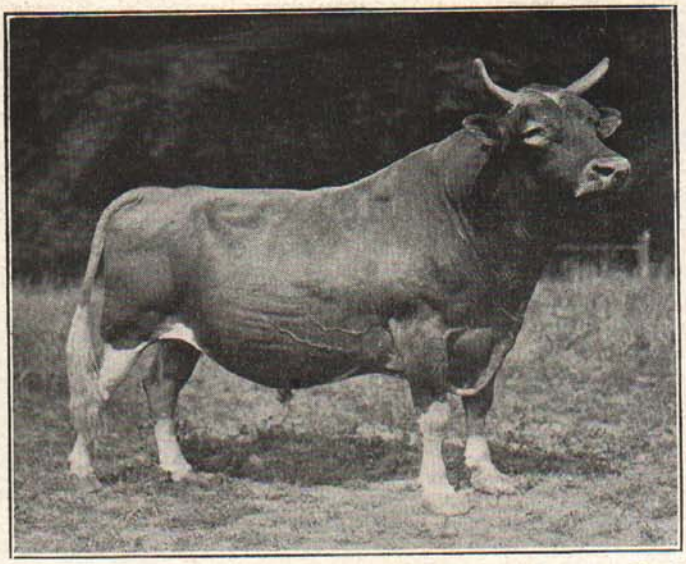
Selecting a Sire for the Dairy Herd
Michigan State University Extension Service
G.A. Bowling
Issued September 1930
16 pages

Extension Bulletin 108 September, 1930

SELECTING A SIRE FOR THE DAIRY HERD



Cora's Cherub of Shorewood 58822, Senior Guernsey Herd Sire at Michigan State College. The pedigree of this bull is shown in figure 5.

MICHIGAN STATE COLLEGE
Of Agriculture and Applied Science

EXTENSION DIVISION
R. J. BALDWIN, Director

Printed and distributed in furtherance of the purposes of the cooperative agricultural extension work provided for in the Act of Congress, May 8, 1914.
Michigan State College and U. S. Department of Agriculture co-operating.

SELECTING A SIRE FOR THE DAIRY HERD

BY G. A. BOWLING

Better bulls must be used in Michigan dairy herds if the average production of the cows of the State is to continue to increase.

Approximately one-third of all dairy cows now milked are not paying for their feed and care. Many cows receive the best of feed and care and yet do not produce enough milk and butterfat to return a profit to their owners. Such cases serve to further emphasize the fundamental fact that feeding and care alone do not make a profitable cow. Dairymen are beginning to realize that unless a cow has the inherited ability to produce milk in large quantities she simply cannot be a profitable producer regardless of her environment. Economic conditions demand that dairymen milk higher producing cows or else be crowded out of the dairy business. Better dairy cattle should be bred on Michigan dairy farms.

THE OTHER HALF OF THE HERD

It is often said that the bull is half the herd. Just how true is such a statement?

The ability of a cow to produce milk and butterfat is, on the average, inherited equally from both parents. All the characteristics a parent possibly can transmit to the offspring are contained in the sex cells. In other words, all the characteristics that a bull is able to transmit to his offspring are contained in the sperm cells of the seminal fluid and all the characteristics that a cow can contribute to her calf are contained in the egg or ovum. When a cow is bred, and the male and female sex cells unite to form the calf embryo, an equal number of characteristics from each animal are present. As the calf develops, these characteristics determine what the calf will look like and what its productive ability will be. It can readily be seen that a bull actually contributes one-half to the inheritance of every calf born to his service, and is therefore half the herd.

If the bull used in the herd is from high producing ancestry, he is quite likely to contribute many characteristics of high production and his daughters will be heavy producers. If, on the other hand, the bull is from ancestors that were of poor type and of low producing ability, he will contribute many poor characteristics. His daughters will be of undesirable type and their production will be low.

For these reasons, every dairy farmer should fully appreciate the fact that his future dairy profits depend upon the kind of bull he buys. If a good bull is selected, the herd will be greatly improved in a few years and the price of the bull will be repaid many times over. A bull that is inferior

in type and production at the head of a herd will do actual damage which cannot be righted without years of effort and expense. Time actually spent in selecting carefully good herd sires is the most profitable time the dairy farmer can spend.

BASIS FOR SELECTING THE BULL

Breed of Cattle Preferred

The farmer who owns scrub cows should first of all decide what breed of dairy cattle he wishes to breed before he selects a bull. The practice of breeding cows to the nearest bull has contributed more to the mongrel livestock population than any other single factor. The unsystematic crossing of breeds will never lead to livestock improvement and a thorough appreciation of this fact would benefit greatly the dairy industry.

There is no best breed of dairy cattle in the strictest sense of the word. Usually, the best breed of dairy cattle is the one that is liked the best. For the farmer who has no particular breed preference, however, there are certain factors which he should consider thoroughly before he selects a herd sire.

