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Selecting a DAIRY HERD SIRE

By RUSSELL E. HORWOOD and G. S. McINTYRE

Outstanding cows are the results of good sires, such as pictured here.

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EAST LANSING

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SUMMARY

1. Select a sire that has a reasonable chance of maintaining or improving a 350-pound butterfat herd average or raising the average of a lower producing herd in which he is used.

2. A sire proved desirable is more likely to transmit the desired characteristics to his future offspring than an unproved sire. All strong, healthy, unproved sires should be selected on the basis of a thorough knowledge of their ancestry. This may be secured largely from the type and production records in a complete pedigree.

3. When one selects by pedigree, the production and type records on the parents and grandparents and their progeny, are of the utmost importance. Individuals three, four and five generations previous have little genetic influence on the offspring of the bull in question.

4. The dam of a sire contributes approximately 25 percent of the inheritance of her son. Consequently, her records should not be used as the sole basis of selecting a herd sire.

5. A knowledge of the terms used in a pedigree and their correct interpretation, is important in evaluating the transmitting ability of a sire.

6. Buying a scrub bull or getting one from a trucker or "bull jockey" will prove to be a most costly and unsatisfactory way of attempting to make progress in the dairy business.

Selecting a Dairy Herd Sire

By RUSSELL E. HORWOOD and G. S. McINTYRE

PURPOSE OF A DAIRY HERD

The basic purpose for keeping a dairy herd is to make money. The main sources of income from a dairy farm are from the sale of dairy products and from the sale of cattle. The major income on the greater percentage of Michigan dairy farms, however, is from the sale of milk products. This is increased somewhat by the sale of veal calves and butcher stock. On the other hand, a few Michigan farms have income from the sale of dairy breeding stock which exceeds that from dairy products. When considered on the percentage basis this group is relatively small. Despite the fact that the income from the sale of dairy breeding stock on many farms could be greatly increased, most dairymen are concerned in maintaining their herds chiefly through breeding their own stock. This offers a real challenge to the average dairyman.

To make money the dairyman must produce what the market demands in both products and livestock. The demands for these will vary widely among market areas, and there will be some variation within a given area. Consequently, the dairyman must study his market closely if his purpose is to be accomplished. In the marketing of livestock the prices will be greater for animals that have the essential characteristics of good type and possess good health. Animals with desirable type, on the average, will be more profitable producers, especially when viewed from the life-time standpoint. The sire should be selected with those purposes in mind.

With present information it is impossible to outline a method of selecting a sire that gives positive assurance of success. There are factors, however, that if followed will eliminate much of the chance of failure. The Bureau of Dairy Industry reports that approximately half of the sires selected for Dairy Herd Improvement Association herds decreased production when bred to cows that produced as much as 375 to 399 pounds of butterfat per year.

The majority of these sires were selected for use by better-than-average dairymen with some attention to the information that should aid in herd improvement. It is safe to assume, therefore, that bulls used on the mass cow population of the country, which averages only 180 pounds of butterfat per year, are not increasing production nor aiding in making the dairy business profitable.

It is the purpose of this publication to discuss methods that may be employed in selecting a herd sire that will give greater assurance of success in herd improvement in the future.

KNOW YOUR HERD

To select a sire that will aid in accomplishing the major purposes of a herd, a thorough knowledge of the herd must be available. If the herd is efficiently fulfilling its purposes it may be a case of selecting a sire that can at least maintain the herd. If, however, the herd is not in some manner fulfilling its purpose, the outstanding weaknesses should be observed and a sire selected that is strong in his inheritance to overcome those particular weaknesses. It may require several generations to accomplish this. A careful check should be made to determine that the prospective sire is not seriously weak in other characteristics.

KNOW YOUR BREED

To evaluate information properly, it is essential for the dairyman to know the production and type programs of the breed in which he is interested, as well as terms in general use by dairymen. Numerous terms and abbreviations are used to indicate important information. Some of the more important ones are listed below. Other terms may be obtained from publications by breeders' organizations, colleges, and the Bureau of Dairy Industry of the United States Department of Agriculture, as well as from meetings, conferences, and visits with other dairymen.

