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THE RELATION OF TYPE AND CONFORMATION
TO PRODUCTION IN DAIRY CATTLE

by

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THE RELATION OF TYPE AND CONFORMATION
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INTRODUCTION

There are approximately 21,000,000 cows used for dairy purposes in the United States at the present time. Statistics show that one-third of these are unprofitable as producers of milk and butterfat. This has led to the necessity of some means for determining which cows are profitable and which are kept at a loss.

There are two methods of judging the value of a dairy cow for milk production: (1) By keeping accurate records of her production, and (2) by her physical appearance. The first method is unquestionably of the greater value. However as yet, there are but few breeders who keep accurate records of the production of individual cows, and this leads to the necessity of selection by type or conformation.

It is a recognized fact that there is a dairy form or type that generally goes with large production. This type is sufficient as a rule to enable competent judges to select very good animals from inferior ones, although judging by conformation is always limited by the condition of the cow and the stage of lactation. Many breeders when selecting a cow for their herd look only to her pedigree and record of production. In this way a definite type of animal is overlooked in the belief that high producing animals will reproduce themselves.

Milk production is not a unit character. Many factors enter in to determine the amount of milk and butterfat a cow will produce. Some of these characters are latent so that their importance cannot be measured. Others are plainly evident in the external appearance of the cow. Just how important these characters are, and what is their relation to production is still a problem that confronts the breeder and student of dairy cattle.

The object of this investigation is to determine so far as possible how much importance should be attached to form and type in the selection of dairy cows and to what extent type may be expressed by definite measurements.

A GENERAL CONSIDERATION OF THE RELATION OF
FORM TO FUNCTION IN DAIRY CATTLE.

LITERATURE.

The type and conformation of the dairy cow has received much attention by the writers of text books on this subject, and all associate high production with a certain type of animal.

The function of the cow in her wild state was not to produce food for man, but to supply sufficient milk for her young until old enough to search out its own subsistence. The dairy cow of today is to some extent an artificial animal, possessing the ability to produce a quantity of milk and butterfat, far in excess of the normal of the species, as a result of generations of selection and breeding. The production of milk is a function of motherhood and this function still remains although it has been developed to a greater degree.

Some investigators in attempting to establish a more definite conception of dairy type have

taken measurements and made observations on a large number of animals. The plan of work of these men will be considered first and their conclusions will be grouped under separate headings.

The following data has been collected by most investigators:

1. Age of cow	5. Height at withers and croup
2. Breed	6. Width, depth and circumference of chest.
3. Body Weight	7. Width, depth and circumference of barrel.
4. Length of body.	8. Milk and butterfat record.

In addition to the above data, Dr. Attinger¹ collected the following information on 100 cows:-
Score according to the Allgau method and observations on the fineness of hair, quality of skin, size of milk veins, and size of milk wells.

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 indication of thrift	5
Hind quarters . . .	12	Skin and hair	5
Bone	12		

The cows were divided into two groups according to measurements; the cows with the larger measurements in Class A and those with the smaller measurements in Class B. Comparison was also made of the ten best and ten poorest animals in each group.

Dr. Attinger also measured the circumference of chest and width and depth of chest of 38 steers before slaughtering and later weighed the heart and lungs after slaughtering to compare the size of chest to the size of the heart and lungs.

Together with the data noted previously Dr. Kronacher² collected the following data on 100 Baden and Swiss cows. He explains that the Baden cows are a boarse boned breed used for both work and milk.

Length of forehead	Distance from curl of forehead to a horizontal line across the eyes.
Length of nose.	
Width of forehead	Thickness of pole
Width of pelvis in front.	Curvature of rib.
Width of pelvis in back.	Droop in underline.
Width of thurls.	Position and slant of backbone.
Length of pelvis.	Length and attachment of tail.

Length of legs.	Distance between vertebrae
Width of muzzle	Form, shape and position of limbs.
Distance from hip to last rib.	
Circumference of shank of fore and hind leg.	
Size of left hunger hollow.	
Size of horns, shape and strength of horns.	
Marking by horn rings.	
Size of udder.	
Quality and flexibility of hide and hair.	

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Dr. Schmidt compiled the data collected by Bogdanow, Stegman, Kleberger and Attinger. In addition to the data noted previously it consisted of the following measurements:

Length of neck.	Length of head.
Length of shoulder	Width of forehead
Width of hips.	Size of horns.
Width of pinbones.	Circumference of hind leg.

All measurements were worked out in proportion to height at withers.

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Dr. H. Rodenwald in taking the figures which Dr. Schmidt compiled has attempted a mathematical description of the milk producing power of a cow. He states that as body weight and linear dimensions are intra-dependent, nothing can be made by modifying

the equations as to include body measurements. His calculations indicate that milk production is a function of live weight and can best be represented by the formula: Milk production = $17.4 - 0.01933$ Live Weight. The results obtained by computing milk yield from this equation agree to a large extent with actual observations and with results obtained by computing yields from equations which include a number of body measurements.

J. Reimers⁵ correlated production with measurements on 300 Friesian cows, $2\frac{1}{2}$ to 3 years old.

H. M. Kroon⁶ and C. J. Rab collected the following data on 100 Holstein cows.

Length of head.	Length of horn.
Breadth of forehead.	Quality of ear.
Shape of poll	Hair growth on the head and poll.
Thickness of horn at base.	Size of nose and mouth.
Color and quality of horn.	Color of nostril.

The cows were grouped into ten classes according to milk yield (2,000 to 7,000 kg.) and milk fat record (80 to 240 kg) with a resulting classification giving the number of cows in each class as follows.

As to Milk yield, 5, 5, 16, 17, 22, 22, 8, 3, 1, 1

As to butterfat record 9, 15, 17, 17, 23, 12, 5, 1, 1, 0.

Mr. A. R. Mann⁷ compiled the measurements of 210 animals four years old and over. The majority of his figures were taken from the Holstein-Friesian Advanced Registry, when cows were admitted upon measurements. He made comparison of measurements as follows:

Height of shoulders to height of hips.

Length of rump to length of body.

Height of shoulders to length of body.

Height of shoulders to circumference of chest.

Together with data noted previously, McNatt⁸ and McKellip collected the following measurements on 300 cows of the Holstein, Jersey and Guernsey breeds.

Length of head from top of pole to end of nose.

Width at the eyes.

Muzzle circumference just above the nostrils.

Circumference of jaws measured around the heaviest parts and just over the eyes.

Length of neck from poll of head to where it joined the withers.

Circumference at junction of head.

Breast depth from highest point of withers to lowest point of brisket.

Width between front legs.

Distance between shoulder points.

The flank girth.

Distance from hip point to last rib.

Distance from udder to last well.

Width of hips.

Length of rump.

Length of tail.

Width of thurls,

Judgment was passed on the size, shape and quality of udder, size and form of milk veins, size of milk wells, texture and flexibility of the hide and hair.

The results of their investigations were worked out in ratios in order to get the relation between points of conformation and milk production. Ratios were made on measurements that are commonly thought to have a relation to each other.

Together with the data noted previously, Jensen collected the following measurements on 88 animals representing the Holstein, Jersey, Guernsey and Ayrshire breeds.

Width at hips.

Width of thurls.

Length of rump.

Length, width and depth of udder.

Length of veins.

Distance from udder to first well.

Diameter of milk veins.

Score according to the breed score card.

He also used measurements taken by Prof. C. H. Eckles of 18 Jerseys and 6 Holsteins. The breeds were considered separately. Each one was divided into two classes, Class A representing the group of animals with the larger measurements, and Class B the group with the smaller measurements.

Two thousand years ago an old Arab said "Form is everything to purpose". We now know that this is only true in part. Later authorities have advanced the contrary opinion that form is the result of function: that an animal has a certain inherited tendency and as a result of this inheritance assumes a fairly definite form.

The terms "type" and "temperament" have come to mean much the same thing, although in a technical sense there is quite a distinction in their use. Gay¹⁶ defines them as follows: "Type is the sum total of those features, the possession of which enables an individual to meet the definite requirements of special service or production." "Temperament is the term by which the nature of the nerve control over

the functions in general is designated." These two terms will be discussed separately.

TEMPERAMENT -- The dairy cow is essentially a cow of nervous temperament. This is indicated by the absence of any tendency to beefiness, the spare condition associated with dairy capacity, an open loose made frame especially in the chine and evidence of nerve force as expressed by the eye. It does not imply that a cow is restless but rather that she is resourceful in nerve energy. The importance attached to temperament in selecting a cow is emphasized by Governor Hoard when he said; "Temperament governs function and function governs form."

TYPE -- Dairy type is a general term and will be discussed first in a general way and then under sub-headings. We have no concise meaning of the term although its use among dairymen signifies a certain shape and form of animal recognized as associating that animal with the power to produce milk and butter-fat.

Score cards have been formulated by different breed associations to designate the stress put upon different points of conformation by admirers of

that breed. A scale of points when properly used will show the degree of perfection in an animal of the breed for which the score card is designed. It is reasonable to assume that the form of animal which goes with high production in one breed would also be the form characteristic of the better animals of other dairy breeds. However, an examination of the score cards for the different breeds shows a wide variation in the importance assigned to different points of conformation. For instance, the Holstein score card allows 12 points for the udder, the Jersey 28, the Guernsey 20 and the Ayrshire 22. The purpose of a score card should be to represent the ideal and the ideal is the cow that combines those characters that go with the greatest production. If udder is worth 28 percent in one breed, it would seem that it should have the same value in other breeds.

Several attempts have been made to explain the meaning of dairy type. When the Holstein-Friesian Breeders Association adopted the system of testing cows for production, it also required that all cows whose records qualified them for the Advanced Registry should be measured according to a standard

prescribed method. This practice was followed for several years, and a large number of measurements were taken, but these measurements have never been correlated in such a way as to formulate a Holstein type.

The Guernsey Breeders Association a few years ago appropriated a sum of money to employ a representative who would make a study of animals of that breed and thus establish a definite type of animal, but no satisfactory plan for the work could be formulated, and the matter was dropped. At present, breeders in general agree with reference to the type of animal but the limits of this type are very wide. The general features noted are:

1. The ¹⁵ extreme angular form, carrying no surplus flesh, but showing evidence of liberal feeding in her vigorous physical condition.
2. The extraordinary development of the udder and milk veins.
3. The marked development of the barrel in proportion to the size of the animal.

Professor Beach¹¹ and Professor Haecker¹⁰ each found that the largest as well as the most economical producers of milk and butterfat were cows spare

and angular in form with deep bodies, whereas the cows blocky and plump were the poorer producers.

Dr. Attinger¹⁸ found that the highest producers had straight backs; also that the line of back was sloping from croup to withers. The score according to the Allgau method compared very well on the average with the milk production.

Without claiming it as an indication of milking qualities, Dr. Kronacher¹⁹ found that a slightly swayed back often goes with high milk production. There was no relation between the shape of withers and production. Scoring gave negative results. Jensen²⁰ found that many of the low producing cows were high scoring, although on the average scoring compared quite favorably with production. McNatt²¹ and McKellip found that the heavier producers do not show the greatest wedge shape in barrel conformation. The best Holsteins had relatively the shortest tails, while the best Guernseys had the longest tails, and with the Jerseys there was no relation.

A long level rump is desired by breeders, probably more for looks than because it is essential for a high producing dairy cow. Sharp withers are

associated with sparseness of form. A long slender neck and a head of pleasing contour are given preference, especially in the show ring. In the past, attention has been given to such points as length of tail, curls on the flank and thighs, and color of the skin and hair; but at the present time these receive little or no attention.

SIZE --- Professor Woll¹² compared the records of 355 cows, consisting of 145 Holsteins, 75 Jerseys and 135 Guernseys, with their body weights. He found that the heavier cows were the larger producers. His conclusions are that "large animals within a breed are, on the whole, preferable to small ones and may be depended on, as a general proposition, to make both the largest and most economical production of dairy products for their owners."

J. Peters¹⁷ compared the body weight of 1938 cows in the herd book with their records. The heavier animals were found to give the larger milk yields, although the lighter animals had the higher percentage of fat.

Size as measured by weight or skeletal dimensions has been found by most investigators to have a definite relation to production, the larger

animals being the higher producers. Dr. Kronacher, on the contrary, found that the highest milk production goes with smaller body weight and smaller height at withers. This is probably due to the class of animals measured, part of which were used for both draft and dairy purposes. He explains that these cattle are different from the breeds of lowland cattle.

²²
J. Reimers found a correlation between the milk yield and the length of body up to a certain point, beyond which the reverse seemed to be true. Abnormal length of body apparently is more often associated with a lower milk secretion.

CONSTITUTION -- Governor Hoard has defined constitution as "The power to endure to the end within the line and limitation of purpose." Its importance is recognized by breeders, although little definite work has been done to prove that it is necessary among dairy animals. The indications of constitution are a large chest, large open nostrils, long well arched ribs, a sleek coat, an expression of vigor in the eye and countenance, and a general appearance of thrift. It represents such capacity of the vital functions, respiration, circulation and digestion especially, as will insure longevity, fecundity and

maximum efficiency in performance or production.

It has been found by all investigators that a large chest goes with high production. Depth is of more importance than width. Dr. Attinger found that the animals with the larger chest girth had the heavier heart and lungs.

CAPACITY -- The breeder of dairy cows associates capacity with the equipment of a cow to consume large quantities of feed. It consists of a wide muzzle and a large barrel. The barrel is that portion of a cow between two vertical planes, one just behind the shoulders and the other at the hook points. It has been found by most investigators that high production is correlated with a long, wide and deep barrel. McNatt²³ and McKellip found the best Guernseys to have the shorter barrel. Jensen²⁴ found the best animals of all breeds, except the Guernseys, to have the deeper barrels and all except the Ayrshires to have barrels of greater width.

QUALITY -- Quality in a dairy cow is indicated by a hide of medium thickness, loose, pliable and unctuous, covered with a medium coat of fine, straight lustrous hair, a high grade of bone noted in a fine head, smooth shoulders, hooks, pin bones and tail

head and sharply defined joints, horn of medium size, and dense smooth texture. Coarseness is especially indicated in the parts enumerated and in a general absence of refinement. Quality of cow and quality of milk are not correlated exactly, yet the refinement of structure manifested in the cow may have a definite bearing on productiveness. A fine texture of udder is also considered as an indication of quality.

Thickness and flexibility of skin were found of no significance by Attinger²⁵ and Kronacher²⁶. On the other hand, Dr. Schmidt,²⁷ and McNatt²⁸ and McKellip found that a fine flexible hide and fine hair were most common among the high producers. Kroon²⁹ and Rab found the size of horn color of horn, quality of ear and hair growth about the head to be correlated with high production. Size of bone has been found of no significance.

MAMMARY SYSTEM -- The Vermont¹³ Experiment Station collected data on 34 cows, classifying them according to the udder characteristics into groups as follows: five well balanced, eighteen fairly well balanced, and eleven poorly balanced. Of those examined, four of the five best were cows

whose production was higher than the average of the eighteen fairly balanced. Eight of the eleven poorest were below the average of the eighteen fairly balanced. The conclusion was drawn that the shape of the udder is of importance in selecting a cow.

Dr. Kronacher³⁰ states that "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 and a fine, light skin easily moved over the udder." He quotes from R. Koch, "It is certain that next in importance after the size of udder comes the so-called milk veins and milk wells. To be sure these cannot be taken as an absolutely certain indication of high milk production. Large capacity in milk veins and large milk wells are superior indications of high capacity if the udder at the same time is rich in glandular substance, that is, a good secreting gland."

Jensen³¹ found the length and depth of udder of more importance than width. Length of milk veins had no importance but size and tortuousness of veins and size of milk wells were indications of production.

McNatt³² and McKellip state that among the cows they measured the majority of the good cows had balanced udders and those lacking in this respect must have the deficiency made up in capacity. They found that the best producers are more inclined to very large milk veins, and especially to very large right veins.

HIND QUARTERS -- The Vermont¹⁴ Experiment Station collected data on 88 cows to determine the relation between the escutcheon and milk production. The cows were classified according to the Guenon system. The variation between the prediction of this system and the actual milk yield ranged from fifteen pounds below to twenty-seven pounds above prediction. The conclusion was that there is no relation between the escutcheon and milk production.

Dr. Schmidt³³ concludes that a "Well developed udder gland, large veins and wells, fine flexible hide and wide escutcheon when taken together, are good indications."

Other investigators have found the escutcheon of no value in determining milk producing ability.

McNatt³⁴ and McKellip found the length of rump in the Holsteins and the width of hips and width of thurls in all breeds to have a definite relation to production. Jensen³⁵ also found that the width of hips and the width of thurls were valuable indications of milk producing ability.

EXPERIMENTAL DATA.

In this investigation, measurements and observations of one-hundred and forty-five animals were used. Ninety-six of these were measured by the author. They represent pure bred and high grade Jerseys in the Barnesville (Ohio) Cow Testing Association. The other data consists of measurements of fourteen Holsteins and thirty-five Jerseys that have been collected at intervals of cows in the herd of the University of Missouri.

By taking trial measurements it was found that the measurements of the barrel were affected by advanced pregnancy and by feeding and watering. For this reason no cows were measured that had been bred over 180 days, and none were measured immediately after both feeding and watering. It was the intention to take all measurements after feeding and before watering, but in two herds the measurements were taken just before feeding, although the cows had been watered four hours before.

EXPLANATION OF DATA -- Tables 1, 32, and 35 contain the original data of each cow. The cows were

first arranged according to butterfat production, the one with the largest record being first. They were then arranged according to measurements, the cow with the largest measurement being first. The breeds are considered separately, and the Jerseys in the University of Missouri herd are also taken up separately from those in the Barnesville Cow Testing Association. The latter group will be considered first.

The cows were divided into four groups, (I, II, III, and IV) of twenty-four each when arranged according to production, and comparison was made of the average measurements. The best forty-eight were compared with the poorest forty-eight, and the best ten with the poorest ten. A summary of these comparisons is given in Table 2..

Groups A, B, C, and D represent the cows divided into groups of twenty-four each when arranged according to measurements. Comparison was made of the average measurements and the production of butterfat of each group; also of the largest forty-eight with the smallest forty-eight and the largest ten with the smallest ten.

Tables 3 to 12 show some of the arrangements according to measurements. These tables are given for the purpose of showing how much or how little regularity there is in the correlation of measurements of individual cows with their butterfat production. A summary of the different groupings is given in Table 14.

Comparisons of measurements were then made to determine whether the cows having the larger measurements were larger producers because of size. In making these comparisons the aim was to use those measurements which governed size most, as height at withers, height at croup, width of hips, and depth of chest, and compare to them the measurements that seemed to have a definite correlation to production. These comparisons are given in Tables 17 to 30.

The number of each class of observations coming in the different groups when arranged according to production is given in Table 15. The observations on the individual cows were arranged similar to the measurements. The average amount of butterfat produced by the cows in each class of observations, A, B and C is given in Table 16.

The relation between the droop of rump and the shape of fore udder is given in Tables 31 and 37.

Table 13 shows the ranking of the individual cows when arranged according to measurements.

University of Missouri Cows.

Jerseys -- When arranged according to production the cows were divided into four groups with 9, 8, 9 and 9 cows respectively in each group. Comparison was made of these groups and also of the best seventeen with the poorest eighteen. The average measurements of each group are given in Table 33. When arranged according to measurements they are divided into four groups A, B, C and D. The average measurements and production for these groups and also for the best seventeen and poorest eighteen are given in Table 34.

Holsteins -- The average measurements of the best seven cows are compared with the measurements of the poorest seven in Table 36. When arranged according to measurements the largest seven and their butterfat records are compared with the poorest seven and their records. These are summarized in Table 36.

FIGURE 1.

The measuring standards consist of two brass tubes, A and B, each one meter long, and two parallel rods C and D. The tube A is calibrated in centimeters and fits snugly in B so that it can be raised or lowered, but will still rest at any height. The rod C is at right angles to A and is fitted with a level to make the standards plumb in measuring.

When taking other than height measurements the tube B is removed and the rod D is used parallel to C. At the end of D is a tee which fits as closely as possible to the tube A, but so that it can be moved up or down.

FIGURE 2.

This figure represents the sliding rule used in measuring the depth of milk veins. The piece B is placed against the abdomen of the cow and the piece A is shifted until it just touches the vein. The depth is read from the scale on B.

FIGURE 3.

These calipers were used to measure the width of milk veins. The ends are made wide to give more surface against the vein. By using a rule the width was measured as the distance between the two flat surfaces.

FIGURE 4.

One of the plugs used in measuring the diameter of milk wells. A number of these plugs were used, varying in size from .5 cm. to 2.0 cm in diameter.

DIAGRAM SHOWING POINTS OF COW.

The following data was collected for each animal:

- A. Age at time of measuring.
 - B. Number of days since bred.
 - C. Estimated weight.
 - 1. The height at withers was taken with the standards at the highest point.
 - 2. The height at croup was taken with the standards at a point midway between the hook bones.
 - 3. The depth of chest was taken with the parallel standards just behind the elbow joints.
 - 4. The depth of barrel was taken with the parallel standards at the point of greatest circumference.
 - 5. The depth of barrel at the udder was taken at the point where the fore udder is attached to the abdomen. This is referred to as depth at udder.
 - 6. The width of chest was taken at the point of the smallest width just behind the shoulders.
 - 7. The width of barrel was taken with the parallel standards at the widest point.
 - 8. The width of hips was taken with the parallel standards from the outside of the hip bones.
 - 9. The width of thurls was taken with the parallel standards from the outside of the thurl bones.
-

10. The circumference of chest was taken with the tape just behind the elbow joints.
 11. The circumference of barrel was taken with the tape at the point of the greatest girth.
 12. The circumference of barrel at udder was taken with the tape at the point where the fore udder is attached to the abdomen and just in front of the hip bones. This is referred to as circumference at udder.
 13. The length of back was taken with the tape from the vertebra at the center of the junction of the shoulder blades to a point where a line between the hip bones intersects the back line.
 14. Length of rump was taken with the parallel standards from the center of the hip bone to the end of the pin bone.
 - 15 and 16. The diameter of the veins was determined by taking the width with the calipers (Fig. 3) and the depth with the sliding rule (Fig. 2) and taking the square root of the product of these two dimensions.
 - 17 and 18 . The diameter of the wells was taken by the use of a set of plugs (Fig. 4). The plugs were inserted in the well until the one was
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found that just fit into the opening.

OBSERVATIONS -- Observations were taken on the udder, tortuousness of milk veins and straightness of back. The animals examined were divided into three classes, A, B and C, with reference to each of these points.

19. Size of udder. Class A includes those having a large roomy udder; B, a medium large, and C a small udder.
 20. Shape of udder. Class A includes those showing an udder that is well balanced and approaches a semicircle in shape; B, represents those with a fairly well balanced udder; and C, those showing a decidedly unbalanced or very pendant udder.
 21. Shape of fore udder. Class A includes those with a fore udder that carries far forward on the abdomen, and is well filled out; B, those that lack sufficient development in this respect to be put in Class A; C represents those very lacking in length of udder or that are decidedly cut up between the halves.
 22. Quality of udder. Class A includes those cows with an udder that is very mellow and
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that will diminish much in size when milked out; B includes those having a mellow and elastic udder; and C includes those with a hard and meaty udder.

23 and 24. Tortuousness of veins. Class A includes those having a vein that is very tortuous, winding back and forth on the abdomen; B those with a less tortuous vein than Class A; C those having a straight or nearly straight vein from the udder to the milk well.

25. Straightness of back. A represents a back that is straight from withers to a line between the hip bones; B includes those having a slightly drooping back; and C, those with a decided sway back.

26. The droop of rump was determined by measuring the difference in height between the hip bone and the pin bone. When the pin bone was the highest it is designated by the plus sign.

27 to 30. Records of Production. This includes the amount of milk and butterfat produced, the average percent of butterfat and the cost of the feed eaten by the cow in one year.

Measurements taken of the University of Missouri herd. The following data was collected on thirty-five Jerseys and fourteen Holsteins.

- . . Number of cow
 - A. Age at time of measurements.
 - B. Weight.
 - 1. Height at withers.
 - 2. Height at croup.
 - 3. Height at hip points taken at the point from which all other measurements are taken, which is the top inner angle of the haunch.
 - 4. Depth of chest.
 - 5. Width of hips.
 - 6. Width of loin is taken at a spot located about four inches in front of the hips and straight across.
 - 7. Length from pole to point of muzzle is taken from the top of pole to the lowest line on muzzle.
 - 8. Width of forehead is taken at a spot about two inches above the eye of the animal.
 - 9. Circumference of muzzle is taken at the widest part of muzzle.
 - 10. Length of back.
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11. Length of rump.
 12. From point of hips to last rib is taken from a fixed point on the hips to the rib following a line parallel to the loin.
 13. Circumference of chest.
 14. Circumference of barrel.
 15. Smallest circumference of shin bone of fore leg.
 16. Smallest circumference of shin bone of hing leg.
 17. Milk record for one year.
 18. Percent of butterfat.
 19. Best butterfat record for one year.
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DISCUSSION OF DATA.

A summary of the measurements and production of animals by groups is given in Tables 14, 33, 34, 2, and 36 of the Appendix. Plates showing the relation between the measurements and production of individual cows accompanies the discussion of each point.

Weight -- An examination of the data shows that, as a general rule, the largest producing cows are the heaviest. The weights given for Jerseys in the Barnesville Cow Test Association are estimated and altho they may be inaccurate for individual animals, the tendency is to show a true proportion when a number of weights are averaged. The following summary shows the weights for the different groups:

Group	I	II	III	IV	Best Half	Poorest Half
Jerseys;	890	861	863	840	875	851

Herd of the University of Missouri.

Jerseys	887	898	880	887	890	883
Holsteins	--	---	---	---	1245	1219

These figures show that weight does not have any definite relation to production and the group of highest producers is not always composed of the heaviest

WEIGHT

Pounds of Butterfat

	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
<u>Pounds</u>							
650 to 700	*	*		*			
700 to 750				*			
750 to 800		*	*	* *	* *	*	
800 to 850		* *	* *	* *	*	* *	
850 to 900			* *	* *	** **	* *	*
900 to 950		*	* *	* *	* *	* *	
950 to 1000		*	* *	* *	* *		* *
1000 to 1050			*		*		
1050 to 1100					*		*
1100 to 1150					*		
1150 to 1200							*

animals. It is noted that with the University of Missouri Jerseys the average weight of the best and poorest groups is the same; Group II is the heaviest, and Group III is the lightest. In every comparison the best half is larger than the poorest half, although the difference is small. Among the first Jerseys measured the best 10 had an average weight of 917 pounds as compared with 805 pounds for the poorest 10.

The following summary shows the butterfat production of the different groups when arranged according to weight.

