35
Average class A.	31.1	12494	415.1	3.32
Average class B.	23.4	9338	315.7	3.37

Depth of Udder	Depth	Milk	Fat	%Fat
General average	29.4	10916	365.8	3.35
Average class A.	34.1	14044	459.2	3.27
Average class B.	23.6	7788	266.2	3.41

Length of Veins	Length	Milk	Fat	%Fat
General average	48.9	10916	365.8	3.35
Average class A.	52.9	11088	372.0	3.35
Average class B.	44.9	10744	359.2	3.34

Diam. of Veins	Diam.	Milk	Fat	%Fat
General average	2.11	10916	365.8	3.35
Average class A.	2.55	14056	463.3	3.29
Average class B.	1.67	7778	267.4	3.43

Diam. of Wells	Diam.	Milk	Fat	%Fat
General average	.858	10916	365.8	3.35
Average class A.	1.000	12980	426.0	3.28
Average class B.	.716	8852	304.8	3.44

TABLE 21.

JERSEYS

Number		1	2	3	4	5	6
Weight		850	1000	945	970	910	1020
Age		13-2	15-3	6-6	6-6	10-2	6-3
Age first calving		2	2-5	2-11	2-11	2-4	2-8
Days since calving		43	345	40	54	46	182
Days since bred		---	252	---	---	----	---
Height of withers		115	122	128	123.5	123	124.5
Height of hips		116	125	128.5	124.5	125	129.5
Width of hips		47	50	50	53.5	51.5	53
Width of thurls		40	44	43.5	44.5	43	45
Length of rump		44.5	48.5	50	49.5	48.5	50.5
Length of back		81	84	90	88	89	89
Cir. of chest		170	177	177	176	175	181
Circ. of barrel		216	236	212	218	218	219
Depth of chest		66	68.5	70	68	70	69.5
Depth of barrel		70.5	74	70.5	68	72	71.5
Width of chest		43	46	43	46.5	41.5	47
Width of barrel		66	80	64	69	67.5	67
Length of udder		44	42	46	41.5	41.5	45.5
Width of udder		29	23	35.5	28	27	31
Depth of udder		37	29	28	29	40	25
Udder to first well	R	40	40	39	38	44	44
	L	39	41	41	34	43	38
Length of veins	R	55*	44	47	42	60	47
	L	54	49	48	44	60	40
Diam. of veins	R	2.2	2.5	1.95	2.1	2.5	1.8
	L	2.6	2.7	2.05	2.0	2.35	1.5
Diam. of wells	R	1.0	1.0	.9	1.1	.7	.9
	L	1.1	1.0	1.0	1.0	1.0	.9
Record of milk		12729	13320	10611	10752	10393	10140
Record of B.F.		633.9	625	607.4	567.7	548.8	478.8
Average test		4.98	4.69	5.71	5.28	5.29	4.72
Score		92.7	93.5	93.8	93.2	92.3	92.5

TABLE 21 (Continued)

JERSEYS

		7	8	9	10	11	12
Number		905	1100	775	845	900	1036
Weight		11-2	5-9	15-4	10-10	7-3	7-7
Age		3-4	2-3	2	---	---	---
Age first calving		112	37	147	206	294	269
Days since calving		68	6	29	105	165	100
Days since bred		125.5	121	122.5	125.5	124	124
Height of withers		126	124.5	126.0	129	125	124
Height of hips		53.5	50	50	49	51	53
Width of hips		45	44	44	44.5	43.5	42
Width of thurls		47	48	47	46	48	49
Length of rump		88	84	87	85	85	88
Length of back		183	185	164	167	178	180
Circ. of chest		212	231	197	213	215	225
Circ. of barrel		72	69	67	67	68	60
Depth of chest		70.5	74	70	73	70	63
Depth of barrel		41.5	45	36	37	42.5	45
Width of chest		62.5	74.5	55	65	70	69
Width of barrel		48.5	42	42	46	35	50
Length of udder		21	23.5	24	25	23	28
Width of udder		30	24	37	27	30	23
Depth of udder		R 36	39	38	46	45	42
Udder to first well		L 41	42	36	42	36	47
Length of veins		R 52*	41	48	55	58	49
		L 60	42	48	52	40	62
Diam. of veins		R 2.4	1.85	2.3	2.05	4.25	2.7
		L 2.4	2.00	2.5	1.9	1.8	2.2
Diam. of wells		R 1	.8	1.1	.9	1	.8
		L .7	.9	1	.9	.9	.8
Record of milk		8487	8395	9171	8033	7229	8165
Record of B.F.		470	423.7	406.3	387	346.1	360.6
Average test		5.87	4.81	4.40	4.82	5.04	4.42
Score		84.2	91.3	85.8	93.4	89.5	96.2

TABLE 21. (Continued)

JERSEYS

Number		13	14	15	16	17
Weight		885	795	915	1050	880
Age		3-6	4-10	5-10	15-10	7-7
Age first calving		1-11	3-10	2-5	---	2-11
Days since calving		189	73	31	491	243
Days since bred		105	--	--	203	87
Height at withers		121.5	123.5	119	121.5	126
Height at hips		124	123.5	121	122.5	126
Width of hips		52	47	51.5	52	53
Width of thurls		43	41.5	42.5	45	42
Lenght of rump		49	47	47	48	48.5
Length of back		86	85	85	85	83
Circ. of chest		179	163	174	180	182
Circ. of barrel		214	202	211	227	214
Depth of chest		70	65	67.5	69.5	72.5
Depth of barrel		69	67	68	75	72
Width of chest		43	40.5	43	42	42
Width of barrel		66	64	66	72	64
Length of udder		45	32	47.5	37	42
Width of udder		26	21	28	11	27.5
Depth of udder		27	20	30	26	29
Udder to first well	R	47	43	35	45	34
	L	32	35	40	44	37
Length of veins	R	58*	47	35	48	40
	L	58	40	40	48	45
Diam. of veins	R	1.9	1.45	1.75	2.1	2.1
	L	2.25	1.2	2.1	2.25	2.0
Diam. of wells	R	.8	.7	.9	.8	.7
	L	.9	.6	.9	.9	.8
Record of milk		7108	6885	5779	7555	5976
Record of B.F.		350.3	347	346.1	337.7	329.2
Average test		4.93	3.04	5.99	4.47	5.51
Score		85.6	85.2	92.4	92.1	91.0

TABLE 21. (Continued)

JERSEYS

Number		18	19	20	21	22
Weight		1075	880	820	835	860
Age		5-10	6-1	14-2	12-6	3-6
Age first calving		1-5	2-1	----	----	2
Days since calving		32	222	158	239	61
Days since bred		10	---	64	107	---
Height at withers		121.5	125	117	120	125.5
Height at hips		126.5	126	120	121	126
Width of hips		56	51	51	51	51.5
Width of thurls		46	42.5	42	43	44
Length of rump		47.5	47.5	48	46	49.5
Length of back		88	88	86	81	82
Circ. of chest		183	171	175	166	173
Circ. of barrel		226	202	230	209	208
Depth of chest		72	67	78.5	65	69
Depth of barrel		73	66	73	69	88.5
Width of chest		44	44	46.5	44	40
Width of barrel		69.5	63	76.5	68	62.5
Length of udder		47	42	39	42	40
Width of udder		27	25.5	23.5	27	29
Depth of udder		30	25	29	33	25
Udder to first well	R	35	33	39	35	32
	L	33	30	42	35	38
Length of veins	R	40	37	42	38	40
	L	38	37	42	40	47
Diam. of veins	R	2.05	1.9	1.5	2.3	2.0
	L	2.20	2.0	1.5	2.2	2.5
Diam. of wells	R	.9	.8	.8	1.0	.6
	L	.9	.8	.7	1.1	.8
Record of milk		5949	5136	7379	5245	5233
Record of B.F.		327.8	321	318.9	314.4	291.8
Average test		5.51	5.44	4.41	5.73	5.60
Score		91.4	88.3	92.3	94.9	93

TABLE 21. (Continued)

JERSEYS

Number		23	24	25	26	27
Weight		975	1000	950	830	775
Age		8-6	4-9	10-5	5-1	4-8
Age first calving		2-1	3-7	----	1-11	---
Days since calving		223	80	6	82	159
Days since bred		53	----	----	----	43
Height at withers		123	121.5	119	121	115
Height at hips		122	122	121.5	124	119.5
Width of hips		53	54	47.5	52	50.5
Width of thurls		47	46	44	43.5	44
Length of rump		51	49.5	46.5	48	46
Length of back		83	83	85	80	83
Circ. of chest		180	180	176	168	164
Circ. of barrel		222	218	220	201	196
Depth of chest		70	70.5	70.5	64.5	64
Depth of barrel		70	71	74	66	66
Width of chest		45.5	40.5	41	41	39
Width of barrel		70.5	71	65	60.5	59
Length of udder		47	42	36	45	44
Width of udder		25	24	23	23	23
Depth of udder		25	32	28	25	23
Udder to first well	R	40	34	50	43	32
	L	44	42	45	37	38
Length of veins	R	47	35*	51	47	38
	L	44	47	47	40	38
Diam. of veins	R	2.0	1.95	2.1	1.85	2.0
	L	1.8	2.05	1.95	1.6	1.9
Diam. of wells	R	.8	.8	1.0	.7	.8
	L	.8	1.0	.9	.7	.8
Record of milk		6716	5402	4699	5146	4923
Record of B.F.		288.7	286.3	272.5	272.2	269
Average test		4.30	5.30	5.80	5.29	5.46
Score		91.1	94.0	90.2	87.6	94.9

TABLE 21. (Continued)