1. The breed most popular in the community. Every dairy farmer should look forward to the time when he will be offering for sale young breeding stock. Stock buyers go where they can buy the most stock in the shortest time. For this reason, they go into communities where they can look over several herds and make selections from a large number of animals. The farmer who is producing one breed of cattle, but who is surrounded by neighbors who are producing another breed of cattle finds it necessary to make special, and often expensive, efforts in order to sell surplus stock.

If the dairy farmer selects the breed that is common to his community, there is also greater opportunity for breed improvement. The individual farmer quite often cannot afford to own, entirely, an outstanding bull. It is good practice, where there are several farmers in a community who have the same breed of dairy cattle, to own co-operatively very high class bulls at a surprisingly low cost to the individual farmer.

2. The kind of product to be sold. It is ordinarily considered a fact that the major breeds of dairy cattle which secrete milk of higher fat percentage are the most economical producers of butterfat. Likewise, the lower testing breeds are considered the most economical producers of milk. The dairy farmer who has a market for butter or cream may be acting wisely if he selects one of the Island breeds of cattle but, if whole milk is sold, one of the lower testing, higher milk producing breeds would be preferred. In some cities, there is a limited market at a special price for retail milk of high fat percentage. The development of such a market depends upon the salesmanship of the producers rather than upon a spontaneous public demand.

3. The most income for the money invested. For the farmer who has no breed preference, the problem of getting the most for his money should receive serious consideration. Quite often a breed of cattle will be enjoying unusual popularity, and, in order to obtain desirable animals of the breed, more than a fair comparative price must be paid. In such cases, the purchaser should always buy into the breed that will give him the most income for each dollar expended. If the breeder expects to have surplus stock for

sale, the relative demand and sales value of the various breeds should be considered when making a choice. In any case, however, the future possibilities as well as the present actualities should be considered.

SELECTING BY TYPE

It is generally believed that type, or body conformation, is inherited equally from sire and dam. This being the case, it can readily be seen that the bull will play a very important part in fixing the type of the animals in the herd. A bull should be selected from ancestors that have been prepotent for type or, in other words, ancestors that have demonstrated their ability to transmit consistently their body conformation to their offspring.

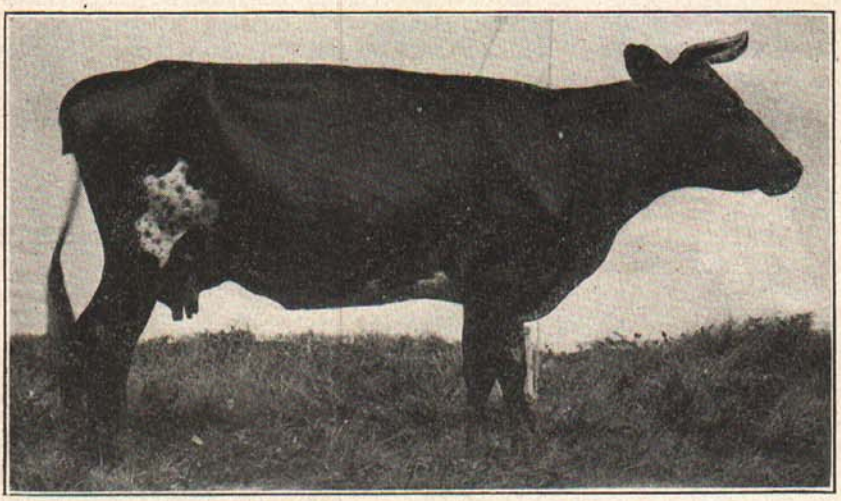


Fig. 1.—A scrub cow, the greatest reason why dairying is unprofitable in many parts of Michigan.

SELECTING BY PEDIGREE

The pedigree of an animal is nothing more than an authentic record of the ancestry of the animal. The production records in a pedigree are the records of the animals named in the pedigree and is a history of their performance. As milk and butterfat production are inherited characteristics, a pedigree may be considered as a promise of production. It should be remembered that pedigrees are promises and should never be considered as absolute guarantees of production. The richer the pedigree is in high production records, however, the greater the chances are that the offspring of such pedigreed animals will be high producers.

The pedigree of an animal should be studied thoroughly before a purchase is made. The following points should receive special consideration:

1. The importance of each generation.

The first generation in a pedigree, the sire and dam of the bull in question, should receive the most consideration, because the first generation, on an average, represents one-half of the contribution to the bull's inheritance. Each of the parents contribute effectively one-fourth to the inheritance of the animal.

The second generation, the grandparents, on an average, contributes one-fourth to the inheritance of the bull, and the effective contribution of each grandparent is one-sixteenth.

The third generation, the great-grandparents, on an average, contributes one-eighth to the inheritance of the bull, and the effective contribution of each animal in this generation is one sixty-fourth.

It can readily be seen that the most important animals in the pedigree of a bull are those animals in the first two generations of the ancestry. They represent three-fourths of the possible inheritance of the bull.

Fig. 2.—A grade cow, the result of using a registered Guernsey bull on the scrub cow in Fig. 1.

2. Production records in the pedigree.

The dam of the bull should in every case have an authentic record of production and it should be *better than the production records of the cows on which the bull will be used.* If the dam has daughters in milk, they should be considered, for they are a partial indication of what the bull's daughters will be.