Group	A	B	C	D	Heaviest Half	Lightest Half
Weight	976	881	837	761	928	799
Record B.F.	301	301	255	272	301	263

Cows in the University of Missouri Herd.

Jerseys

Weight	1035	904	848	765	964	807
Record B.F.	420	420	356	381	420	373

Holsteins.

Weight	----	---	---	----	1305	1158
Record B.F.	--	---	----	----	509	461

The heaviest group in every case has the largest average production, when the heaviest half is

compared with the lightest half. Groups A and B in both cases have the same production, and Group C produced less than Group D. From Table 14 in the Appendix it will be noted that the difference between the heaviest 10 and the lightest 10 is much more striking, as the heaviest group produced 98 pounds of butterfat on the average more than the lightest group.

It can be seen from these figures that weight is of some importance, although it has not a definite relation to production even when the cows are grouped together. Of two cows having the same type and conformation the heavier animal in all probability would be the larger producer, although it may be said that in the selection of cows the scales would be a poor criterion of a cow's value. Some of the heaviest animals are poor producers and some below the average in weight are among the best producers.

These conclusions agree with the results of other investigators, all of whom except Dr. Kronacher state that the heaviest animals on the average are the largest producers. However, Dr. Kronacher worked with a draft and milk breed so that his results should not be compared with results ob-

tained from a study of dairy breeds.

Height -- Height at withers, hips and croup show much the same thing so these measurements will be taken up together. The average height for the different groups are given in the following summary;

Group	I	II	III	IV	Best 48	Poorest 48
Ht. at withers	122.2	: 119.0	: 121.4	: 119.7	: 120.6	:120.6
Ht. at croup	122.9	: 120.7	: 122.5	: 120.1	: 121.8	:121.3

The measurements for height at withers, hips and croup of the University of Missouri cows are summarized in Tables 33 and 36 of the Appendix. The best half is higher than the poorest half in every group except in height at withers with the Jerseys noted above. Group II is the smallest in one case and the largest in the other, and when divided into groups in this way there seems to be so little relation between height and production, it is concluded that the largest producers do not always have the greatest height. The best 10 are about 5 centimeters higher on the average than the poorest 10. The greatest difference is shown with the Holsteins between the best half and the poorest half, although

HEIGHT AT WITHERS

Pounds of Butterfat

<u>Height</u>	100	150	200	250	300	350	Above
	to 150	to 200	to 250	to 300	to 350	to 400	400
110 to 112				*	*		
112 to 114				*			
114 to 116		*	* *		*		
116 to 118	*		* * *	* * *	* * *		
118 to 120		* *	* * *	* * *	* * *	*	
120 to 122		*	* *	* * * *	* * * *	* *	*
122 to 124		* * *	* * *	* * * *	* * *	* *	
124 to 126			* *	* * *	* *	*	
126 to 128			* *		*	*	* *
128 to 130					*		*
130 to 132					*		*

HEIGHT AT CROUP

Pounds of Butterfat

	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
<u>Height</u>							
112 to 114					*		
114 to 116			*		* *		
116 to 118		* *	* * *	* * * *	* *	*	
118 to 120	*	*	* *	* * * *	* *		*
120 to 122		* *	* * *	* * * *	* * *	*	
122 to 124		*	* *	* * * *	* * * * * *	* *	
124 to 126		* *	* *	* * * *	* *	*	
126 to 128		*	*	*		* *	
128 to 130							*
130 to 132			*	*	*		* *
132 to 134				*	*		*
134 to 136					*		

this may be due to the few animals that were measured.

The production by groups when arranged according to measurements are summarized as follows.

Group	A	B	C	D	Largest 48	smallest 48
Ht. at withers	125.6	122.0	119.4	115.9	123.7	117.6
Record B. F.	314	257	301	257	286	279
Ht. at croup	126.5	122.5	120.0	116.6	124.5	118.8
Record B. F.	311	281	276	261	296	268

Height at croup seems to have a better defined relation to production than height at withers and hips, as the production decreases constantly with decreasing height. There is no relation between the height at withers and height at croup so that it cannot be said that a cow should be the higher at either of these points.

An examination of the height measurements shows that the largest half has, in every instance, greater average production than the smallest half. This is especially noted with the Holsteins. When divided into smaller groups this relation does not hold true, although Group A has the largest average production. The highest ten produced an average of 96 pounds more than the lowest ten.

These figures show that there is considerable difference in height between the maximum producers and low producers, but when a larger number of cows are averaged the difference is less striking. If one is looking for maximum production it would be well to look for an animal high at these points, but among average producers height should not be taken into consideration in choosing between two animals. It may be said that height is of importance only so far as it indicates greater development of body in general.

These conclusions agree in part with the results reached by other men, most of whom attach more importance to height than this investigation shows to be true.

Depth and Width of Chest -- Measurements on the depth and width of chest when the cows are arranged according to production are given in the following summary.

Group	I	II	III	IV	Best Half	Poorest Half
Dp. of chest	67.2	65.5	66.3	64.8	66.4	66.0
Wd. of chest	34.5	33.6	32.7	31.9	34.1	32.4

The best half is larger than the poorest

DEPTH OF CHEST

Pounds of Butterfat

<u>Depth</u>	100	150	200	250	300	350	Above
	to 150	to 200	to 250	to 300	to 350	to 400	400
58 to 60		*					
60 to 62			* *	* *	*		
62 to 64	*	* * *	* * *	* *	* *	* *	*
64 to 66		*	* *	** **	* *	* *	
66 to 68		* *	* *	** **	** **	* *	
68 to 70			* *	* *	* *		
70 to 72			*	* *	*	*	* *
72 to 74					* *		
74 to 76							*

WIDTH OF CHEST

Pounds of Butterfat

<u>Width</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
28 to 30	*					*	
30 to 32			* *	* * *	* *		
32 to 34		* *	* *	* * *	** **	* *	* *
34 to 36		* *	* *	* * *	* * *	* * *	
36 to 38		*	*	* *	* *	*	*
38 to 40		*			*		
40 to 42				*			*
42 to 44					*		

half, but when arranged in smaller groups, Group III is larger than Group II. With the University of Missouri Jerseys Group III is the largest of any, but the best half is larger than the poorest half, as shown in Table 33. When the cows are arranged according to measurements the production for the different groups is as follows:

Group	A	B	C	D	Largest 48	Smallest 48
Depth	69.6	66.7	65.1	62.5	68.2	63.8
Record B.F.	306	282	280	257	294	264
Width	37.0	34.3	33.2	31.1	35.6	32.1
Record B.F.	302	272	286	264	285	275

Depth of chest shows positive results as the largest group has the greatest average production, and with each group of less depth the amount of butterfat decreases. The largest half has an average production of 30 pounds of butterfat more than the smallest half, and the largest 10 produced 85 pounds on the average more than the smallest 10.

The same is true only in part with width of chest. The butterfat production of the largest 10 is less than the production of the largest 10 of any other measurement of those taken. The largest

half produced 10 pounds of butterfat more than the smallest half. When arranged in Groups, A, B, C and D there is little relation as Group C produced more than Group B.

Depth of chest in the herd of the University of Missouri herd shows similar results when the largest half is compared with the poorest half.

Depth seems to be of decidedly more importance than width in choosing the best cows. This agrees with the conclusions of other investigators and is also in accord with the common belief in regard to chest measurements.

Circumference of Chest -- This measurement tends to combine the width and depth of chest by expressing them as one, and the conclusions drawn from a study of this measurement are practically the same as from a study of the width and depth of chest. When the cows are arranged according to production the average of the groups is as follows:

Group	I	II	III	IV	Best 48	Poorest 48
Circumference	173.5	170.0	171.2	168.1	171.8	169.7

As with depth of chest Group II is smaller than Group III. The best 48 are an average of 2.1

CIRCUMFERENCE OF CHEST

Pounds of Butterfat

<u>Circ</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
155 to 160		*	* * *	* *			
160 to 165	*	* *	* * *	* * *	* *		
165 to 170			* * *	* * * * * * * * *	* * * * * *	* * *	*
170 to 175		* * * *	* * *	* * * * * * *	* * * * * * * * *	* *	
175 to 180		*	* * * * * *	* * *	* * * * * *	* *	*
180 to 185				* *	*		* *
185 to 190					*		*
190 to 195					*		

centimeters larger than the poorest 48 and the best 10 have a larger circumference by 6.7 centimeters than the poorest 10. When arranged according to measurements the production for the different groups is summarized as follows:

Group	A	B	C	D	Largest 48	Smallest 48
Circumference	179.4	172.9	168.7	162.0	176.2	165.3
Record B. F.	312	268	280	259	292	270

The largest 48 have an average production of 22 pounds more than the smallest 48, but the difference is much greater when Group A is compared with Group D. The best 10 produced on the average 122 pounds more than the poorest 10.

The difference in production between groups of cows when arranged to circumference of chest is too little to attach much importance, except when cows with extremely large or small measurements are compared. Dr. Attinger found that size of chest was an indication of the size of heart and lungs in steers, and it is probable that this is true of dairy cattle. Other investigators have found that large production was associated with a large chest, but from this investigation it is concluded that size

of chest is of importance only as it goes with a larger animal.

Width, Depth and Circumference of Barrel --

The width, depth and circumference of barrel will be considered together because they all represent size of barrel at the same point. The following table shows the measurements by groups when the cows are arranged according to production.

Group	I	II	III	IV	Best 48	Poorest 48
Depth	68.3	67.1	66.9	66.2	67.7	66.6
Width	66.5	66.5	65.0	63.5	66.5	64.2
Circumference	218.2	216.7	214.5	210.6	217.5	214.6

The highest producing animals have the largest barrels as shown by all of these measurements. The difference in size of barrel between the best 10 and the poorest 10 animals is still greater as shown in Table 2 of the Appendix. The proportion of width of barrel to width of hips, and height at withers shows that the barrel should be wide in proportion to these measurements. (Tables 29 and 30) The production of the cows when grouped according to these measurements also shows the importance of size of barrel.

WIDTH OF BARREL

Pounds of Butterfat

	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
<u>Width.</u>							
Below							
56		*					
56 to 58			*	*	*		
58 to 60			* * *	* * *	*		
60 to 62		* * *	* * *	* * *	*	*	
62 to 64	*	* *		* * *	* *		
64 to 66			* *	* *	* *	* * *	*
66 to 68			* *	* *	* * *	*	*
68 to 70		*	*	* *	* * *	*	*
70 to 72					* *	*	
72 to 74				* *			
Above 74					*		*

DEPTH OF BARREL

Pounds of Butterfat

	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
<u>Depth</u>							
58 to 60		*					
60 to 62							*
62 to 64			* *	* *	*	*	
64 to 66	*	* * *	* *	* * *	* *	*	
66 to 68		* * *	* * *	* * *	* * *	* *	
68 to 70		* *	* * *	* *	* *	* *	*
70 to 72			* *	*	* * *	*	
72 to 74			* * *	*	* *		*
74 to 76							*

CIRCUMFERENCE OF BARREL

Pounds of Butterfat

<u>Circ</u>	100 to 150	150; to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
190 to 195		*	*				
195 to 200			* *		*		
200 to 205		*		* *	*		
205 to 210	*	* *	*	* * *	* *		*
210 to 215		* * *	* *	* * *	* *	* * *	
215 to 220		* *	* *	* * *	* * *	*	*
220 to 225			* *	* *	* * *	*	
225 to 230				* *	* * *	* *	*
230 to 235							*
235 to 240					* *		
240 to 245							*

Group	A	B	C	D	Largest 48	Smallest 48
Depth	71.2	67.9	66.2	63.4	69.6	64.8
Record B. F.	310	277	279	257	293	268
Width	71.2	66.5	63.3	59.8	68.9	61.6
Record B. F.	319	292	260	254	306	257
Circumference	226.5	218.3	212.5	202.9	222.5	207.7
Record B. F.	319	279	272	255	299	264

These figures show that the animals having the largest barrels as shown by these measurements are the highest producers on the average. Width of barrel is of more importance than depth. Taking the average of the measurements together, the average production in the different groups has a direct relation to the measurements and this is also true of the measurements taken separately, except Groups B and C in depth of barrel. The 10 cows having the greatest circumference of barrel produced an average of 150 pounds of butterfat more than the 10 of smallest circumference.

The measurements taken of the herd of the University of Missouri bear out these results, the highest producers on the average having larger barrels

than the lowest producers, and when arranged according to measurements a greater average production is found among those animals showing the greatest size of barrel.

These conclusions agree with what other men have found out from their investigations, that a cow in order to be a high producer must have a large, roomy barrel.

Depth and Circumference of Barrel at Udder -- The size of the rear part of the barrel as measured by the depth and circumference of barrel at the point where the udder is attached to the abdomen, shows a greater relation to production, according to the measurements given, than does any other point of conformation on which data was collected. The average measurement for the different groups is as follows:

Group	I	II	III	IV	Best 48	Poorest 48
Depth	62.8	61.6	60.4	60.0	62.2	60.2
Circumference	193.1	187.4	186.4	181.2	190.2	183.8

The measurements of these groups bear a direct relation to production. The group having the greatest production is composed of cows with

DEPTH AT UDDER

Pounds of Butterfat

Depth	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
50 to 52		*					
52 to 54		*		*			
54 to 56	*		* *	* *	* *		
56 to 58		* *	* * *	*	*		
58 to 60		*	* *	* * *	* *		*
60 to 62		* *	* *	* * *	* * *	* *	
62 to 64		* *	* * *	* * *	*	* *	*
64 to 66			*	*	* *	*	
66 to 68			*	*	* *		
68 to 70			* *	* *	* * *		*
70 to 72					*		*

CIRCUMFERENCE AT UDDER

Pounds of Butterfat

<u>Circ</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
160 to 165		*					
165 to 170			* * *				
170 to 175		*	* *	*			
175 to 180	*	* *	* *	* * *	*		*
180 to 185		* *	* *	* * * * * *	* * * * * *	*	
185 to 190		* * *	* * *	* * * * * *	* * * * * *	* * *	
190 to 195			* *	* * *	* * * * * *	* *	* *
195 to 200			*	* * *	* *	*	
200 to 205			*				
205 to 210			*		*		*
210 to 215				*			
Above 215					*		*

largest average depth and circumference of barrel at this point, and with each succeeding group of lower production the measurements are, on the average, smaller. The production of the groups when arranged according to measurements is as follows:

Group	A	B	C	D	Largest 48	Smallest 48
Depth	67.0	62.0	59.9	56.2	64.5	58.1
Record B. F.	308	274	296	252	287	274
Circumference	200.0	189.2	183.6	175.2	194.6	179.4
Record B. F.	324	288	258	250	307	255

The 48 cows with the largest circumference at udder have an average production of 52 pounds of butterfat more than the 48 of smallest circumference. This difference is greater than with any of the other measurements taken, so it is concluded that circumference of barrel at udder shows a greater relation to production than does any other single measurement taken in this investigation. Depth at udder seems to be of most importance when the cows are grouped according to production.

Tables 17 to 20 and 25 to 28 of the Appendix show proportions between these measurements and other body measurements, showing that great

depth and circumference of barrel at this point in proportion to the size of the animal is a valuable indication of milk producing ability.

The importance of these measurements as shown by these comparisons, is explained by the fact that many animals have large capacity at the middle point of barrel, but do not carry this capacity far enough toward the hips to give them the greatest total size of barrel. Animals that show large measurements in this region are seldom lacking in capacity to consume large quantities of feed.

So far as is known, no other investigators have correlated these measurements with production. From the Jerseys measured in this work it is concluded that the size of barrel in that portion to the rear of the point of greatest circumference bears a greater relation to production than do any other body measurements.

Length of Back and Rump -- A study of the length of back and rump indicates that length does not indicate a high producer with any degree of certainty. The following table gives the averages of these measurements.

LENGTH OF BACK

Pounds of Butterfat

<u>Length</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
76 to 78				*			
78 to 80				*			
80 to 82		*	* *	* *	* * *		
82 to 84		* *	* * *	* * * * *	* * * * * *	* *	*
84 to 86		* * *	* * * * * *	* * * * * *	* * * *		
86 to 88	*		* * * *	* * * *	* * * *	* * * *	
88 to 90		* * *	*	* * *	* * * *		
90 to 92			* *	* *	*		* *
92 to 94			*	*			
94 to 96					* * *		*

LENGTH OF RUMP

Pounds of Butterfat

<u>Length</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
42 to 44	*		* * *	*	*		
44 to 46		* *	* *	* * *	* * *	* *	
46 to 48		* *	* * *	* * *	* * *	* * *	
48 to 50		* * *	* *	* * *	* *	* *	*
50 to 52				*	*		* *
52 to 54							*

Group	I	II	III	IV	Best 48	Poorest 48
Back	86.8	85.5	85.5	85.8	86.2	85.6
Rump	47.4	46.4	47.0	45.9	46.9	46.4

There is such little difference between the average measurements of the above groups that it is concluded that long backs and long rumps are about equally common among high and low producers. When grouped according to measurements the average production by groups is as follows:

Group	A	B	C	D	Largest 48	Smallest 48
Back	90.9	86.7	84.6	81.6	88.8	83.1
Record B. F.	293	288	270	271	290	270
Rump	49.1	47.3	46.1	44.3	48.2	45.2
Record B. F.	310	270	288	257	287	272

Extreme length of rump as shown in Group A is indicative of high production. The 10 cows with the longest rumps have an average production of 101 pounds of butterfat more than the 10 with the shortest rumps. The largest 48 animals have a slightly larger production than the smallest 48, but this difference is probably due to the size of animals in each group. Tables 23 and 24 show that there is

no relation between the proportions of length of rump to width of hips, or width of thurls and production.

The measurements in the University of Missouri herd show that length of back and rump do not have any relation to production among the animals measured.

These results do not agree with what other men have concluded from their work. Jensen, and McNatt and McKellip concluded that length of both back and rump were indications of large production but a study of these figures indicate that with the Jersey breed these measurements taken alone are not to be considered in the selection of individual animals. They are of value, however, in that they indicate size, and to that extent may be relied upon in the choosing between two animals.

Width of Hips and Thurls -- These two measurements will be considered together because they appear to have a decided relation to each other. The following table gives the measurements for the different groups.

WIDTH OF HIPS

Pounds of Butterfat

<u>Width</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
42 to 44			*		*		
44 to 46		*	* *	* *	* *		
46 to 48	*	* *	* *	* * *	* * *	* *	
48 to 50		* *	* *	* * *	* * *	*	*
50 to 52			* * *	* *	* *	* *	* *
52 to 54				*			
54 to 56							
56 to 58							
58 to 60					*		*

WIDTH OF THURLS

Pounds of Butterfat

<u>Width</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
36 to 38	*		* *		* * *		
38 to 40		* *	*	* * * * * * * *	* * * * *	* *	
40 to 42		* * * * *	** ** ** ** ** **	** ** ** ** ** **	***** ***** *****	* *	*
42 to 44		*	* *	* * * * * *	* * * *	* *	*
44 to 46		*	* *			*	* *
46 to 48					*		

Group	I	II	III	IV	Best 48	Poorest 48
Hips	49.0	47.7	48.5	47.4	48.8	47.9
Thurls	41.4	40.0	41.3	40.7	40.7	41.0

The best 48 are wider at the hips but slightly narrower at the thurls than the poorest 48. The proportion of width of hips to width of thurls as given in Table 21 shows that the best cows have wide hips in proportion to width of thurls and the ratio between these measurements when grouped together has a direct relation to production. When the cows are arranged according to measurements the production by groups is as follows:

Group	A	B	C	D	Largest	Smallest
Hips	51.4	48.8	47.5	45.7	50.1	46.6
Record B. F. 320	284	268	255	302	260	
Thurls	43.4	41.3	40.4	38.4	42.3	39.4
Record B.F. 299	287	258	272	293	266	

Width of hips is of more importance than width of thurls as shown by these figures. The difference is more striking when the largest 10 is compared with the smallest 10 as given in Table 14. With the exception of Groups C and D in width of

thurls the production is less with each group of less width.

With the cows in the herd of the University of Missouri these results are borne out in part as to width of hips with the Jerseys, but the best Holsteins have slightly the narrowest hips on the average. When arranged according to measurements the cows with widest hips have the greatest production with the Holsteins, but not with the Jerseys. Taken as a whole these measurements give negative results.

Little importance should be given to either width of hips or width of thurls, especially with the Jersey breed, as shown by this investigation, but when these two points are taken together cows should be selected that have the widest hips in proportion to width of thurls.

These results do not agree on the whole with the conclusions of other men, all of whom attach a greater importance to these measurements. Both groups of Jerseys measured show positive results when the best half is compared with the poorest half, but when smaller groups are considered it shows that width of hips and width of thurls should be given little attention.

Diameter of Milk Veins -- The measurements on the diameter of milk veins are subject to error because of the difficulty in measuring them accurately for each cow and also because the size of vein decreases with advanced lactation. However, errors due to inaccuracy in measuring individual cows will be counterbalanced when the measurements of a number of animals are averaged together. The following table shows the average diameter in centimeters when the cows are arranged according to production.

Group	I	II	III	IV	Best 48	Poorest 48
Right Vein	1.61	1.51	1.41	1.48	1.56	1.44
Left Vein	1.63	1.55	1.45	1.43	1.58	1.44

The diameter bears a direct ratio to production with every group except in Group IV with the right vein. The best 48 cows have larger veins than the poorest 48 and the best 10 have veins 37 percent in diameter larger than the poorest 10. The production by groups when arranged according to measurements is as follows.

DIAMETER OF RIGHT VEIN

Pounds of Butterfat

<u>Diam</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
0.8 to 1.0					*		
1.0 to 1.2		* * *	* *	* *	*		
1.2 to 1.4	*	* * *	* * *	* * *	* * *	* *	
1.4 to 1.6		*	* * *	* * *	* *	* * *	*
1.6 to 1.8		*	* *	* *	* * *	*	* *
1.8 to 2.0			* * *	* * *	* *	*	
2.0 to 2.2			* *		*		
2.2 to 2.4					*		*

DIAMETER OF LEFT VEIN

Pounds of Butterfat

<u>Diam</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
1.0 to 1.2	*	* *	* *	* * *	* *		
1.2 to 1.4		* *	* *	* * *	*		
1.4 to 1.6		*	* * *	* * *	* * *	* *	* *
1.6 to 1.8		*	* *	* * *	* * *	* *	* *
1.8 to 2.0		*	* *	* * *	* *		
2.0 to 2.2					* * *	*	
2.2 to 2.4							*

Group	A	B	C	D	Largest 48	Smallest 48
Right Vein	1.88	1.60	1.37	1.16	1.73	1.27
Record B.F.	297	299	296	241	298	267
Left Vein	1.84	1.60	1.43	1.18	1.72	1.30
Record B.F.	306	289	297	237	297	267

The 48 with largest veins have a larger average production than the 48 with the smallest veins. This is still more noticeable when it is noted that the 10 cows with largest veins produced on the average 72 pounds of butterfat more than the 10 with smallest veins. A study of Groups A, B, C and D shows that the greatest production does not always go with the largest veins, although the group composed of cows with the smallest veins has much the lowest production of any.

The two veins seem to be of equal importance and while they differ in size for individual animals, when averaged together for the total number the diameter is approximately the same. This is contrary to the conclusions of Jensen, and McNatt and McKellip, who state that large producers have the right vein the largest. Other investigators have found that the diameter of milk veins is

of importance in the selection of dairy cattle. According to the measurements taken, large veins are associated with high production, and cows with small veins as a general rule are inferior producers.

Milk Wells -- The measurements on the diameter of milk wells as given in the following table shows that large wells are most common among the highest producers, and this is more true of the right well than of the left.

Group	I	II	III	IV	Best 48	Poorest 48
Right Well	1.12	1.12	1.09	0.98	1.12	1.03
Left Well	1.13	1.07	1.03	0.96	1.10	1.00

The average size of well as shown here is smaller with each succeeding group of lower producing animals. Groups I and II with the right well have the same average diameter. The best 10 cows have larger wells on the average by 22 percent than do the poorest 10. When the cows are arranged according to measurements the average production for the different groups is as follows.

DIAMETER OF RIGHT WELL

Pounds of Butterfat

	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
Diam							
0.6 to 0.8			*				
0.8 to 1.0		* *	* *	** **	* *	* *	*
1.0 to 1.2		* *	* *	** **	* *	* *	
1.2 to 1.4	*	*	* *	* *	** **	*	* *
1.4 to 1.6				*	*	* *	
1.6 to 1.8							*

DIAMETER OF LEFT WELL

Pounds of Butterfat

<u>Diam</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
0.5 to 0.6				*			
0.6 to 0.8			*				
0.8 to 1.0		* * *	* * * * * * * * *	* * * * * * * * *	* * * * * * * * *	* *	*
1.0 to 1.2	*	* * *	* *	* * * * * * * * *	* * * * * * * *	*	*
1.2 to 1.4			* *	* * * * * *	* * * * * *	* *	* *
1.4 to 1.6				*	* *	* *	
1.6 to 1.8							*

Group	A	B	C	D	Largest 48	Smallest 48
Right Well	1.32	1.14	0.96	0.84	1.24	0.89
Record B. F.	311	280	292	247	296	259
Left Well	1.32	1.10	0.96	0.84	1.21	0.90
Record B.F.	332	275	273	253	303	263

Several of the cows measured had more than one well on each side and from the original data Table I, it will be noted that most of these cows were high producers. The 10 cows with the largest wells have an average production of 106 pounds of butterfat more than the 10 with smallest wells. The production of Group D is much below the average of the other groups which indicates that cows with small wells are to be avoided in choosing dairy animals. The 48 cows with largest wells produced 34 pounds more on the average, than the 48 with smallest milk wells. These figures show that large milk wells are valuable guides in choosing the best dairy animals.

An examination of Table I of the Appendix shows no relation between the size of milk veins and milk wells of individual cows, but this may be due in part to different stages of lactation.

This is in accordance with the results of Jensen's study. When judging cows that are far advanced in the lactation period the milk wells should be given most attention, but with cows that have recently freshened most attention should be directed to the milk veins.

Ordinarily cows with large wells or numerous wells will prove to be high producers and small wells are indicative of inferior animals from this standpoint. This is in accord with the common belief and agrees with the conclusions of other men.

Capacity -- Capacity of barrel is calculated from the four dimensions, length of back, depth at udder, width of barrel, and width of chest. It is assumed that the barrel approaches a cylinder in shape. Depth at udder is used because the depth of barrel at this point varies most with the different cows. The average between the width of barrel and width of chest is taken to represent the average width. From this measurement, and depth at udder, the diameter of the cylinder is calculated and capacity is figured from this diameter and length of back. Capacity is expressed in liters.