JERSEYS

Number		28	29	30	31	32
Weight		797	775	988	1007	840
Age		4-6	3-3	5-2	4-8	4-10
Age first calving		2-2	1-6	---	1-7	2-10
Days since calving		7	188	445	342	271
Days since bred		---	84	183	202	135
Height at withers		120	123	124	126.5	121
Height at hips		124	125.5	128	127.5	124
Width of hips		48	51	52	53	49
Width of Thurls		42	42	43.5	45.5	41.5
Length of rump		45.5	47	49	50	47.5
Length of back		83	84	85	90	85
Circ. of chest		168	164	176	177	172
Circ. of barrel		198	198	222	218	210
Depth of chest		66	64.5	67.5	68	67
Depth of barrel		67	66.5	70	70	69
Width of chest		46	41.5	45	45	41.5
Width of barrel		62	60	73	70	63
Length of udder		45	30	41	34	21
Width of udder		26.5	20	19	14.5	12
Depth of udder		24	20	19	16	20
Udder to first well	R	39	46	43	48	55
	L	36	40	43	41	48
Length of veins	R	39	50	43	48	55
	L	36	43	43	44	50
Diam. of veins	R	1.6	1.5	1.25	1.1	1.15
	L	1.35	1.5	1.45	1.3	1.35
Diam. of wells	R	.7	.7	.7	.7	.6
	L	.8	.9	.7	.7	.7
Record of milk		4829	3894	4577	3490	3397
Record of B.F.		249.2	226.3	222	171.4	162.1
Average test		5.16	5.81	4.89	4.91	4.77
Score		85.7	78	89.2	73.8	74.3

JERSEYS

TABLE 22

Height at Withers

Height	No.	Milk	Fat	%Fat
128	3	10611	607.4	5.71
126.5	31	3490	171.4	4.91
126	17	5976	329.2	5.51
125.5	7	8487	470	5.87
125.5	10	8033	387	4.82
125.5	22	5233	291.8	5.60
125	19	5136	321	5.44
124.5	6	10140	478.8	4.72
124	11	7229	364.1	5.04
124	12	8165	360.6	4.42
124	30	4577	222	4.89
123.5	4	10752	567.7	5.28
123.5	14	6885	347	3.04
123	5	10393	548.8	5.29
123	23	6716	288.7	4.30
123	29	3894	226.3	5.81
122.5	9	9171	406.3	4.40
122	2	13320	625	4.69
121.5	13	7108	350.3	4.93
121.5	16	7555	337.7	4.47
121.5	18	5949	327.8	5.51
121.5	24	5402	286.3	5.30
121	8	8395	423.7	4.81
121	26	5146	277.2	5.29
121	32	3397	162.1	4.77
120	21	5245	314.4	5.73
120	28	4829	249.2	5.16
119	15	5779	346.1	5.99
119	25	4699	272.5	5.80
117	20	7379	318.9	4.41
115	1	12729	633.9	4.98
115	27	4923	269	5.46

TABLE 23.

Height at Hips

Height	No.	Milk	Fat	%Fat
129.5	6	10140	478.8	4.72
129.0	10	8033	387.0	4.82
128.5	3	10611	607.4	5.71
128	30	4577	222	4.89
127.5	31	3490	171.5	4.91
126.5	18	5949	327.8	5.51
126	7	8487	470	5.87
126	9	9171	406.3	4.40
126	17	5976	329.2	5.51
126	19	5136	321	5.44
126	22	5233	291.8	5.60
125.5	29	3894	226.3	5.81
125	2	13320	625	4.69
125	5	10393	548.8	5.29
125	11	7229	364.1	5.04
124.5	4	10752	567.7	5.28
124.5	8	8395	423.7	4.81
124	12	8165	360.6	4.42
124	13	7108	350.3	4.93
124	26	5146	272.2	5.29
124	28	4829	249.2	5.16
124	32	3397	162.1	4.77
123.5	14	6885	347	3.04
123.5	16	7555	337.7	4.47
122	23	6716	288.7	4.30
122	24	5402	286.3	5.30
121.5	25	4699	272.5	5.80
121	15	5779	346.1	5.99
121	21	5245	314.4	5.73
120	20	7379	318.9	4.41
119.5	27	4923	269	5.46
116	1	12729	633.9	4.98

JERSEYS

TABLE 24.

Length of Back

Length	No.	Milk	Fat	%Fat
90	3	10611	607.4	5.71
90	31	3490	171.4	4.91
89	5	10393	548.8	5.29
89	6	10140	478.8	4.72
88	4	10752	567.7	5.28
88	7	8487	470	5.87
88	12	8165	360.6	4.42
88	18	5949	327.8	5.51
88	19	5136	321	5.44
87	9	9171	406.3	4.40
86	13	7108	350.3	4.93
86	20	7379	318.9	4.41
85	10	8033	387	4.82
85	11	7229	364.1	5.04
85	14	6885	347	3.04
85	15	5779	346.1	5.99
85	16	7555	337.7	4.47
85	25	4699	272.5	5.80
85	30	4577	222	4.89
85	32	3397	162.1	4.77
84	2	13320	625	4.69
84	8	8395	423.7	4.81
84	29	3894	226.3	5.81
83	17	5976	329.2	5.51
83	23	6716	288.7	4.30
83	24	5402	286.3	5.30
83	27	4923	269	5.46
83	28	4829	249.2	5.16
82	22	5233	291.8	5.60
81	1	12729	633.9	4.98
81	21	5245	314.4	5.73
80	26	5146	272.2	5.29

TABLE 25.

Width of Hips

Width	No.	Milk	Fat	%Fat
56	18	5949	327.8	5.51
54	24	5402	286.3	5.30
53.5	4	10752	567.7	5.28
53.5	7	8487	470	5.87
53	6	10140	478.8	4.72
53	12	8165	360.6	4.42
53	17	5976	329.2	5.51
53	23	6716	288.7	4.30
53	31	3490	171.4	4.91
52	13	7108	350.3	4.93
52	16	7555	337.7	4.47
52	26	5146	272.2	5.29
52	30	4577	222	4.89
51.5	5	10393	548.8	5.29
51.5	15	5779	346.1	5.99
51.5	22	5233	291.8	5.60
51	11	7229	364.1	5.04
51	19	5136	321	5.44
51	20	7379	318.9	4.41
51	21	5245	314.4	5.73
51	29	3894	226.3	5.81
50.5	27	4923	269	5.46
50	2	13320	625	4.69
50	3	10611	607.4	5.71
50	8	8395	423.7	4.81
50	9	9171	406.3	4.40
49	10	8033	387	4.82
49	32	3397	162.1	4.77
48	28	4829	249.2	5.16
47.5	25	4699	272.5	5.80
47	1	12729	633.9	4.98
47	14	6885	347	3.04

JERSEYS

TABLE 26.

Width of Thurls

Width	No.	Milk	Fat	%Fat
47	23	6716	288.7	4.30
46	18	5949	327.8	5.51
46	24	5402	286.3	5.30
45.5	31	3490	171.4	4.91
45	6	10140	478.8	4.72
45	7	8487	470	5.87
45	16	7555	337.7	4.47
44.5	4	10752	567.7	5.28
44.5	10	8033	387	4.82
44	9	9171	406.3	4.40
44	2	13320	625	4.69
44	8	8395	423.7	4.18
44	22	5233	291.8	5.60
44	25	4699	272.5	5.80
44	27	4923	269	5.46
43.5	3	10611	607.4	5.71
43.5	11	7229	364.1	5.04
43.5	26	5146	272.2	5.29
43.5	30	4577	222	4.89
43	5	10393	548.8	5.29
43	13	7108	350.3	4.93
43	21	5245	314.4	5.73
42.5	15	5779	346.1	5.99
42.5	19	5136	321	5.44
42	12	8165	360.6	4.42
42	17	5976	329.2	5.51
42	20	7379	318.9	5,41
42	28	4829	249.2	5.16
42	29	3894	226.3	5.81
41.5	14	6885	347	3.04
41.5	32	3397	162.1	4.77
40	1	12729	633.9	4.98

TABLE 27.

Length of Rump

Length	No.	Milk	Fat	%Fat
51	23	6716	288.7	4.30
50.5	6	10140	478.8	4.72
50	3	10611	607.4	5.71
50	31	3490	171.4	4.91
49.5	4	10752	567.7	5.28
49.5	22	5233	291.8	5.60
49.5	24	5402	286.3	5.30
49	12	8165	360.6	4.42
49	13	7108	350.3	4.93
49	30	4577	222	4.89
48.5	2	13320	625	4.69
48.5	5	10393	548.8	5.29
48.5	17	5976	329.2	5.51
48	8	8395	423.7	4.81
48	11	7229	364.1	5.04
48	16	7555	337.7	4.47
48	20	7379	318.9	4.41
48	26	5146	272.2	5.29
47.5	18	5949	327.8	5.51
47.5	19	5136	321	5.44
47.5	32	3397	162.1	4.77
47	7	8487	470	5.87
47	9	9171	406.3	4.40
47	14	6885	347	3.04
47	15	5779	346.1	5.99
47	29	3894	226.3	5.81
46.5	25	4699	272.5	5.80
46	10	8033	387	4.82
46	21	5245	314.4	5.73
46	27	4923	269	5.46
45.5	1	12729	633.9	4.98
45.5	28	4829	249.2	5.16

JERSEYS

TABLE 28.

Cir. of Chest

Cir.	No.	Milk	Fat	%Fat
185	8	8395	423.7	4.81
183	7	8487	470	5.87
183	18	5949	327.8	5.51
182	17	5976	329.2	5.51
181	6	10140	478.8	4.72
180	12	8165	360.6	4.42
180	16	7555	337.7	4.47
180	23	6716	288.7	4.30
180	24	5402	286.3	5.30
179	13	7108	350.3	4.93
178	11	7229	364.1	5.04
177	2	13320	625	4.69
177	3	10611	607.4	5.71
177	31	3490	171.4	4.91
176	4	10752	567.7	5.28
176	25	4699	272.5	5.80
176	30	4577	222	4.89
175	5	10393	548.8	5.29
175	20	7379	318.9	4.41
174	15	5779	346.1	5.99
173	22	5233	291.8	5.60
172	32	3397	162.1	4.77
171	19	5136	321	5.44
170	1	12729	633.9	4.98
168	26	5146	272.2	5.29
168	28	4829	249.2	5.16
167	10	8033	387	4.82
166	21	5245	314.4	5.73
164	9	9171	406.3	4.40
164	27	4923	269	5.46
164	29	3894	226.3	5.81
163	14	6885	347	3.04

TABLE 29.