Terms

General Terms

1. Advanced Registry or A. R., within the Ayrshire, Guernsey and Holstein breeds, Record of Production, or R. P., within the Brown Swiss and Register of Merit, or R. M., within the Jersey breed are the terms used to indicate official records made on individual cows selected within a herd. The cows are generally carefully selected for testing, with consideration given to time of freshening, health condition, age, available feed supply and other factors to be advantageous in securing the highest records.

2. Herd Improvement Registry, or H. I. R., is an official plan of the dairy breed associations for keeping production records on all the cows with certain minor exceptions within a herd. Its main purposes are for herd and breed improvement and for advertising.

3. The Dairy Herd Improvement Association, or D. H. I. A., is an unofficial plan of keeping production records on all the cows in a

grade or pure-bred herd. Its main function is to secure information for herd improvement.

4. A Mature Equivalent, or M. E., refers to records that, through the use of certain factors, are computed to a mature basis from records made by immature cows. In general a two-year-old record is considered to be 70 percent of the mature equivalent, a three-year-old 80 percent, and a four-year-old 90 percent. The number of milkings and the length of the record should be indicated.

5. Number of Milkings:
   "2 x" indicates twice a day milkings
   "3 x" indicates three times a day milkings
   "4 x" indicates four times a day milkings

6. A Proved Sire is one in D. H. I. A. that has a minimum of five unselected daughters with records and whose dams have records. A comparison of one daughter's record with that of her dam is often referred to as a "daughter-dam" pair. The proof must include all the daughters with records with a minimum of five unselected daughters with records whose dams have records. The records are computed to a twice-a-day 305-day mature equivalent basis. It must be realized that a proved sire may be found to transmit low production as well as high or medium. It must also be remembered that the feeding and management of the daughters and the dams are important factors. The dairy breed associations have programs that are somewhat similar for proving a sire.

7. The Sire Index is a numerical evaluation of a sire's transmitting ability. It is based on the average production of the bulls' daughters and their dams. It is considered that the sire and the dam make equal contribution to the offspring. Thus the daughters' average production records should be midway between the average production of the dams and the inherent ability of the sire for production.

8. The term Brood Cow should refer to a cow with a minimum of two daughters with records or two sons with five daughters each with records, or a combination of a daughter with a record and a son with five daughters with records. This term is not necessarily an indication of merit.

9. The term Pedigree as used here refers to maternal and paternal listing of ancestry by generations. It usually shows certain data regarding each animal and its offspring in the pedigree such as production, classification, show and sales records.

10. Type Classification is a program of the breed associations in which an official type rating is placed on animals in a herd. The classification is carried on by men designated as official classifying judges. They are selected and appointed by the breed associations. This program is carried on by the Ayrshire, Brown Swiss, Holstein and Jersey breeds. The classifying judge places an animal in one of six classes as follows, on the basis of his evaluation of its type:

CLASS	ABBREVIATION	AYRSHIRE	BROWN SWISS	HOLSTEIN	JERSEY
		Score	*Score*	*Score*	*Score*
Excellent...	E.....	90 to 100	90 to 100	90 to 100	90 to 100
Very Good.	V. G.....	85 to 90	85 to 90	85 to 90	85 to 90
Good Plus..	G. P.....	80 to 85	80 to 85	80 to 85	80 to 85
Good.....	G.....	75 to 80	70 to 80	70 to 80	75 to 80
Fair.....	F.....	70 to 75	60 to 70	60 to 70	70 to 75
Poor.....	P.....	Below 70	Below 60	Below 60	Below 70

Scores for a herd or daughters of a bull may be averaged to indicate the type for a group of animals.

GENERAL PLAN OF USING SIRES

Dairymen generally use a sire only two to three years. Longer use would result in the keeping of two bulls or in breeding a sire to his own offspring, neither of which is generally practical in the average herd. This indicates that a dairyman will select several sires during his lifetime. Likewise, this indicates that the number of sires selected annually in Michigan runs into the thousands. This number is being reduced somewhat by the development of artificial insemination associations. The success of the individual herd owner depends to a major extent upon his ability to select sires which carry inheritance that will improve the average production of a lower producing herd or maintain the production level of such creditable herds and cows as average 350 or more pounds of butterfat per cow each year. Similar attention must also be given to the type which the sire will transmit to his offspring.