CAPACITY

Pounds of Butterfat

<u>Liters</u>	100 to 150	150 to 200	200 to 250	250 to 300	300 to 350	350 to 400	Above 400
140 to 160		*		*			
160 to 180	*	* *	* * * *	* * * *	*		
180 to 200		* * *	* * * *	* * * * * *	* * * *	* * *	*
200 to 220		* * *	* * * * * *	* * * * * *	* * * * * *	* *	
220 to 240			* * *	* *	* * *	* *	*
240 to 260			* *	*	*		*
260 to 280					* *		
280 to 300					* *		
300 to 320							*

The average capacity when grouped according to production is given in the following table.

Group	I	II	III	IV	Best 48	Poorest 48
Capacity	218	207	200	197	213	199

It is evident from these figures that capacity when calculated in this way has more relation to production than size as expressed by weight or height. The best 48 have an average capacity of 14 liters more than the poorest 48; the best 10 an average of 36 liters more than the poorest 10 and the capacity by groups is less with each succeeding group of lower production.

When arranged according to capacity the production by groups is as follows:

Group	A	B	C	D	Largest 48	Smallest 48
Capacity	250	208	196	175	228	185
Record B.F.	303	283	284	250	293	267

The 48 with greatest capacity produced an average of 26 pounds more than the smaller 48 and the largest 10 an average of 101 pounds more than the smallest 10. Table 10 of the Appendix shows the arrangement of the individual cows according to capacity.

These figures show that weight and capacity are not exactly related as claimed by some investigators. As a general rule, capacity alone is a valuable indication of milk producing ability. The best cows measured have the greatest capacity and those lacking in this respect seldom prove to be high producers.

Droop of Rump -- When cows are judged in the show ring it is seldom that an animal with a drooping rump attracts the eye of the judge. However, this prejudice against animals that do not carry out with a level rump is not warranted when their production is taken into account. The following summary shows the average droop when the cows are arranged according to production.

Group	I	II	III	IV	Best 48	Poorest 48
Droop of rump	4.0	4.3	3.5	3.6	4.1	3.5

The best 48 show greater droop of rump than the poorest 48 and when divided into smaller groups there appears to be no relation. .

When arranged according to droop of rump the production by groups is as follows.

DRoop OF RUMP

Pounds of Butterfat

	Above 400	350 to 400	300 to 350	250 to 300	200 to 250	150 to 200	100 to 150
<u>Droop</u>							
2.0 to 0.0		* * *	* *	*		* *	
0.0 to 2.0		*		* * *	* *		
2.0 to 4.0	*	*	* * * * * * * * *	***** ** ** *****	* * *	* *	*
4.0 to 6.0	* *	*	* * * * * * * * *	* * * * * * * * *	* * * * * * * * *	* * *	
6.0 to 8.0	*	*	* * * * * * * *	* * * * * *	* * * * *	*	
8.0 to 10.0	*						

Group	A	B	C	D	Smallest	Largest
					48	48
Droop of rump	0.7	3.0	4.6	6.8	1.8	5.8
Record B. F.	274	290	281	283	282	282

Group A which is composed of cows with the most level rumps are the lowest producers of any and there is no difference between the production when the 48 with the smallest droop is compared with the 48 of greatest droop. It is concluded that cows with a level rump have this at the sacrifice of production, but further than this a drooping rump should not be discriminated against in the selection of cows for their milk producing ability.

Measurements in the Herd of the University of Missouri.

Part of these measurements have been considered along with the discussion of the other data, and the remainder will be considered at this time. Tables 33, 34 and 36 of the Appendix include a summary of these.

Width of Loin -- It is generally believed that a wide loin is associated with high production

but with the Holsteins and Jerseys measured this point does not seem to be of great importance.

Dr. Attinger states that cows with the widest backs are the largest producers, but it is not known how his measurements were taken. The conclusions here are contrary to the common belief among dairymen, but agrees with the work of Dr. Kronacher and Jensen.

Length and Width of Head -- A short, narrow head is most common among the best Holsteins as shown by this investigation. With the Jerseys the opposite is true and those cows with a long, broad head are the largest producers. However, the difficulty in taking any measurements on the head does not justify attaching much importance to these conclusions.

Circumference of Muzzle -- A large muzzle seems to be a valuable indication of production with both the Jerseys and Holsteins. When the cows are divided into groups there is a constant relation between the production and circumference of muzzle. The difference in this point of conformation is

more noticeable, with the cows measured, than with any other point recorded. These conclusions agree with the work of other men, and is the generally accepted belief.

Hunger Hollow -- The "hunger hollow" as measured by the distance from hip point to last rib seems to be of some importance with the Holsteins but of little or no value in choosing the best cows among the Jerseys. This is in accord with the conclusions of Jensen, and McNatt and McKellip.

Circumference of Shin Bones -- When the best half is compared with the poorest half, the circumference of shin bones of both fore and hind leg seem to have a relation to production, the highest producing animals having the largest shin bone. However, with the Jerseys when arranged in smaller groups this point appears to have no relation to production.

OBSERVATIONS.

The number of each class of observations coming in the different groups is given in Table 15

of the Appendix. Table 16 shows the production of each class.

Tortuousness of Milk Veins -- According to the observations taken those cows with the most tortuous milk veins are the largest producers on the average. The contrary is especially true, that cows with straight or nearly straight veins are low producers. Class A produced on the average 65 pounds of butterfat more than Class C. This agrees with the conclusions of Jensen that tortuousness of veins is of great importance in choosing the highest producing cows.

Size of Udder -- The cows with large, roomy udders on the average, are the highest producers, and cows with small udders as shown by Class C are very inferior producers. This agrees with the investigations of other men and is the generally accepted opinion.

Quality of Udder -- The highest producing cows show on the average, much finer quality of udder than do the lower producers. Hard, meaty udders seem to be indicative of low producing ability. Class A produced on the average 35 pounds more than

Class C. Some individual cows that are high producers have very mellow udders and this is the only point in their conformation according to this investigation, that accounts for their large production.

These conclusions on quality of udder agree with what other investigators have found out in their work, and is the common belief among dairymen.

Shape of Udder -- Cows having udders that approach a semicircle in shape and are well filled out in all quarters, are on the average, larger producing animals than those with very pendulant or poorly shaped udders. Class A produced an average of 47 pounds of butterfat more than Class C and 19 pounds more than Class B. This agrees with the work of the Vermont Experiment Station. High producers ordinarily have fairly well shaped udders, but with medium and low producing animals there is little difference in this point of conformation.

Shape of Fore Udder -- Some score cards give a large relative value to shape of fore udder, and with some breeds and especially families within a breed, individual cows show deficiency in this

respect. According to the data collected, well filled out fore udders are found at a sacrifice of production. Class B produced more than Class A, but Class C has the lowest average production of any. It is concluded that cows to be high producers must have a fairly well shaped fore udder; that cows with very deficient fore udders are, on the average, poor producers, but cows with fore udders well filled out are lacking in some other important points of udder which limit their production.

Straightness of Back -- An examination of the data shows that but three of the cows measured are placed in Class C on straightness of back. Class A which is composed of those cows with straight backs, has a higher average production than Class B, but Class C which is composed of cows with decidedly swayed backs has the highest production of any. It is concluded that in general, the best cows have straight backs, but that those animals whose backs are swayed should not be discriminated against for this reason. These conclusions agree with the work of Dr. Kronacher, and is in accord with the belief prevalent among practical dairymen.

Relation between Angle of Rump and Shape of Fore Udder -- There is a widespread belief among dairymen that cows with a very deficient fore udder have drooping rumps. The data collected tends to bear out this opinion. Table 31 shows the relation between these two points when divided into groups and Table 37 shows the arrangement of the individual cows to droop of rump with the class of fore udder that goes with that animal. A study of this data shows that many cows with drooping rumps are prone to deficient shape of fore udder although this does not hold true with every animal. This fact may be of some value in selecting young animals as the udder is undeveloped but the droop of rump will in all probability remain the same as the animal continues to develop. However, no great stress should be placed here because according to this investigation, neither of these points bear any relation to production.

Discussion of Individual Cows.

An examination of Table 13 which shows the ranking of the individual cows to the different measurements indicates that a large percent of the

high producing cows do possess the looked for type and most of the poorest cows, to all appearances, fail to produce by reason of lacking proper dairy form. Other cows, however, may be either high or low producers without showing anything in their physical make-up that would classify them as such; or, they may be high or low producers because they are extra strong in one or a few points of conformation that are indicative of high production. This discussion will not include all the cows measured, but only those whose producing ability is not easily explained.

High Producers -- Cow No. 5 ranks 73 in capacity and other measurements indicate that she would be classed among the low producers. In quality of udder, however, she is placed in Class A. The depth at udder in proportion to depth of barrel is above the average of the cows measured, and as these two factors are valuable indications of producing ability as shown by this investigation, it seems evident with this particular cow that her high production is due to these two points.

Cow No. 8 ranks low in capacity and size, but has very large wells and a well shaped udder. Excepting these two points, it is difficult to show by any measurements why she ranks in this place.

No. 9 lacks capacity of barrel and size, but her mammary system shows superior development in shape of udder and tortuousness of milk veins.

No. 12 ranks low in size and total capacity, but has wide hips and thurls, a large circumference at udder, and a fairly well developed mammary system throughout.

No. 20 ranks low in capacity, all skeletal measurements and shape of udder, but in size and tortuousness of milk veins and quality of udder she is among the best.

No. 22 is far above the average in production, but from this investigation it is impossible to advance any reason why she has such a production.

No. 25 holds her place in production by reason of quality of udder, and size and tortuousness of milk veins.

Low Producers -- From the data at hand it is impossible to give any reason why No. 60 should not have a production that would class her higher

in the list.

No. 71 has every appearance of a high producing cow when her body form is considered, but in size and shape of udder and mammary system in general she is decidedly lacking.

No. 74 has the form and type that would classify her among the high producers, but she is an imported cow and the change of climate may be responsible for her low record.

Cow No. 77 ranks high in capacity and body measurements, and size and shape of udder, but is lacking, however, in quality of udder, a factor which seems to be of the greatest importance in selecting the highest producing cows.

No. 79 shows large capacity due to great length of body, but beyond this point she shows no indications of being a high producer.

No. 86 shows great total capacity and size, but lacks in udder development and circumference of barrel at udder.

No. 90 ranks well in mammary development and in body measurements. Her low production cannot be accounted for unless she did not receive sufficient feed. The cost of her feed during the year in which the record was made is far below the average of the cows measured.

CONCLUSIONS.

1. As a general rule the heaviest animals are the largest producers, although it may be said that in the selection of cows the scales would be a poor criterion of producing ability.
2. Height is of importance only as it indicates greater development of body in general.
3. A large chest is associated with high production in most cases. Depth of chest is of more importance than width.
4. Size of barrel is one of the best indications of high production. This is especially true of the rear part of the barrel as shown by depth and circumference at udder.
5. Length of back and rump is of minor importance in the selection of cows for production.
6. The highest producing cows have the widest hips in proportion to width of thurls. When taken separately little importance should be attached to these measurements.
7. Large and tortuous milk veins are valuable indications of milk producing ability.
8. Most high producing cows have large milk wells or more than one on each side. Cows with very small wells, as a general rule, are inferior producers.

9. The total capacity of barrel is of great importance in selecting the best cows.
 10. Among the 96 animals measured, there is no relation between droop of rump and production. As a general rule, cows with level rumps have this at a sacrifice to production.
 11. According to this investigation, width of loin has no relation to production.
 12. The head is a breed characteristic and of little importance in choosing the best animals.
 13. A large muzzle appears to be closely related to high production.
 14. The best Holsteins seem to have the largest "hunger hollow" but with the Jerseys this point is of no importance.
 15. Size of shin bones has little if any relation to production.
 16. Size and quality of udder are probably the most valuable indications of producing ability. Small udders, or hard, meaty udders are especially indicative of low production.
 17. Shape of udder, as a general rule, is an indication of production as it shows capacity of udder. However, a well filled out fore udder is found at a sacrifice to production.
-

18. As a general rule, the best cows have straight backs, but cows with swayed backs should not be discriminated against for this reason.
 19. The data collected indicates that there is a relation between the angle of rump and the development of fore udder. A drooping rump and a very deficient fore udder are generally found together.
 20. Most cows can be classified as either high, medium, or low milk producers from an examination of their physical appearance; others cows may be high or low producers without showing anything in their physical make-up that would indicate such a production.
-

GENERAL CONCLUSIONS.

From a study of what has been set forth in this investigation it is concluded that ability to produce milk is associated with a certain type of animal. No one point of conformation can be taken as an index to high production, but most cows with large records have a combination of the characters, that according to this work, are most closely related to production.

The points most common to high producers are (1) a great capacity of barrel, and (2) a highly developed mammary system. Cows possessing these two points can be depended upon, as a general rule, to meet the requirements at the pail. Other body measurements may be of some significance, but to a large extent their importance lies in the fact that they indicate greater development in general. Other things being equal, the cow with the larger measurements will have the greater production.

Some minor points as a level rump and a well shaped foreudder, to which the breeder often gives much attention, are seldom found among the highest producers, and the data indicates that these points have, in most cases, been perfected to the breeders' satisfaction at a sacrifice to production.

REMARKS.

In beginning an investigation of this kind it is necessary to take measurements and observations on a large number of animals within a breed, and so far as possible, to use cows that have made their records under similar conditions of feed and environment. It is desirable to measure cows that have a wide variation in production so long as their records are made under fairly normal conditions.

The author suggests that in a continuation of this work, that measurements be taken of animals belonging to the different experiment stations and agricultural colleges, or of cows in cow testing associations within a community, and in this way to compile data on a sufficient number of animals to establish a more definite conception of what constitutes dairy type.

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28. Same as 8.
29. Same as 6.
30. Same as 2.
31. Same as 9.
32. Same as 8.
33. Same as 3.
34. Same as 9.

Key to Cows Measured

	:	
<u>Herd of L. P. Bailey & Son</u>	:	<u>Herd of Allen Bailey & Son</u>
Ref. No.	:	Ref. No.
10 - Belle 10's Golden Lily	:	3 - Clark
11 - Forfarshire Show Girl	:	8 - Eva Oxford
34 - Miss Butterscotch	:	9 - Oxford's Darinka
46 - Oxford's Dandelion	:	14 - Oxford's Lady B.
51 - Fannie's Welcome Lass	:	28 - Oxford Lad's Lady
62 - Oxford's Tessie	:	29 - Gretta Oxford
67 - Laura Oxford	:	35 - Greda Brown
70 - King's Rose Daughter	:	40 - Lucy Oxford B.
76 - Stockwell's Virginia	:	41 - Tavery's Eva.
<u>96 - Katrina's Little Beauty</u>	:	63 - Ethel's Maiden
	:	74 - Forfarshire's Foxy Daisy
	:	<u>77 - Eva Romp</u>
<u>Herd of W. T. Hall</u>	:	<u>Herd of L. J. Taber</u>
7 - Bella of Argyle	:	1 - Lady Blythe
44 - Jean Lavara	:	6 - Lady Blythe 2d.
48 - Patty Ambrose	:	15 - Milcha of Dunleath
50 - Dido's Dolly	:	19 - Herd No. 142
55 - Lad	:	20 - Blue Bird
61 - Letty's King Lois	:	25 - Lad's Pet Flo
64 - Sadie	:	27 - Maud
69 - Mary	:	36 - Pedro
72 - Queen Soprano	:	38 - Pet

Key to Cows Measured (Continued)

80 - Flora Forbishire	: 45 - Lady Pedro B.
85 - Ursina	: 75 - Jane Carmon
86 - Edith of Crestview	: 81 - Perfect Lady
89 - Goldie	: 83 - Mabel
91 - Bertha	: 93 - Bucksom Rose

<u>Herd of D. C. Bundy</u>	: <u>Herd of Ross Bailey</u>
4 - Sa Lambert King	: 13 - Daisy
5 - Sa Golden	: 17 - Eminent's Sweet Marie
12 - Sa Sheomet	: 21 - Bonnie
16 - Jane	: 22 - Fancy Nora
26 - Ida	: 53 - Silver Thiela
42 - Fern	: 68 - Dana's Susie Pogis
43 - Rose	: 78 - Dana's Pauline Pogis

<u>Herd of Bailey & Carpenter</u>	: <u>Herd of O. O. Dodd</u>
32 - Lamberta	: 24 - Devina
33 - Herd No. 298	: 30 - Domo
39 - Creepy	: 37 - Belle Blue Bonnet
49 - Herd No. 311	: 54 - Orma Wilson
65 - Spot	: 56 - Miss Anna
66 - Susie	: 73 - Sue Bristow
88 - Early Anna	: 82 - Shady Dell Beauty

<u>Herd of Marion Ault</u>	: <u>84 - Shady Dell Titanic</u>
52 - Rose	:
79 - Pide	:

Key to Cows Measured (Continued)

87 - Star : Herd of McCartney & Howiler
 90 - Kepsie : 2 - Pete
 92 - Pet : 18 - Cherry
94 - Whitie : 57 - Tiny

: 60 - Nelly

: 71 - Jersey

Herd of Friend's

Boarding School

: Herd of Oscar Bailey

23 - Tiny : 31 - Dot McMillan

47 - Alice : 59 - Ethel Laurie

58 - Upland's Fancy : 95 - Judy Miller

Jerseys - University of Missouri.

Reference Number	Herd No.	:	Reference: Number	Herd No	:	Reference : Number	Herd No.
1	1	:	13	59✓	:	25	61
2	124✓	:	14	23	:	26	14
3	16✓	:	15	11✓	:	27	53
4	50✓	:	16	43	:	28	48
5	34	:	17	10✓	:	29	57✓
6	64	:	18	4	:	30	47
7	27✓	:	19	51	:	31	39
8	21	:	20	63	:	32	62
9	25	:	21	55	:	33	22
10	54✓	:	22	320	:	34	8✓
11	19✓	:	23	67	:	35	13
12	317✓	:	24	20	:		

Key to Cows Measured (Continued)

Holsteins

Reference Number	Herd Number	:	Reference Number	Herd Number
1	210	:	8	206
2	207	:	9	215
3	209 ✓	:	10	227
4	204	:	11	213
5	211	:	12	228
6	208	:	13	205
7	223	:	14	222

TABLE 1

MEASUREMENTS AND OBSERVATIONS ON COWS.

: Number of cow		1	2	3	4
A	: Age in months	: 72	: 96	: 108	: 90
B	: Days since bred	: 94	: 14	: ---	: --
C	: Weight(est)	: 1050	: 1150	: 950	: 975
1	: Height at withers	: 127	: 129.5	: 126.25	: 130.5
2	: Height at croup	: 129.25	: 130.5	: 130.00	: 132.0
3	: Depth of chest	: 71	: 74.0	:	: 71.0
4	: Depth of barrel	: 74.5	: 73.5	:	: 68.5
5	: Depth at udder	: 69.0	: 71.75	:	: 63.25
6	: Width of chest	: 33.5	: 40.5	:	: 36.75
7	: Width of barrel	: 69.5	: 76.75	:	: 64.0
8	: Width at hips	: 51.75	: 58.5	:	: 51.0
9	: Width at thurls	: 44.0	: 45.0	:	: 42.5
10	: Circ. of chest	: 181.0	: 188.5	: 176.5	: 180.25
11	: Circ. of barrel	: 233.5	: 241.25	: 226.0	: 217.75
12	: Circ. at udder	: 209.0	: 224.25	: 195.5	: 193.75
13	: Length of back	: 90.75	: 91.5	:	: 94.0
14	: Length of rump	: 50.00	: 52.00	:	: 50.0
15	: Diam. of vein R	: 1.7	: 1.45	: 2.2	: 1.65
16	: Diam. of vein L	: 1.7	: 1.45	: 2.2	: 1.65
17	: Diam. of well R	: 1.3	: 1.3	: 1.6	: 0.8
18	: Diam. of well L	: 1.3	: 1.3	: 1.6	: 0.9
19	: Size of udder	: A	: B	: A	: B
20	: Shape of udder	: B	: B	: A	: B
21	: Shape of fore udder	: C	: B	: B	: B
22	: Quality of udder	: B	: B	: B	: A
23	: Tortuousness of vein: {R	: B	: B	: A	: A
24	: Tortuousness of vein: {L	: B	: B	: A	: A
25	: Straightness of back:	: B	: B	: A	: B
26	: Droop of rump	: 5	: 5	: 2.25	: 9.5
27	: Pounds of milk	: 8985.0	: 8967.0	: 8376.0	: 7863.0
28	: Pounds of fat	: 537.12	: 422.42	: 420.67	: 411.12
29	: Percent fat	: 6.0	: 4.7	: 5.0	: 5.2
30	: Cost of feed	: 69.95	: 77.40	: 56.43	: 67.17

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont.)

	5	6	7	8	9	10	
A	: 108	: 60	: 66	: 78	: 54	: 66	:
B	: 100	:	:	:	: 7	:	:
C	: 850	: 875	: 900	: 800	: 775	: 850	:
1	: 120.00	: 125.75	: 126.00	: 120.75	: 119.25	: 120.00	:
2	: 119.00	: 126.50	: 127.50	: 121.00	: 122.00	: 117.00	:
3	: 62.75	: 67.00	: 70.50	: 65.50	: 63.00	: 67.00	:
4	: 61.50	: 69.00	: 69.50	: 66.00	: 65.00	: 67.00	:
5	: 58.00	: 61.50	: 60.00	: 60.00	: 62.25	: 62.50	:
6	: 33.50	: 33.00	: 35.50	: 33.75	: 29.75	: 37.00	:
7	: 67.50	: 71.00	: 65.25	: 60.75	: 65.25	: 69.00	:
8	: 49.00	: 51.50	: 50.50	: 50.25	: 49.75	: 47.50	:
9	: 41.50	: 43.25	: 43.50	: 40.75	: 39.50	: 39.00	:
10	: 165.00	: 176.50	: 176.25	: 171.25	: 165.00	: 168.75	:
11	: 205.75	: 227.25	: 215.25	: 211.50	: 210.75	: 226.00	:
12	: 178.25	: 198.75	: 181.00	: 189.75	: 186.50	: 193.75	:
13	: 82.50	: 87.75	: 83.75	: 87.00	: 86.25	: 86.25	:
14	: 49.00	: 48.25	: 48.75	: 47.50	: 46.25	: 44.50	:
15	: 1.45	: 1.40	: 1.35	: 1.40	: 1.70	: 1.90	:
16	: 1.45	: 1.40	: 1.40	: 1.40	: 1.75	: 2.05	:
17	: 1.10	: 0.90	: 0.95	: 1.50	: 0.90	: 1.50	:
18	: 1.10	: 1.00	: 0.85	: 1.50	: 1.20	: 1.50	:
19	:	:	:	:	:	:	:
19	: B	: B	: B	: B	: B	: A	:
20	: B	: B	: C	: A	: A	: A	:
21	: C	: B	: B	: B	: B	: A	:
22	: A	: B	: A	: B	: B	: A	:
23	: B	: B	: B	: C	: A	: A	:
24	: B	: B	: B	: C	: A	: A	:
25	: B	: B	: B	: B	: B	: B	:
26	: 7.50	: +1.50	: +0.50	: 2.50	: 4.00	: 0.00	:
27	: 6957.00	: 6201.00	: 6948.00	: 6201.00	: 6515.00	: 7514.00	:
28	: 407.30	: 385.00	: 377.57	: 369.75	: 366.26	: 364.69	:
29	: 5.90	: 6.20	: 5.40	: 6.00	: 5.60	: 4.90	:
30	: 60.24	: 57.98	: 45.33	: 52.97	: 54.50	: 71.47	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	11	:	12	:	13	:	14	:	15	:	16	:
A	:	72	:	66	:	96	:	54	:	204	:	108	:
B	:	135	:		:		:		:	150	:		:
C	:	900	:	825	:	850	:	875	:	1000	:	900	:
1	:	123.00	:	122.00	:	118.00	:	119.25	:	118.00	:	119.00	:
2	:	122.00	:	124.00	:	118.00	:	122.25	:	117.00	:	120.50	:
3	:	66.25	:	64.50	:	68.00	:	64.00	:	66.00	:	68.50	:
4	:	71.50	:	63.50	:	71.50	:	64.50	:	72.75	:	69.50	:
5	:	65.50	:	61.00	:	65.00	:	60.25	:	71.00	:	64.00	:
6	:	35.50	:	35.50	:	34.50	:	35.00	:	34.00	:	33.50	:
7	:	64.00	:	66.50	:	68.50	:	62.75	:	78.25	:	70.00	:
8	:	47.50	:	51.00	:	46.50	:	49.00	:	48.00	:	49.00	:
9	:	40.00	:	44.00	:	38.50	:	39.00	:	40.00	:	41.00	:
10	:	173.25	:	167.50	:	172.50	:	166.25	:	180.25	:	177.75	:
11	:	221.00	:	210.75	:	202.00	:	208.25	:	239.00	:	229.75	:
12	:	188.25	:	191.25	:	193.75	:	184.50	:	207.50	:	198.00	:
13	:	87.00	:	83.00	:	81.25	:	84.50	:	90.25	:	83.75	:
14	:	45.50	:	47.50	:	47.25	:	47.50	:	46.00	:	46.25	:
15	:	1.30	:	1.40	:	1.95	:	1.45	:	2.20	:	1.60	:
16	:	1.45	:	1.60	:	1.70	:	1.70	:	2.15	:	1.65	:
17	:	1.20	:	0.90	:	1.20	:	1.30	:	1.20	:	1.30	:
18	:	1.30	:	0.95	:	1.30	:	1.20	:	1.50	:	1.30	:
19	:	A	:	B	:	A	:	B	:	A	:	A	:
20	:	B	:	B	:	A	:	A	:	A	:	B	:
21	:	B	:	B	:	B	:	B	:	B	:	B	:
22	:	B	:	B	:	A	:	B	:	B	:	A	:
23	:	B	:	B	:	B	:	B	:	B	:	B	:
24	:	B	:	B	:	B	:	B	:	B	:	B	:
25	:	B	:	B	:	B	:	A	:	C	:	A	:
26	:	3.50	:	7.00	:	3.50	:	4.00	:	+1.25	:	4.50	:
27	:	7236.00	:	6298.00	:	6272.00	:	5966.00	:	8104.00	:	6220.00	:
28	:	357.66	:	352.44	:	347.33	:	346.17	:	338.00	:	333.87	:
29	:	4.90	:	5.70	:	5.50	:	5.80	:	4.20	:	5.40	:
30	:	58.45	:	62.62	:	60.94	:	52.42	:	68.04	:	58.58	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	: 17	: 18	: 19	: 20	: 21	: 22	:
A	: 54	: 72	: 60	: 48	: 66	: 50	:
B	: 158	: 45	:	: 28	:	: 112	:
C	: 775	: 1100	: 975	: 750	: 850	: 750	:
1	: 120.50	: 131.00	: 125.50	: 118.00	: 119.50	: 115.50	:
2	: 122.00	: 134.00	: 124.00	: 122.00	: 114.50	: 122.50	:
3	: 67.00	: 72.00	: 69.75	: 63.00	: 69.00	: 64.50	:
4	: 68.50	: 73.00	: 66.00	: 65.50	: 72.00	: 66.50	:
5	: 60.00	: 69.00	: 59.00	: 54.00	: 68.00	: 59.00	:
6	: 33.50	: 43.00	: 33.75	: 33.00	: 38.00	: 33.75	:
7	: 63.50	: 71.00	: 62.00	: 57.00	: 58.00	: 61.50	:
8	: 47.00	: 58.00	: 50.75	: 45.00	: 48.25	: 47.00	:
9	: 41.50	: 46.00	: 41.50	: 38.25	: 41.25	: 40.00	:
10	: 168.75	: 191.75	: 177.75	: 165.00	: 179.00	: 162.50	:
11	: 212.00	: 236.00	: 209.50	: 196.75	: 209.50	: 207.00	:
12	: 180.25	: 217.25	: 189.25	: 180.25	: 187.00	: 182.75	:
13	: 89.00	: 94.00	: 89.00	: 83.00	: 85.00	: 85.00	:
14	: 46.00	: 51.50	: 46.50	: 45.00	: 49.00	: 46.00	:
15	: 1.30	: xx	: 0.90	: 2.10	: 1.50	: 1.75	:
16	: 1.35	: 1.80	: 1.10	: 2.10	: 1.50	: 1.55	:
17	: 0.90	: xx	: 0.80	: 1.20	: 0.80	: 0.80	:
18	: 0.90	: 1.10	: 0.90	: 0.80	: 0.95	: 0.80	:
19	: B	: A	: B	: B	: B	: B	:
20	: B	: B	: B	: C	: B	: B	:
21	: C	: C	: B	: C	: B	: B	:
22	: A	: B	: B	: A	: C	: C	:
23	: B	: A	: C	: A	: B	: A	:
24	: B	: B	: C	: A	: B	: B	:
25	: B	: B	: B	: B	: B	: B	:
26	: 2.00	: 7.00	: 3.50	: 7.00	: 7.00	: 5.00	:
27	: 6696.00	: 6561.00	: 5675.00	: 5718.00	: 7229.00	: 6179.00	:
28	: 331.85	: 329.22	: 329.00	: 329.00	: 325.79	: 324.51	:
29	: 5.00	: 5.00	: 5.80	: 5.80	: 4.50	: 5.30	:
30	: 61.59	: 66.91	: 56.54	: 61.08	: 62.93	: 61.59	:

xx. Branching vein and more than one well.