Cir. of Barrel

Cir.	No.	MILK	Fat	%Fat
236	2	13320	625.0	4.69
231	8	8395	423.7	4.81
230	20	7379	318.9	4.41
227	16	7555	337.7	4.47
226	18	5949	327.8	5.51
225	12	8165	360.6	4.42
222	23	6716	288.7	4.30
222	30	4577	222	4.89
220	25	4699	272.5	5.80
219	6	10140	478.8	4.72
218	4	10752	567.7	5.28
218	5	10393	548.8	5.29
218	24	5402	286.3	5.30
218	31	3490	171.4	4.91
216	1	12729	633.9	4.98
215	11	7229	364.1	5.04
214	13	7108	350.3	4.93
214	17	5976	329.2	5.51
214	10	8033	387	4.82
212	3	10611	607.4	5.71
212	7	8487	470	5.87
211	15	5779	346.1	5.99
210	32	3397	162.1	4.77
209	21	5245	314.4	5.73
208	22	5233	291.8	5.60
202	14	6885	347	3.04
202	19	5136	321	5.44
201	26	5146	272.2	5.29
198	28	4829	249.2	5.16
198	29	3894	226.3	5.81
197	9	9171	406.3	4.40
196	27	4923	269	5.46

JERSEYS

TABLE 30.

Depth of chest

Depth	No.	Milk	FAT	%FAT
78.5	20	7379	318.9	4.41
72.5	17	5976	329.2	5.51
72	7	8487	470	5.87
72	18	5949	327.8	5.51
70.5	24	5402	286.3	5.30
70.5	25	5699	272.5	5.80
70	3	10611	607.4	5.71
70	5	10393	548.8	5.29
70	13	7108	350.3	4.93
70	23	6716	288.7	4.30
69.5	6	10140	478.8	4.72
69.5	16	7555	337.7	4.47
69	8	8395	423.7	4.81
69	22	5233	291.8	5.60
68.5	2	13320	625	4.69
68	4	10752	567.7	5.28
68	11	7229	364.1	5.04
68	31	3490	171.4	4.91
67.5	15	5779	346.1	5.99
67.5	30	4577	222	4.89
67	9	9171	406.3	4.40
67	10	8033	387	4.82
67	19	5136	321	5.44
67	32	3397	162.1	4.77
66	1	12729	633.9	4.98
66	28	4829	249.2	5.16
65	14	6885	347	3.04
65	21	5245	314.4	5.73
64.5	26	5146	272.2	5.29
64.5	29	3894	226.3	5.81
64	27	4923	269	5.46
60	12	8165	360.6	4.42

TABLE 31.

Length of Udder

Length	No.	Milk	Fat	%Fat
50	12	8165	360.6	4.42
48.5	7	8487	470	5.87
47.5	15	5779	346.1	5.99
47	18	5949	327.8	5.51
47	23	6716	288.7	4.30
46	3	10611	607.4	5.71
46	10	8033	387	4.82
45.5	6	10140	478.8	4.72
45	13	7108	350.3	4.93
45	26	5146	272.2	5.29
45	28	4829	249.2	5.16
44	1	12729	633.9	4.98
44	27	4923	269	5.46
42	2	13320	625	4.69
42	8	8395	423.7	4.81
42	9	9171	406.3	4.40
42	17	5976	329.2	5.51
42	19	5136	321	5.44
42	21	5245	314.4	5.73
42	24	5402	286.3	5.30
41.5	4	10752	567.7	5.28
41.5	5	10393	548.8	5.29
41	30	4577	222	4.89
40	22	5233	291.8	5.60
39	20	7379	318.9	4.41
37	16	7555	337.7	4.47
36	25	4699	272.5	5.80
35	11	7229	364.1	5.04
34	31	3490	171.4	4.91
32	14	6885	347	3.04
30	29	3894	226.3	5.81
21	32	3397	162.1	4.77

JERSEYS

TABLE 32.

Width of Udder

Width	No.	Milk	Fat	%Fat
35.5	3	10611	607.4	5.71
31	6	10140	478.8	4.72
29	1	12729	633.9	4.98
29	22	5233	291.8	5.60
28	4	10752	567.7	5.28
28	12	8165	360.6	4.42
28	15	5779	346.1	5.99
27.5	17	5976	329.2	5.51
27.0	5	10393	548.8	5.29
27	18	5949	327.8	5.51
27	21	5245	314.4	5.73
26.5	28	4829	249.2	5.16
26	13	7108	350.3	4.93
25.5	19	5136	321.0	5.44
25	10	8033	387.0	4.82
25	23	6716	288.7	4.30
24	9	9171	406.3	4.40
24	24	5402	286.3	5.30
23.5	8	8395	423.7	4.81
23.5	20	7379	318.9	4.41
23	2	13320	625.0	4.69
23	11	7229	364.1	5.04
23	25	4699	272.5	5.80
23	26	5146	272.2	5.29
23	27	4923	269.0	5.46
21	7	8487	470.0	5.87
21	14	6885	347.0	3.04
20	29	3894	226.3	5.81
19	30	4577	222.0	4.89
14.5	31	3490	177.4	4.91
12	32	3397	162.1	4.77
11	16	7555	337.7	4.47

TABLE 33.

Depth of Udder

Depth	No.	Milk	Fat	%Fat
40	5	10393	548.8	5.29
37	1	12729	633.9	4.98
37	9	9171	406.3	4.40
33	21	5245	314.4	5.73
32	24	5402	286.3	5.30
30	7	8487	470.0	5.87
30	11	7229	364.1	5.04
30	15	5779	346.1	5.99
30	18	5949	327.8	5.51
29	2	13320	625.0	4.69
29	4	10752	567.7	5.28
29	17	5976	329.2	5.51
29	20	7379	318.9	4.41
28	3	10611	607.4	5.71
28	25	4699	272.5	5.80
27	10	8033	387.0	4.82
27	13	7108	350.3	4.93
26	16	7555	337.7	4.47
25	6	10140	478.8	4.72
25	19	5136	321.0	5.44
25	22	5233	291.8	5.60
25	23	6716	288.7	4.30
25	26	5146	272.2	5.29
24	8	8395	423.7	4.81
24	28	4829	249.2	5.16
23	12	8165	360.6	4.42
23	27	4923	269.0	5.46
20	14	6885	347.0	3.04
20	29	3894	226.3	5.81
20	32	3397	162.1	4.77
19	30	4577	222.0	4.89
16	31	3490	171.4	4.91

JERSEYS

TABLE 34.

Depth of Barrel

Depth	No.	Milk	Fat	%Fat
88.5	22	5233	291.8	5.60
75	16	7555	337.7	4.47
74	2	13320	625	4.69
74	8	8395	423.7	4.81
74	25	4699	272.5	5.80
73	10	8033	387	4.82
73	18	5949	327.8	5.51
73	20	7379	318.9	4.41
72	5	10393	548.8	5.29
72	17	5976	329.2	5.51
71.5	6	10140	478.8	4.72
71	24	5402	286.3	5.30
70.5	1	12729	633.9	4.98
70.5	3	10611	607.4	5.71
70.5	7	8487	470	5.87
70	9	9171	406.3	4.40
70	31	3490	171.4	4.91
70	11	7229	364.1	5.04
70	23	6716	288.7	4.30
70	30	4577	222	4.89
69	13	7108	350.3	4.93
69	21	5245	314.4	5.73
69	32	3397	162.1	4.77
68	4	10752	567.7	5.28
68	15	5779	346.1	5.99
67	14	6885	347	3.04
67	28	4829	249.2	5.16
66.5	29	3894	226.3	5.81
66	19	5136	321	5.44
66	26	5146	272.2	5.29
66	27	4923	269	5.46
63	12	8165	360.5	4.42

TABLE 35.

Width of Chest

Width	No.	Milk	Fat	%Fat
47	6	10140	478.8	4.72
46.5	4	10752	567.7	5.28
46.5	20	7379	318.9	4.41
46	2	13320	625	4.69
46	28	4829	249.2	5.16
45.5	23	6716	288.7	4.30
45	8	8395	423.7	4.81
45	12	8165	360.6	4.42
45	30	4577	222	4.89
45	31	3490	171.4	4.91
44	18	5949	327.8	5.51
44	19	5136	321	5.44
44	21	5245	314.4	5.73
43	1	12729	633.9	4.98
43	3	10611	607.4	5.71
43	13	7108	350.3	4.93
43	15	5779	346.1	5.99
42.5	11	7229	364.1	5.04
42	16	7555	337.7	4.47
42	17	5976	329.2	5.51
41.5	5	10393	548.8	5.29
41.5	7	8487	470	5.87
41.5	29	3894	226.3	5.81
41.5	32	3397	162.1	4.77
41	25	4699	272.5	5.80
41	26	5146	272.2	5.29
40.5	14	6885	347	3.04
40.5	24	5402	286.3	5.30
40	22	5233	291.8	5.60
39	27	4923	269	5.46
37	10	8033	387	4.82
36	9	9171	406.3	4.40

JERSEYS

TABLE 36.

Width of Barrel

Width	No.	Milk	Fat	%Fat
80	2	13320	625.0	4.69
76.5	20	7379	318.9	4.41
74.5	8	8395	423.7	4.81
73	30	4577	222	4.89
72	16	7555	337.7	4.47
71	24	5402	286.3	5.30
70.5	23	6716	288.7	4.30
70	11	7229	364.1	5.04
70	31	3490	171.4	4.91
69.5	18	5949	327.8	5.51
69	4	10752	567.7	5.28
69	12	8165	360.6	4.42
68	21	5245	314.4	5.73
67.5	5	10393	548.8	5.29
67	6	10140	478.8	4.72
66	1	12729	633.9	4.98
66	13	7108	350.3	4.93
66	15	5779	346.1	5.99
65	10	8033	387	4.82
65	17	5976	329.2	5.51
65	25	4699	272.5	5.80
64	3	10611	607.4	5.71
64	14	6885	347	3.04
63	19	5136	321	5.44
63	32	3397	162.1	4.77
62.5	7	8487	470	5.81
62.5	22	5233	291.8	5.60
62	28	4829	249.2	5.16
60.5	26	5146	272.2	5.29
60	29	3894	226.3	5.81
59	27	4923	269	5.46
55	9	9171	406.3	4.40

TABLE 37.