FACTORS TO USE IN SIRE SELECTION

In selecting the dairy sire attention should be given to three factors: (I) progeny, (II) pedigree, (III) type.

I. Progeny

1. *Production*

The progeny is the best guide as to what a sire will transmit in the way of type and production. The offspring must be carefully studied and certain obstacles in his use recognized. A study of sires proved in Dairy Herd Improvement Associations shows that approximately two-thirds increased or maintained production, and one-third decreased production. The differences found between proved bulls are indicated in Tables 1, 2 and 3, which are taken from United States Department of Agriculture Miscellaneous Publication 547.

TABLE 1—*A bull proved highly creditable*

Lakefield King Ventnor Fobes 732743				
15 daughters	16 records	16685 pounds of milk	3.5%	590 pounds of butterfat
14 daughters	15 records	17000 pounds of milk	3.5%	601 pounds of butterfat
14 dams	39 records	14907 pounds of milk	3.4%	504 pounds of butterfat
Diff. (6-8-7)		+2093 pounds of milk	+.1%	+97 pounds of butterfat

Table 1 shows the proof of Lakefield King Ventnor Fobes 732743. There are 15 daughters with 16 lactation records. Only 14 daughters, however, have dams with records. The figures, 6-8-7, indicate that six daughters exceeded their dams in milk production, eight exceeded their dams in percent fat and seven in pounds of butterfat. It may be seen by the performance of his daughters that he has transmitted high production to them. Even though their dams were high producers, the mating of this bull with them gave his daughters the ability to produce 2,093 pounds more milk and 97 pounds more butterfat per year, and raised their average test .1 percent.

The bull in Table 2 is also proved. He was bred to only fair-producing cows, and the daughters actually produced 1,107 pounds less milk

TABLE 2—*A bull proved undesirable*

Wisconsin Mystic Ormsby King 720871				
14 daughters	20 records	7988 pounds of milk	3.3%	260 pounds of butterfat
11 daughters	16 records	7904 pounds of milk	3.2%	254 pounds of butterfat
11 dams	31 records	9011 pounds of milk	3.4%	310 pounds of butterfat
Diff. (4-1-4)		−1107 pounds of milk	−.2%	−56 pounds of butterfat

and 56 pounds less butterfat than their dams. The daughters' production indicates that this bull does not have the ability to transmit even a fair level of production to his progeny. It may be noted that four of the daughters exceeded their dams in milk, one in percentage of butterfat and four in pounds of butterfat. He has *proved* to be *undesirable* even in a low-producing herd. This shows that the term *PROVED SIRE* is not necessarily a term indicating merit. It means only that he has five or more unselected daughters with records which may be compared with the records of their dams.

TABLE 3—*A bull with questionable proof that needs careful analysis*

Sir Posch Senatara Ellen 741862				
8 daughters	9 records	10772 pounds of milk	3.5%	377 pounds of butterfat
8 dams	27 records	11514 pounds of milk	3.4%	390 pounds of butterfat
Diff. (3-5-4)		−742 pounds of milk	+.1%	−13 pounds of butterfat

Table 3 presents the information on the proved sire Sir Posch Senatara Ellen 741862. The production records of his daughters are slightly below the records of their dams. He was bred to dams of fairly high-production, and his daughters did not quite maintain that average.

Fig. 1. Three Guernsey daughters of the brood cow Michigan Bell Buoy's Belle 610972. Her 2-, 3-, and 4-year-old lactation records average 296 days in length, 8229 pounds of milk, 4.8 percent butterfat, and 401 pounds of butterfat. The daughter on the left has 2- and 3-year-old records averaging 286 days in length, 6124 pounds of milk, 4.6 percent test, and 284.5 pounds of butterfat. The next daughter has a 2-year-old record of 353 days, 9723 pounds of milk, 5.1-percent butterfat, and 495 pounds of butterfat. The daughter on the right has 2-, 3-, and 4-year-old records which average 297 days, 8559 pounds of milk, 4.5-percent butterfat, and 388 pounds of butterfat. These three daughters indicate to a degree the inheritance for type and production transmitted by the dam.