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	23	:	24	:	25	:	26	:	27	:	28	:
A	:	72	:	88	:	72	:	66	:	60	:	54	:
B	:		:	30	:	170	:	68	:	180	:		:
C	:	875	:	775	:	850	:	950	:	975	:	775	:
1	:	119.50	:	117.00	:	120.00	:	126.00	:	124.25	:	116.25	:
2	:	122.50	:	118.50	:	119.25	:	120.00	:	122.00	:	114.50	:
3	:	66.50	:	64.00	:	62.50	:	68.00	:	66.75	:	61.00	:
4	:	66.00	:	67.50	:	67.50	:	71.00	:	65.75	:	62.50	:
5	:	60.50	:	60.00	:	60.00	:	66.50	:	60.00	:	55.25	:
6	:	33.5	:	33.00	:	33.00	:	36.00	:	37.50	:	32.00	:
7	:	68.00	:	70.75	:	65.00	:	67.00	:	71.75	:	63.25	:
8	:	49.50	:	45.50	:	47.00	:	50.00	:	51.25	:	42.50	:
9	:	41.00	:	41.50	:	38.50	:	41.50	:	42.00	:	37.75	:
10	:	171.25	:	165.00	:	166.25	:	171.25	:	175.00	:	162.50	:
11	:	219.75	:	221.00	:	213.25	:	219.75	:	221.00	:	207.50	:
12	:	194.75	:	188.50	:	183.50	:	191.25	:	191.75	:	176.75	:
13	:	87.75	:	85.00	:	83.75	:	89.75	:	86.25	:	82.50	:
14	:	46.00	:	44.50	:	45.50	:	47.00	:	46.50	:	42.50	:
15	:	1.65	:	1.45	:	1.60	:	1.65	:	1.35	:	1.25	:
16	:	1.45	:	1.45	:	1.50	:	1.65	:	1.50	:	1.45	:
17	:	xx	:	1.20	:	1.10	:	1.30	:	0.90	:	1.10	:
18	:	0.90	:	1.20	:	0.90	:	1.10	:	0.90	:	1.00	:
19	:	A	:	B	:	B	:	A	:	C	:	B	:
20	:	A	:	B	:	B	:	C	:	B	:	B	:
21	:	B	:	B	:	B	:	C	:	A	:	B	:
22	:	B	:	B	:	A	:	B	:	B	:	B	:
23	:	A	:	B	:	A	:	B	:	C	:	C	:
24	:	B	:	B	:	B	:	B	:	C	:	C	:
25	:	B	:	B	:	B	:	B	:	B	:	B	:
26	:	6.50	:	3.00	:	2.00	:	7.00	:	+0.75	:	2.50	:
27	:	6115.00	:	6595.00	:	6122.00	:	5736.00	:	5322.00	:	6130.00	:
28	:	324.00	:	322.58	:	318.22	:	310.56	:	308.59	:	307.25	:
29	:	5.30	:	4.90	:	5.20	:	5.40	:	5.80	:	5.00	:
30	:	53.09	:	58.14	:	60.11	:	57.48	:	46.82	:	52.38	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	29	30	31	32	33	34
A	55	90	117	120	82	72
B		150		105	70	30
C	875	850	800	925	1050	850
1	120.00	110.50	116.00	116.00	128.00	120.50
2	120.50	112.50	116.00	119.00	132.00	120.00
3	66.50	64.50	67.00	63.50	73.50	65.75
4	67.50	69.00	67.00	70.50	72.75	65.75
5	58.75	62.00	59.25	65.00	69.50	57.00
6	31.75	31.00	36.00	34.50	35.25	33.00
7	65.50	71.50	68.50	63.00	66.50	68.50
8	49.50	47.00	47.50	46.00	50.50	48.25
9	40.50	37.00	40.50	37.00	41.50	41.25
10	170.00	165.00	172.50	175.00	185.25	172.50
11	217.25	219.75	222.25	216.00	227.75	221.00
12	187.00	184.50	184.50	193.00	195.50	182.00
13	87.00	83.00	83.75	80.00	94.75	80.00
14	45.75	44.50	46.00	45.00	49.75	46.25
15	1.25	1.15	1.25	1.80	1.85	1.75
16	1.15	1.65	1.40	1.80	1.70	1.75
17	1.05	1.10	1.05*	XX	1.10	1.20
18	1.10	1.10	1.80	1.00*	1.20	1.30
19	B	A	A	A	B	A
20	B	B	C	B	B	B
21	B	B	B	C	C	B
22	B	B	B	B	A	A
23	B	B	B	A	B	B
24	B	B	B	A	B	B
25	A	B	B	A	B	C
26	4.25	4.00	3.50	7.00	5.50	5.00
27	5737.00	4648.00	6286.00	5430.00	5537.00	5883.00
28	306.56	306.10	305.85	305.21	302.96	302.53
29	5.70	6.60	4.90	5.80	5.50	5.10
30	52.03	54.39	61.27	61.20	63.20	60.25

* More than one well.

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	35	:	36	:	37	:	38	:	39	:	40	:
A	:	126	:	144	:	54	:	96	:	93	:	78	:
B	:	150	:		:		:		:	30	:		:
C	:	850	:	950	:	850	:	925	:	900	:	850	:
1	:	120.25	:	123.00	:	122.00	:	120.00	:	116.00	:	119.00	:
2	:	123.25	:	124.00	:	123.25	:	122.00	:	116.00	:	121.25	:
3	:	66.50	:	67.75	:	66.00	:	66.50	:	63.75	:	65.00	:
4	:	67.75	:	68.25	:	68.00	:	72.50	:	62.00	:	67.00	:
5	:	60.00	:	64.75	:	60.25	:	66.50	:	62.00	:	60.00	:
6	:	32.00	:	35.75	:	36.50	:	33.00	:	32.00	:	30.25	:
7	:	68.00	:	67.00	:	68.75	:	69.00	:	65.25	:	62.25	:
8	:	46.75	:	49.00	:	49.50	:	47.00	:	47.75	:	48.25	:
9	:	39.25	:	41.50	:	41.00	:	42.00	:	42.50	:	38.25	:
10	:	170.75	:	173.25	:	175.00	:	170.00	:	166.25	:	165.00	:
11	:	225.25	:	217.25	:	220.25	:	223.50	:	207.00	:	213.50	:
12	:	188.50	:	193.00	:	194.25	:	192.25	:	182.00	:	184.00	:
13	:	89.00	:	87.75	:	86.25	:	94.75	:	85.00	:	87.00	:
14	:	46.50	:	48.00	:	48.75	:	46.25	:	46.25	:	46.75	:
15	:	1.65	:	1.50	:	1.85	:	1.85	:	1.20	:	1.85	:
16	:	1.70	:	1.60	:	2.00	:	1.55	:	1.40	:	1.30	:
17	:	1.40	:	1.30	:	1.30	:	1.20	:	1.00	:	1.20	:
18	:	1.50	:	1.30	:	1.20	:	1.00	:	1.20	:	0.95	:
19	:	B	:	A	:	A	:	A	:	A	:	B	:
20	:	B	:	B	:	C	:	B	:	A	:	B	:
21	:	C	:	C	:	C	:	B	:	C	:	B	:
22	:	B	:	B	:	A	:	A	:	B	:	B	:
23	:	C	:	B	:	B	:	B	:	B	:	B	:
24	:	C	:	B	:	B	:	B	:	B	:	B	:
25	:	B	:	B	:	B	:	B	:	C	:	B	:
26	:	5.00	:	2.25	:	4.50	:	6.50	:	5.00	:	2.00	:
27	:	6243.00	:	6408.00	:	4957.00	:	5096.00	:	5940.00	:	5499.00	:
28	:	301.95	:	301.64	:	301.44	:	300.00	:	299.42	:	297.38	:
29	:	4.80	:	4.70	:	6.10	:	5.90	:	5.00	:	5.40	:
30	:	48.91	:	55.83	:	54.06	:	55.14	:	61.83	:	48.54	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	:	:	:	:	:	:
	:	41	:	42	:	43	:
	:	:	:	44	:	45	:
	:	:	:	46	:	:	:
A	:	78	:	54	:	78	:
B	:		:	37	:		:
C	:	800	:	800	:	825	:
1	:	113.50	:	111.50	:	119.00	:
2	:	117.00	:	116.00	:	122.00	:
3	:	62.50	:	61.50	:	66.50	:
4	:	63.25	:	65.00	:	65.25	:
5	:	63.25	:	60.00	:	63.00	:
6	:	31.00	:	33.50	:	34.50	:
7	:	65.50	:	68.00	:	67.50	:
8	:	44.50	:	47.50	:	48.50	:
9	:	38.25	:	40.00	:	41.00	:
10	:	163.75	:	158.75	:	170.75	:
11	:	214.75	:	216.75	:	213.25	:
12	:	188.50	:	181.00	:	191.75	:
13	:	85.50	:	86.25	:	83.75	:
14	:	46.75	:	45.50	:	46.50	:
15	:	1.65	:	1.25	:	1.45	:
16	:	1.45	:	1.25	:	1.50	:
17	:	1.10	:	XX	:	1.00	:
18	:	0.85	:	XX	:	1.05	:
19	:	A	:	A	:	A	:
20	:	A	:	B	:	A	:
21	:	B	:	B	:	A	:
22	:	B	:	B	:	B	:
23	:	B	:	A	:	B	:
24	:	B	:	A	:	B	:
25	:	B	:	B	:	B	:
26	:	5.25	:	3.00	:	5.50	:
27	:	5826.00	:	5325.00	:	6125.00	:
28	:	297.11	:	295.20	:	294.89	:
29	:	5.10	:	5.50	:	4.80	:
30	:	49.95	:	55.07	:	60.04	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	47	:	48	:	49	:	50	:	51	:	52	:
A	:	108	:	51	:	60	:	54	:	51	:	96	:
B	:		:	58	:	30	:	38	:		:	170	:
C	:	875	:	800	:	950	:	775	:	750	:	900	:
1	:	120.50	:	119.25	:	122.00	:	122.00	:	121.25	:	120.00	:
2	:	119.50	:	120.25	:	121.00	:	121.00	:	125.25	:	118.50	:
3	:	65.50	:	65.50	:	66.00	:	61.00	:	64.75	:	66.75	:
4	:	68.00	:	66.50	:	67.25	:	64.00	:	64.75	:	67.00	:
5	:	67.00	:	60.25	:	63.00	:	59.50	:	55.50	:	61.25	:
6	:	35.50	:	35.00	:	31.50	:	33.25	:	35.50	:	31.00	:
7	:	62.50	:	68.75	:	57.00	:	67.50	:	58.50	:	69.50	:
8	:	47.50	:	46.00	:	48.50	:	47.00	:	47.00	:	47.25	:
9	:	38.50	:	40.50	:	40.50	:	40.00	:	40.00	:	42.00	:
10	:	177.75	:	167.50	:	171.50	:	160.00	:	169.50	:	176.50	:
11	:	214.75	:	215.25	:	204.50	:	212.50	:	206.50	:	222.25	:
12	:	196.75	:	184.50	:	185.25	:	181.50	:	183.50	:	181.50	:
13	:	85.00	:	79.50	:	87.75	:	85.50	:	85.50	:	87.00	:
14	:	45.25	:	46.00	:	48.00	:	46.25	:	44.50	:	46.50	:
15	:	1.50	:	1.65	:	1.55	:	1.30	:	1.00	:	1.55	:
16	:	1.65	:	1.65	:	1.80	:	1.40	:	1.10	:	1.60	:
17	:	1.00	:	1.20	:	0.80	:	0.95	:	0.90	:	1.30	:
18	:	1.00	:	1.10	:	0.90	:	1.00	:	0.50	:	1.20	:
19	:	A	:	B	:	B	:	B	:	C	:	A	:
20	:	A	:	A	:	B	:	B	:	B	:	B	:
21	:	B	:	A	:	C	:	B	:	B	:	B	:
22	:	B	:	B	:	B	:	B	:	B	:	A	:
23	:	B	:	B	:	B	:	B	:	C	:	B	:
24	:	B	:	B	:	A	:	B	:	C	:	B	:
25	:	B	:	B	:	A	:	B	:	B	:	A	:
26	:	3.50	:	3.25	:	1.00	:	5.75	:	1.50	:	2.50	:
27	:	6390.00	:	6019.00	:	5078.00	:	4973.00	:	5244.00	:	4687.00	:
28	:	291.23	:	287.43	:	286.68	:	284.12	:	283.24	:	283.14	:
29	:	4.60	:	4.80	:	5.60	:	5.70	:	5.20	:	6.00	:
30	:	54.03	:	43.14	:	59.35	:	43.98	:	55.82	:	45.36	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	53	:	54	:	55	:	56	:	57	:	58	:
A	:	48	:	78	:	66	:	90	:	48	:	96	:
B	:	102	:	10	:	59	:		:	7	:	78	:
C	:	875	:	875	:	850	:	750	:	925	:	925	:
1	:	123.75	:	122.75	:	121.00	:	117.00	:	123.50	:	124.50	:
2	:	125.50	:	118.00	:	123.25	:	119.00	:	131.50	:	132.00	:
3	:	69.00	:	65.00	:	65.50	:	64.00	:	67.50	:	70.00	:
4	:	68.50	:	67.00	:	66.50	:	66.50	:	67.00	:	70.00	:
5	:	62.75	:	58.00	:	60.25	:	59.50	:	63.00	:	65.00	:
6	:	34.00	:	33.50	:	32.25	:	34.50	:	36.50	:	40.50	:
7	:	62.75	:	67.50	:	65.25	:	62.00	:	66.00	:	65.00	:
8	:	49.50	:	48.25	:	49.00	:	45.00	:	49.50	:	52.00	:
9	:	40.00	:	42.50	:	42.50	:	39.50	:	43.00	:	43.50	:
10	:	172.50	:	169.75	:	165.00	:	168.75	:	179.00	:	182.75	:
11	:	216.00	:	214.00	:	214.50	:	204.50	:	219.25	:	219.75	:
12	:	189.00	:	180.25	:	184.00	:	179.00	:	198.00	:	197.25	:
13	:	85.50	:	90.25	:	90.25	:	83.00	:	92.75	:	89.00	:
14	:	48.50	:	45.00	:	44.50	:	42.50	:	48.00	:	50.00	:
15	:	1.40	:	1.40	:	1.25	:	1.65	:	1.15	:	1.75	:
16	:	1.60	:	1.40	:	1.45	:	1.20	:	1.15	:	1.95	:
17	:	0.80	:	0.80	:	1.00	:	1.30	:	0.90	:	XX	:
18	:	1.00	:	0.90	:	1.00	:	1.30	:	0.90	:	1.10	:
19	:	B	:	B	:	A	:	A	:	C	:	B	:
20	:	B	:	B	:	A	:	A	:	C	:	B	:
21	:	B	:	B	:	B	:	B	:	C	:	C	:
22	:	C	:	A	:	A	:	B	:	B	:	A	:
23	:	B	:	B	:	B	:	A	:	B	:	B	:
24	:	A	:	B	:	C	:	B	:	B	:	B	:
25	:	B	:	B	:	A	:	B	:	B	:	B	:
26	:	2.25	:	2.00	:	2.25	:	2.00	:	4.75	:	4.00	:
27	:	4746.00	:	5713.00	:	5620.00	:	5324.00	:	5005.00	:	5979.00	:
28	:	280.63	:	279.27	:	277.63	:	272.17	:	269.58	:	269.00	:
29	:	5.90	:	4.90	:	4.90	:	5.70	:	5.40	:	4.50	:
30	:	61.54	:	55.98	:	40.19	:	52.66	:	64.49	:	54.60	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	59	:	60	:	61	:	62	:	63	:	64	:
A	:	74	:	60	:	102	:	60	:	62	:	48	:
B	:		:	22	:	35	:	125	:	115	:	980	:
C	:	825	:	975	:	950	:	925	:	875	:	700	:
1	:	118.00	:	123.00	:	120.00	:	117.50	:	122.50	:	116.75	:
2	:	117.00	:	125.00	:	121.75	:	117.50	:	122.00	:	120.50	:
3	:	63.75	:	70.50	:	67.50	:	65.50	:	69.00	:	62.00	:
4	:	63.00	:	72.50	:	67.50	:	68.00	:	68.00	:	62.50	:
5	:	54.50	:	68.50	:	60.00	:	61.75	:	59.75	:	59.00	:
6	:	30.00	:	35.00	:	30.75	:	34.00	:	35.25	:	33.50	:
7	:	61.00	:	69.50	:	72.00	:	72.25	:	66.50	:	65.50	:
8	:	45.00	:	50.50	:	50.75	:	45.50	:	50.00	:	46.75	:
9	:	41.50	:	40.50	:	43.00	:	39.50	:	42.00	:	39.75	:
10	:	166.25	:	181.50	:	157.50	:	171.25	:	177.00	:	161.75	:
11	:	200.50	:	226.00	:	224.25	:	226.00	:	224.75	:	207.00	:
12	:	170.00	:	213.25	:	191.75	:	189.00	:	189.25	:	182.75	:
13	:	83.75	:	89.75	:	89.00	:	82.50	:	84.50	:	76.25	:
14	:	48.00	:	48.25	:	48.50	:	45.00	:	47.50	:	47.25	:
15	:	1.05	:	1.55	:	1.45	:	1.95	:	1.15	:	1.45	:
16	:	1.10	:	1.55	:	1.30	:	1.75	:	1.35	:	1.50	:
17	:	0.95	:	0.90	:	1.00	:	1.40	:	1.20	:	1.30	:
18	:	0.90	:	0.90	:	1.10	:	1.30	:	1.00	:	1.35	:
19	:	A	:	B	:	A	:	A	:	C	:	A	:
20	:	B	:	B	:	A	:	A	:	B	:	B	:
21	:	B	:	B	:	B	:	A	:	B	:	B	:
22	:	B	:	B	:	B	:	B	:	B	:	B	:
23	:	B	:	B	:	B	:	B	:	B	:	B	:
24	:	B	:	B	:	B	:	A	:	C	:	B	:
25	:	B	:	A	:	B	:	B	:	B	:	B	:
26	:	2.00	:	3.00	:	3.00	:	1.00	:	+2.00	:	7.50	:
27	:	4850.00	:	5836.00	:	5924.00	:	5773.00	:	5018.00	:	5738.00	:
28	:	267.64	:	266.07	:	265.42	:	265.14	:	264.33	:	263.80	:
29	:	5.50	:	4.60	:	4.60	:	4.60	:	5.30	:	4.60	:
30	:	56.31	:	63.59	:	46.81	:	58.64	:	46.72	:	37.38	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	65	:	66	:	67	:	68	:	69	:	70	:
A	:	60	:	70	:	54	:	52	:	52	:	60	:
B	:	175	:		:	104	:	20	:	150	:	32	:
C	:	900	:	675	:	900	:	800	:	850	:	950	:
1	:	121.00	:	124.00	:	121.00	:	119.00	:	127.00	:	122.00	:
2	:	123.00	:	125.00	:	121.50	:	123.00	:	126.00	:	121.00	:
3	:	66.25	:	66.00	:	66.25	:	63.00	:	68.75	:	67.00	:
4	:	66.50	:	65.00	:	66.25	:	62.00	:	69.00	:	68.50	:
5	:	68.75	:	53.00	:	59.50	:	54.00	:	57.75	:	59.50	:
6	:	34.00	:	34.00	:	37.25	:	34.00	:	34.50	:	34.00	:
7	:	60.50	:	58.50	:	69.50	:	61.00	:	67.25	:	66.00	:
8	:	48.75	:	50.00	:	50.50	:	45.00	:	49.50	:	48.00	:
9	:	41.00	:	43.00	:	41.50	:	37.50	:	42.50	:	41.25	:
10	:	173.75	:	174.25	:	177.75	:	160.00	:	174.25	:	175.00	:
11	:	212.00	:	202.00	:	221.00	:	194.25	:	220.25	:	222.25	:
12	:	194.25	:	175.00	:	186.00	:	171.25	:	181.50	:	187.50	:
13	:	83.00	:	81.25	:	80.00	:	81.25	:	86.25	:	83.75	:
14	:	48.00	:	47.25	:	46.50	:	46.50	:	49.00	:	46.25	:
15	:	1.95	:	1.45	:	1.30	:	1.05	:	1.10	:	1.55	:
16	:	1.80	:	1.45	:	1.65	:	1.00	:	1.10	:	1.60	:
17	:	1.30	:	0.90	:	0.90	:	0.80	:	1.10	:	1.20	:
18	:	1.40	:	0.95	:	1.10	:	0.80	:	1.00	:	1.20	:
19	:	B	:	C	:	B	:	C	:	B	:	A	:
20	:	B	:	B	:	B	:	C	:	B	:	C	:
21	:	B	:	C	:	A	:	C	:	B	:	B	:
22	:	B	:	A	:	A	:	B	:	A	:	A	:
23	:	A	:	B	:	C	:	C	:	C	:	B	:
24	:	A	:	B	:	C	:	C	:	C	:	B	:
25	:	A	:	A	:	B	:	B	:	B	:	B	:
26	:	4.00	:	7.00	:	2.00	:	6.00	:	1.50	:	7.00	:
27	:	5284.00	:	5309.00	:	3555.00	:	5480.00	:	4837.00	:	4751.00	:
28	:	258.86	:	256.54	:	253.61	:	249.38	:	248.08	:	248.02	:
29	:	4.90	:	4.90	:	7.10	:	4.60	:	5.10	:	5.20	:
30	:	54.43	:	57.32	:	55.74	:	59.68	:	40.16	:	56.56	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	71	:	72	:	73	:	74	:	75	:	76	:
A	:	60	:	60	:	80	:	78	:	84	:	60	:
B	:	13	:	3	:		:		:	12	:		:
C	:	1000	:	825	:	850	:	900	:	850	:	875	:
1	:	127.00	:	122.75	:	125.00	:	118.75	:	115.50	:	119.25	:
2	:	131.00	:	124.00	:	125.00	:	117.00	:	118.25	:	118.50	:
3	:	71.00	:	65.50	:	68.25	:	64.50	:	67.75	:	62.75	:
4	:	73.00	:	65.50	:	70.25	:	66.50	:	67.00	:	62.75	:
5	:	68.00	:	58.50	:	62.75	:	69.00	:	62.50	:	56.50	:
6	:	34.50	:	32.25	:	32.00	:	30.75	:	32.00	:	33.00	:
7	:	68.00	:	64.00	:	64.00	:	66.25	:	66.00	:	59.00	:
8	:	51.50	:	48.00	:		:	48.75	:	48.50	:	47.50	:
9	:	45.25	:	40.25	:	41.75	:	41.75	:	40.25	:	41.50	:
10	:	179.00	:	164.25	:	174.75	:	167.50	:	172.50	:	167.50	:
11	:	224.75	:	209.50	:	217.75	:	214.75	:	219.75	:	199.75	:
12	:	204.50	:	177.75	:	190.50	:	191.25	:	196.25	:	181.50	:
13	:	89.75	:	84.50	:	87.00	:	84.50	:	86.25	:	87.00	:
14	:	49.50	:	46.75	:	47.00	:	42.00	:	45.25	:	43.00	:
15	:	1.65	:	1.30	:	2.00	:	1.50	:	1.85	:	1.30	:
16	:	1.65	:	1.30	:	1.70	:	1.75	:	1.55	:	1.50	:
17	:	1.00	:	0.85	:	1.20*	:	0.90	:	1.30	:	0.80	:
18	:	0.90	:	0.95	:	1.20	:	0.95	:	1.00	:	0.85	:
19	:	C	:	B	:	A	:	B	:	A	:	A	:
20	:	B	:	B	:	A	:	A	:	B	:	A	:
21	:	C	:	C	:	B	:	A	:	B	:	A	:
22	:	B	:	C	:	B	:	B	:	B	:	B	:
23	:	B	:	B	:	A	:	C	:	A	:	B	:
24	:	B	:	B	:	B	:	C	:	B	:	B	:
25	:	B	:	B	:	A	:	B	:	B	:	A	:
26	:	5.00	:	5.00	:	7.50	:	0.75	:	4.00	:	5.00	:
27	:	6323.00	:	4523.00	:	5482.00	:	4693.00	:	5115.00	:	5438.00	:
28	:	243.93	:	240.38	:	236.94	:	231.45	:	228.49	:	227.81	:
29	:	3.90	:	5.50	:	4.30	:	4.90	:	4.50	:	4.20	:
30	:	67.23	:	36.30	:	55.36	:	48.00	:	48.36	:	57.90	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	77	:	78	:	79	:	80	:	81	:
A	:	67	:	48	:	84	:	54	:	48	:
B	:		:		:	120	:	32	:	180	:
C	:	950	:	825	:	850	:	800	:	825	:
1	:	121.50	:	121.00	:	119.50	:	116.00	:	119.25	:
2	:	121.00	:	122.00	:	123.50	:	117.75	:	118.25	:
3	:	67.00	:	64.00	:	64.75	:	62.00	:	65.00	:
4	:	69.00	:	62.75	:	66.00	:	64.00	:	68.00	:
5	:	67.00	:	56.00	:	61.50	:	61.25	:	61.00	:
6	:	34.00	:	30.00	:	35.50	:	32.75	:	37.75	:
7	:	64.50	:	57.50	:	67.00	:	65.00	:	64.25	:
8	:	50.75	:	45.50	:	48.75	:	46.00	:	46.25	:
9	:	40.50	:	41.00	:	41.00	:	40.50	:	39.00	:
10	:	172.50	:	160.00	:	170.00	:	157.50	:	173.00	:
11	:	219.75	:	198.75	:	215.25	:	212.00	:	210.00	:
12	:	206.50	:	170.00	:	184.00	:	189.25	:	183.00	:
13	:	80.50	:	85.00	:	91.50	:	83.00	:	84.50	:
14	:	47.25	:	45.50	:	46.50	:	42.00	:	45.50	:
15	:	1.70	:	1.75	:	1.40	:	1.70	:	1.35	:
16	:	1.90	:	1.40	:	1.40	:	1.50	:	1.20	:
17	:	1.00	:	1.10	:	1.00*	:	0.90	:	0.90	:
18	:	1.20	:	1.00	:	1.20	:	0.95	:	0.90	:
19	:	A	:	B	:	B	:	A	:	B	:
20	:	A	:	B	:	C	:	B	:	B	:
21	:	B	:	B	:	C	:	B	:	B	:
22	:	C	:	B	:	B	:	B	:	B	:
23	:	B	:	B	:	B	:	B	:	C	:
24	:	B	:	B	:	B	:	B	:	C	:
25	:	A	:	B	:	B	:	B	:	B	:
26	:	6.50	:	2.00	:	4.00	:	1.00	:	0.00	:
27	:	4601.00	:	5054.00	:	4165.00	:	5049.00	:	4295.00	:
28	:	224.94	:	222.16	:	219.66	:	214.08	:	211.32	:
29	:	4.90	:	4.40	:	5.30	:	4.20	:	4.90	:
30	:	47.11	:	61.30	:	34.47	:	36.90	:	47.75	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	: : 82	: : 83	: : 84	: : 85	: : 86	:
A	: 66	: 96	: 66	: 72	: 62	:
B	:	:	:	:	:	:
C	: 775	: 800	: 900	: 975	: 950	:
1	: 116.00	: 116.25	: 115.00	: 122.50	: 124.50	:
2	: 114.00	: 118.00	: 116.50	: 121.00	: 123.00	:
3	: 61.50	: 61.00	: 66.50	: 68.25	: 69.00	:
4	: 62.00	: 64.50	: 68.50	: 68.00	: 71.75	:
5	: 55.00	: 62.00	: 60.50	: 61.00	: 64.75	:
6	: 30.50	: 31.50	: 34.00	: 30.50	: 33.00	:
7	: 58.00	: 60.00	: 64.25	: 69.25	: 63.25	:
8	: 43.00	: 46.00	: 47.75	: 49.00	: 51.00	:
9	: 36.50	: 40.00	: 41.00	: 43.00	: 45.00	:
10	: 157.50	: 159.25	: 169.75	: 175.00	: 175.75	:
11	: 195.50	: 198.75	: 214.75	: 223.50	: 219.75	:
12	: 165.00	: 178.50	: 187.00	: 166.50	: 166.50	:
13	: 82.50	: 85.00	: 85.00	: 90.25	: 93.25	:
14	: 45.00	: 44.50	: 47.00	: 48.25	: 49.50	:
15	: 1.30	: 1.80	: 2.05	: 1.80	: 1.20	:
16	: 1.45	: 1.70	: 1.35	: 1.80	: 1.20	:
17	: 0.80	: 1.30	: 1.00	: 1.30	: 0.60	:
18	: 0.90	: 0.90	: 0.80	: 0.90	: 0.60	:
19	: B	: A	: B	: A	: A	:
20	: C	: B	: B	: C	: C	:
21	: C	: C	: C	: C	: C	:
22	: B	: B	: B	: B	: A	:
23	: B	: A	: B	: A	: B	:
24	: C	: B	: B	: B	: B	:
25	: B	: B	: B	: B	: B	:
26	: 2.00	: 5.75	: 5.00	: 2.00	: 7.00	:
27	: 3662.00	: 4070.00	: 3036.00	: 4901.00	: 4070.00	:
28	: 208.77	: 208.26	: 204.84	: 204.65	: 203.53	:
29	: 5.70	: 5.10	: 6.70	: 4.20	: 5.000	:
30	: 52.66	: 47.58	: 53.37	: 42.61	: 40.40	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	:	:	:	:	:					
	:	87	:	88	:	89	:	90	:	91	:
A	:	60	:	96	:	90	:	84	:	72	:
B	:	160	:	156	:	80	:	20	:	94	:
C	:	825	:	950	:	825	:	900	:	825	:
1	:	118.00	:	121.00	:	123.00	:	123.50	:	122.25	:
2	:	118.00	:	122.50	:	126.50	:	124.00	:	121.00	:
3	:	65.50	:	67.00	:	66.00	:	62.75	:	63.00	:
4	:	66.50	:	67.50	:	69.00	:	67.50	:	64.50	:
5	:	58.75	:	62.25	:	63.50	:	56.75	:	53.25	:
6	:	38.25	:	33.00	:	37.00	:	33.25	:	33.50	:
7	:	63.00	:	61.50	:	66.50	:	69.00	:	68.00	:
8	:	46.25	:	48.50	:	48.00	:	48.00	:	45.00	:
9	:	41.00	:	40.00	:	43.00	:	41.00	:	41.00	:
10	:	171.25	:	172.50	:	172.50	:	170.75	:	164.25	:
11	:	207.00	:	210.75	:	219.75	:	217.75	:	214.00	:
12	:	179.00	:	185.25	:	187.75	:	182.00	:	174.75	:
13	:	85.00	:	89.75	:	85.00	:	85.00	:	80.00	:
14	:	47.00	:	47.50	:	46.00	:	48.00	:	45.00	:
15	:	1.20	:	1.75	:	1.30	:	1.50	:	1.20	:
16	:	1.00	:	1.95	:	1.40	:	1.30	:	1.20	:
17	:	1.20	:	1.10*	:	0.90	:	0.90	:	1.10	:
18	:	1.10	:	1.10	:	0.90	:	1.00	:	1.15	:
19	:	C	:	B	:	B	:	A	:	B	:
20	:	C	:	B	:	B	:	B	:	B	:
21	:	C	:	B	:	C	:	C	:	C	:
22	:	B	:	B	:	B	:	A	:	A	:
23	:	C	:	B	:	B	:	A	:	C	:
24	:	C	:	B	:	B	:	A	:	C	:
25	:	B	:	B	:	B	:	B	:	B	:
26	:	4.00	:	5.50	:	4.50	:	+2.00	:	0.50	:
27	:	4018.00	:	3727.00	:	4472.00	:	3443.00	:	3026.00	:
28	:	198.25	:	191.19	:	189.55	:	185.50	:	179.37	:
29	:	4.90	:	5.20	:	4.20	:	5.30	:	5.90	:
30	:	34.47	:	50.62	:	40.91	:	36.33	:	37.47	:

MEASUREMENTS AND OBSERVATIONS ON COWS (Cont)

	:	92	:	93	:	94	:	95	:	96	:
A	:	60	:	60	:	96	:	60	:	54	:
B	:	120	:		:		:		:	44	:
C	:	750	:	825	:	825	:	650	:	675	:
1	:	118.00	:	122.50	:	123.50	:	114.00	:	117.50	:
2	:	117.00	:	120.00	:	125.50	:	116.00	:	118.75	:
3	:	63.00	:	66.50	:	67.50	:	59.00	:	63.75	:
4	:	64.50	:	65.50	:	69.25	:	59.00	:	64.75	:
5	:	57.00	:	60.00	:	60.25	:	51.75	:	55.25	:
6	:	33.00	:	34.00	:	34.50	:	33.00	:	29.00	:
7	:	63.25	:	60.00	:	62.00	:	61.00	:	62.50	:
8	:	47.00	:	47.00	:	48.00	:	47.00	:	47.00	:
9	:	38.00	:	41.00	:	44.50	:	38.50	:	37.50	:
10	:	163.75	:	170.00	:	176.50	:	158.25	:	162.50	:
11	:	207.00	:	201.75	:	213.25	:	194.75	:	208.25	:
12	:	175.00	:	185.25	:	184.50	:	163.75	:	175.00	:
13	:	82.50	:	89.00	:	88.25	:	83.75	:	86.25	:
14	:	46.00	:	47.50	:	48.50	:	44.75	:	43.75	:
15	:	1.10	:	1.10	:	1.30	:	1.10	:	1.30	:
16	:	1.10	:	1.10	:	1.65	:	1.10	:	1.10	:
17	:	XX	:	0.90	:	0.80	:	0.90	:	1.30	:
18	:	0.90	:	0.80	:	1.00	:	1.00	:	1.20	:
19	:	C	:	C	:	B	:	C	:	B	:
20	:	B	:	B	:	C	:	C	:	B	:
21	:	B	:	C	:	C	:	C	:	B	:
22	:	B	:	C	:	B	:	B	:	B	:
23	:	B	:	C	:	B	:	C	:	B	:
24	:	B	:	C	:	B	:	C	:	B	:
25	:	B	:	B	:	B	:	B	:	B	:
26	:	4.00	:	3.00	:	3.50	:	6.00	:	3.25	:
27	:	3924.00	:	3548.00	:	4104.00	:	2943.00	:	2342.00	:
28	:	178.63	:	174.00	:	167.40	:	165.80	:	121.69	:
29	:	4.60	:	4.90	:	4.10	:	5.60	:	5.20	:
30	:	34.47	:	41.83	:	38.58	:	50.77	:	46.89	:

TABLE 2.

ARRANGED ACCORDING TO FAT PRODUCTION.

	:	I	:	II	:	III	:	IV	:
Weight	:	890	:	861	:	863	:	840	:
Ht. at withers:	:	122.2	:	119.0	:	121.4	:	119.7	:
Ht. at croup	:	122.9	:	120.7	:	122.5	:	120.1	:
Depth of chest:	:	67.2	:	65.5	:	66.3	:	64.8	:
Dp. of barrel	:	68.3	:	67.1	:	66.9	:	66.2	:
Dp. at udder	:	62.8	:	61.6	:	60.4	:	60.0	:
Wd. of chest	:	34.5	:	33.6	:	32.7	:	31.9	:
Wd. of barrel	:	66.5	:	66.5	:	65.0	:	63.5	:
Wd. of hips	:	49.9	:	47.7	:	48.5	:	47.4	:
Wd. of thurls	:	41.4	:	40.0	:	41.3	:	40.7	:
Circ. of chest:	:	173.5	:	170.0	:	171.2	:	168.1	:
Cir. of barrel:	:	218.2	:	216.7	:	214.5	:	210.6	:
Circ. at udder:	:	193.1	:	187.4	:	186.4	:	181.2	:
Lg. of back	:	96.8	:	85.5	:	85.5	:	85.8	:
Lg. of rump	:	47.4	:	46.4	:	47.0	:	45.9	:
Diameter R	:	1.61:	:	1.51:	:	1.41:	:	1.48	:
of veins L	:	1.63:	:	1.55:	:	1.45:	:	1.43	:
Diameter R	:	1.12:	:	1.12:	:	1.09:	:	0.98	:
of wells L	:	1.13:	:	1.07:	:	1.03:	:	0.96	:
Capacity	:	218	:	207	:	200	:	197	:
Droop of rump	:	4.0	:	4.3	:	3.5	:	3.6	:

TABLE 2 (Continued)

	: :Best : 10	: :Poorest : 10	: : Best : 48	: : Poorest : 48	:
Weight	: 917	: 805	: 875	: 851	:
Ht. at withers:	124.5	: 120.3	: 120.6	: 120.6	:
Ht. at croup	: 125.5	: 120.9	: 121.8	: 121.3	:
Depth of chest:	67.8	: 64.4	: 66.4	: 66.0	:
Dp. of barrel	: 68.6	: 65.8	: 67.7	: 66.6	:
Dp. at udder	: 63.4	: 57.9	: 62.3	: 60.2	:
Wd. of chest	: 34.9	: 33.8	: 34.1	: 32.4	:
Wd. of barrel	: 67.3	: 63.7	: 66.5	: 64.2	:
Wd. of hips	: 50.7	: 47.2	: 48.8	: 47.9	:
Wd. of thurls	: 41.9	: 40.6	: 40.7	: 41.0	:
Circ. of chest:	174.9	: 168.2	: 171.8	: 169.7	:
Cir. of barrel:	221.5	: 209.4	: 217.6	: 214.6	:
Cir. at udder	: 195.1	: 179.2	: 190.2	: 183.8	:
Lg. of back	: 87.7	: 85.5	: 86.2	: 85.6	:
Lg. of rump	: 48.2	: 46.4	: 46.9	: 46.4	:
Diameter R	: 1.62:	1.28	: 1.56:	1.44:	:
of veins L	: 1.65:	1.29	: 1.58:	1.44:	:
Diameter R	: 1.19:	1.01	: 1.12:	1.03:	:
of wells L	: 1.23:	1.01	: 1.10:	1.00:	:
Capacity	: 224	: 188	: 213	: 199	:
Droop of rump	: 3.37:	3.22	: 4.1	: 3.5	:

TABLE 3

HEIGHT AT WITHERS

: No. :			: No. :			: No. :		
Height:	Cow	Fat	Height:	Cow	Fat	Height:	Cow	Fat
131	: 18	: 329	:122.25:	91	: 179	:119.25:	81	: 211
130.5	: 4	: 411	:122 :	12	: 352	:119. :	16	: 333
129.5	: 2	: 422	:122.00:	37	: 301	:119 :	40	: 297
128	: 33	: 302	:122 :	49	: 286	:119 :	43	: 294
127	: 1	: 537	:122 :	50	: 284	:119 :	68	: 249
127	: 69	: 248	:122 :	70	: 248	:118.75:	74	: 231
127	: 71	: 243	:121.5 :	77	: 224	:118 :	13	: 347
126.25:	: 3	: 420	:121.25:	51	: 283	:118 :	15	: 338
126	: 7	: 377	:121. :	55	: 277	:118 :	20	: 329
126	: 26	: 310	:121 :	65	: 258	:118 :	59	: 267
125.75:	: 6	: 385	:121 :	67	: 253	:118 :	87	: 198
125.5	: 19	: 329	:121 :	78	: 222	:118 :	92	: 178
125	: 73	: 236	:121 :	88	: 191	:117.5 :	62	: 265
124.5	: 46	: 292	:120.75:	8	: 369	:117.5 :	96	: 121
124.5	: 58	: 269	:120.5 :	17	: 331	:117 :	24	: 322
124.5	: 86	: 203	:120.5 :	34	: 302	:117 :	45	: 292
124.25:	: 27	: 308	:120.5 :	47	: 291	:117 :	56	: 272
124	: 66	: 256	:120.25:	35	: 301	:116.75:	64	: 263
123.75:	: 53	: 280	:120 :	5	: 407	:116.25:	28	: 307
123.5	: 44	: 294	:120 :	10	: 364	:116.25:	83	: 208
123.5	: 57	: 269	:120 :	25	: 318	:116 :	31	: 305
123.5	: 90	: 185	:120 :	29	: 306	:116 :	32	: 305
123.5	: 94	: 167	:120 :	38	: 300	:116 :	39	: 299
123	: 11	: 357	:120 :	52	: 283	:116 :	80	: 214
123	: 36	: 301	:120 :	61	: 265	:116 :	82	: 208
123	: 60	: 266	:119.5 :	21	: 325	:115.5 :	22	: 324
123	: 89	: 189	:119.5 :	23	: 324	:115.5 :	75	: 228
122.75:	: 54	: 279	:119.5 :	79	: 219	:115 :	84	: 204
122.75:	: 72	: 240	:119.25:	9	: 366	:114 :	95	: 165
122.5	: 63	: 264	:119.25:	14	: 346	:113.5 :	41	: 297
122.5	: 85	: 204	:119.25:	48	: 287	:111.5 :	42	: 295
122.5	: 93	: 174	:119.25:	76	: 227	:110.5 :	30	: 306

TABLE 4.

DEPTH AT UDDER

Depth:	No. :	Fat :	Depth:	No. :	Fat :	Depth:	No. :	Fat :
Cow :			Cow :			Cow :		
71.75:	2 :	422 :	62.25:	88 :	191 :	59.5 :	45 :	292 :
71 :	15 :	338 :	62 :	30 :	306 :	59.5 :	50 :	284 :
69.5 :	33 :	302 :	62 :	39 :	299 :	59.5 :	56 :	272 :
69 :	1 :	537 :	62 :	83 :	208 :	59.5 :	67 :	253 :
69 :	18 :	329 :	61.75:	62 :	265 :	59.5 :	70 :	248 :
69 :	74 :	231 :	61.5 :	6 :	385 :	59.25:	31 :	420 :
68.75:	65 :	258 :	61.5 :	46 :	292 :	59 :	19 :	329 :
68.75:	60 :	266 :	61.5 :	79 :	219 :	59 :	22 :	324 :
68 :	21 :	325 :	61.25:	52 :	283 :	59 :	64 :	263 :
68 :	71 :	243 :	61.25:	80 :	214 :	58.75:	29 :	306 :
67 :	47 :	291 :	61 :	12 :	352 :	58.75:	87 :	198 :
67 :	77 :	224 :	61 :	81 :	211 :	58.5 :	72 :	240 :
66.5 :	26 :	310 :	61 :	85 :	204 :	58 :	5 :	407 :
66.5 :	38 :	300 :	60.5 :	23 :	324 :	58 :	54 :	279 :
65.5 :	11 :	357 :	60.5 :	84 :	204 :	57.75:	69 :	248 :
65 :	13 :	347 :	60.25:	14 :	346 :	57 :	34 :	302 :
65 :	32 :	305 :	60.25:	37 :	301 :	57 :	92 :	178 :
65 :	58 :	269 :	60.25:	48 :	287 :	56.75:	90 :	185 :
64.75:	36 :	301 :	60.25:	55 :	277 :	56.5 :	76 :	227 :
64.75:	86 :	203 :	60.25:	94 :	167 :	56 :	44 :	294 :
64 :	16 :	333 :	60 :	7 :	377 :	56 :	78 :	222 :
63.5 :	89 :	189 :	60 :	8 :	369 :	55.5 :	51 :	283 :
63.25:	4 :	411 :	60 :	17 :	331 :	55.25:	28 :	307 :
63.25:	41 :	297 :	60 :	24 :	322 :	55.25:	96 :	121 :
63 :	43 :	294 :	60 :	25 :	318 :	55 :	82 :	208 :
63 :	49 :	286 :	60 :	27 :	308 :	54.5 :	59 :	267 :
63 :	57 :	269 :	60 :	35 :	301 :	54 :	20 :	329 :
62.75:	53 :	280 :	60 :	40 :	297 :	54 :	68 :	249 :
62.75:	73 :	236 :	60 :	42 :	295 :	53.25:	91 :	179 :
62.5 :	10 :	364 :	60 :	61 :	265 :	53 :	66 :	256 :
62.5 :	75 :	228 :	60 :	93 :	174 :	51.75:	95 :	165 :
62.25:	9 :	366 :	59.75:	63 :	264 :	:	:	:

TABLE 5

WIDTH OF BARREL

Width	No.	Fat	Width	No.	Fat	Width	No.	Fat
: Cows	:	:	: Cow	:	:	: Cow	:	:
78.25	: 15	: 338	: 67	: 79	: 219	: 62.5	: 47	: 291
76.75	: 2	: 422	: 66.5	: 12	: 352	: 62.5	: 96	: 121
72.25	: 62	: 265	: 66.5	: 33	: 302	: 62.25	: 40	: 297
72	: 61	: 265	: 66.5	: 63	: 264	: 62	: 19	: 329
71.75	: 27	: 308	: 66.25	: 74	: 231	: 62	: 32	: 305
71.5	: 30	: 306	: 66	: 57	: 269	: 62	: 56	: 272
71	: 6	: 385	: 66	: 70	: 248	: 62	: 94	: 167
71	: 18	: 329	: 66	: 75	: 228	: 61.5	: 22	: 324
70.75	: 24	: 322	: 65.5	: 29	: 306	: 61.5	: 88	: 191
70	: 16	: 333	: 65.5	: 41	: 297	: 61	: 59	: 267
69.5	: 1	: 537	: 65.5	: 64	: 263	: 61	: 68	: 249
69.0	: 52	: 283	: 65.25	: 7	: 377	: 61	: 85	: 204
69.5	: 60	: 266	: 65.25	: 9	: 366	: 61	: 95	: 165
69.5	: 67	: 253	: 65.25	: 39	: 299	: 60.75	: 8	: 369
69	: 10	: 364	: 65	: 25	: 318	: 60.5	: 45	: 292
69	: 38	: 300	: 65	: 58	: 269	: 60.5	: 65	: 258
69	: 90	: 185	: 65	: 80	: 214	: 60.25	: 48	: 287
68.75	: 37	: 301	: 64.75	: 86	: 203	: 60.25	: 55	: 277
68.5	: 13	: 347	: 64.5	: 77	: 224	: 60	: 83	: 208
68.5	: 31	: 305	: 64.25	: 81	: 211	: 60	: 93	: 174
68.5	: 34	: 302	: 64.25	: 84	: 204	: 59.5	: 50	: 284
68.5	: 44	: 294	: 64	: 4	: 411	: 59	: 76	: 227
68	: 23	: 324	: 64	: 11	: 357	: 58.5	: 51	: 283
68	: 35	: 301	: 64	: 73	: 236	: 58.5	: 66	: 256
68	: 42	: 295	: 63.5	: 17	: 331	: 58.5	: 72	: 240
68	: 71	: 243	: 63.5	: 89	: 189	: 58	: 21	: 325
67.5	: 5	: 407	: 63.25	: 28	: 307	: 58	: 82	: 208
67.5	: 43	: 294	: 63.25	: 92	: 178	: 57.5	: 78	: 222
67.5	: 54	: 279	: 63	: 87	: 198	: 57	: 20	: 329
67.25	: 69	: 248	: 62.75	: 14	: 346	: 57	: 49	: 269
67	: 26	: 310	: 62.75	: 46	: 292	: 57.25	: 91	: 179
67	: 36	: 301	: 62.75	: 53	: 280	:	:	:

TABLE 6

CIRCUMFERENCE AT UDDER

Circ.	No.	Fat	Circ.	No.	Fat	Circ.	No.	Fat
: Cow	:	:	: Cow	:	:	: Cow	:	:
224.25:	2	: 422	:189.25:	19	: 329	:182.75:	22	: 324
217.25:	18	: 329	:189.25:	63	: 264	:182.75:	64	: 263
213.25:	60	: 266	:189.25:	80	: 214	:182	: 34	: 302
209	: 1	: 537	:189	: 53	: 280	:182	: 39	: 299
207.5	: 15	: 338	:189	: 62	: 265	:182	: 90	: 185
206.5	: 77	: 224	:188.5	: 24	: 322	:181.5	: 50	: 284
204.5	: 71	: 243	:188.5	: 35	: 301	:181.5	: 52	: 283
198.75:	6	: 385	:188.5	: 41	: 297	:181.5	: 69	: 248
198	: 16	: 333	:188.25:	11	: 357	:181.5	: 76	: 227
198	: 57	: 269	:187.75:	46	: 292	:181	: 7	: 377
197.25:	58	: 269	:187.75:	89	: 189	:181	: 42	: 295
196.75:	47	: 291	:187.5	: 70	: 248	:180.25:	17	: 331
196.25:	75	: 228	:187	: 21	: 325	:180.25:	20	: 329
195.5	: 3	: 420	:187	: 29	: 306	:180.25:	54	: 279
195.5	: 33	: 302	:187	: 84	: 204	:179.5	: 45	: 292
194.75:	23	: 324	:186.5	: 9	: 366	:179	: 56	: 272
194.25:	37	: 301	:186	: 67	: 253	:179	: 87	: 198
194.25:	65	: 258	:185.25:	49	: 286	:178.5	: 83	: 208
193.75:	4	: 411	:185.25:	88	: 191	:178.25:	5	: 407
193.75:	10	: 364	:185.25:	93	: 174	:177.75:	72	: 240
193.75:	13	: 347	:184.5	: 14	: 346	:176.75:	28	: 307
193	: 32	: 305	:184.5	: 30	: 306	:175	: 66	: 256
193	: 36	: 301	:184.5	: 31	: 305	:175	: 92	: 178
192.25:	38	: 300	:184.5	: 44	: 294	:175	: 96	: 121
191.75:	43	: 294	:184.5	: 48	: 287	:174.75:	91	: 179
191.75:	61	: 265	:184.5	: 94	: 167	:171.25:	68	: 248
191.75:	27	: 308	:184	: 40	: 291	:170	: 59	: 267
191.25:	12	: 352	:184	: 79	: 219	:170	: 78	: 222
191.25:	26	: 310	:184	: 55	: 277	:166.5	: 85	: 204
191.25:	74	: 231	:183.5	: 25	: 318	:166.5	: 86	: 203
190.5	: 73	: 236	:183.5	: 51	: 283	:165	: 82	: 208
189.75:	8	: 369	:183	: 81	: 211	:163.75:	95	: 165