Length of Veins

Length	No.	Milk	Fat	%Fat
60	5	10392	548.8	5.29
58	13	7108	350.3	4.93
56	7	8487	470	5.87
55	12	8165	360.6	4.42
54.5	1	12729	633.9	4.98
52.5	32	3397	162.1	4.77
52	10	8033	387	4.82
49	11	7229	364.1	5.04
49	25	4699	272.5	5.80
48	9	9171	406.3	4.40
48	16	7555	337.7	4.77
47.5	3	10611	607.4	5.71
46.5	2	13320	625	4.69
46.5	29	3894	226.3	5.81
46	31	3490	171.4	4.91
45.5	23	6716	288.7	4.30
43.5	6	10140	478.8	4.72
43.5	14	6885	347	3.04
43.5	22	5233	291.8	5.60
43.5	26	5146	272.2	5.29
43	4	10752	567.7	5.28
43	30	4577	222	4.89
42.5	17	5976	329.2	5.51
42	20	7379	318.9	4.41
41.5	8	8395	423.7	4.81
41	24	5402	286.3	5.30
39	21	5245	314.4	5.73
38	27	4923	269	5.46
37.5	28	4829	249.2	5.16
37	19	5136	321	5.44
36	18	5949	327.8	5.51
32.5	15	5779	346.1	5.99

JERSEYS

TABLE 38.

Diam. of Veins

Diam.	No.	Milk	Fat	%Fat
3.03	11	7229	364.1	5.04
2.60	2	13320	625	4.69
2.45	12	8165	306.6	4.42
2.42	5	10392	548.8	5.29
2.4	1	12729	633.9	4.98
2.4	7	8487	470	5.87
2.4	9	9171	406.3	4.40
2.32	14	6885	347	3.04
2.25	21	5245	314.4	5.73
2.25	22	5233	291.8	5.60
2.17	16	7555	337.7	4.77
2.12	18	5949	327.8	5.51
2.07	13	7108	350.3	4.93
2.05	4	10752	567.7	5.28
2.05	17	5976	329.2	5.51
2.02	25	4699	272.5	5.80
2.00	3	10611	607.4	5.71
2.00	24	5402	296.3	5.30
1.97	10	8033	387	4.82
1.92	15	5779	346.1	5.99
1.9	19	5136	321	5.44
1.9	23	6716	288.7	4.30
1.9	27	4923	269	5.46
1.72	26	5146	272.2	5.29
1.65	6	10140	478.8	4.72
1.50	29	3894	226.3	5.81
1.50	20	7379	318.9	4.41
1.47	28	4829	249.2	5.16
1.42	8	8395	423.7	5.81
1.35	30	4577	222	4.89
1.25	32	3397	162.1	4.77
1.20	31	3490	171.4	4.91

TABLE 39.

Diam. of Wells

Diam.	No.	Milk	Fat	% Fat
1.05	1	12729	633.9	4.98
1.05	4	10752	567.7	5.28
1.05	9	9171	406.3	4.40
1.05	21	5245	314.4	5.73
1.00	2	13320	625	4.69
1.00	25	4699	272.5	5.80
.95	3	10611	607.4	5.71
.95	11	7229	364.1	5.04
.90	6	10140	478.8	4.72
.90	10	8033	387	4.82
.90	18	5949	327.8	5.51
.90	24	5402	286.3	5.30
.85	5	10392	548.8	5.29
.85	7	8487	470	5.87
.85	8	8395	423.7	4.81
.85	13	7108	350.3	4.93
.85	15	5779	346.1	5.99
.85	16	7555	337.7	4.77
.80	12	8165	360.6	4.42
.80	19	5136	321	5.44
.80	23	6716	288.7	4.30
.80	27	4923	269	5.46
.80	29	3894	226.3	5.81
.75	17	5976	329.2	5.51
.75	20	7379	318.9	4.41
.75	28	4829	249.2	5.16
.70	22	5233	291.8	5.60
.70	26	5146	272.2	5.29
.70	30	4577	222	4.89
.70	31	3490	171.4	4.91
.65	14	6885	347	3.04
.65	32	3397	162.1	4.77

TABLE 40.

JERSEYS

Height at Withers	Height	Milk	Fat	%Fat
General average	122.2	7085	361.7	5.10
Average class A.	124.6	7232	373.4	5.16
Average class B.	119.9	6939	349.6	5.03

Height at Hips	Height	Milk	Fat	%Fat
General average	124.3	7085	361.7	5.10
Average class A.	126.5	7649	396.5	5.18
Average class B.	122.1	6522	327.0	5.01

Length of back	Length	Milk	Fat	%Fat
General average	85.2	7085	361.7	5.10
Average class A.	87.3	7794	398.3	5.11
Average class B.	83.1	6377	322.5	5.05

Width of hips	Width	Milk	Fat	%Fat
General average	51.3	7085	361.7	5.10
Average class A.	52.1	6929	353.1	5.09
Average class B.	49.5	7235	370.5	5.10

Width of thurls	Width	Milk	Fat	%Fat
General average	43.5	7085	361.7	5.10
Average class A.	44.7	7804	388.2	4.97
Average class B.	42.3	6441	335.3	5.20

Length of rump	Length	Milk	Fat	%Fat
General average	47.9	7085	361.7	5.10
Average class A.	49.1	8191	346.2	4.22
Average class B.	46.8	6355	332.7	5.23

TABLE 40 (Continued)

JERSEYS

Circ. of chest	Circum.	Milk	Fat	%Fat
General average	174.5	7085	361.7	5.10
Average class A.	179.6	7749	391.3	5.04
Average class B.	168.7	6546	332.2	5.05

Circ. of barrel	Circum.	Milk	Fat	%Fat
General average	214.2	7085	361.7	5.10
Average class A.	222.5	7930	389.2	4.90
Average class B.	206.0	6241	334.3	5.35

Depth of chest	Depth	Milk	Fat	%Fat
General average	68.2	7085	361.7	5.10
Average class A.	70.6	8007	407.9	5.09
Average class B.	65.8	6165	315.8	5.16

Depth of Barrel	Depth	Milk	Fat	%Fat
General average	70.5	7085	361.7	5.10
Average class A.	73.2	8342	421.5	5.05
Average class B.	67.7	5829	302.0	5.18

Width of chest	Width	Milk	Fat	%Fat
General average	42.7	7085	361.7	5.10
Average class A.	44.9	7784	391.3	5.03
Average class B.	40.6	6530	332.2	5.08

Width of barrel	Width	Milk	Fat	%Fat
General average	66.7	7085	361.7	5.10
Average class A.	70.8	7964	391.8	4.91
Average class B.	62.6	6206	331.7	5.34

TABLE 40 (Continued)

JERSEYS

Length of udder	Length	Milk	Fat	%Fat
General average	41.3	7085	361.7	5.10
Average class A.	45.4	8093	406.0	5.01
Average class B.	37.2	7077	317.6	4.48
Width of udder	**Width**	**Milk**	**Fat**	**%Fat**
General average	24.1	7085	361.7	5.10
Average class A.	27.7	7674	400.1	5.22
Average class B.	20.5	6496	323.4	4.97
Depth of udder	**Depth**	**Milk**	**Fat**	**%Fat**
General average	26.9	7085	361.7	5.10
Average class A.	31.1	8197	425.3	5.20
Average class B.	22.7	5973	298.1	5.01
Length of veins	**Length**	**Milk**	**Fat**	**%Fat**
General average	45.6	7085	361.7	5.10
Average class A.	50.8	7812	388.3	4.97
Average class B.	40.5	6359	347.8	5.46
Diam. of Veins	**Diam.**	**Milk**	**Fat**	**%Fat**
General average	1.96	7085	361.7	5.10
Average class A.	2.31	8056	409.2	5.07
Average class B.	1.61	6115	314.3	5.14
Diam. of wells	**Diam.**	**Milk**	**Fat**	**%Fat**
General average	.845	7085	361.7	5.10
Average class A.	.940	8604	441.5	5.13
Average class B.	.750	5567	282.1	5.06

TABLE 41.

AYRSHIRES

Number		1	2	3	4	5
Weight		1093	1010	945	967	1005
Age		9-4	5-9	4-4	10-10	10-1
Age first calving		---	2-3	---	---	3-7
Days since calving		134	159	184	160	145
Days since bred		---	---	16	71	27
Height at withers		125	125	129	123	120
Height at hips		127	126	133	128.5	124
Width of hips		57	54	50.5	54	50
Width of thurls		48	47	45	45	46
Length of rump		51	49	49	48.5	49
Length of back		88	85	85	82	90
Circ. of chest		186	184	178	185	177
Circ. of barrel		220	220	217	220	218
Depth of chest		72	72	71.5	72	59.5
Depth of barrel		74.5	74.5	72.5	73.5	61
Width of chest		46	54	42	46	44
Width of barrel		64	68	62	65	70.5
Length of udder		44	42	49	44	37
Width of udder		23	30	30.5	25.5	21
Depth of udder		36	26	26	37	23
Udder to first well	R	37	42	46	36	36
	L	35	30	42	30	41
Length of veins	R	41*	60	49	43	45
	L	40	38	48	38	46
Diam. of veins	R	2.5	3.1	4.4	2.5	2.3
	L	2.6	2.25	2.0	2.9	2.05
Diam. of wells	R	.8	.9	.8	.7	.9
	L	.7	.9	.9	.9	.9
Record of milk		13415	13536	10118	10005	8480
Record of B.F.		537	458.8	374.3	357.9	328.4
Average test		3.91	3.39	3.64	3.57	3.87
Score		92	94.1	92.7	87	89.6

TABLE 41. (Continued)