The sire of the bull should have either daughters or sisters in milk. Their average production is more important in helping to determine the average production of the daughters of the bull in question than are the production records of one or two outstanding cows of the same relationship.

The grandparents should be of known productive ability. The grandsires should have several daughters with high average production. The grand dams should have high individual records.

Individual records in the third and fourth generation are not so important,

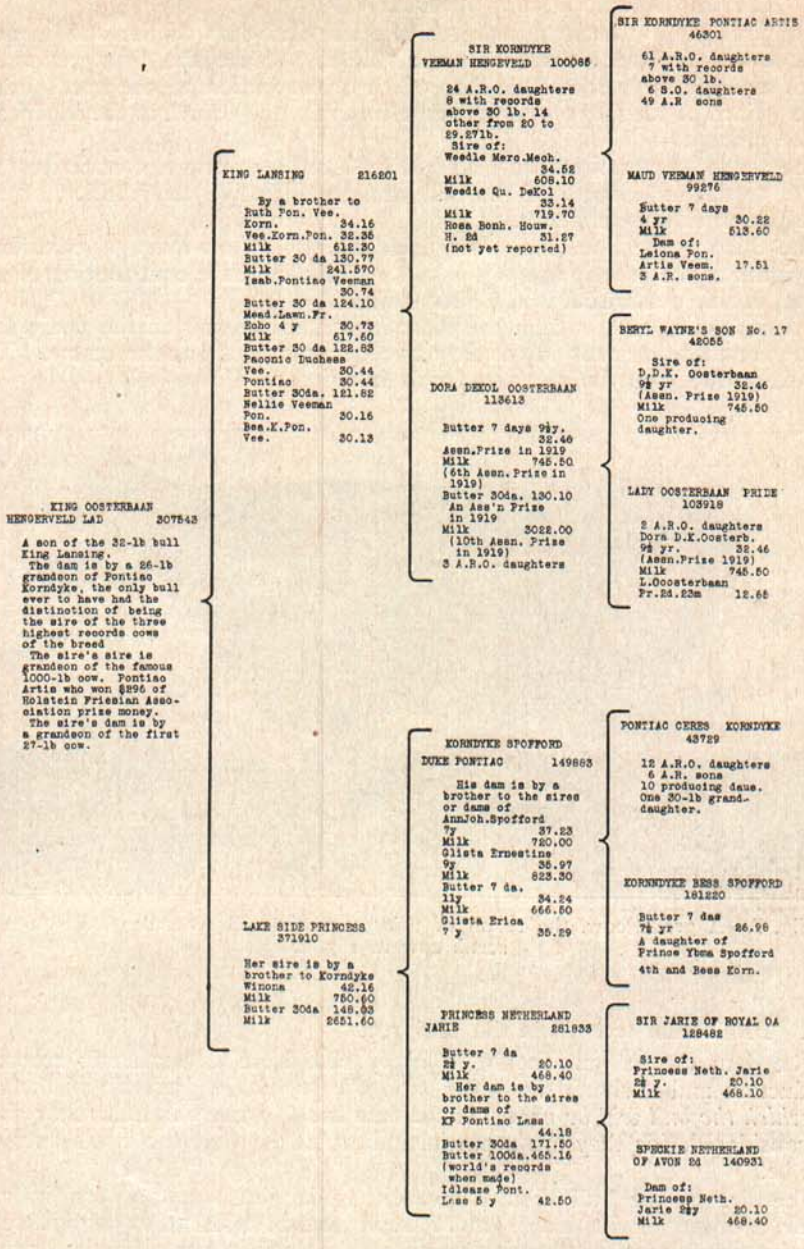


Fig. 3.—A pedigree containing typical filler information. Compare this pedigree with Fig. 4.