TABLE 7

LENGTH OF RUMP

Length	No.	Fat	Length	No.	Fat	Length	No.	Fat
: Cow	:	:	: Cow	:	:	: Cow	:	:
52	: 2	: 422	47.5	: 88	: 191	46	: 31	: 305
51.5	: 18	: 329	47.5	: 93	: 174	46	: 48	: 287
50	: 1	: 537	47.25	: 13	: 347	46	: 89	: 189
50	: 4	: 411	47.25	: 14	: 294	46	: 92	: 178
50	: 58	: 269	47.25	: 64	: 263	45.75	: 29	: 306
49.75	: 33	: 302	47.25	: 66	: 256	45.5	: 11	: 357
49.5	: 71	: 243	47.25	: 77	: 224	45.5	: 25	: 318
49.5	: 86	: 203	47	: 26	: 310	45.5	: 42	: 295
49	: 5	: 407	47	: 73	: 236	45.5	: 46	: 292
49	: 21	: 325	47	: 84	: 204	45.5	: 81	: 211
49	: 69	: 248	46.75	: 40	: 297	45.5	: 75	: 228
48.75	: 7	: 377	46.75	: 41	: 297	45.25	: 47	: 291
48.75	: 37	: 301	46.75	: 72	: 240	45	: 20	: 329
48.5	: 53	: 280	46.50	: 19	: 329	45	: 32	: 305
48.5	: 61	: 265	46.5	: 27	: 308	45	: 54	: 279
48.5	: 94	: 167	46.5	: 35	: 301	45	: 62	: 265
48.25	: 6	: 385	46.5	: 43	: 294	45	: 82	: 208
48.25	: 34	: 302	46.5	: 52	: 283	45	: 91	: 179
48.25	: 60	: 266	46.5	: 67	: 253	44.75	: 95	: 165
48.25	: 85	: 204	46.5	: 68	: 249	44.5	: 10	: 364
48	: 36	: 301	46.5	: 78	: 222	44.5	: 24	: 322
48	: 45	: 292	46.5	: 79	: 219	44.5	: 30	: 306
48	: 49	: 286	46.25	: 9	: 366	44.5	: 51	: 283
48	: 57	: 269	46.25	: 16	: 333	44.5	: 55	: 277
48	: 59	: 267	46.25	: 38	: 300	44.5	: 83	: 208
48	: 65	: 258	46.25	: 39	: 299	43.75	: 96	: 121
48	: 87	: 198	46.25	: 50	: 284	43	: 76	: 227
48	: 90	: 185	46.25	: 70	: 248	42.5	: 28	: 307
47.5	: 8	: 369	46	: 15	: 338	42.5	: 56	: 272
47.5	: 12	: 352	46	: 17	: 331	42	: 80	: 214
47.5	: 14	: 346	46	: 22	: 324	42	: 74	: 231
47.5	: 63	: 264	46	: 23	: 324		:	:

TABLE 8

DIAMETER OF RIGHT WELL

	No.			No.			No.		
Diam.	Cow	Fat	Diam.	Cow	Fat	Diam.	Cow	Fat	
1.6	3	420	1.2	70	248	0.9	9	361	
1.5	8	369	1.2	73	236	0.8	12	352	
1.5	10	364	1.2	87	198	0.9	17	331	
1.4	35	301	1.1	5	407	0.9	27	308	
1.4	62	265	1.1	25	318	0.9	44	294	
1.3	1	537	1.1	28	307	0.9	51	283	
1.3	2	422	1.1	30	306	0.9	57	269	
1.3	14	346	1.1	33	302	0.9	60	266	
1.3	16	333	1.1	41	297	0.9	66	256	
1.3	26	310	1.1	46	292	0.9	67	253	
1.3	36	301	1.1	69	248	0.9	74	231	
1.3	37	301	1.1	78	222	0.9	80	214	
1.3	52	283	1.1	88	191	0.9	81	211	
1.3	56	272	1.1	91	179	0.9	89	189	
1.3	64	263	1.05	29	306	0.9	90	185	
1.3	65	258	1.05	31	305	0.9	93	174	
1.3	75	228	1.0	39	299	0.9	95	165	
1.3	83	208	1.0	43	294	0.85	72	240	
1.3	85	204	1.0	45	292	0.8	4	411	
1.3	96	121	1.0	47	291	0.8	19	329	
1.2	11	357	1.0	55	277	0.8	21	325	
1.2	13	347	1.0	61	265	0.8	22	324	
1.2	15	338	1.0	71	243	0.8	49	286	
1.2	20	329	1.0	77	224	0.8	53	280	
1.2	24	322	1.0	79	219	0.8	54	279	
1.2	34	302	1.0	84	204	0.8	68	249	
1.2	38	300	0.95	7	377	0.8	76	227	
1.2	40	297	0.95	50	284	0.8	82	208	
1.2	48	287	0.95	59	267	0.8	94	167	
1.2	63	264	0.9	6	385	0.6	86	205	

TABLE 9.

DIAMETER OF RIGHT VEIN.

: No. :			: No. :			: No. :		
Diam.:	Cow	Fat	Diam.:	Cow	Fat	Diam.:	Cow	Fat
2.2 :	3	420	1.65:	56	272	1.3 :	11	357
2.2 :	15	338	1.65:	71	243	1.3 :	17	331
2.1 :	20	329	1.6 :	16	333	1.3 :	44	294
2.05:	84	204	1.6 :	25	318	1.3 :	50	284
2.0 :	73	236	1.55:	49	286	1.3 :	67	253
1.95:	13	347	1.55:	52	283	1.3 :	72	240
1.95:	62	265	1.55:	60	266	1.3 :	76	227
1.95:	65	258	1.55:	70	248	1.3 :	82	208
1.9 :	10	364	1.5 :	21	325	1.3 :	89	189
1.85:	75	228	1.5 :	36	301	1.3 :	94	167
1.85:	33	302	1.5 :	47	291	1.3 :	96	121
1.85:	37	301	1.5 :	74	231	1.25:	28	307
1.85:	38	300	1.5 :	90	185	1.25:	29	306
1.85:	40	297	1.45:	2	422	1.25:	31	305
1.8 :	32	305	1.45:	5	407	1.25:	42	295
1.8 :	83	208	1.45:	14	346	1.25:	55	277
1.8 :	85	204	1.45:	24	322	1.2 :	38	299
1.75:	22	324	1.45:	43	294	1.2 :	86	203
1.75:	38	302	1.45:	61	265	1.2 :	87	198
1.75:	58	269	1.45:	64	263	1.2 :	91	179
1.75:	78	222	1.45:	66	256	1.15:	30	306
1.75:	88	191	1.4 :	6	385	1.15:	57	269
1.7 :	1	537	1.4 :	8	369	1.15:	63	264
1.7 :	9	366	1.4 :	12	352	1.1 :	69	248
1.7 :	77	224	1.4 :	45	292	1.1 :	92	178
1.7 :	80	214	1.4 :	53	280	1.1 :	93	174
1.65:	4	411	1.4 :	54	279	1.1 :	95	165
1.65:	23	324	1.4 :	79	219	1.05:	59	267
1.65:	26	310	1.35:	7	377	1.05:	68	249
1.65:	35	301	1.35:	27	308	1.0 :	51	283
1.65:	41	297	1.35:	46	292	0.9 :	19	329
1.65:	48	287	1.35:	81	211	:	:	:

TABLE 10

CAPACITY

Capa-:	:		:Capa-:	:		:Capa-:	:		:
city :	No. :		:city :	No. :		:city :	No. :		:
liters	Cow :	Fat	:liters	Cow :	Fat	:liters	Cow :	Fat	:
300 :	2 :	422 :	210 :	43 :	294 :	193 :	29 :	306 :	:
288 :	18 :	329 :	208 :	52 :	283 :	193 :	48 :	287 :	:
280 :	15 :	338 :	208 :	35 :	301 :	192 :	8 :	369 :	:
262 :	37 :	301 :	207 :	77 :	224 :	192 :	90 :	185 :	:
261 :	33 :	302 :	206 :	55 :	277 :	192 :	25 :	318 :	:
255 :	86 :	203 :	206 :	54 :	279 :	191 :	39 :	299 :	:
251 :	1 :	537 :	206 :	24 :	322 :	190 :	49 :	286 :	:
250 :	60 :	266 :	206 :	75 :	228 :	189 :	80 :	214 :	:
230 :	38 :	300 :	206 :	88 :	191 :	188 :	5 :	407 :	:
244 :	71 :	243 :	205 :	30 :	306 :	188 :	40 :	297 :	:
239 :	26 :	310 :	205 :	81 :	211 :	188 :	83 :	208 :	:
238 :	58 :	269 :	204 :	42 :	295 :	186 :	22 :	324 :	:
233 :	57 :	269 :	204 :	46 :	292 :	185 :	56 :	272 :	:
233 :	4 :	411 :	204 :	73 :	236 :	185 :	72 :	240 :	:
227 :	36 :	301 :	202 :	31 :	305 :	180 :	34 :	302 :	:
224 :	79 :	219 :	202 :	17 :	331 :	179 :	44 :	294 :	:
222 :	84 :	204 :	201 :	12 :	352 :	176 :	92 :	178 :	:
221 :	10 :	364 :	201 :	69 :	248 :	176 :	76 :	227 :	:
221 :	27 :	308 :	200 :	63 :	264 :	175 :	45 :	292 :	:
221 :	11 :	357 :	200 :	94 :	167 :	174 :	20 :	329 :	:
220 :	74 :	231 :	199 :	50 :	284 :	174 :	82 :	208 :	:
219 :	85 :	204 :	199 :	9 :	366 :	173 :	51 :	283 :	:
218 :	6 :	385 :	198 :	53 :	280 :	173 :	64 :	263 :	:
217 :	89 :	184 :	198 :	67 :	253 :	169 :	28 :	207 :	:
217 :	47 :	291 :	197 :	32 :	305 :	169 :	96 :	121 :	:
216 :	16 :	333 :	197 :	7 :	377 :	168 :	91 :	179 :	:
216 :	21 :	325 :	197 :	87 :	198 :	162 :	78 :	222 :	:
213 :	61 :	265 :	197 :	41 :	297 :	162 :	68 :	249 :	:
211 :	13 :	347 :	196 :	19 :	329 :	162 :	59 :	267 :	:
211 :	62 :	265 :	195 :	93 :	174 :	158 :	95 :	165 :	:
210 :	23 :	324 :	194 :	70 :	248 :	155 :	66 :	256 :	:
210 :	65 :	258 :	194 :	14 :	364 :	:	:	:	:

TABLE 11

DROOP OF RUMP

	: No. :				: No. :				: No. :		
	Droop:	Cow :	Fat :	Droop:	Cow :	Fat :	Droop:	Cow :	Fat :		
+	2.0 :	63 :	264 :	2.5 :	52 :	283 :	5.0 :	35 :	301 :		
+	2.0 :	90 :	185 :	3.0 :	24 :	322 :	5.0 :	39 :	299 :		
+	1.5 :	6 :	385 :	3.0 :	42 :	295 :	5.0 :	71 :	243 :		
+	1.25:	15 :	338 :	3.0 :	60 :	266 :	5.0 :	72 :	240 :		
+	.75:	27 :	308 :	3.0 :	61 :	265 :	5.0 :	76 :	227 :		
+	.5 :	7 :	377 :	3.0 :	93 :	174 :	5.0 :	84 :	204 :		
+	.5 :	91 :	179 :	3.25:	48 :	287 :	5.25:	41 :	297 :		
	0.0 :	10 :	364 :	3.25:	96 :	121 :	5.5 :	33 :	302 :		
	0.0 :	81 :	211 :	3.50:	11 :	357 :	5.5 :	43 :	294 :		
	.75:	74 :	231 :	3.5 :	13 :	347 :	5.5 :	88 :	191 :		
	1.0 :	49 :	286 :	3.5 :	19 :	329 :	5.75:	50 :	284 :		
	1.0 :	62 :	265 :	3.5 :	31 :	305 :	5.75:	83 :	208 :		
	1.0 :	80 :	214 :	3.5 :	47 :	291 :	6.0 :	68 :	249 :		
	1.5 :	51 :	293 :	3.5 :	94 :	167 :	6.00:	95 :	165 :		
	1.5 :	69 :	248 :	4.0 :	9 :	366 :	6.5 :	23 :	324 :		
	2.0 :	17 :	331 :	4.0 :	14 :	346 :	6.5 :	38 :	300 :		
	2.0 :	25 :	318 :	4.0 :	30 :	306 :	6.5 :	45 :	292 :		
	2.0 :	40 :	297 :	4.0 :	58 :	269 :	6.5 :	77 :	224 :		
	2.0 :	54 :	279 :	4.0 :	65 :	258 :	7.0 :	12 :	352 :		
	2.0 :	56 :	272 :	4.0 :	75 :	228 :	7.0 :	18 :	329 :		
	2.0 :	59 :	267 :	4.0 :	79 :	219 :	7.0 :	20 :	329 :		
	2.0 :	67 :	253 :	4.0 :	87 :	198 :	7.0 :	21 :	325 :		
	2.0 :	78 :	222 :	4.0 :	92 :	178 :	7.0 :	26 :	310 :		
	2.0 :	82 :	208 :	4.25:	29 :	306 :	7.0 :	32 :	305 :		
	2.0 :	85 :	204 :	4.5 :	16 :	333 :	7.0 :	66 :	256 :		
	2.25:	3 :	420 :	4.5 :	37 :	301 :	7.0 :	70 :	248 :		
	2.25:	36 :	301 :	4.5 :	89 :	189 :	7.0 :	86 :	203 :		
	2.25:	46 :	292 :	4.75:	57 :	269 :	7.5 :	5 :	407 :		
	2.25:	53 :	280 :	5.0 :	1 :	537 :	7.5 :	44 :	294 :		
	2.25:	55 :	277 :	5.0 :	2 :	422 :	7.5 :	64 :	263 :		
	2.5 :	8 :	369 :	5.0 :	22 :	324 :	7.5 :	73 :	236 :		
	2.5 :	28 :	307 :	5.0 :	34 :	302 :	9.5 :	4 :	411 :		

TABLE 12.

SHAPE OF UDDER

: No. :			: No. :			: No. :		
Shape:	Cow	Fat	Shape:	Cow	Fat	Shape:	Cow	Fat
A	3	420	B	21	325	B	71	243
A	8	369	B	22	324	B	72	240
A	9	366	B	24	322	B	75	228
A	10	364	B	25	318	B	78	222
A	13	347	B	27	308	B	80	214
A	14	346	B	28	307	B	81	211
A	15	338	B	29	306	B	83	208
A	23	324	B	30	306	B	84	204
A	39	299	B	32	305	B	88	191
A	41	297	B	33	302	B	89	189
A	43	294	B	34	302	B	90	185
A	47	291	B	35	301	B	91	179
A	48	287	B	36	301	B	92	178
A	55	277	B	38	300	B	93	174
A	56	272	B	40	297	B	96	121
A	61	265	B	42	295	C	7	377
A	62	265	B	46	292	C	20	329
A	73	236	B	49	286	C	26	310
A	74	231	B	50	284	C	31	305
A	66	227	B	51	283	C	37	301
A	67	224	B	52	283	C	44	294
B	1	537	B	53	280	C	45	292
B	2	422	B	54	279	C	57	269
B	4	411	B	58	269	C	68	249
B	5	407	B	59	267	C	70	248
B	6	385	B	60	266	C	79	219
B	11	357	B	63	264	C	82	208
B	12	352	B	64	263	C	85	204
B	16	333	B	65	258	C	86	204
B	17	331	B	66	256	C	87	198
B	18	329	B	67	253	C	94	167
B	19	329	B	69	248	C	95	165

RANK OF COWS TO MEASUREMENTS.

No. :	Cap-Weight :	Height at Withers :	Height at Hips :	Depth of Chest :	Depth of Barrel :	Depth of Udder :	Width of Chest :	
1 :	7 :	3 :	5 :	10 :	4 :	1 :	4 :	49 :
2 :	1 :	1 :	3 :	7 :	1 :	2 :	1 :	2 :
3 :	:	11 :	8 :	8 :	:	:	:	:
4 :	14 :	7 :	2 :	2 :	5 :	25 :	23 :	11 :
5 :	73 :	45 :	51 :	66 :	83 :	94 :	77 :	50 :
6 :	23 :	35 :	11 :	12 :	26 :	20 :	38 :	60 :
7 :	58 :	25 :	9 :	11 :	7 :	17 :	53 :	17 :
8 :	67 :	73 :	46 :	51 :	52 :	61 :	54 :	46 :
9 :	54 :	81 :	61 :	38 :	78 :	71 :	32 :	94 :
10 :	18 :	46 :	52 :	82 :	27 :	45 :	30 :	9 :
11 :	20 :	26 :	24 :	39 :	43 :	11 :	15 :	18 :
12 :	49 :	61 :	34 :	22 :	65 :	84 :	43 :	19 :
13 :	29 :	47 :	71 :	76 :	19 :	12 :	16 :	29 :
14 :	64 :	36 :	62 :	37 :	70 :	77 :	48 :	25 :
15 :	3 :	5 :	72 :	83 :	46 :	5 :	2 :	36 :
16 :	26 :	27 :	66 :	58 :	16 :	18 :	21 :	51 :
17 :	48 :	82 :	47 :	40 :	28 :	26 :	55 :	52 :
18 :	2 :	2 :	1 :	1 :	3 :	3 :	5 :	1 :
19 :	61 :	8 :	12 :	23 :	10 :	62 :	71 :	47 :
20 :	84 :	88 :	73 :	41 :	79 :	67 :	91 :	61 :
21 :	27 :	48 :	58 :	93 :	11 :	9 :	9 :	5 :
22 :	76 :	89 :	90 :	34 :	66 :	52 :	72 :	48 :
23 :	31 :	37 :	59 :	35 :	36 :	63 :	46 :	53 :
24 :	39 :	83 :	79 :	71 :	71 :	38 :	56 :	62 :
25 :	69 :	49 :	53 :	65 :	86 :	39 :	57 :	63 :
26 :	11 :	12 :	10 :	9 :	20 :	13 :	13 :	14 :
27 :	19 :	38 :	17 :	42 :	34 :	65 :	58 :	7 :
28 :	88 :	84 :	83 :	94 :	92 :	89 :	87 :	74 :
29 :	65 :	39 :	54 :	59 :	37 :	40 :	74 :	79 :
30 :	42 :	50 :	96 :	96 :	67 :	21 :	34 :	83 :
31 :	47 :	74 :	85 :	89 :	29 :	46 :	70 :	15 :
32 :	57 :	20 :	86 :	67 :	77 :	14 :	17 :	30 :

TABLE 13 (Continued)

RANK OF COWS TO MEASUREMENTS.

No.:	Width	Width	Width	Circ.:	Circ.:	Circ.:	Length:	Length	
of:	of	af	at	of	of	at	of	of	
Cow:	Barrel:	Hips	Thurls:	Chest:	Barrel:	Udder:	Back	Rump	:
1	:	11	:	5	:	6	:	6	:
2	:	2	:	1	:	3	:	2	:
3	:		:		:	17	:	8	:
4	:	54	:	8	:	16	:	7	:
5	:	27	:	29	:	27	:	73	:
6	:	7	:	3	:	10	:	18	:
7	:	44	:	14	:	8	:	21	:
8	:	78	:	18	:	53	:	44	:
9	:	45	:	22	:	73	:	74	:
10	:	15	:	56	:	78	:	61	:
11	:	55	:	57	:	63	:	32	:
12	:	34	:	9	:	7	:	64	:
13	:	19	:	76	:	81	:	35	:
14	:	62	:	30	:	79	:	69	:
15	:	1	:	47	:	64	:	8	:
16	:	10	:	31	:	41	:	12	:
17	:	57	:	63	:	28	:	62	:
18	:	8	:	2	:	1	:	1	:
19	:	68	:	11	:	29	:	13	:
20	:	93	:	87	:	86	:	75	:
21	:	90	:	43	:	38	:	9	:
22	:	72	:	64	:	65	:	84	:
23	:	23	:	23	:	42	:	45	:
24	:	19	:	84	:	30	:	76	:
25	:	47	:	65	:	82	:	70	:
26	:	31	:	19	:	31	:	46	:
27	:	5	:	7	:	21	:	23	:
28	:	59	:	94	:	90	:	85	:
29	:	41	:	24	:	54	:	56	:
30	:	6	:	66	:	93	:	77	:
31	:	20	:	58	:	55	:	36	:
32	:	69	:	80	:	94	:	24	:

TABLE 13 (Continued)

RANK OF COWS TO MEASUREMENTS.

No. of Cows	Diam. of Milk Veins		Diameter of Milk Wells		Size of Udder		Shape of Udder		Shape of fore Udder	
	R	L	R	L	R	L	R	L	R	L
1	23	18	6	8	A	B			C	
2	46	52	7	9	B	B			B	
3	1	1	1	1	A	A			B	
4	27	26	79	66	B	B			B	
5	47	53	34	31	B	B			C	
6	54	62	60	43	B	B			B	
7	61	63	57	85	B	C			B	
8	55	64	8	2	B	A			B	
9	24	14	61	17	B	A			B	
10	9	4	3	3	A	A			A	
11	65	54	21	10	A	B			B	
12	56	35	62	59	B	B			B	
13	6	19	22	11	A	A			B	
14	48	20	8	18	B	A			B	
15	2	2	23	4	A	A			B	
16	35	27	9	12	A	B			B	
17	66	72	63	67	B	B			C	
18		9		32	A	B			C	
19	91	87	80	68	B	B			B	
20	3	3	24	88	B	C			C	
21	41	45	81	60	B	B			B	
22	18	40	82	89	B	B			B	
23	28	55		69	A	A			B	
24	49	56	25	19	B	B			B	
25	36	46	35	70	B	B			B	
26	29	28	10	33	A	C			C	
27	62	47	64	71	C	B			A	
28	76	57	36	44	B	B			B	
29	77	85	45	34	B	B			B	
30	85	29	37	35	A	B			B	
31	78	65	46	90	A	C			B	
32	15	10		45	A	B			C	

TABLE 13 (Continued)

RANK OF COWS TO MEASUREMENTS

No.:	Quality:	Tortuousness:							
of :	of :	of veins	Straight						
Cows:	Udder :	R : L :	Back :				Rump :		
1 :	B :	B :	B :	B :			61 :		
2 :	B :	B :	B :	B :			62 :		
3 :	B :	A :	A :	A :			26 :		
4 :	A :	A :	A :	B :			96 :		
5 :	A :	B :	B :	B :			92 :		
6 :	B :	B :	B :	B :			3 :		
7 :	A :	B :	B :	B :			6 :		
8 :	B :	C :	C :	B :			31 :		
9 :	B :	A :	A :	B :			47 :		
10 :	A :	A :	A :	B :			8 :		
11 :	B :	B :	B :	B :			41 :		
12 :	B :	B :	B :	B :			83 :		
13 :	A :	B :	B :	B :			42 :		
14 :	B :	B :	B :	A :			48 :		
15 :	B :	B :	B :	C :			4 :		
16 :	A :	B :	B :	A :			57 :		
17 :	A :	B :	B :	B :			16 :		
18 :	B :	A :	B :	B :			84 :		
19 :	B :	C :	C :	B :			43 :		
20 :	A :	A :	A :	B :			85 :		
21 :	C :	B :	B :	B :			86 :		
22 :	C :	A :	B :	B :			63 :		
23 :	B :	A :	B :	B :			78 :		
24 :	B :	B :	B :	B :			34 :		
25 :	A :	A :	B :	B :			17 :		
26 :	B :	B :	B :	B :			87 :		
27 :	B :	C :	C :	B :			5 :		
28 :	B :	C :	C :	B :			32 :		
29 :	B :	B :	B :	A :			56 :		
30 :	B :	B :	B :	B :			49 :		
31 :	B :	B :	B :	B :			44 :		
32 :	B :	A :	A :	A :			88 :		

TABLE 13 (Continued)

No.:				Height:	Height:	Depth:	Depth:	Depth:	Width:	
Of:	Cap-	Weight:	at	at	at	of	of	at	of	
Cow:	acity:		Withers	Hips	Chest:	Barrel:	Udder:	Chest		
33 :	5 :	4 :	4 :	3 :	2 :	6 :	3 :	23 :		
34 :	79 :	51 :	48 :	62 :	51 :	66 :	80 :	64 :		
35 :	35 :	52 :	50 :	29 :	38 :	37 :	59 :	75 :		
36 :	15 :	13 :	25 :	24 :	21 :	30 :	19 :	16 :		
37 :	4 :	53 :	35 :	28 :	47 :	31 :	49 :	12 :		
38 :	9 :	21 :	55 :	43 :	29 :	7 :	14 :	65 :		
39 :	70 :	28 :	87 :	90 :	74 :	91 :	35 :	76 :		
40 :	74 :	54 :	67 :	50 :	59 :	47 :	60 :	84 :		
41 :	60 :	75 :	94 :	84 :	87 :	85 :	24 :	91 :		
42 :	44 :	76 :	95 :	91 :	90 :	72 :	61 :	54 :		
43 :	33 :	62 :	68 :	44 :	40 :	70 :	25 :	31 :		
44 :	80 :	85 :	20 :	14 :	68 :	78 :	84 :	60 :		
45 :	83 :	63 :	80 :	68 :	60 :	73 :	65 :	85 :		
46 :	45 :	55 :	14 :	45 :	30 :	53 :	39 :	28 :		
47 :	25 :	40 :	49 :	64 :	53 :	32 :	11 :	20 :		
48 :	66 :	77 :	63 :	61 :	54 :	54 :	50 :	26 :		
49 :	71 :	14 :	36 :	52 :	48 :	44 :	26 :	81 :		
50 :	53 :	86 :	37 :	53 :	93 :	82 :	66 :	58 :		
51 :	86 :	90 :	40 :	17 :	68 :	75 :	86 :	21 :		
52 :	34 :	29 :	56 :	72 :	35 :	48 :	41 :	86 :		
53 :	55 :	41 :	19 :	16 :	12 :	27 :	28 :	37 :		
54 :	38 :	42 :	28 :	77 :	61 :	49 :	78 :	55 :		
55 :	37 :	56 :	41 :	30 :	55 :	55 :	51 :	72 :		
56 :	77 :	91 :	81 :	69 :	72 :	56 :	67 :	32 :		
57 :	13 :	22 :	21 :	5 :	23 :	50 :	27 :	13 :		
58 :	12 :	23 :	15 :	4 :	9 :	16 :	18 :	3 :		
59 :	93 :	64 :	74 :	85 :	75 :	86 :	90 :	92 :		
60 :	8 :	9 :	26 :	18 :	8 :	8 :	8 :	27 :		
61 :	28 :	15 :	57 :	48 :	24 :	41 :	62 :	87 :		
62 :	30 :	24 :	77 :	81 :	56 :	33 :	37 :	38 :		
63 :	51 :	43 :	30 :	46 :	13 :	34 :	64 :	24 :		
64 :	87 :	93 :	82 :	60 :	88 :	90 :	73 :	56 :		

TABLE 13 (Continued)