AYRSHIRES

Number		6	7	8	9	10
Weight		985	920	1040	930	869
Age		4-1	5-8	6-2	4-4	4-4
Age first calving		---	2-8	2-4	---	---
Days since calving		228	251	97	350	131
Days since bred		42	104	---	184	24
Height at withers		127.5	121.5	127	116.5	118.5
Height at hips		131.5	122	132.5	118	119.5
Width of hips		51	53.5	52	48	47
Width of thurls		45	44.5	49	47	44
Length of rump		47	47	48.5	43.5	46
Length of back		86	83	91	87	83
Circ. of chest		180	171	181	174	179
Circ. of barrel		210	221	222	218	210
Depth of chest		68	68.5	70	66.5	70
Depth of barrel		71	71.5	74	60	70
Width of chest		44	40	44	45.5	42
Width of barrel		64	65.5	67	68.5	63
Length of udder		44.5	34.5	40	43.5	41
Width of udder		29.5	27.5	23.5	18.5	24
Depth of udder		25	26	28	19	18
Udder to first well	R	38	50	47	33	40
	L	36	48	43	38	42
Length of veins	R	46	50	47	38	44
	L	38	63	45	38	42
Diam. of veins	R	2.75	1.5	1.75	1.8	2.1
	L	2.45	1.7	1.75	1.75	1.7
Diam. of wells	R	.9	.7	.9	.7	.8
	L	.9	.8	.9	.7	.8
Record of milk		8793	7774	7389	7681	5218
Record of B.F.		206.6	305.5	289.5	286.9	248.7
Average test		3.49	3.93	3.91	3.72	4.76
Score		90.6	86.8	89.6	91.8	88.9

TABLE 41. (Continued)

AYRSHIRES

Number		11	12	13	14
Weight		871	1006	900	1065
Age		4-2	4-2	3-10	3-6
Age first calving		---	---	2-2	2-1
Days since calving		201	265	251	80
Days since bred		---	99	158	----
Height at withers		119.5	124	121.5	128
Height at hips		124.5	126.5	126	129
Width of hips		48.5	54.5	51	57
Width of thurls		45	48.5	45.5	49
Length of rump		46	46	45	50
Length of back		86	85	86	90
Circ. of chest		168	179	171	184
Circ. of barrel		212	218	212	222
Depth of chest		66	70.5	65.5	70
Depth of barrel		68	74.5	69.5	73
Width of chest		40	44	45	43
Width of barrel		66	65.5	67	69
Length of udder		42	50.5	24.5	42
Width of udder		25.5	26.5	14.5	32.5
Depth of udder		20	25	18	23
Udder to first well	R	41	37	42	36
	L	42	29	48	45
Length of veins	R	42	44	42	39
	L	42	32	49	46
Diam. of veins	R	1.65	2.25	1.6	1.9
	L	1.3	2.05	1.75	2.0
Diam. of wells	R	.8	.9	.8	.7
	L	.8	.8	.8	.7
Record of milk		5145	5171	5657	4235
Record of B.F.		245.6	226.9	225.7	166
Average test		4.77	4.38	3.99	3.92
Score		86.2	92.5	81.7	90.1

TABLE 42.

AYRSHIRES

Width of Hips

Width	No.	Milk	Fat	%Fat
57	1	13415	537	3.91
57	14	4235	166	3.92
54.5	12	5171	226.9	4.38
54	2	13536	458.8	3.39
54	4	10005	357.9	3.57
53.5	7	7774	305.5	3.93
52	8	7389	289.5	3.91
51	6	8793	306.6	3.49
51	13	5657	225.7	3.99
50.5	3	10118	374.3	3.64
50	5	8480	328.4	3.87
48.5	11	5145	245.6	4.77
48	9	7681	286.9	3.72
47	10	5219	248.7	4.76

TABLE 43.

Width of Thurls

Width	No.	Milk	Fat	%Fat
49	8	7389	289.5	3.91
49	14	4235	166	3.92
48.5	12	5171	226.9	4.38
48	1	13415	537	3.91
47	2	13536	458.8	3.39
47	9	7681	286.9	3.72
46	5	8480	328.4	3.87
45.5	13	5657	225.7	3.99
45	3	10118	374.3	3.64
45	4	10005	357.9	3.57
45	6	8793	306.6	3.49
45	11	5145	245.6	4.77
44.5	7	7774	305.5	3.93
44	10	5219	248.7	4.76

TABLE 44.

Length of Rump

Length	No.	Milk	Fat	%Fat
51	1	13415	537	3.91
50	14	4235	166	3.92
49	2	13536	458.8	3.39
49	3	10118	374.3	3.64
49	5	8480	328.4	3.87
48.5	4	10005	357.9	3.57
48.5	8	7389	289.5	3.91
47	6	8793	306.6	3.49
47	7	7774	305.5	3.93
46	10	5219	248.7	4.76
46	11	5145	245.6	4.77
46	12	5171	226.9	4.38
45	13	5657	225.7	3.99
43.5	9	7681	286.9	3.72

TABLE 45.

Height at Withers

Height	No.	Milk	Fat	%Fat
129	3	10118	374.3	3.64
128	14	4235	166	3.92
127.5	6	8793	306.6	3.49
127	8	7389	289.5	3.91
125	1	13415	537	3.91
125	2	13536	458.8	3.39
124	12	5171	226.9	4.38
123	4	10005	357.9	3.57
121.5	7	7774	305.5	3.93
121.5	13	5657	225.7	3.99
120	5	8480	328.4	3.87
119.5	11	5145	245.6	4.77
118.5	10	5219	248.7	4.76
116.5	9	7681	286.9	3.72

TABLE 46.

AYRSHIRES

Height at Hips

Height	No.	Milk	Fat	%Fat
133	3	10118	374.3	3.64
132.5	8	7389	389.5	3.91
131.5	6	8793	306.6	3.49
129	14	4235	116.0	3.92
128.5	4	10005	357.9	3.57
127	1	13415	537.0	3.91
126.5	12	5171	226.9	4.38
126	2	13536	458.8	3.39
126	13	5657	225.7	3.99
124.5	11	5145	245.6	4.77
124	5	8480	328.4	3.87
122	7	7774	305.5	3.93
119.5	10	5219	248.7	4.76
118	9	7681	286.9	3.72

TABLE 47.

Length of Back

Length	No.	Milk	Fat	%Fat
91	8	7389	289.5	3.91
90	5	8480	328.4	3.87
90	14	4235	166.0	3.92
88	1	13415	537.0	3.91
87	9	7681	286.9	3.72
86	6	8793	306.6	3.49
86	11	5145	245.6	4.77
86	13	5657	225.7	3.99
85	2	13536	458.8	3.39
85	3	10118	374.3	3.64
85	12	5171	226.9	4.38
83	7	7774	305.5	3.93
83	10	5219	248.7	4.76
82	4	10005	357.9	3.57

TABLE 48.

Cir. of Chest

Cir.	No.	Milk	Fat	%Fat
186	1	13415	537	3.91
185	4	10005	357.9	3.57
184	2	13536	458.8	3.39
184	14	4235	166.0	3.92
181	8	7389	289.5	3.91
180	6	8793	306.6	3.49
179	10	5219	248.7	4.76
179	12	5171	226.9	4.38
178	3	10118	374.3	3.64
177	5	8480	328.4	3.87
174	9	7681	286.9	3.72
171	7	7774	305.5	3.93
171	13	5657	225.7	3.99
168	11	5145	245.6	4.77

TABLE 49.

Cir. of Barrel

Cir.	No.	Milk	Fat	%Fat
222	8	7389	289.5	3.91
222	14	4235	166.0	3.92
221	7	7774	305.5	3.93
220	1	13415	537.0	3.91
220	2	13536	458.8	3.39
220	4	10005	357.9	3.57
218	5	8480	328.4	3.87
218	9	7681	286.9	3.72
218	12	5171	226.9	4.38
217	3	10118	374.3	3.64
212	11	5145	245.6	4.77
212	13	5657	225.7	3.99
210	6	8793	306.6	3.49
210	10	5219	248.7	4.76

AYRSHIRES

TABLE 50.

Depth of Chest

Depth	No.	Milk	Fat	%Fat
72	1	13415	537.0	3.91
72	2	13536	458.8	3.39
72	4	10005	357.9	3.57
71.5	3	10118	374.3	3.64
70.5	12	5171	226.9	4.38
70	8	7389	289.5	3.91
70	10	5219	248.7	4.76
70	14	4235	166.0	3.92
68.5	7	7774	305.5	3.93
68	6	8793	306.6	3.49
66.5	9	7681	286.9	3.72
66	11	5154	245.6	4.77
65.5	13	5657	225.7	3.99
59.5	5	8480	328.4	3.87

TABLE 51.

Depth of Barrel

Depth	No.	Milk	Fat	%Fat
74.5	1	13415	537.0	3.91
74.5	2	13536	458.8	3.39
74.5	12	5171	226.9	4.38
74	8	7389	289.5	3.91
73.5	4	10005	357.9	3.57
73	14	4235	166.0	3.92
72.5	3	10118	374.3	3.64
71.5	7	7774	305.5	3.93
71	6	8793	306.6	3.49
70	10	5219	248.7	4.76
69.5	13	5657	225.7	3.99
68	11	5145	245.6	4.77
61	5	8480	328.4	3.87
60	9	7681	286.9	3.72

TABLE 52.

Width of Barrel

Width	No.	Milk	Fat	%Fat
70.5	5	8480	328.4	3.87
69	14	4235	166.0	3.92
68.5	9	7681	286.9	3.72
68	2	13536	458.8	3.39
67	8	7389	289.5	3.91
67	13	5657	225.7	3.99
66	11	5145	245.6	4.77
65.5	7	7774	305.5	3.93
65.5	12	5171	226.9	4.38
65	4	10005	357.9	3.57
64	1	13415	537.0	3.91
64	6	8793	306.6	3.49
63	10	5219	248.7	4.76
62	3	10118	374.3	3.64

TABLE 53.

Width of Chest

Width	No.	Milk	Fat	%Fat
54	2	13536	458.8	3.39
46	1	13415	537.0	3.91
46	4	10005	357.9	3.57
45.5	9	7681	286.9	3.72
45	13	5657	225.7	3.99
44	5	8480	328.4	3.87
44	6	8793	306.6	3.49
44	8	7389	289.5	3.91
44	12	5171	226.9	4.38
43	14	4235	166.0	3.92
42	3	10118	374.3	3.64
42	10	5219	248.7	4.76
40	7	7774	305.5	3.93
40	11	5145	245.6	4.77

AYRSHIRES

TABLE 54.