However, had he been bred to the dams in Table 2, he would likely have increased the production of their daughters. Had he been bred to the dams in Table 1, it is also quite evident the daughters would have produced less than their dams. A variation, however, of less than 25 pounds of butterfat by the daughters from their dams, probably has very little significance.

It is well to remember that, on the average, one-half of the inheritance of the offspring of a bull comes from his sire and one-half comes from his dam. In certain instances one parent transmits much more than this of some characteristics such as butterfat test to the progeny. This may also apply to a group of animals, such as the dams to which a sire may be mated. Thus a sire may be transmitting production to his offspring to a greater or less extent than the proof or index indicates.

Thus, the record of a proved sire may be used to indicate the level of production he is likely to transmit. Even so, however, the production of daughters of a bull proved in one herd may not always follow the same pattern in another herd.

2. *Factors Affecting Proof of Sires*

Several factors may affect the proof of sires. These factors should be checked carefully in evaluating the transmitting abilities of such bulls. Generally the greater the number of daughter-dam comparisons the more accurately the records indicate the level of transmitting ability of the sire. A check should be made to determine that all tested daughters from tested dams are included. Likewise it is generally considered that the larger the number of records on each daughter and dam the more accurate the interpretation will be. The percentage of butterfat should not vary widely from the breed average. The feeding and herd management under which the records of both the dams and daughters are made has a definite bearing on the level of production. Under poor herd management good inheritance has little chance to express itself.

The age or maturity of both daughters and dams when tested may have a bearing on the accuracy of the proof. If the records on the daughters are made when the animals are two or three years old and they have matured quickly, their mature equivalent records will be higher than their actual records at maturity. This would be unduly favorable to the sire. Slow-maturing daughters would have the opposite effect on the proof. The early or more slow maturity of the dams will also affect the accuracy of the proof but in an opposite manner to that of the daughters.

The length of the interval between calves and the age of freshening for the daughters or for their dams, if abnormal, may result in a proof that is unduly favorable or unfavorable to the sire.

In case two bulls are approximately equal the one with the more desirable pedigree should be selected.

3. *Factors Other Than Production*

It is important to study the type of the progeny of a proved bull and make comparisons with the type of their dams. The size, shape, attachment, and quality of udders, the size of the animals, their ruggedness, strength of legs, and general conformity to breed type will have a bearing on the length of productive life of the animals. These factors will reflect upon the returns from the sale of products and surplus cattle. The type of the bull himself may not be of major importance outside his own sale value if he is strong physically.

In addition, consideration should be given to disease, breeding efficiency, age, price, disposition, and facilities available for handling a bull of this age.

4. *Selecting Bulls with a Common Ancestry*

More uniformity in type and production may be expected where a succession of bulls are used with some common ancestry in the first three generations of their pedigrees. In this manner the characteristics common to the ancestry will be intensified. This will be equally true for both desirable and undesirable characteristics. Faster progress may be made using this plan if great care is exercised in selecting bulls with ancestry that are free from serious defects. This is also true in selecting unproved bulls.

5. *Proved Sires Scarce*

A total of 1,283 bulls have been proved in Dairy Herd Improvement Associations in Michigan. In addition, a limited number have been proved in the breed herd tests programs. Many of these were dead or infertile when proved. Others sired low production or other undesirable characteristics. Thus dairymen are faced with the fact that there are only a very limited number of desirable proved bulls available. The use of such bulls has been limited by the price, the age, health, danger, lack of facilities for housing, lower fertility and uncertainty for further breeding purposes. The services of some of the better proved bulls are being extended by artificial breeding. However, according to the Bureau of Dairy Industry, only 23 percent of the bulls used in cooperative artificial breeding associations throughout the country are proved. This leaves thousands of herds that must secure their inheritance from unproved bulls.

More desirable proved bulls could be made available if a greater number of herds were production tested, and if dairymen with well bred cattle would place their bull calves with dairymen who would agree to test the bull's progeny.

Fig. 2. These Jersey heifers provided a partial proof on their sire, Fawvic Knight's Prince 263969, early in his life. At a later date 24 daughters averaged 12869 pounds of milk, 5.2 percent fat, and 666 pounds of butterfat (mature equivalent). His 11 classified daughters averaged a score of 82.5 points. At least 16 sons were sold for service from one herd and at least three were proved, by production and type records, to be desirable.