No.:	Width	Width	Width	Circ.:	Circ.:	Circ.:	Length	Length		
of:	of	at	at	of	of	at	of	of		
Cow:	Barrel:	Hips:	Thurls:	Chest:	Barrel:	Udder:	Back	Rump		
33	: 35	: 15	: 32	: 3	: 6	: 15	: 1	: 6	:	:
34	: 21	: 44	: 39	: 37	: 24	: 67	: 91	: 18	:	:
35	: 24	: 74	: 76	: 49	: 12	: 37	: 20	: 48	:	:
36	: 32	: 32	: 33	: 33	: 41	: 23	: 27	: 21	:	:
37	: 18	: 25	: 43	: 25	: 26	: 17	: 40	: 13	:	:
38	: 16	: 67	: 22	: 52	: 17	: 24	: 2	: 57	:	:
39	: 46	: 54	: 17	: 71	: 77	: 68	: 52	: 58	:	:
40	: 67	: 45	: 87	: 78	: 57	: 59	: 33	: 43	:	:
41	: 42	: 92	: 88	: 82	: 50	: 40	: 45	: 44	:	:
42	: 25	: 59	: 66	: 92	: 42	: 75	: 41	: 72	:	:
43	: 28	: 39	: 44	: 51	: 59	: 25	: 69	: 49	:	:
44	: 22	: 33	: 34	: 65	: 47	: 56	: 85	: 36	:	:
45	: 79	: 77	: 83	: 53	: 85	: 79	: 81	: 22	:	:
46	: 63	: 48	: 77	: 59	: 45	: 42	: 29	: 73	:	:
47	: 65	: 60	: 84	: 14	: 51	: 12	: 53	: 76	:	:
48	: 81	: 81	: 56	: 66	: 48	: 57	: 94	: 66	:	:
49	: 94	: 40	: 57	: 43	: 84	: 50	: 28	: 23	:	:
50	: 85	: 68	: 67	: 88	: 61	: 70	: 46	: 59	:	:
51	: 87	: 69	: 68	: 60	: 81	: 63	: 47	: 87	:	:
52	: 12	: 62	: 75	: 19	: 19	: 71	: 34	: 50	:	:
53	: 64	: 26	: 69	: 38	: 44	: 36	: 48	: 14	:	:
54	: 29	: 46	: 18	: 57	: 55	: 78	: 11	: 79	:	:
55	: 82	: 34	: 19	: 79	: 54	: 61	: 12	: 88	:	:
56	: 70	: 88	: 74	: 63	: 83	: 80	: 76	: 93	:	:
57	: 38	: 27	: 15	: 10	: 36	: 10	: 6	: 24	:	:
58	: 48	: 4	: 9	: 4	: 31	: 11	: 21	: 5	:	:
59	: 74	: 89	: 35	: 72	: 89	: 91	: 70	: 25	:	:
60	: 13	: 16	: 58	: 5	: 10	: 3	: 16	: 19	:	:
61	: 4	: 12	: 11	: 94	: 15	: 26	: 22	: 15	:	:
62	: 3	: 85	: 75	: 47	: 11	: 37	: 82	: 80	:	:
63	: 36	: 20	: 24	: 16	: 13	: 34	: 61	: 32	:	:
64	: 43	: 75	: 72	: 87	: 78	: 66	: 95	: 37	:	:

TABLE 13 (Continued)

No.:	Diam. of		Diameter of		Size:	Shape :	Shape :	
of:	Milk Veins		Milk Wells		of :	of :	of :	
Cow:	R	L	R	L	Udder:	Udder	Fore Udder	
33 :	11	21	38	20	B	B	C	:
34 :	19	15	26	13	A	B	B	:
35 :	30	22	4	5	B	B	C	:
36 :	42	36	11	14	A	B	C	:
37 :	12	5	12	21	A	C	C	:
38 :	13	41	27	46	A	B	B	:
39 :	81	66	47	22	A	A	C	:
40 :	14	76	28	61	B	B	B	:
41 :	31	58	39	86	A	A	B	:
42 :	79	80			A	B	B	:
43 :	50	48	48	42	A	A	A	:
44 :	67	73	65	47	C	C	C	:
45 :	57	23	49	72	B	C	C	:
46 :	63	42	40	23	A	B	B	:
47 :	43	30	50	48	A	A	B	:
48 :	32	31	29	36	B	A	A	:
49 :	37	11	83	73	B	B	C	:
50 :	68	67	58	49	B	B	B	:
51 :	94	88	66	95	C	B	B	:
52 :	38	37	13	24	A	B	B	:
53 :	58	38	84	50	B	B	B	:
54 :	59	68	85	74	B	B	B	:
55 :	80	59	51	51	A	A	B	:
56 :	33	81	14	15	A	A	B	:
57 :	86	86	67	75	C	C	C	:
58 :	20	6		37	B	B	C	:
59 :	92	89	59	76	A	B	B	:
60 :	29	43	68	77	B	B	B	:
61 :	51	77	52	38	A	A	B	:
62 :	7	16	5	16	A	A	A	:
63 :	87	74	30	52	C	B	B	:
64 :	52	49	15	7	A	B	B	:

TABLE 13 (Continued)

No. :	Quality :	Tortuousness :		Straight :		Droop :
of :	of :	of veins :		Back :		of :
Cow :	Udder :	R :	L :			Rump :
33 :	A	B	B	B		72
34 :	A	B	B	C		64
35 :	B	C	C	B		65
36 :	B	B	B	B		27
37 :	A	B	B	B		58
38 :	A	A	B	B		80
39 :	B	B	B	C		66
40 :	B	B	B	B		18
41 :	B	B	B	B		71
42 :	B	A	A	B		35
43 :	B	B	B	B		73
44 :	A	C	C	B		93
45 :	A	B	A	B		51
46 :	A	B	B	A		28
47 :	B	B	B	B		45
48 :	B	B	B	B		39
49 :	B	B	A	A		11
50 :	B	B	B	B		75
51 :	B	C	C	B		14
52 :	A	B	B	A		33
53 :	C	B	A	B		29
54 :	A	B	B	B		19
55 :	A	B	B	A		30
56 :	B	A	A	B		20
57 :	B	B	B	B		60
58 :	A	B	B	B		50
59 :	B	B	B	B		21
60 :	B	B	B	A		36
61 :	B	B	B	B		37
62 :	B	B	A	B		12
63 :	B	B	C	B		1
64 :	B	B	B	B		94

TABLE 13 (Continued)

No.:	Cap-	Weight:	Height:	Height:	Depth:	Depth:	Depth:	Width:
of :	acity:		at :	at :	of :	of :	at :	of :
Cow:			Withers	Hips	Chest:	Barrel:	Udder:	Chest :
65 :	32 :	30 :	42 :	31 :	44 :	57 :	7 :	39 :
66 :	95 :	94 :	18 :	19 :	49 :	74 :	94 :	40 :
67 :	56 :	31 :	43 :	49 :	45 :	60 :	68 :	8 :
68 :	92 :	78 :	69 :	32 :	80 :	92 :	92 :	41 :
69 :	50 :	57 :	6 :	15 :	15 :	22 :	79 :	33 :
70 :	63 :	16 :	38 :	54 :	31 :	28 :	69 :	42 :
71 :	10 :	6 :	7 :	6 :	6 :	4 :	10 :	34 :
72 :	78 :	65 :	29 :	25 :	57 :	68 :	76 :	73 :
73 :	46 :	58 :	13 :	20 :	17 :	15 :	29 :	77 :
74 :	21 :	32 :	70 :	86 :	69 :	58 :	6 :	88 :
75 :	40 :	59 :	91 :	74 :	22 :	51 :	31 :	78 :
76 :	82 :	44 :	64 :	73 :	84 :	87 :	83 :	66 :
77 :	36 :	17 :	39 :	55 :	32 :	23 :	12 :	43 :
78 :	91 :	66 :	44 :	47 :	33 :	88 :	85 :	93 :
79 :	16 :	60 :	60 :	27 :	64 :	64 :	40 :	22 :
80 :	72 :	79 :	88 :	80 :	89 :	83 :	42 :	71 :
81 :	43 :	67 :	65 :	75 :	62 :	35 :	44 :	6 :
82 :	85 :	87 :	80 :	95 :	91 :	93 :	89 :	89 :
83 :	75 :	80 :	84 :	78 :	94 :	79 :	36 :	82 :
84 :	17 :	33 :	92 :	88 :	41 :	29 :	47 :	44 :
85 :	22 :	10 :	31 :	56 :	18 :	36 :	45 :	90 :
86 :	6 :	18 :	16 :	33 :	14 :	10 :	20 :	67 :
87 :	59 :	68 :	75 :	79 :	58 :	59 :	75 :	4 :
88 :	41 :	19 :	45 :	36 :	33 :	42 :	33 :	68 :
89 :	24 :	69 :	27 :	13 :	50 :	24 :	22 :	10 :
90 :	68 :	34 :	22 :	26 :	85 :	43 :	82 :	59 :
91 :	90 :	70 :	33 :	57 :	81 :	80 :	93 :	57 :
92 :	81 :	92 :	76 :	87 :	82 :	81 :	81 :	69 :
93 :	62 :	71 :	32 :	63 :	42 :	69 :	63 :	45 :
94 :	52 :	72 :	23 :	21 :	25 :	19 :	52 :	35 :
95 :	94 :	96 :	93 :	92 :	95 :	95 :	95 :	70 :
96 :	89 :	95 :	78 :	70 :	76 :	76 :	88 :	95 :

TABLE 13 (Continued)

No.:	Width	Width	Width	Circ.:	Circ.:	Circ.:	Length:	Length:	
of :	of :	of :	at :	of :	of :	at :	of :	of :	
Cow:	Barrel:	Hips	Thurls:	Chest:	Barrel:	Udder:	Back	Rump	
65 :	80 :	36 :	45 :	31 :	63 :	18 :	77 :	26 :	
66 :	88 :	21 :	12 :	30 :	87 :	86 :	87 :	38 :	
67 :	14 :	17 :	36 :	15 :	25 :	49 :	92 :	51 :	
68 :	75 :	90 :	91 :	89 :	95 :	90 :	88 :	52 :	
69 :	30 :	28 :	20 :	28 :	27 :	72 :	42 :	11 :	
70 :	39 :	49 :	40 :	26 :	20 :	44 :	71 :	60 :	
71 :	26 :	6 :	2 :	11 :	14 :	7 :	14 :	7 :	
72 :	89 :	50 :	61 :	80 :	72 :	84 :	62 :	45 :	
73 :	56 :	:	25 :	29 :	38 :	31 :	35 :	41 :	
74 :	37 :	37 :	26 :	67 :	52 :	30 :	63 :	95 :	
75 :	40 :	41 :	62 :	39 :	32 :	13 :	43 :	75 :	
76 :	86 :	61 :	37 :	68 :	90 :	73 :	36 :	91 :	
77 :	51 :	13 :	59 :	40 :	33 :	6 :	89 :	39 :	
78 :	92 :	86 :	46 :	90 :	92 :	92 :	54 :	53 :	
79 :	33 :	38 :	47 :	54 :	49 :	60 :	8 :	54 :	
80 :	49 :	82 :	60 :	95 :	64 :	35 :	78 :	94 :	
81 :	52 :	78 :	80 :	34 :	69 :	64 :	64 :	74 :	
82 :	91 :	93 :	95 :	96 :	94 :	95 :	83 :	81 :	
83 :	83 :	83 :	70 :	91 :	91 :	82 :	55 :	89 :	
84 :	53 :	55 :	48 :	58 :	53 :	47 :	56 :	42 :	
85 :	76 :	35 :	13 :	27 :	16 :	93 :	13 :	20 :	
86 :	50 :	10 :	4 :	22 :	34 :	94 :	5 :	8 :	
87 :	61 :	79 :	49 :	48 :	79 :	81 :	57 :	27 :	
88 :	73 :	42 :	71 :	41 :	68 :	51 :	17 :	33 :	
89 :	58 :	51 :	14 :	42 :	35 :	43 :	58 :	67 :	
90 :	17 :	52 :	50 :	50 :	39 :	69 :	59 :	28 :	
91 :	95 :	91 :	51 :	81 :	56 :	89 :	93 :	82 :	
92 :	60 :	70 :	89 :	83 :	80 :	87 :	84 :	68 :	
93 :	84 :	71 :	52 :	55 :	88 :	52 :	23 :	34 :	
94 :	71 :	53 :	5 :	20 :	60 :	58 :	24 :	16 :	
95 :	77 :	72 :	85 :	93 :	96 :	96 :	72 :	83 :	
96 :	66 :	73 :	92 :	86 :	74 :	88 :	44 :	90 :	

TABLE 13 (Continued)

No.:	Diam. of		Diameter of		Size	Shape	Shape of:
of:	Milk Veins		Milk Wells		of	of	fore
Cow:	R	L	R	L	Udder:	Udder:	Udder
65 :	8	12	16	6	B	B	B
66 :	53	60	69	62	C	B	C
67 :	69	32	70	39	B	B	A
68 :	93	95	86	91	C	C	C
69 :	88	90	41	53	B	B	B
70 :	40	39	31	25	A	C	B
71 :	34	33	53	78	C	B	C
72 :	70	78	78	63	B	B	C
73 :	5	24	32	26	A	A	B
74 :	44	17	71	64	B	A	A
75 :	10	44	17	54	A	B	B
76 :	71	50	87	87	A	A	A
77 :	25	8	54	27	A	A	B
78 :	21	69	42	55	B	B	B
79 :	60	70	55	28	B	C	C
80 :	26	51	72	65	A	B	B
81 :	64	82	73	79	B	B	B
82 :	72	61	88	80	B	C	C
83 :	16	25	18	81	A	B	B
84 :	4	75	56	92	B	B	C
85 :	17	13	19	82	A	C	C
86 :	82	83	90	94	A	C	C
87 :	83	96	33	40	C	C	C
88 :	22	7	43	80	B	B	B
89 :	73	71	74	83	B	B	B
90 :	45	79	75	56	A	B	C
91 :	84	84	44	30	B	B	B
92 :	89	91		84	B	B	C
93 :	90	92	76	93	C	B	B
94 :	74	34	89	57	B	C	C
95 :	91	93	77	58	C	C	C
96 :	75	94	20	29	B	B	B

TABLE 13 (Continued)

No.:	Quality:	Tortuousness:		Straight:		Drop:	
of:	of	of veins		of		of	
Cow:	Udder	R	L	Back	Rump		
65	B	A	A	A		51	:
66	A	B	B	A		89	:
67	A	C	C	B		22	:
68	B	C	C	B		77	:
69	A	C	C	B		15	:
70	A	B	B	B		90	:
71	B	B	B	B		67	:
72	C	B	B	B		68	:
73	B	A	B	A		95	:
74	B	C	C	B		10	:
75	B	A	B	B		52	:
76	B	B	B	A		69	:
77	C	B	B	A		82	:
78	B	B	B	B		23	:
79	B	B	B	B		53	:
80	B	B	B	B		13	:
81	B	C	C	B		9	:
82	B	B	C	B		24	:
83	B	A	B	B		76	:
84	B	B	B	B		70	:
85	B	A	B	B		25	:
86	A	B	B	B		91	:
87	B	C	C	B		54	:
88	B	B	B	B		74	:
89	B	B	B	B		59	:
90	A	A	A	B		2	:
91	A	C	C	B		7	:
92	B	B	B	B		55	:
93	C	C	C	B		38	:
94	B	B	B	B		46	:
95	B	C	C	B		78	:
96	B	B	B	B		40	:

TABLE 14

ARRANGED ACCORDING TO MEASUREMENTS.

	:	A	:	Fat	:	B	:	Fat	:
Weight	:	976	:	301	:	881	:	301	:
Ht. at withers	:	125.6	:	314	:	122.0	:	257	:
Ht. at croup	:	126.5	:	311	:	122.5	:	281	:
Depth of Chest	:	69.6	:	306	:	66.7	:	282	:
Depth of barrel	:	71.2	:	310	:	67.9	:	277	:
Depth at udder	:	67.0	:	308	:	62.0	:	274	:
Width of Chest	:	37.0	:	302	:	34.3	:	272	:
Width of barrel	:	71.2	:	319	:	66.5	:	292	:
Width of Hips	:	51.4	:	320	:	48.8	:	284	:
Width of Thurls	:	43.4	:	299	:	41.3	:	287	:
Circ. of chest	:	179.4	:	318	:	172.9	:	268	:
Circ. of barrel	:	226.5	:	319	:	218.3	:	279	:
Circ. of udder	:	200.0	:	324	:	189.2	:	288	:
Length of back	:	90.9	:	293	:	86.7	:	288	:
Length of rump	:	49.1	:	310	:	47.3	:	270	:
Diameter R	:	1.88:	:	297	:	1.6	:	299	:
Of Veins L	:	1.84:	:	306	:	1.6	:	289	:
Diameter R	:	1.32:	:	311	:	1.14:	:	280	:
of Wells L	:	1.32:	:	332	:	1.1	:	275	:
Capacity	:	250	:	303	:	208	:	283	:
Droop of rump	:	0.7	:	274	:	3.0	:	290	:

TABLE 14 (Continued)

	:	C	:	Fat	:	D	:	Fat	:
	:		:		:		:		:
Weight	:	837	:	255	:	761	:	272	:
Ht. at withers	:	119.4:	:	301	:	115.9:	:	257	:
Ht. at croup	:	120	:	276	:	116.6:	:	261	:
Depth of chest	:	65.1:	:	280	:	62.5:	:	257	:
Depth of barrel	:	66.2:	:	279	:	63.4:	:	257	:
Depth at udder	:	59.5:	:	296	:	56.2:	:	252	:
Width of chest	:	33.2:	:	286	:	31.1:	:	264	:
Width of barrel	:	63.3:	:	260	:	59.8:	:	254	:
Width of hips	:	47.5:	:	268	:	45.6:	:	253	:
Width of thurls	:	40.4:	:	258	:	38.4:	:	272	:
Circ. of chest	:	168.7:	:	280	:	162.0:	:	259	:
Circ. of barrel	:	212.5:	:	272	:	292.0:	:	255	:
Circ. of udder	:	183.6:	:	258	:	175.2:	:	250	:
Length of back	:	84.6:	:	270	:	81.6:	:	271	:
Length of rump	:	46.1:	:	288	:	44.3:	:	257	:
Diameter R	:	1.37:	:	296	:	1.16:	:	241	:
of Veins L	:	1.43:	:	297	:	1.18:	:	237	:
Diameter R	:	0.96:	:	292	:	0.84:	:	247	:
of Wells L	:	0.96:	:	273	:	0.84:	:	253	:
Capacity	:	196	:	284	:	175	:	255	:
Droop of Rump	:	4.6:	:	281	:	6.8:	:	283	:

TABLE 14 (Continued)

	:Larg-	:	:Small-	:
	: est	:	: est	:
	: 10	:	: 10	:
Weight	: 1025	:	: 722	:
Ht at withers	: 127.8	:	: 114.4	:
Ht. at croup	: 128.3	:	: 115.3	:
Depth of chest	: 71.3	:	: 61.4	:
Depth of barrel	: 72.8	:	: 62.0	:
Depth at udder	: 69.3	:	: 54.2	:
Width of chest	: 38.7	:	: 30.3	:
Width of barrel	: 72.5	:	: 57.2	:
Width of hips	: 52.8	:	: 44.5	:
Width of thurls	: 44.4	:	: 37.6	:
Circ. of chest	: 183.2	:	: 159.1	:
Circ. of barrel	: 231.3	:	: 198.3	:
Circ. at udder	: 207.7	:	: 169.8	:
Length of back	: 93.0	:	: 80.0	:
Length of rump	: 50.5	:	: 43.4	:
Diameter R	: 2.01:	:	: 1.07:	:
of veins L	: 1.99:	:	: 1.08:	:
Diameter R	: 1.39:	:	: 0.78:	:
of wells L	: 1.42:	:	: 0.76:	:
Capacity	: 322	:	: 165	:
<u>Droop of rump</u>	: +.77:	:	: 7.45:	:

TABLE 14 (Continued)

		:Larg- :est : 48	:	Fat	:	:Smallest: : 48	:	Fat	:
Weight		: 928	:	301	:	799	:	263	:
Ht. at withers		: 123.7	:	286	:	117.6	:	279	:
Ht. at croup		: 124.5	:	296	:	118.8	:	268	:
Depth of chest		: 68.2	:	294	:	63.8	:	264	:
Depth of barrel		: 69.6	:	293	:	64.8	:	268	:
Depth at udder		: 64.5	:	287	:	58.1	:	272	:
Width of chest		: 35.6	:	285	:	32.1	:	275	:
Width of barrel		: 68.9	:	305	:	61.6	:	257	:
Width of hips		: 50.1	:	302	:	46.6	:	260	:
Width of thurls		: 42.3	:	293	:	39.4	:	266	:
Circ. of chest		: 176.2	:	292	:	165.3	:	279	:
Circ. of barrel		: 222.5	:	299	:	207.7	:	264	:
Circ. at udder		: 194.6	:	307	:	179.4	:	255	:
Length of back		: 88.8	:	290	:	83.1	:	270	:
Length of rump		: 48.2	:	287	:	45.2	:	272	:
Diameter	R	: 1.73	:	298	:	1.27	:	267	:
of veins	L	: 1.72	:	297	:	1.3	:	267	:
Diameter	R	: 1.24	:	296	:	0.8	:	269	:
of wells	L	: 1.21	:	303	:	0.9	:	263	:
Capacity		: 228	:	293	:	185	:	267	:
Droop of rump		: 1.8	:	282	:	5.8	:	282	:

TABLE 15

OBSERVATIONS GROUPED TO BUTTERFAT

	:	:	:	:	:	:
	:	I	:	II	:	III: IV :
Tortuousness	: A :	8 :	4 :	2 :	5 :	
of	: B :	14 :	16 :	18 :	13 :	
Right Vein	: C :	2 :	4 :	4 :	6 :	
Tortuousness	: A :	5 :	3 :	5 :	1 :	
of	: B :	17 :	17 :	14 :	16 :	
Left Vein	: C :	2 :	4 :	6 :	7 :	
Size of	: A :	9 :	14 :	8 :	9 :	
Udder	: B :	15 :	9 :	10 :	11 :	
	: C :	0 :	2 :	6 :	4 :	
	: A :	8 :	5 :	4 :	4 :	
Shape of Udder:	: B :	14 :	14 :	17 :	13 :	
	: C :	2 :	5 :	3 :	7 :	
Shape of	: A :	1 :	3 :	2 :	2 :	
Fore Udder	: B :	18 :	12 :	15 :	9 :	
	: C :	5 :	9 :	7 :	13 :	
Quality of	: A :	8 :	8 :	8 :	3 :	
Udder	: B :	14 :	16 :	14 :	19 :	
	: C :	2 :	0 :	2 :	2 :	
Straightness	: A :	3 :	3 :	6 :	3 :	
of Back	: B :	20 :	19 :	18 :	21 :	
	: C :	1 :	2 :	0 :	0 :	

TABLE 15 (Continued)

		: Best	: Poorest	: Best	: Poorest	
		: 48	: 48	: 10	: 10	: Total:
Tortuousness	: A :	12	7	4	1	19
of Right Vein	: B :	30	31	5	5	61
	: C :	6	10	1	4	16
Tortuousness	: A :	8	6	4	1	14
of Left Vein	: B :	34	30	5	5	64
	: C :	6	13	1	4	18
Size of Udder	: A :	23	17	3	1	40
	: B :	24	21	7	5	44
	: C :	2	10	0	4	12
Shape of Udder	: A :	13	8	4	0	21
	: B :	28	30	5	7	58
	: C :	7	10	1	3	17
Shape of	: A :	4	4	1	0	8
Fore Udder	: B :	30	24	7	3	54
	: C :	14	20	2	7	34
Quality of	: A :	16	11	4	2	27
Udder	: B :	30	33	6	7	63
	: C :	2	4	0	1	6
Straightness	: A :	6	9	1	0	15
of Back	: B :	39	39	9	10	78
	: C :	3	0	0	0	3

TABLE 16

BUTTERFAT ARRANGED TO OBSERVATIONS.

	:	:	:	:General:
	: A	: B	: C	:Average:
Size of udder	: 290	: 286	: 240	: 282 :
Quality of udder	: 296	: 283	: 261	: 282 :
Shape of udder	: 302	: 283	: 255	: 282 :
Shape of fore udder	: 279	: 295	: 263	: 282 :
Straightness of back	: 288	: 280	: 313	: 282 :
Tortuousness milk vein R	290	: 284	: 256	: 282 :
" " " L	308	: 284	: 254	: 282 :

PROPORTIONS OF MEASUREMENTS

	: Table 17	:	Table 18	:	Table 19	:	Table 20	:
	:Depth at Udder:	:	Depth at Udder:	:	Depth at Udder:	:	Depth at Udder:	:
Group:	to depth	:	to height	:	to depth	:	to height	:
	: of barrel	:	at croup	:	of chest	:	at withers	:
I :	1.088	:	1.957	:	1.069	:	1.945	:
II :	1.089	:	1.963	:	1.064	:	1.965	:
III:	1.106	:	2.026	:	1.097	:	2.008	:
IV :	1.144	:	2.075	:	1.120	:	2.068	:
*A :	1.082	:	1.997	:	1.069	:	1.948	:
B :	1.137	:	2.089	:	1.113	:	2.080	:
X :	1.089	:	1.959	:	1.067	:	1.939	:
Y :	1.126	:	2.050	:	1.108	:	2.037	:
Av.:	1.106	:	2.004	:	1.087	:	1.987	:

	: Table 21	:	Table 22	:	Table 23	:	Table 24	:
	: Width of	:	Width of	:	Width of	:	Width of	:
	:thurls to	:	thurls to	:	thurls to	:	hips to	:
	:width of hips	:	Ht. at withers	:	length of rump	:	length rump	:
I :	1.206	:	2.950	:	1.145	:	.950	:
II :	1.193	:	2.975	:	1.161	:	.977	:
III:	1.173	:	2.939	:	1.138	:	.970	:
IV :	1.164	:	2.940	:	1.126	:	.968	:
A :	1.210	:	2.970	:	1.149	:	.950	:
B :	1.163	:	2.967	:	1.144	:	.983	:
X :	1.199	:	2.962	:	1.153	:	.961	:
Y :	1.169	:	2.940	:	1.133	:	.968	:
Av.:	1.181	:	2.951	:	1.143	:	.965	:

*A= Best 10,
B= Poorest 10.

X= Best 48.
Y= Poorest 48.