Length of Udder

Length	No.	Milk	Fat	%Fat
50.5	12	5171	226.9	4.38
49	3	10118	374.3	3.64
44.5	6	8793	306.6	3.49
44	1	13415	537.0	3.91
44	4	10005	357.9	3.57
43.5	9	7681	286.9	3.72
42	2	13536	458.8	3.39
42	11	5156	245.6	4.77
42	14	4235	166.0	3.92
41	10	5219	248.7	4.76
40	8	7389	289.5	3.91
37	5	8480	328.4	3.87
34.5	7	7774	305.5	3.93
24.5	13	5657	225.7	3.99

TABLE 55.

Width of Udder

Width	No.	Milk	Fat	%Fat
32.5	14	4235	166.0	3.92
30.5	3	10118	374.3	3.64
30	2	13536	458.8	3.39
29.5	6	8793	306.6	3.49
27.5	7	7774	305.5	3.93
26.5	12	5171	226.9	4.38
25.5	4	10005	357.9	3.57
25.5	11	5145	245.6	4.77
24.0	10	5219	248.7	4.76
23.5	8	7389	289.5	3.91
23	1	13415	537.0	3.91
21	5	8480	328.4	3.87
18.5	9	7681	286.9	3.72
14.5	13	5657	225.7	3.99

TABLE 56.

Depth of Udder

Depth	No.	Milk	Fat	%Fat
37	4	10005	357.9	3.57
36	1	134.5	537.0	3.91
28	8	7389	289.5	3.91
26	2	13536	458.8	3.39
26	3	10118	374.3	3.64
26	7	7774	305.5	3.93
25	6	8793	306.6	3.49
25	12	5171	226.9	4.38
23	5	8480	328.4	3.87
23	14	4235	166.0	3.92
20	11	5145	245.6	4.77
19	9	7681	286.9	3.72
18	10	5219	248.7	4.76
18	13	5657	225.7	3.99

TABLE 57.

Length of Veins

Length	No.	Milk	Fat	%Fat
56.5	7	7774	305.5	3.93
49	2	13536	458.8	3.39
48.5	3	10118	374.3	3.64
46	8	7389	289.5	3.91
45.5	5	8480	328.4	3.87
45.5	13	5657	225.7	3.99
43	10	5219	248.7	4.76
42.5	14	4235	166.0	3.92
42	6	8793	306.6	3.49
42	11	5145	245.6	4.77
40.5	1	13415	537.0	3.91
40.5	4	10005	357.9	3.57
38	9	7681	286.9	3.72
38	12	5171	226.9	4.38

AYRSHIRES

TABLE 58.

Diam. of Veins

Diam.	No.	Milk	Fat	%Fat
2.3	3	10118	374.3	3.64
2.7	4	10005	357.9	3.57
2.67	2	13536	458.8	3.39
26	6	8793	306.6	3.49
2.55	1	13415	537.0	3.91
2.17	5	8480	328.4	3.87
2.15	12	5171	226.9	4.38
1.95	14	4235	166.0	3.92
1.9	10	5218	248.7	4.76
1.77	9	7681	286.9	3.72
1.75	8	7389	289.5	3.91
1.6	7	7774	305.5	3.93
1.47	11	5145	245.6	4.77
1.17	13	5657	225.7	3.99

TABLE 59.

Diam. of Wells

Diam.	No.	Milk	Fat	%Fat
.9	2	13536	458.8	3.39
.9	5	8480	328.4	3.87
.9	6	8793	306.6	3.49
.9	8	7389	289.5	3.91
.85	3	10118	374.3	3.64
.85	12	5171	226.9	4.38
.8	4	10005	357.9	3.57
.8	10	5219	248.7	4.76
.8	11	5145	245.6	4.77
.8	13	5657	225.7	3.99
.8	14	4235	166.0	3.92
.75	1	13415	537.0	3.91
.75	7	7774	305.5	3.93
.7	9	7681	386.9	3.72

TABLE 60.

AYRSHIRES

Height at Withers	Height	Milk	Fat	%Fat
General Average	123.2	8044	311.2	3.86
Average class A.	126.5	8971	337.1	3.76
Average class B.	120.0	7137	284.1	3.98

Height at Hips	Height	Milk	Fat	%Fat
General Average	127.2	8044	311.2	3.86
Average class A.	129.7	8447	322.6	3.81
Average class B.	122.5	7641	299.9	3.91

Length of Back	Length	Milk	Fat	%Fat
General average	86.2	8044	311.2	3.86
Average class A.	88.2	7848	308.5	3.93
Average class B.	84.1	8211	313.9	3.82

Width of Hips	Width	Milk	Fat	%Fat
General average	52.0	8044	311.2	3.86
Average class A.	54.5	8789	334.5	3.80
Average class B.	49.4	7442	288.0	3.89

Width of Thurls	Width	Milk	Fat	%Fat
General average	46.3	8044	311.2	3.86
Average class A.	47.8	8558	327.8	3.83
Average class B.	44.8	7530	294.9	3.95

Length of Rump	Length	Milk	Fat	%Fat
General average	47.5	8044	311.2	3.86
Average class A.	49.3	9597	355.8	3.70
Average class B.	45.8	6491	263.7	4.06

TABLE 60 (Continued)

AYRSHIRES

Cir. of Chest	Circum.	Milk	Fat	%Fat
General average	178.3	8044	311.2	3.86
Average class A.	182.7	8941	337.8	3.77
Average class B.	174.0	7146	284.7	3.98

Circ. of Barrel	Circum.	Milk	Fat	%Fat
General average	217.2	8044	311.2	3.86
Average class A.	220.4	9262	349.0	3.77
Average class B.	214.0	7112	273.5	3.84

Depth of Chest	Depth	Milk	Fat	%Fat
General Average	68.5	8044	311.2	3.86
Average class A.	71.7	9264	356.3	3.84
Average class B.	66.3	7110	266.3	3.74

Depth of barrel	Depth	Milk	Fat	%Fat
General average	70.4	8044	311.2	3.86
Average class A.	73.4	9114	344.3	3.77
Average class B.	67.4	7249	378.2	3.83

Width of chest	Width	Milk	Fat	%Fat
General average	44.2	8044	311.2	3.86
Average class A.	46.3	9652	357.5	3.70
Average class B.	42.1	6434	265.2	4.12

Width of barrel	Width	Milk	Fat	%Fat
General average	66.0	8044	311.2	3.86
Average class A.	70.8	7446	285.8	3.83
Average class B.	64.1	8642	336.7	3.89

TABLE 60 (Continued)

AYRSHIRES

Length of udder	Length	Milk	Fat	%Fat
General average	41.3	8044	311.2	3.86
Average class A.	45.3	9817	364.0	3.70
Average class B.	37.3	6271	258.5	4.10

Width of udder	Width	Milk	Fat	%Fat
General average	25.1	8044	311.2	3.86
Average class A.	28.8	8519	313.7	3.68
Average class B.	21.4	7569	308.8	4.08

Depth of udder	Depth	Milk	Fat	%Fat
General average	25.0	8044	311.2	3.86
Average class A.	29.2	10147	375.7	3.70
Average class B.	20.8	5941	246.8	4.15

Length of veins	Length	Milk	Fat	%Fat
General average	44.1	8044	311.2	3.86
Average class A.	47.7	8325	318.7	3.82
Average class B.	40.5	7778	308.8	3.90

Diam. of Veins	Diam.	Milk	Fat	%Fat
General average	2.12	8044	311.2	3.86
Average class A.	3.58	9931	369.9	3.72
Average class B.	1.66	6157	252.5	4.10

Diam. of wells	Diam.	Milk	Fat	%Fat
General average	.821	8044	311.2	3.86
Average class A.	.871	9070	334.6	3.68
Average class B.	.771	7018	287.9	4.10

TABLE 61.

GURNSEYS

Number		1	2	3	4	5	6
Weight		950	1020	1030	927	986	892
Age		11-3	7-9	8	4-2	4-8	5-3
Age first calving		---	---	---	---	---	---
Days since calving		86	340	349	173	44	89
Days since bred		---	---	107	93	---	---
Height at withers		120	128	130.5	122	129	124
Height at hips		123	130	132	125	131.5	126.5
Width of hips		51.5	48	55	50	54	49
Width of thurls		43.5	44	41	45.5	42	45
Length of rump		47	49.5	53	46.5	51	49.5
Length of back		86	90	95	87	91	87
Circ. of chest		172	184	183	174	188	173
Circ. of barrel		230	235	220	213	228	212
Depth of chest		67	70	73	68	70	67.5
Depth of barrel		71.5	75.5	75	71	74	70
Width of chest		40	45	43.5	41	46	43.5
Width of barrel		74	75.5	66	66	69	64
Length of udder		47	46.5	43.5	44	45	33
Width of udder		27	21	24	26	27	23
Depth of udder		33	22	30	24	25	21
Udder to first well	R	39	52	47	39	37	37
	L	36	50	41	34	40	43
Length of veins	R	44	57	50	39	44	37
	L	48	50	46	38	45	43
Diam. of veins	R	2.9	2.75	1.9	2.2	2.2	1.8
	L	3.0	2.50	2.0	1.7	2.4	2.0
Diam. of wells	R	.9	1	.9	.9	.8	.7
	L	1	1	.9	.9	.9	.8
Record of milk		9871	6765	8449	4315	4842	5023
Record of B.F.		441.9	368	302.5	245.5	241	232
Average test		4.55	5.45	3.58	5.69	4.96	4.62
Score		89	91.2	89	87.4	90	86.6

TABLE 62.

GURNSEYS

Height at Withers

Height	No.	Milk	Fat	%Fat
130.5	3	8449	302.5	3.58
129	5	4842	241	4.96
128	2	6765	368	5.45
124	6	5023	232	4.62
122	4	4315	245.5	5.69
120	1	9871	441.9	4.55

TABLE 63.

Height at Hips

Height	No.	Milk	Fat	%Fat
132	3	8449	302.5	3.58
131.5	5	4842	241	4.96
130	2	6765	368	5.45
126.5	6	5023	232	4.62
125	4	4315	245.5	5.69
123	1	9871	441.9	4.55

TABLE 64.

Length of Back

Length	No.	Milk	Fat	%Fat
95	3	8449	302.5	3.58
91	5	4842	241	4.96
90	2	6765	368	5.45
87	4	4315	245.5	5.69
87	6	5023	232	4.62
86	1	9871	441.9	4.55

TABLE 65.