6. *Partially Proved Bulls*

In many cases bulls may be found which do not have a sufficient number of daughters with records to be proved, or which have daughters out of untested dams. These sires may have equal or superior inheritance and transmitting ability to that of available proved sires, but such evidence is not yet complete. Because a bull is not entirely proved is no reason to eliminate him from consideration as a possible herd sire.

Should a partially proved bull be found that has demonstrated to a degree that he is transmitting the desired inheritance for type and production, his use will give more assurance of success than would the use of a young untried sire.

II. The Pedigree

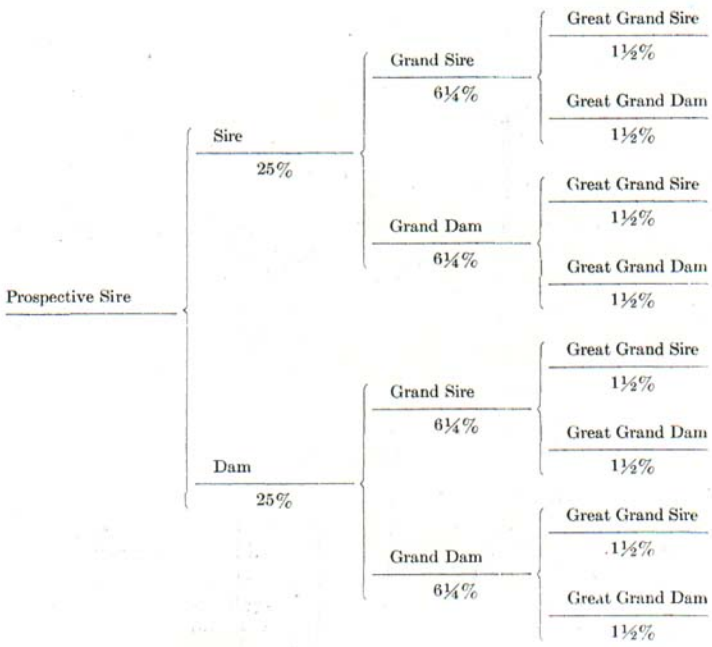
1. *Selecting the Unproved Bull*

Galton's Law states that one-half of the inheritance of an animal comes from the sire and dam that make up the first generation, one-quarter from the grandsires and granddams in the second, and one-eighth from the great-grandsires and great-granddams that make up the third generation. This accounts for 87.5 percent of the total inheritance. This law further indicates that each animal in the first generation is responsible for 25 percent or one-fourth of the inheritance

of its offspring, in the second 6¼ percent or one-sixteenth, and in the third generation 1½ percent or one sixty-fourth. Thus, in general each animal in a pedigree may be considered to have equal transmitting ability to its immediate offspring; however, this influence becomes decreasingly less in more distant generations. In most cases it is not necessary to give serious consideration to animals beyond the third generation, or the great-grandparents in the pedigree (see chart I). In individual cases it has been found that certain animals do exert a greater influence on their offspring than is indicated. However, one generally should not depend entirely on the influence of one animal.

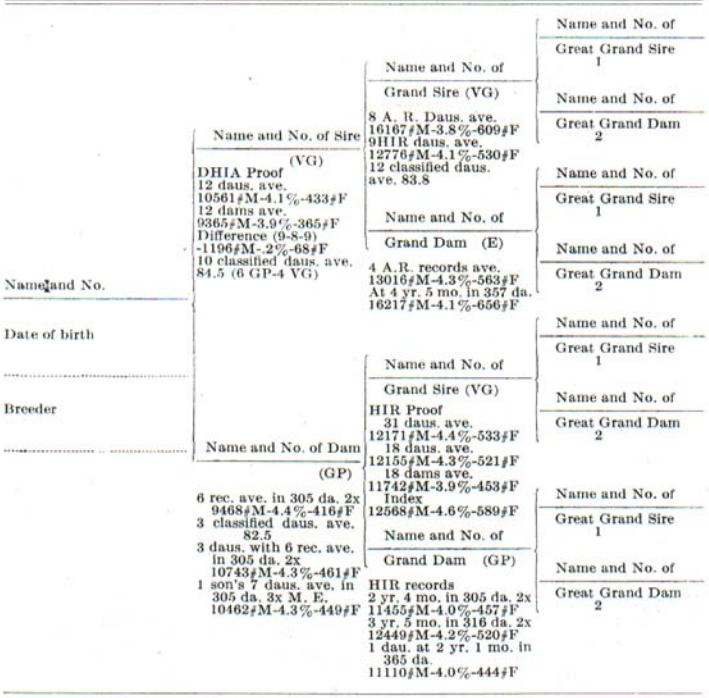
The pedigree of a prospective sire should contain the information by which his inheritance may be evaluated. Chart II shows a pedigree