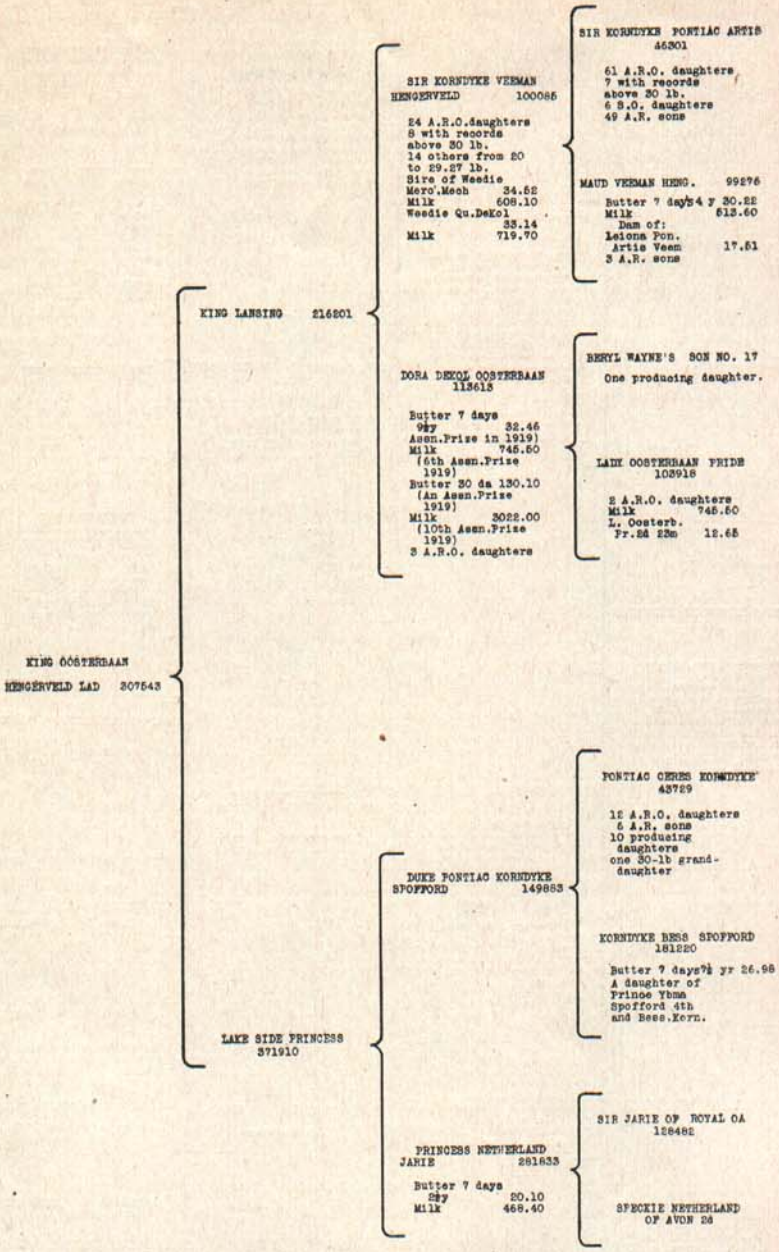


Fig. 4.—The same pedigree as shown in Fig. 3 with material regarded as filler removed.

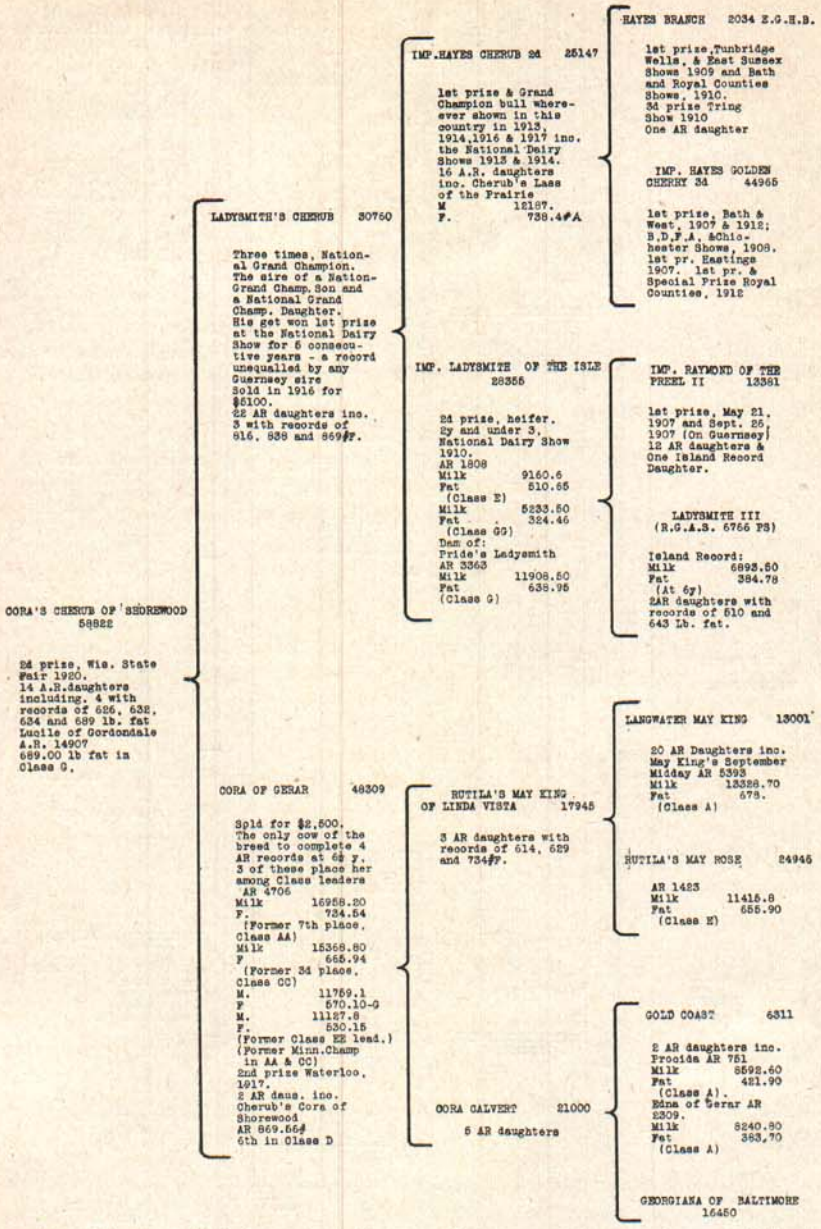


Fig. 5.—A well balanced pedigree. Every record may be considered as an indication of the productive ability of the animal under whose name it appears.

but a solid line-up of high production is an additional guarantee that the animals in the closer generations are really heavy producers capable of transmitting their productive ability.