Proportions of Measurements (Cont)

	Table 25	Table 26	Table 27
Group	Circ. at udder to circ. at barrel	Circ. at udder to circ. of chest	Circ. at udder to height at croup
I	1.130	.899	.635
II	1.138	.907	.644
III	1.173	.917	.657
IV	1.163	.928	.663
*A	1.135	.896	.643
B	1.169	.939	.674
X	1.134	.903	.643
Y	1.166	.923	.654
Av.	1.151	.913	.650

	Table 28	Table 29	Table 30
	Circ. at udder to height at withers	width of barrel to width of hips	Width of barrel to height at withers
I	.633	.751	1.838
II	.635	.717	1.790
III	.651	.744	1.864
IV	.661	.734	1.884
A	.638	.753	1.849
B	.671	.740	1.904
X	.634	.734	1.814
Y	.656	.745	1.874
Av.	.648	.739	1.858

* A= Best 10
B= Poorest 10

K= Best 48
Y= Poorest 48

TABLE 3I

SHAPE OF FORE UDDER TO DROOP[#]
OF RUMP

Group:	: Class A :	Class B :	Class C :	:
A :	5 :	I4 :	5 :	:
B :	I :	I9 :	4 :	:
C :	I :	IO :	I3 :	:
D :	I :	II :	I2 :	:
A & B :	6 :	33 :	9 :	:
C & D :	2 :	2I :	25 :	:
*X :	3 :	5 :	2 :	:
Y :	0 :	4 :	6 :	:
Total :	8 :	54 :	34 :	:

*

X- IO with most level rumps

Y- IO with most drooping rumps

#

Droop of rump arranged according to measurements.

TABLE 32

JERSEYS AT THE UNIVERSITY OF MISSOURI.

No.:	1	2	3	4	5	6	:
A	: 106	: 136	: 112	: 117	: 63	: 70	:
B	: 850	: 886	: 853	: 1030	: 730	: 980	:
1	: 121	: 123	: 115	: 127	: 121.5	: 131	:
2	: 119	: 125.5	: 116	: 128	: 121	: 132	:
3	: 117	: 123.5	: 114.5	: 125	: 118.5	: 129	:
4	: 68.5	: 70	: 66	: 69.5	: 65.5	: 70.5	:
5	: 51	: 49	: 47	: 48	: 54.5	: 50	:
6	: 37	: 35.5	: 33	: 34	: 37	: 35	:
7	: 50	: 51	: 50	: 50	: 48	: 48.5	:
8	: 19	: 20	: 19	: 19	: 20	: 20	:
9	: 45	: 45	: 44	: 48	: 44	: 45	:
10	: 83	: 90	: 84	: 86	: 88	: 85	:
11	: 46	: 48	: 46	: 51.5	: 46	: 51	:
12	: 32	: 33	: 35	: 36	: 36	: 25	:
13	: 173	: 176	: 165	: 186	: 177	: 189	:
14	: 209	: 210	: 221	: 220	: 225	: 212	:
15	: 15	: 15.5	: 15	: 17	: 15.5	: 17	:
16	: 17	: 17.5	: 16.5	: 19	: 17.5	: 19.5	:
17	: 13895	: 13759	: 12729	: 10611	: 11063	: 9675	:
18	: 4.89	: 4.63	: 4.98	: 5.71	: 5.476	: 6.22	:
19	: 680	: 638	: 633	: 607	: 605	: 602.2	:

TABLE 32 (Cont)

JERSEYS AT THE UNIVERSITY OF MISSOURI

No.:	7	8	9	10	11	12
A	: 65	: 88	: 69	: 72	: 77	: 138
B	:1030	: 850	: 800	: 922	: 973	: 765
1	: 123.5	: 120	: 126	: 126.5	: 125	: 124
2	: 125	: 117.5	: 124.5	: 128	: 126	: 125.5
3	: 124	: 113	: 121.5	: 126	: 125	: 122
4	: 70	: 68.5	: 70	: 69	: 71	: 67.5
5	: 51.5	: 50.5	: 51.5	: 53.25	: 54.5	: 49
6	: 36.5	: 34.5	: 36	: 35.25	: 36	: 35.5
7	: 43	: 50	: 49	: 49	: 50	: 49
8	: 19	: 18	: 21	: 18.5	: 20	: 19
9	: 45	: 43	: 44	: 43.5	: 43	: 44
10	: 88	: 83	: 89	: 90	: 94	: 87
11	: 48	: 45	: 49	: 36	: 32	: 32
12	: 35	: 33	: 32	: 37	: 32	: 34
13	: 175	: 169	: 174	: 192	: 184	: 168
14	: 205	: 201	: 214	: 232	: 224	: 206
15	: 15.5	: 15	: 15.5	: 15.5	: 15.5	: 14.5
16	: 17	: 16.5	: 17	: 17.5	: 17.5	: 16.5
17	:10393	: 9998	:11380	:10830	: 8487	:10604
18	: 5.29	: 5.495	: 4.699	: 4.88	: 5.879	: 4.42
19	: 559	: 545	: 534	: 528.75	: 470	: 469

TABLE 32 (Cont)

JERSEYS AT THE UNIVERSITY OF MISSOURI

No.:	13	14	15	16	17	18
A	112	54	90	69	127	102
B	875	897	895	730	1040	780
1	126	126.25	121	125	123	124
2	125	129	123	126	123	123
3	123.5	127.25	120	124.5	121	120
4	66.5	68	67	66.5	67.5	68.5
5	49	51.5	48.5	49	49	51.5
6	31	36.75	32	36	32.5	36
7	50	51	51	49	49	50
8	19	19	20	18	20	19
9	43	43.5	43	44	45	43
10	86	89	83	90	82	88
11	49	49.5	47	33	49	50
12	33	31	35	30	34	33
13	175	173	178	167	186	170
14	203	206	228	194	232	185
15	16	16	15.5	15	16.5	15
16	18.5	18	17.5	16.5	18	16.5
17	9044	8613	7908	8137	7278	6773
18	4.85	5.02	5.21	4.8	5.2	5.5
19	439	432	412	398	378	375

TABLE 32 (Cont)

JERSEYS AT THE UNIVERSITY OF MISSOURI

	:	:	:	:	:	:	:
	:	:	:	:	:	:	:
	19	20	21	22	23	24	:
A	: 66	: 76	: 50	: 148	: 57	: 88	:
B	: 940	: 890	: 838	: 800	: 940	: 1125	:
1	: 124	: 128.5	: 125	: 122.5	: 118.5	: 116.5	:
2	: 124.5	: 129	: 127.5	: 124	: 120	: 117	:
3	: 121.5	: 126.5	: 125.75	: 122	: 115	: 115	:
4	: 70	: 71	: 66.75	: 69.5	: 64	: 67	:
5	: 51.5	: 52	: 50	: 47	: 52	: 49	:
6	: 35.5	: 36.5	: 36.25	: 35.5	: 32	: 34.5	:
7	: 48	: 50	: 46.75	: 49	: 47	: 49	:
8	: 20	: 21	: 19.25	: 18	: 19	: 19	:
9	: 43	: 42	: 41	: 43	: 41	: 42	:
10	: 90	: 89	: 91.75	: 90	: 82	: 89	:
11	: 47	: 50	: 48	: 47	: 47	: 44	:
12	: 31	: 30	: 35.5	: 36	: 33	: 32	:
13	: 176	: 177	: 167.75	: 167	: 187	: 168	:
14	: 219	: 193	: 199	: 201	: 217	: 207	:
15	: 15	: 16	: 15.25	: 15	: 16	: 15	:
16	: 17	: 17.5	: 17	: 17	: 18	: 16.5	:
17	: 6594	: 6077	: 6447	: 6760	: 7462	: 6739	:
18	: 5.63	: 6.1	: 5.6	: 5.3	: 4.65	: 4.91	:
19	: 371	: 370	: 361	: 358	: 347	: 331	:

TABLE 32 (Cont)

JERSEYS AT THE UNIVERSITY OF MISSOURI

	:	25	:	26	:	27	:	28	:	29	:	30	:
A	:	52	:	53	:	69	:	53	:	73	:	53	:
B	:	840	:	768	:	1198	:	724	:	887	:	873	:
1	:	124	:	118.5	:	134.75	:	120	:	121.25	:	122.25	:
2	:	123	:	122.25	:	138.5	:	121.75	:	124.5	:	124.75	:
3	:	121	:	120.75	:	138	:	120	:	123.5	:	123.25	:
4	:	66	:	65.5	:	74	:	62.5	:	63.5	:	66	:
5	:	48	:	48	:	56	:	47.75	:	52	:	51	:
6	:	33.5	:	35	:	35	:	33	:	35	:	36.5	:
7	:	51	:	50	:	50	:	46.5	:	48	:	49	:
8	:	19	:	18.5	:	19	:	17.75	:	19	:	19.75	:
9	:	43.5	:	40	:	47	:	39.5	:	42	:	41.5	:
10	:	82	:	82	:	97	:	87	:	82	:	89.25	:
11	:	48	:	47	:	54	:	44	:	49	:	47	:
12	:	28	:	33	:	40	:	36	:	32	:	36.5	:
13	:	173	:	168	:	191	:	156.5	:	166	:	169.25	:
14	:	204	:	198	:	218	:	196.5	:	202	:	205	:
15	:	16	:	15	:	17	:	15	:	15.5	:	15.25	:
16	:	18	:	17	:	19	:	16.5	:	17.75	:	16.75	:
17	:	6270	:	5389	:	4982	:	5106	:	4451	:	3836	:
18	:	4.46	:	4.95	:	5.16	:	4.85	:	5.5	:	5.97	:
19	:	280	:	265	:	256	:	247	:	237	:	229	:

TABLE 32 (Cont)

JERSEYS AT THE UNIVERSITY OF MISSOURI

	:	31	:	32	:	33	:	34	:	35	:
A	:	48	:	68	:	51	:	57	:	60	:
B	:	813	:	960	:	821	:	857	:	850	:
1	:	120	:	120.5	:	119.5	:	124.75	:	123	:
2	:	122	:	120	:	120	:	127	:	123.25	:
3	:	120.25	:	118	:	118.5	:	124	:	121.5	:
4	:	64.5	:	69.5	:	63.5	:	66.25	:	66.5	:
5	:	47.75	:	54.5	:	47	:	48	:	50	:
6	:	30.75	:	36.5	:	33	:	34	:	35.5	:
7	:	49.5	:	48	:	47	:	47.5	:	48	:
8	:	18	:	20	:	17.5	:	18	:	19	:
9	:	39.5	:	42	:	38	:	42	:	41.5	:
10	:	90.5	:	85	:	80	:	85	:	80.5	:
11	:	46	:	47	:	44	:	48	:	46.5	:
12	:	33.75	:	30	:	36	:	34.5	:	33.5	:
13	:	162.5	:	178	:	168	:	169.5	:	177	:
14	:	201	:	210	:	207	:	206	:	210	:
15	:	15	:	15	:	15	:	15.25	:	15	:
16	:	16.75	:	16.5	:	16.5	:	16.5	:	16.75	:
17	:	3481	:	3188	:	3530	:	3397	:	2941	:
18	:	5.07	:	5.31	:	4.74	:	4.77	:	5.02	:
19	:	176	:	169	:	167	:	162	:	147	:

TABLE 33

JERSEYS AT THE UNIVERSITY OF MISSOURI
ARRANGED ACCORDING TO BUTTERFAT

	:	I	:	II	:	III	:	IV	:
B	:	887	:	898	:	880	:	887	:
1	:	123.11	:	124.59	:	122.40	:	122.94	:
2	:	122.05	:	125.69	:	123.36	:	124.64	:
3	:	120.66	:	123.46	:	120.83	:	123.00	:
4	:	67.92	:	67.88	:	68.38	:	66.25	:
5	:	50.33	:	50.47	:	49.90	:	50.44	:
6	:	35.40	:	34.38	:	34.97	:	34.36	:
7	:	48.83	:	49.75	:	48.97	:	48.17	:
8	:	19.44	:	19.19	:	19.22	:	18.66	:
9	:	44.70	:	43.63	:	42.06	:	41.44	:
10	:	86.22	:	87.62	:	85.97	:	86.25	:
11	:	47.83	:	48.75	:	47.55	:	47.17	:
12	:	34.11	:	33.25	:	32.40	:	34.69	:
13	:	176.00	:	177.87	:	172.64	:	170.86	:
14	:	213.00	:	215.62	:	202.55	:	206.17	:
15	:	15.66	:	15.50	:	15.36	:	15.33	:
16	:	17.50	:	17.25	:	17.17	:	17.00	:
17	:	115.00	:	88.63	:	65.01	:	38.66	:
18	:	5.266	:	5.032	:	5.233	:	5.154	:
19	:	601.	:	424.	:	340.	:	199.	:

TABLE 33 (Continued)

JERSEYS AT THE UNIVERSITY OF MISSOURI

ARRANGED ACCORDING TO BUTTERFAT.

	: Best	: Poorest	: General	:
	: 17	:: 18	: Average	:
B	: 890	: 883	: 886	:
1	: 123.80	: 122.67	: 123.23	:
2	: 123.80	: 124.00	: 123.90	:
3	: 122.06	: 121.92	: 121.99	:
4	: 67.90	: 67.32	: 67.61	:
5	: 50.40	: 50.17	: 50.29	:
6	: 34.91	: 34.67	: 34.79	:
7	: 49.26	: 48.57	: 48.92	:
8	: 19.32	: 18.94	: 19.13	:
9	: 44.26	: 41.75	: 43.00	:
10	: 86.88	: 86.11	: 86.49	:
11	: 48.14	: 47.36	: 47.75	:
12	: 33.70	: 33.55	: 33.63	:
13	: 176.88	: 171.75	: 174.32	:
14	: 214.24	: 204.36	: 209.30	:
15	: 15.59	: 15.35	: 15.47	:
16	: 17.38	: 17.08	: 17.23	:
17	: 10259	: 5188	: 7651	:
18	: 5.156	: 5.194	: 5.175	:
19	: 518.	: 269.	: 396.	:

TABLE 34

JERSEYS AT THE UNIVERSITY OF MISSOURI

ARRANGED ACCORDING TO MEASUREMENT.

	:	:	:	:	:
	:	:	:	:	:
	A	Fat	B	Fat	
B	:1035	: 420	: 904	: 420	:
1	: 127.89	: 471	: 124.25	: 372	:
2	: 129.44	: 421	: 125.09	: 454	:
3	: 127.44	: 447	: 123.22	: 386	:
4	: 70.67	: 489	: 68.62	: 445	:
5	: 53.36	: 386	: 51.06	: 471	:
6	: 56.54	: 438	: 35.63	: 403	:
7	: 50.46	: 522	: 49.70	: 368	:
8	: 20.22	: 476	: 19.25	: 463	:
9	: 45.44	: 542	: 43.62	: 467	:
10	: 91.37	: 395	: 88.66	: 429	:
11	: 50.61	: 460	: 48.25	: 415	:
12	: 36.55	: 373	: 34.34	: 367	:
13	: 186.33	: 418	: 175.87	: 458	:
14	: 224.33	: 473	: 211.12	: 431	:
15	: 16.40	: 412	: 15.50	: 513	:
16	: 18.42	: 398	: 17.38	: 533	:

TABLE 34 (Continued)

JERSEYS AT THE UNIVERSITY OF MISSOURI.

ARRANGED ACCORDING TO MEASUREMENT.

	:	:	:	:	:
	C	Fat	D	Fat	
B	: 848	: 356	: 765	: 381	:
1	: 122.05	: 409	: 118.72	: 320	:
2	: 123.11	: 292	: 119.14	: 414	:
3	: 120.84	: 326	: 116.61	: 414	:
4	: 66.66	: 362	: 64.55	: 284	:
5	: 49.17	: 397	: 47.61	: 322	:
6	: 34.90	: 393	: 32.30	: 342	:
7	: 48.66	: 416	: 46.86	: 266	:
8	: 19.00	: 316	: 18.03	: 316	:
9	: 42.55	: 340	: 40.44	: 233	:
10	: 85.33	: 445	: 81.83	: 304	:
11	: 47.06	: 279	: 45.22	: 422	:
12	: 32.66	: 477	: 29.90	: 354	:
13	: 170.30	: 389	: 165.31	: 316	:
14	: 204.90	: 330	: 196.61	: 344	:
15	: 15.36	: 244	: 14.94	: 419	:
16	: 16.86	: 342	: 16.50	: 318	:

TABLE 34 (Continued)

JERSEYS AT THE UNIVERSITY OF MISSOURI

ARRANGED ACCORDING TO MEASUREMENTS.

	:Largest :		:Smallest:		:General :		
	: 17 :	Fat	: 18 :	Fat	:Average :	Fat	:
B	: 964 :	420	: 807 :	373	: 886 :	396	:
1	: 126.07 :	427	: 120.38 :	364	: 123.23 :	396	:
2	: 127.35 :	438	: 121.12 :	353	: 123.90 :	396	:
3	: 125.33 :	420	: 118.70 :	370	: 121.99 :	396	:
4	: 69.65 :	467	: 65.60 :	323	: 67.61 :	396	:
5	: 52.21 :	432	: 48.39 :	360	: 50.29 :	396	:
6	: 36.01 :	423	: 33.60 :	368	: 34.79 :	396	:
7	: 50.08 :	451	: 47.76 :	341	: 48.92 :	396	:
8	: 19.74 :	474	: 18.51 :	316	: 19.13 :	396	:
9	: 44.50 :	506	: 41.50 :	286	: 43.00 :	396	:
10	: 89.70 :	415	: 83.63 :	377	: 86.49 :	396	:
11	: 49.46 :	442	: 46.14 :	350	: 47.75 :	396	:
12	: 35.53 :	376	: 31.28 :	418	: 33.63 :	396	:
13	: 180.82 :	439	: 167.80 :	353	: 174.32 :	396	:
14	: 217.65 :	455	: 200.76 :	337	: 209.30 :	296	:
15	: 15.88 :	460	: 15.16 :	332	: 15.47 :	396	:
16	: 17.94 :	462	: 16.68 :	330	: 17.23 :	396	:

TABLE 35

HOLSTEINS AT THE UNIVERSITY OF MISSOURI

No.:	1	2	3	4	5	6
A	99	120	104	145	99	59
B	1185	1305	1282	1310	1200	1268
1	139	131.5	139	139.5	133.5	142.25
2	144	136.5	144.5	140	139	143.25
3	144	133	143	136	134.5	142
4	77	74.5	75.75	77.5	73.5	75.5
5	56	55.5	55.5	56.5	52	54.5
6	38.75	38.5	37	49	39	37.5
7	53	53	51	55	52.5	51
8	19	20	19.5	21	18.5	20
9	51	48	51	50	48	49.5
10	103	102	99	100	95.5	96.5
11	52	50	50	51	51	50
12	42	42	39	41	38.5	38
13	200	189	191	198	185	195
14	235	228	240	238	236	233
15	18.5	16.5	18.5	18.5	18	18.75
16	21.5	19	20	20.5	20.5	21
17	23503	26825	22654	18054	19428	16371
18	3.26	2.76	3.09	3.41	3.03	3.41
19	768	739	711	618	589	545

TABLE 35 (Cont)

HOLSTEINS AT THE UNIVERSITY OF MISSOURI

No.:	7	8	9	10	
A	: 90	: 122	: 105	: 75	:
B	:1165	:1200	:1265	:1385	:
1	: 136	: 143.5	: 138	: 134	:
2	: 136	: 143	: 139	: 134	:
3	: 134	: 141	: 136	: 132	:
4	: 75	: 76.5	: 73	: 73	:
5	: 55	: 56.5	: 54.5	: 55.5	:
6	: 39	: 43.5	: 37	: 40	:
7	: 55.5	: 54	: 56	: 56	:
8	: 19.5	: 20	: 22	: 21	:
9	: 49	: 47	: 50	: 49.5	:
10	: 99	: 100	: 94	: 91	:
11	: 52	: 55	: 51	: 51	:
12	: 38.5	: 36	: 35	: 35	:
13	: 190	: 193	: 196	: 200	:
14	: 233	: 227	: 241	: 244	:
15	: 19	: 18.5	: 18.5	: 19	:
16	: 20.5	: 20.5	: 21.5	: 22	:
17	:18384	:12336	:14684	: 9933	:
18	: 2.76	: 3.48	: 2.9	: 3.02	:
19	: 509	: 430	: 429	: 309	:

TABLE 35 (Cont)

HOLSTEINS AT THE UNIVERSITY OF MISSOURI

No.	11	12	13	14
A	120	76	123	61
B	1330	1075	1135	1145
1	136	132	132.5	130.75
2	135	135	134	131
3	134	133	132.5	127.5
4	73.5	69	73	70
5	58	52.5	56	52.25
6	38	37	41.5	39
7	53	54	52	54
8	21	19.5	20	19
9	49	46.5	49	45
10	97	90	95	90
11	51.5	53	50	46
12	37	33	39	33
13	198	182	185	183
14	239	218	235	220
15	18	17.5	17.5	16.5
16	21	20.5	20	19
17	10219	9169	8629	8574
18	3.03	3.27	3.26	2.92
19	309	299	281	250

TABLE 36

HOLSTEINS AT THE UNIVERSITY OF MISSOURI.

ARRANGED ACCORDING TO BUTTERFAT

	:	:	:	General	:
Group:	I	:	II	Average	:
B	: 1245	:	1219	:	1233
1	: 137.25:	:	135.25:	:	136.25
2	: 140.46:	:	135.86:	:	138.16
3	: 138.09:	:	133.71:	:	135.89
4	: 75.54:	:	72.66:	:	74.10
5	: 55.00:	:	55.03:	:	55.01
6	: 39.82:	:	39.43:	:	39.62
7	: 53.00:	:	54.14:	:	53.57
8	: 19.64:	:	20.36:	:	20.00
9	: 49.50:	:	48.00:	:	48.75
10	: 99.30:	:	93.86:	:	96.58
11	: 50.86:	:	51.07:	:	50.96
12	: 39.86:	:	35.43:	:	37.64
13	: 192.66:	:	191.00:	:	191.83
14	: 234.71:	:	232.00:	:	233.36
15	: 18.25:	:	17.93:	:	18.09
16	: 20.43:	:	20.64:	:	20.53
17	: 20745	:	10506	:	15625
18	: 3.102	:	3.13:	:	3.116:
19	: 640	:	330	:	485

TABLE 36 (Continued)

HOLSTEINS AT THE UNIVERSITY OF MISSOURI
ARRANGED ACCORDING TO MEASUREMENTS.

Group:	A	Fat	B	Fat
B	1305	1509	1158	461
1	139.61	573	132.90	397
2	141.82	584	134.50	385
3	139.50	584	132.30	385
4	75.96	620	72.14	352
5	56.30	551	53.75	419
6	41.57	426	37.68	543
7	54.93	406	52.21	564
8	20.71	483	19.29	489
9	50.00	556	47.5	418
10	100.00	583	93.14	386
11	52.21	503	49.71	466
12	40.00	602	35.28	367
13	196.86	486	186.43	483
14	239.00	533	227.72	436
15	18.68	556	17.50	418
16	21.14	509	19.93	460

TABLE 37

FORE UDDER TO DROOP OF RUMP

No. :	Fore :	No. :	Fore :	No. :	Fore :
Cow : Droop :	Udder :	Cow : Droop :	Udder :	Cow : Droop :	Udder :
63 : +2.00 :	B :	52 : 2.5 :	B :	35 : 5.0 :	C :
93 : +2.0 :	C :	24 : 3.0 :	B :	39 : 5.0 :	C :
6 : +1.5 :	B :	42 : 3.0 :	B :	71 : 5.0 :	C :
15 : +1.25 :	B :	60 : 3.0 :	B :	72 : 5.0 :	C :
27 : +0.75 :	A :	61 : 3.0 :	B :	76 : 5.0 :	A :
7 : +0.5 :	B :	93 : 3.0 :	C :	84 : 5.0 :	C :
91 : +0.5 :	C :	48 : 3.25 :	A :	41 : 5.25 :	B :
10 : 0.0 :	A :	96 : 3.25 :	B :	33 : 5.5 :	C :
81 : 0.0 :	B :	11 : 3.5 :	B :	43 : 5.5 :	A :
74 : .75 :	A :	13 : 3.5 :	B :	88 : 5.5 :	B :
49 : 1.0 :	C :	19 : 3.5 :	B :	50 : 5.75 :	B :
62 : 1.0 :	A :	31 : 3.5 :	B :	83 : 5.75 :	C :
80 : 1.0 :	B :	47 : 3.5 :	B :	68 : 6.0 :	C :
51 : 1.5 :	B :	94 : 3.5 :	C :	95 : 6.0 :	C :
69 : 1.5 :	B :	9 : 4.0 :	B :	23 : 6.5 :	B :
17 : 2.0 :	C :	14 : 4.0 :	B :	38 : 6.5 :	B :
25 : 2.0 :	B :	30 : 4.0 :	B :	45 : 6.5 :	C :
40 : 2.0 :	B :	58 : 4.0 :	C :	77 : 6.5 :	B :
54 : 2.0 :	B :	65 : 4.0 :	B :	12 : 7.0 :	B :
56 : 2.0 :	B :	75 : 4.0 :	B :	18 : 7.0 :	C :
59 : 2.0 :	B :	79 : 4.0 :	C :	20 : 7.0 :	C :
67 : 2.0 :	A :	87 : 4.0 :	C :	21 : 7.0 :	B :
78 : 2.0 :	B :	92 : 4.0 :	B :	26 : 7.0 :	C :
82 : 2.0 :	C :	29 : 4.25 :	B :	32 : 7.0 :	C :
85 : 2.0 :	C :	16 : 4.5 :	B :	66 : 7.0 :	C :
3 : 2.25 :	B :	37 : 4.5 :	C :	70 : 7.0 :	B :
36 : 2.25 :	C :	89 : 4.5 :	C :	86 : 7.0 :	C :
46 : 2.25 :	B :	57 : 4.75 :	C :	5 : 7.5 :	C :
53 : 2.25 :	B :	1 : 5.0 :	C :	44 : 7.5 :	C :
55 : 2.25 :	B :	2 : 5.0 :	B :	64 : 7.5 :	B :
8 : 2.5 :	B :	22 : 5.0 :	B :	73 : 7.5 :	B :
28 : 2.5 :	B :	34 : 5.0 :	B :	4 : 9.5 :	B :

UNIVERSITY OF MISSOURI
COLUMBIA

COLLEGE OF AGRICULTURE
RICULTURAL EXPERIMENT STATION
DEPARTMENT OF ANIMAL HUSBANDRY

May 25, 1916.

Dean of the Graduate School,
Academic Hall.

Dear Sir:

In accordance with your request, I have examined the dissertation which has been submitted by Mr. Robert Wylie.

I beg to concur with Professor C. H. Eckles in its approval.

I am pleased to state that, in my opinion, it meets the requirements of the general standard which has been established at the University of Missouri.

I am also pleased to state that it furnishes valuable and accurate data on a subject which is greatly in need of investigation.

Very respectfully yours,

E. A. Howard
Professor of Animal Husbandry

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