Width of Hips

Width	No.	Milk	Fat	%Fat
55	3	8449	302.5	3.58
54	5	4842	241	4.96
51.5	1	9871	441.9	4.55
50	4	4315	245.5	5.69
49	6	5023	232	4.62
48	2	6765	368	5.45

TABLE 66.

Width of Thurls

Width	No.	Milk	Fat	%Fat
45.5	4	4315	245.5	5.69
45	6	5023	232	4.62
44	2	6765	368	5.45
43.5	1	9871	441.9	4.55
42	5	4842	241	4.96
41	3	8449	302.5	3.58

TABLE 67.

Length of Rump

Length	No.	Milk	Fat	%Fat
53	3	8449	302.5	3.58
51	5	4842	241	4.96
49.5	2	6765	368	5.45
49.5	6	5023	232	4.62
47	1	9871	441.9	4.55
46.5	4	4315	245.5	5.69

TABLE 68.

Circum. of Chest

Circum.	No.	Milk	Fat	%Fat
188	5	4842	241	4.96
184	2	6765	368	5.45
183	3	8449	302.5	3.58
174	4	4315	245.5	5.69
173	6	5023	232	4.62
172	1	9871	441.9	4.55

TABLE 69.

Circum. of Barrel

Circum.	No.	Milk	Fat	%Fat
235	2	6765	368	5.45
230	1	9871	441.9	4.55
228	5	4542	241	4.96
220	3	8449	302.5	3.58
213	4	4315	245.5	5.69
212	6	5023	232	4.62

GURNSEYS

TABLE 70.

Depth of Chest

Depth	No.	Milk	Fat	%Fat
73	3	8449	302.5	3.58
70	2	6765	368	5.45
70	5	4842	241	4.96
68	4	4315	245.5	5.69
67.5	6	5023	232	4.62
67	1	9871	441.9	4.55

TABLE 71.

Depth of Barrel

Depth	No.	Milk	Fat	%Fat
75.5	2	6765	368	5.45
75	3	8449	302.5	3.58
74	5	4842	241	4.96
71.5	1	9871	441.9	4.55
71	4	4315	245.5	5.69
70	6	5023	232	4.62

TABLE 72.

Width of Chest

Width	No.	Milk	Fat	%Fat
46	5	4842	241	4.96
45	2	6765	368	5.45
43.5	3	8449	302.5	3.58
43.5	6.	5023	232	4.62
41	4	4315	245.5	5.69
40	1	9871	441.9	4.55

TABLE 73.

Width of Barrel

Width	No.	Milk	Fat	%Fat
77.5	2	6765	368	5.45
74	1	9871	441.9	4.55
69	5	4842	241	4.96
66	3	8449	302.5	3,58
66	4	4315	245.5	5.69
64	6	5023	232	4.62

TABLE 74.

Length of Udder

Length	No.	Milk	Fat	%Fat
47	1	9871	441.9	4.55
46.5	2	6765	368	5.45
45	5	4842	241	4.96
44	4	4315	245.5	5.69
43.5	3	8449	302.5	3.58
33	6	5023	232	4.62

TABLE 75.

Width of Udder

Width	No.	Milk	Fat	%Fat
27	1	9871	441.9	4.55
27	5	4842	241	4.96
26	4	4315	245.5	5.69
24	3	8449	302.5	3.58
23	6	5023	232	4.62
21	2	6765	368	5.45

GURNSEYS

TABLE 76.

Depth of Udder

Depth	No.	Milk	Fat	%Fat
33	1	9871	441.9	4.55
30	3	8449	302.5	3.58
25	5	4842	241	4.96
24	4	4315	245.5	5.69
22	2	6765	368	5.45
21	6	5023	232	4.62

TABLE 77.

Length of Veins

Length	No.	Milk	Fat	%Fat
53.5	2	6765	368	5.45
48	3	8449	302.5	3.58
46	1	9871	441.9	4.55
44.5	5	4842	241	4.96
40	6	5023	232	4.62
38.5	4	4315	245.5	5.69

TABLE 78.

Diam. of Veins

Diam.	No.	Milk	Fat	%Fat
2.95	1	9871	441.9	4.55
2.67	2	6765	368	5.45
2.3	5	4842	241	4.96
1.95	3	8449	302.5	3.58
1.95	4	4315	245.5	5.69
1.90	6	5023	232	4.62

TABLE 79.

Diam. of Wells

Diam.	No.	Milk	Fat	%Fat
1.0	2	6765	368	5.45
.95	1	9871	441.9	4.55
.90	3	8449	302.5	3.58
.90	4	4315	245.5	5.69
.85	5	4842	241	4.96
.75	6	5023	232	4.62

TABLE 80.

GURNSEYS

Height at withers	Height	Milk	Fat	%Fat
General average	125.6	6544	305.1	4.60
Average class A	129.1	6685	303.8	4.69
Average class B.	122.0	6403	306.4	4.78

Height at hips	Height	Milk	Fat	%Fat
General average	128	6544	305.1	4.60
Average class A.	131.1	6685	303.8	4.69
Average class B.	124.8	6403	306.4	4.78

Length of Back	Length	Milk	Fat	%Fat
General average	89.3	6544	305.1	4.60
Average class A.	92	6685	303.8	4.69
Average class B.	86.2	6403	306.4	4.78

Width of Hips	Width	Milk	Fat	%Fat
General average	51.2	6544	305.1	4.60
Average class A.	53.5	7721	328.4	4.25
Average class B.	49.0	5367	281.8	5.25

Width of Thurls	Width	Milk	Fat	%Fat
General average	43.5	6544	305.1	4.60
Average class A.	44.8	5367	281.8	5.25
Average class B.	42.1	7721	328.4	4.25

Length of Rump	Length	Milk	Fat	%Fat
General average	49.4	6544	305.1	4.60
Average class A.	51.1	6685	303.8	4.69
Average class B.	47.6	6403	306.4	4.78

TABLE 80 (Continued)

GURNSEYS

Circ. of Chest	Circ.	Milk	Fat	%Fat
General average	179	6544	305.1	4.60
Average class A.	185	6685	303.8	4.69
Average class B.	173	6403	306.4	4.78

Circ. of Barrel	Circ.	Milk	Fat	%Fat
General average	223	6544	305.1	4.60
Average class A.	231	7159	383.6	5.35
Average class B.	215	5929	260.0	4.39

Depth of Chest	Depth	Milk	Fat	%Fat
General average	69.2	6544	305.1	4.60
Average class A.	71.0	6685	303.6	4.69
Average class B.	67.5	6403	306.4	4.78

Depth of Barrel	Depth	Milk	Fat	%Fat
General average	72.8	6544	305.1	4.60
Average class A.	74.8	6685	303.8	4.69
Average class B.	70.8	6403	306.4	4.78

Width of Chest	Width	Milk	Fat	%Fat
General average	43.1	6544	305.1	4.60
Average class A.	44.8	6685	303.8	4.69
Average class B.	41.5	6403	306.4	4.78

Width of Barrel	Width	Milk	Fat	%Fat
General average	69.1	6544	305.1	4.60
Average class A.	72.8	7159	383.6	5.35
Average class B.	65.3	5929	260.0	4.39

TABLE 80. (Continued)

GURNSEYS

Length of Udder	Length	Milk	Fat	%Fat
General average	43.1	6544	305.1	4.60
Average class A.	46.2	7159	383.6	5.35
Average class B.	40.1	5929	260.0	4.39

Width of Udder	Width	Milk	Fat	%Fat
General average	24.6	6544	305.1	4.60
Average class A.	26.6	6376	309.4	4.85
Average class B.	22.6	6746	300.8	4.45

Depth of Udder	Depth	Milk	Fat	%Fat
General average	25,8	6544	305.1	4.60
Average class A.	29.3	7721	328.4	4.25
Average class B.	22.3	5367	281.8	5.25

Length of Veins	Length	Milk	Fat	%Fat
General average	45.1	6544	305.1	4.60
Average class A.	49.1	8295	370.8	4.47
Average class B.	41.0	4726	239.5	5.07

Diam. of Veins	Diam.	Milk	Fat	%Fat
General average	2.28	6544	305.1	4.60
Average class A.	2.62	7159	383.6	5.35
Average class B.	1.93	5929	260.0	4.39

Diam. of Wells	Diam.	Milk	Fat	%Fat
General average	.89	6544	305.1	4.60
Average class A.	.95	8295	370.8	4.47
Average class B.	.83	4726	239.5	5.07

TABLE 81.

Measurements by Professor Eckles.
JERSEYS

1	1	2	3	4	5	6	7	8	9
2	8-10	9-4	5-4	6-4	8-7	5-6	5-11	11-3	7-4
3	945	900	970	730	975	930	875	825	775
4	121	115	121.5	125	124	124	128.5	122.5	116.5
5	119	116	121	126	123	124.5	129	124	117
6	117	114.5	118.5	124.5	120	121.5	126.5	122	115
7	68.5	66	65.5	66.5	68.5	70	71	69.5	67
8	36	35.5	44.5	36.5	34	41.5	41	32	33.5
9	51	47	54.5	49	51.5	51.5	52	47	49
10	37	33	37	36	36	35.5	36.5	35.5	34.5
11	50	50	48	49	50	48	50	49	49
12	19	19	20	18	19	20	20	18	19
13	45	44	44	44	43	43	42	43	42
14	51	48	50	54	57	51	58	55	49
15	83	84	88	90	88	90	89	90	89
16	33	32	30	33	33	30	37	35	30
17	106	105	110	111	114	111	115	115	112
18	105	145	153	153	155	150	162	155	150
19	46	46	46	49	50	47	50	47	44
20	32	35	36	30	33	31	30	36	32
21	173	165	177	167	170	176	177	167	168
22	209	221	225	194	185	219	193	201	207
23	15	15	15.5	15	15	15	16	15	15
24	17	16.5	17.5	16.5	16.5	17	17.5	17	16.5
25	13895	12729	11063	8137	6773	6594	6077	7669	6739
26	680.7	633.9	605.6	398.4	375.9	371.5	370.1	342.8	331.0
27	4.89	4.98	5.47	4.89	5.50	5.63	6.10	4.60	4.91

TABLE 81 (Continued)

Measurements by Professor Eckles.