3. Pedigree Filler.

A great many breeders and pedigree writers make a practice of filling up a pedigree blank with records regardless of how distantly the recorded animals may be related to the animal in question. Such a practice can have but one purpose, to deceive a person who does not appreciate the relative value of the animals in the pedigree. Buyers who can not properly interpret records in a pedigree may pay entirely too much for bulls because of filler in the pedigree.

Figure (3) is a pedigree that contains a certain amount of filler. Some of the records do not belong where they are located in the pedigree and are misleading.

Figure (4) shows the same pedigree from which all filler has been removed. Beware of such expressions as "sired by a son of," "dam is sired by a son of," "sire is by a half-brother to," and many other clauses used to fill up space in a pedigree that had better be left blank. Many of the animals referred to in such a pedigree appear in the fourth and fifth generation, and are therefore so far away that their effective contribution is too small to be significant.

Figure (5) is a pedigree that shows only records made by the animals and their offspring. These records are indicative of real productive ability and the pedigree is one that promises a great deal of production. The bull with this pedigree is actually proving that high production is inherited. The first nine of his daughters out of dams with records averaged 686.77 pounds of fat on a mature equivalent basis. See table 1 for conversion factors. The dams had an average production of 684 pounds of fat on a mature equivalent basis. A bull that can maintain the average production of such high producing dams should be considered an excellent bull. The show ring winnings represented in this pedigree go to prove that dairy cattle of excellent body conformation can be both good producers and reproducers.

SELECTING BY THE TYPE AND PRODUCTION OF OFFSPRING

A bull can best be judged by the type and production of his offspring. The production of a bull's daughters is actual proof of his transmitting ability, and is the only proof of the true worth of a sire.

In dairy herd improvement associations where all the daughters of a bull are tested, the production records of five daughters out of five different tested dams are considered a good indication that other daughters of the bull will have about the same average production. In the case of Advanced Register and Register of Merit testing, where the records of the low producing daughters of a bull are not published, more tested daughters are necessary in order to prove a bull. The exact number is not known, but 10 to 15 tested daughters should give a good indication of the transmitting ability of an Advanced Register or Register of Merit Sire. In no case, should a bull be considered as a proved sire unless he has five or more tested daughters.

Every proved sire is not a good sire. It is safe to estimate that nearly

half of the bulls that are being used are not increasing to a significant degree, the production of their daughters over the dams. The bull that is proved to be a sire of low producing daughters should be slaughtered at once. There is always a market for the good proved bull if he is properly advertised.

Comparing Production Records

In order to get a fair comparison of dams and daughters, it is necessary to shift their records to a comparable basis. This is usually done by raising all the yearly records to a mature basis by the use of certain conversion factors which have been calculated from Advanced Register and Register of Merit records. This is known as the mature equivalent production of a cow. Table (1) gives the conversion factors for the Holstein-Friesian, Jersey, Guernsey, and Ayrshire breeds. These factors were published by the Experiment Station of the University of Missouri.

Table 1.—Conversion Factors for Milk and Butterfat Production.

Age	Breed			
	Holstein Friesian	Jersey	Guernsey	Ayrshire
Under 2 years	1.473	1.484	.....	.....
2 - 2½ years	1.365	1.448	1.313	1.402
2½- 3 years	1.269	1.344	1.251	1.343
3 - 3½ years	1.196	1.248	1.194	1.283
3½- 4 years	1.140	1.164	1.142	1.226
4 - 4½ years	1.099	1.115	1.100	1.172
4½- 5 years	1.066	1.083	1.064	1.123
5 - 5½ years	1.041	1.052	1.041	1.084
5½- 6 years	1.023	1.034	1.023	1.050
6 - 6½ years	1.009	1.023	1.013	1.028
6½- 7 years	1.003	1.014	1.006	1.012
7 - 7½ years	1.000	1.008	1.000	1.000
7½- 8 years	1.000	1.004	1.000	1.000
8 - 8½ years	1.003	1.000	1.004	1.002
8½- 9 years	1.005	1.000	1.009	1.008
9 - 9½ years	1.011	1.004	1.017	1.019
9½-10 years	1.018	1.008	1.029	1.030
10 -10½ years	1.031	1.012	1.041	1.044
10½-11 years	1.046	1.025	1.058	1.059
11 -11½ years	1.064	1.038	1.075	1.077
11½-12 years	1.085	1.052	1.093	1.094
12 -12½ years	1.106	1.065	1.113	1.114
12½-13 years	1.131	1.093	1.137	1.135
13 -13½ years	1.156	1.096	1.162	1.157
13½-14 years	1.204	1.110	1.191	1.180
14 -14½ years	1.227	1.127	1.219	1.205

Conversion factors for the Brown Swiss breed have not been published. The factors for the other breeds may be used for the Brown Swiss with only a very slight error.

In using the conversion factors multiply the actual production by the factor for the age of the cow at the time she started on test. For example, if a Jersey cow made 350 pounds of fat at two years four months of age, her mature record would be 350 x 1.448 equals 506.8.

If a cow has more than one yearly record, there is some question as to which record to use. Some authorities use the first lactation record while others use the best record the cow has made. Due to the fact that in most cases most of the tested daughters of a bull are usually found on one farm and have been developed under the same conditions, the first lactation may

be the most reliable. This opinion is expressed in view of the fact that after the first lactation many conditions enter in such as length of the dry period, the number of days the cow carried a calf, and the amount of fitting the cow received between lactations.

In calculating records to a mature basis, the United States Bureau of Dairy Industry uses a percentage system. With this system a cow is considered to be a maximum producer at five years of age. At two years of age, she will produce 70 per cent, at three years 80 per cent, and at four years 90 per cent as much as when she is mature.

It is generally considered that a cow milked twice a day will produce about 20 per cent less milk than when milked three times a day and about 30 per cent less than when milked four times each day.

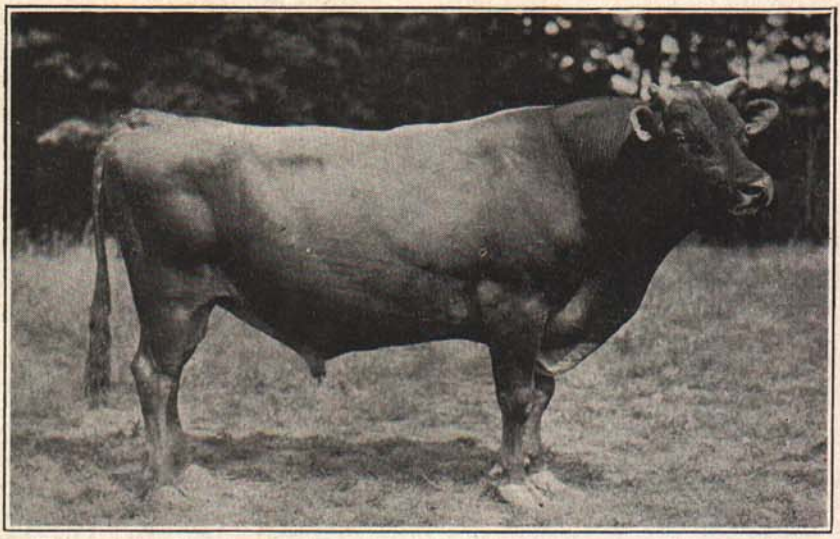


Fig. 6.—Modesty's Oxford Majesty 194626, Senior Jersey herd sire at Michigan State College. This bull has transmitted both high production and excellent body conformation to his offspring.

To convert a 305 day record to 365 day record multiply by 1.15.

In comparing official or semi-official records with cow testing association and herd improvement records, consideration must be given to the rules under which the records are made and the difference in environmental conditions where the different types of testing are conducted.

Official and semi-official records are usually based on the production made during one lactation. Cow testing association records and Herd Test records are based on a year's production and do not necessarily mean one complete lactation. In this type of testing, the whole herd is started on test at one time and the records of the individual cows usually include a dry period. Under official testing rules, a cow should be able to make a larger record than she would under cow testing association or Herd Test rules. It is usually considered that cows under official and semi-official test are kept under more favorable environmental conditions. In cases where this is true, a difference

in production may be expected which would be in favor of the cows on official test.

Before concluding that a sire is valuable or worthless as shown by the production of his daughters, it is best to consider well whether or not the production records were made under conditions that were favorable to high production. Many good bulls are discredited as sires because their daughters were not given a chance to produce to the full extent of their inherited capacity for production.

Production Classes Under Official Test Rules

In studying production pedigrees, one quite often finds class designations given with each record. These classes are usually distinguished by the use of letters. Due to the fact that a class record in one breed association does not have the same meaning that it has in another breed association there is much confusion as to how letter classes should be interpreted. The following is a brief interpretation of the more common letter classes usually found in production pedigrees of the dairy breeds that use such designations.

Jersey Letter Classes

Class AAA—Records made in triple A class are 305 days in length and the cow must carry a calf for at least 155 days during the period of time over which the record was made.

ClassAA—Records made in double A class are for 365 days, during which time the cow must carry a calf 155 days.

Class A—If a cow does not meet the calving requirements of the double or triple letter class, the record is classed as a single letter record.

Guernsey Letter Classes

Class A—All records started when cow is over 5 years of age.
Class B—All records started when cow is 4½-5 years of age.
Class C—All records started when cow is 4-4½ years of age.
Class D—All records started when cow is 3½-4 years of age.
Class E—All records started when cow is 3-3½ years of age.
Class F—All records started when cow is 2½-3 years of age.
Class G—All records started when cow is under 2½ years of age.

Single Letter Class—Records of 365 days where no calving requirements are met are designated as single letter records.