JERSEYS

1	10	11	12	13	14	15	16	17	18
2	8-6	4-4	10-1	4-10	3-7	3-7	3-6	5-8	2-7
3	905	875	1155	905	690	810	835	925	603
4	122.5	123.5	124.5	121.5	118.5	123	124.5	120.5	115.5
5	124.5	122.5	127	123.5	120.5	124.5	127.5	120	119
6	121.5	121	125.5	122	117.5	122.5	126	118	117
7	68.5	68.5	73	66.5	61.5	66	67	69.5	59.5
8	43.5	48.5	41.5	45.5	32.5	44	35.5	38.5	34
9	52.5	51	53	55	47	50.5	49.5	54.5	43
10	35	38	36.5	36	34	36.5	38	36.5	30.5
11	49	49	49	48	47	49	46	48	47
12	19	19	19	20	19	20	19.5	20	19
13	42	42	45	42	40	42	41	42	37
14	55	50	56	50	48	48	47	53	41
15	92	87	90	87	87	88	93	85	83
16	33	31	32	33	28	29	33	33	31
17	112	115	116	118	109	109	116	110	101
18	152	156	160	159	148	149	151	155	138
19	47	46	43	47	44	46	47	47	42
20	33	31	35	33	34	35	34	30	31
21	178	173	185	178	155	167	167	178	153
22	221	221	237	220	195	198	201	210	180
23	15	15	16	15	14.5	15	15	15	14
24	17	16.5	18	17	16	16.5	17	16.5	16
25	7213	7300	6160	6241	5803	4927	4854	4345	3796
26	313.7	311.7	290.5	289.5	281.4	255.7	251.4	204	192.4
27	4.30	4.27	4.71	4.64	4.85	5.19	5.18	4.77	5.07

TABLE 82
Measurements by Professor Eckles.

HOLSTEINS

1	1	2	3	4	5	6
2	6-6	8-7	6-8	6-9	3-7	3-8
3	1225	1440	1500	1120	1080	1095
4	131.5	139.5	143.5	132.5	134	135.5
5	136.5	140	143.5	134	136	137.5
6	133	136	141	132.5	133	136
7	74.5	77.5	76.5	73	71	71
8	39.5	46	44	42	43.5	49.5
9	55.5	56.5	56.5	56	55	55.5
10	38.5	49	43.5	41.5	39.5	36
11	53	55	54	52	51	46
12	20	21	20	20	20	21.5
13	48	50	47	49	45	50
14	65	60	63	63	52	51
15	102	100	100	95	100	104
16	33	37	38	33	34	33
17	122	131	127	123	121	123
18	160	178	175	166	168	167
19	50	51	55	50	51	47.5
20	42	41	36	39	37	37
21	189	198	193	185	183	181
22	228	238	227	235	213	215
23	16.5	18.5	18.5	17.5	17.5	18
24	19	20.5	20	20	19.5	20.5
25	26825	18405	12336	8629	7212	6351
26	739.1	618.2	430.6	281.4	261.6	221
27	2.75	3.41	3.49	3.26	3.63	3.48

TABLE 83.

HOLSTEINS

Arranged according to butter fat records.

	Milk	Fat	%Fat
General Average	13292	441.9	3.32
Average Class A.	19188	595.9	3.10
Average Class B.	7397	254.6	3.44

Measurements	General Average	Average Class A	Average Class B
Weight	1243	1385	1098
Height at withers	136	138.1	134
Height at croup	137.9	140	139
Height at Hip points	135.2	137	133.8
Depth of Chest	73.9	76.1	71.6
Width of Chest	44	43.1	45
Width of Hips	58.3	56.1	55.5
Width of loin	41.3	40.3	39
Pole to muzzle	51.9	54	49
Width of forehead	20.4	20.3	20.5
Circ. of muzzle	48.1	48.3	48
Base of horns to withers	59	62.6	55.3
Highest point of withers to hips	100.1	100.6	99.6
Hips to tail	34.6	36	33.3
Shoulder points to hip points	124.3	126.6	122.3
Shoulder points to ischium	169	171	167
Hips to last rib	38.6	39.6	37.6
Heart girth	188	193.3	183
Paunch girth	226	231	221
Smallest circ. of shin bone front leg	17.7	17.8	17.6
Smallest circ. of shin bone hind leg	19.7	19.8	20
Point of hip to ischium	50.7	52	49.5

TABLE 84

JERSEYS

Arranged according to butter fat records

	Milk	Fat	%Fat
General Average	7239	380.4	5.25
Average Class A.	8853	456.4	5.15
Average Class B.	5626	304.2	5.40

Measurements	General Average	Average Class A	Average Class B
Weight	868.7	880.5	856
Height at withers	121.7	122	121.5
Height at croup	122.7	122.1	123.2
Height at hip points	120.6	119.9	121.2
Depth of chest	67.2	68	66.6
Width of chest	38.9	33.1	44.7
Width of hips	50.4	50.3	50.6
Width of loin	35.6	35.6	35.6
Pole to muzzle	48.6	49.2	48
Width of forehead	19.2	19.1	19.4
Circ. of muzzle	42.4	43.3	41.4
Base of horns to withers	51.1	52.5	49.8
Highest point of withers to hips	87.9	87.9	88
Hips to tail	32	32.5	30.4
Shoulder points to hip points	111.4	111	111.8
Shoulder points to ischium	149.8	147.5	152
Hips to last rib	32.8	32.8	32.9
Heart girth	148.5	171.1	170.4
Paunch girth	207.6	206	209.2
Smallest circ. of shin bone front leg	15	15.1	14.9
Smallest circ.of shin bone hind leg	16.8	18.9	16.7
Point of hip to ischium	46.3	47.2	45.4

TABLE 85.

From Dr. Attinger.
Arrangement according to:-

Class A represents best 50; Class B, poorest 50

1. Withers	Height	Milk 365 da.	Lbs.Fat	%Fat
Gen.ave.Class A.	135.5	7064	258.5	3.66
Gen.ave.Class B.	131.2	6611	243.2	3.71
Ave.10 Best Class A.	139.4	7647	286.4	3.74
Ave.10 Poorest Class A.	132.8	6888	254.7	3.69
Ave.10 Best Class B.	132.0	6334	242.8	3.83
Ave.10 Poorest Class B.	126.4	6978	250.7	3.59

2. Body	Length	Milk 365 da.	Lbs.Fat	%Fat
Gen.ave.Class A.	164.6	6949	255.7	3.68
Gen.ave.Class B.	159.9	6743	248.5	3.69
Ave.10 Best Class A.	170.4	6600	262.6	3.98
Ave.10 Poorest Class A.	159.7	6895	258.0	3.74
Ave.10 Best Class B.	158.2	7255	280.0	3.87
Ave.10 Poorest Class B.	152.4	6215	223.7	3.59

3. Chest	Width	Milk 365 da.	Lbs.Fat	%Fat
Gen.ave.Class A.	49.2	7262	267.0	3.68
Gen.ave.Class B.	42.9	6430	237.2	3.69
Ave.10 Best Class A.	53.5	8214	309.5	3.79
Ave.10 Poorest Class A.	45.9	6925	260.7	3.76
Ave.10 Best Class B.	45.0	7425	264.5	3.57
Ave.10 Poorest Class B.	39.4	5867	209.3	3.58

4. Chest.	Depth	Milk 365 da.	Lbs.Fat	%Fat
Gen.ave.Class A.	71.7	7262	268.6	3.70
Gen.ave.Class B.	67.7	6430	236.6	3.68
Ave.10 Best Class A.	73.6	7733	281.0	3.76
Ave.10 Poorest Class A.	69.7	7421	256.9	3.47
Ave.10 Best Class B.	69.0	7354	269.3	3.66
Ave.10 Poorest Class B.	66.0	5649	208.9	3.69

5. Back.	Width	Milk 365 da.	Lbs.Fat	%Fat
Gen.ave.Class A.	49.8	7315	269.1	3.68
Gen.ave.Class B.	46.4	6375	245.2	3.69
Ave.10 Best ClassA.	51.4	7968	295.5	3.70
Ave.10 Poorest Class A.	48.4	7418	273.9	3.69
Ave.10 Best Class B.	47.9	6715	248.9	3.70
Ave.10 Poorest Class B.	44.5	6316	229.9	3.59

TABLE 86.

From Dr. Attinger.

Cows with two calves. 13 animals.

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 3	8256	134.8	134.0	138	139.1
Ave. Lowest 3	4515	133.1	132.3	136	136.6

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 3	161.5	42.3	70.1	43.3
Ave. Lowest 3	157.3	42.5	68.5	47.1

Cows with three calves. 16 animals

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 3	8628	132.5	131.8	135.8	135.3
Ave. Lowest 3	4637	131.6	130.0	135.3	136.3

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 3	157.0	45	69.3	48.0
Ave. Lowest 3	161.3	49	70.8	46.6

Cows with four calves. 27 animals.

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 5	9211	135.0	132.9	137.1	137.6
Ave. Lowest 5	5149	134.6	131.9	136.9	140.2

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 5	162.8	50.4	72.1	50.1
Ave. Lowest 5	163.9	43.7	71.2	49.6

TABLE 86.
From Dr. Attinger.

Cows with five calves. 14 animals.

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 3	8160	133.8	131.6	136	137.3
Ave. Lowest 3	5009	131.3	127.3	132	134.8

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 3	162.0	51.6	72.6	48.6
Ave. Lowest 3	157.8	42.0	67.0	46.6

Cows with six calves. 15 animals.

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 3	9512	136.1	132.1	137.3	140.5
Ave. Lowest 3	4835	132.1	129.5	137.1	137.8

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 3	162.3	48.6	71.5	49.1
Ave. Lowest 3	162.3	43.3	68.6	47.5

Cows with seven calves. 5 animals.

	Milk Record	Height Withers	Height Back	Height Rump	Height Tail Head
Ave.Highest 2	8575	129.7	131.7	134.7	134.7
Ave. Lowest 2	4492	131.5	133.5	137.2	137.2

	Length Body	Width Chest	Depth Chest	Width Back
Ave.Highest 2	163	44.5	69.0	48.2
Ave. Lowest 2	161	39.5	67.7	47.2