Double Letter Class—A 365 day record, during which time a calf was carried 265 days is designated as a double letter record.

Triple Letter Class—Records entered in the triple letter class are 305 days in length and the cow cannot be milked more than twice daily, must start test within 30 days after calving and must carry a calf 205 days while on test.

The following is an example of how a cow would be classified:

A cow was started on test at three years and two months of age. She was milked three times a day for 365 days and carried a calf 265 days of her test. This cow's record would be in Class EE. If this cow did not meet calving requirements, she would be in Class E. If she were milked only

twice a day for 305 days, started her record within 30 days of the calving date and carried a calf 205 days she would be in class EEE.

Holstein-Friesian Letter Classes

Class A—If a cow is milked four times a day after the forty-fifth day of her lactation, her record is placed in class A.

Class B—If a cow is milked three times a day after the forty-fifth day of her lactation her record is placed in class B.

Class C—If a cow is milked two times a day after the forty-fifth day of her lactation her record is placed in class C.

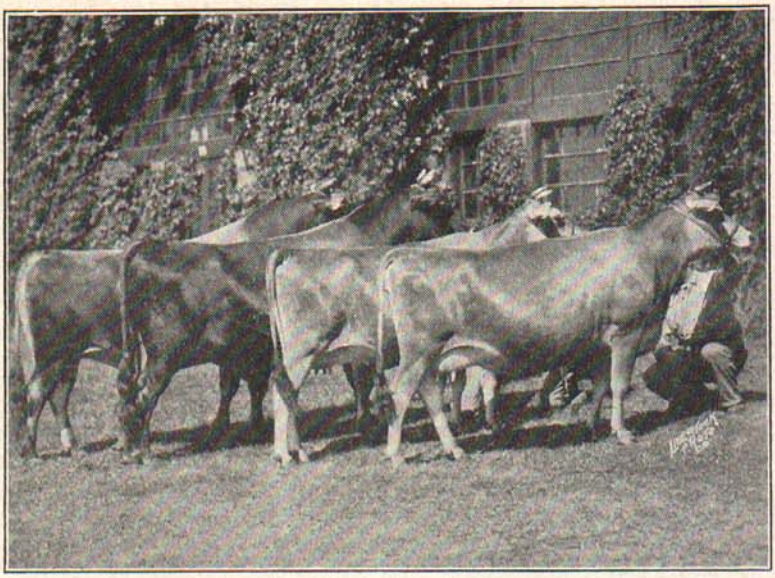


Fig. 7.—The offspring of Modesty's Oxford Majesty 194624. This Get of Sire group won first prize at many leading shows including the Pacific International in 1929.

Ayrshire Classes

The abbreviation A. R. signifies an advanced registry record.

R. H. is the abbreviation for Roll of Honor. Roll of Honor records are 305 days in length. In order to qualify for Roll of Honor, a cow must drop a living calf within 400 days of the date the test was started. There is a minimum production requirement for this class.

H. T. signifies that the cow made her record under the Ayrshire Herd Test Rules.

M. R. is the abbreviation for Meritorious Record. A meritorious record calls for a minimum production requirement under Herd Test rules. The record is 305 days in length and a calf must be dropped within 400 days of the date the test was started.

Brown Swiss Classes

The Brown Swiss production records are classified according to age, no letters being used. The Brown Swiss Cattle Breeders Association sponsor three types of records.

1. Yearly records (365 days) with no calving requirements and no limit on the number of milkings permitted.
2. Ten months test with no limit on the number of milkings permitted, but requiring that a fully matured calf be produced within 14 months from the last calving date.
3. Farmers Class—This record must not be over 305 days, during which time the cow must not be milked more than twice daily. The cow must also produce a fully matured calf within 14 months from the last calving date.

THE BREEDER'S PROBLEM

Atavism

If every bull used in the herd, sired just the kind of offspring the breeder expected him to sire, the problem of improving dairy cattle would be very simple indeed. The master breeders of livestock have always met with many disappointments. The best planned matings do not produce, in every case, just the type of animal the breeders expected to result from such a mating. Poor offspring apparently from well-planned breeding programs, do not result from the use of the wrong system of breeding. Neither are they the outcome of some supernatural influence which, according to many superstitions, determine the characteristics of the offspring regardless of its actual inheritance. Variations from the expected result can usually be traced to atavism, and a word of explanation will show how this occurs.

Atavism may be defined as the appearance of characteristics in the offspring that were not observed in the parents, but which were evident in a grandparent, or some more remote ancestor. The common term applied to atavism is breeding back.

Atavism presents one of the most serious problems in the breeding of purebred dairy cattle. Many dairy farmers purchase bulls that have excellent type, and give promise of siring high producing cows, and yet these cows do not produce as well as many so-called scrubs and grade cows. Such an incident is entirely too common and causes many dairymen to consider lightly any additional value that may be claimed for registered purebred dairy cattle.

There is only one explanation for atavism or breeding back. If poor offspring result from the mating of two good animals, then somewhere back in the pedigree of those two animals there were low producing ancestors. The characteristics of low producing ancestors show up in dairy cattle just as black lambs appear in a flock of white sheep. An outstanding cow from poor parents is also a case of atavism. Every good grade cow has a high producing ancestor somewhere back in her pedigree. When such a case occurs, however, there is no complaint registered, and so breeders have come to regard atavism as breeding back to poor production.

Atavism could be avoided to a great extent if breeders would study carefully the records appearing in the production pedigree of the bull before making a selection. Additional breeding back can be avoided by culling carefully the herd to which the bull is mated. After a few generations of careful and constructive selection of the cows and the bull in the herd, there will be very little poor production to breed back to and the problem of atavism will no longer be a serious factor in herd improvement.

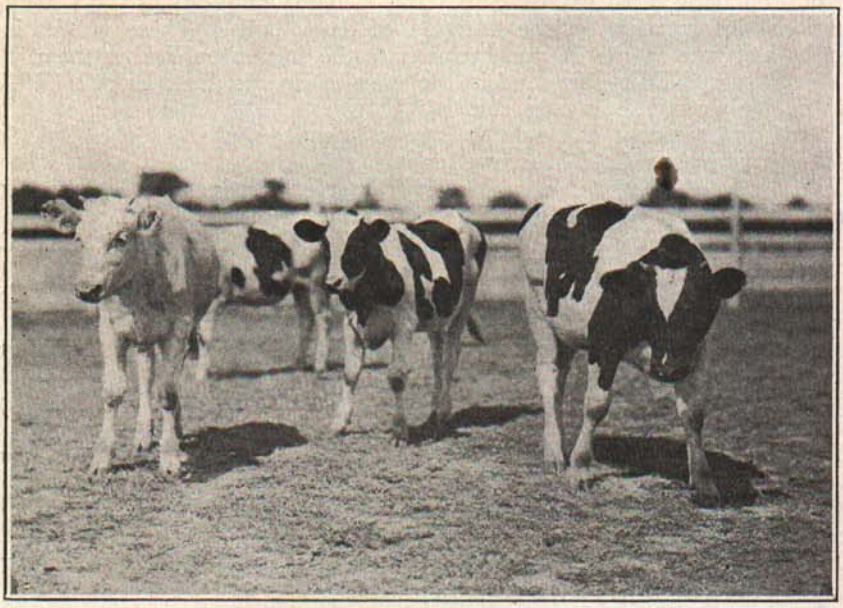


Fig. 8.—The future herd. A permanent policy of keeping a few good heifers, sired by the right kind of bull and out of the best cows, insures constant herd improvement.

Making the Selection

The selection of the herd sire is a real problem and the choice should not be made in haste. It is poor practice to delay the selection of the bull until he is needed and then go out and buy the first bull that is for sale. Good bulls that can be bought for a very reasonable price can be found quite often if a little time is spent in looking for them.

If in doubt as to just what to look for when selecting a herd sire, it will always pay to seek advice before buying. The services of the County Agricultural Agents, the Dairy Extension Specialists, and the representatives of the various dairy breed associations are at the disposal of the dairy farmers of the state. The breeding of dairy cattle is a long time proposition, and it is much more desirable and far less expensive to seek reliable information then it is to learn from experience.

Additional Sources of Information

Owners of purebred dairy cattle should keep in touch with the National Association of the breed they are interested in. The addresses of the major dairy breed associations in the United States are as follows:

Holstein-Friesian Association, Brattleboro, Vermont.

American Guernsey Cattle Club, Peterboro, New Hampshire.

American Jersey Cattle Club, 324 W. 23rd St., New York City.

Ayrshire Breeders' Association, Brandon, Vermont.

Brown Swiss Breeders' Association, Beloit, Wisconsin.

The following is a list of State and Federal publications that contain additional information on the selection of dairy bulls. These publications may be had free of charge upon request to the station publishing them.

The Purebred Dairy Sire and its Relation to Profits, Ext. Bul. 69 (1918) Purdue University, Lafayette, Ind.

Herd Improvement through the use of proved bulls. Idaho Bul. 163 (1929), Idaho Agr. Col., Moscow, Idaho.

The Mode of Inheritance of Yearly Butterfat Production, Missouri Research Bul. 112 (1929), Mo. Agr. Col., Columbia, Mo.

Selecting the Dairy Sire, Missouri Bul. 274 (1929), Mo. Agr. Col., Columbia, Mo.

Dairy Herd Sires, Iowa Extension Bul. 162 (1929), Iowa Agr. Col., Ames, Iowa.

Dairy Cattle Breeds, Farmers Bul. 1143, (1928), U. S. Dept. of Agri., Washington, D. C.

Better Cows from Better Sires. Dept. Circular 368 (1926), U. S. Dept. of Agr., Washington, D. C.

Purebred Dairy Sires, Leaflet No. 16, (1928), U. S. Dept. of Agri., Washington, D. C.

Utility Value of Purebred Livestock, Dept. Circular 235 (1926), U. S. Dept. of Agr., Washington, D. C.

Save the Herd Sire, Ext. Circular 238 (1930), Wisconsin Col. of Agr., Madison, Wis.