CHART I—*Pedigree indicating Galton's Law*



1st generation 50%, 2nd generation 25%, 3rd generation 12¼%.

CHART II—*Sample pedigree indicating information desired in evaluating a sire*



1. Similar type of information desired as found under sire and grand sires.
2. Similar type of information desired as found under dam and grand dams.
3. Explanation of terms not previously mentioned:
   (a) M following a figure indicates milk.
   (b) F following a figure indicates butterfat.
   (c) Daus. is the abbreviation for daughters.
   (d) Letters in parentheses indicate type classification as explained on page 8.

containing such information. The manner in which the information is presented will vary somewhat with the breed.

2. *Pure and Mixed Inheritance*

Most animals transmit desirable characters to a certain percentage of their offspring. In some instances, desirable characteristics may be transmitted to a high degree; in others moderate, and in still others to only a very limited extent. Animals that uniformly transmit to their offspring a character or group of characters, as large size, firmly

attached udders or high butterfat test, are said to be homozygous or pure in their inheritance for that character or group of characters. An animal likewise may be pure in its inheritance for undesirable characters. On the other hand, the animals that transmit a character or group of characters to only a limited extent are spoken of as heterozygous or mixed in their inheritance. The offspring from heterozygous animals will lack the uniformity of production and type that is essential to improve the herd although certain individual offspring may be most outstanding. It cannot be generally expected that these outstanding animals will transmit their type and production to their offspring. Thus the production or type of such animals is of little value in indicating what their offspring will be like.

It is important in selecting an unproved bull to study his ancestors to determine his likelihood of transmitting the desired characters uniformly to his offspring or within a narrow range. This can be determined much more accurately from the performance of the progeny of the animals in the pedigree than from the type and production of the animals themselves. A minimum of five unselected daughters of a

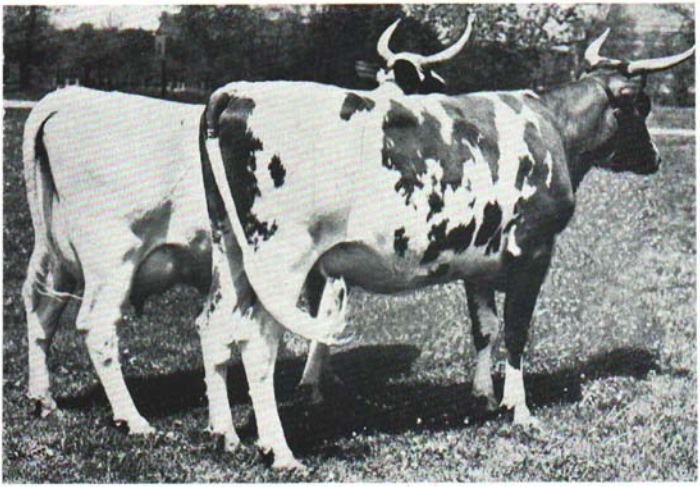


Fig. 3. Michigan Lindy Lady 218918 is the Ayrshire dam of these two animals. She was classified as "Good Plus". The average for her three lactations is 239 days in length, 6961 pounds of milk, 4.0 percent butterfat, and 277 pounds of butterfat. Her one daughter in production classified "Good Plus" and produced as a two-year-old in 305 days 9811 pounds of milk, 4.3 percent butterfat, and 417 pounds of butterfat. This limited information gives an indication that this dam transmitted greater production than she possessed.

Fig. 4. Modesty's Oxford Majesty 194626, a Jersey tested sire (one with 10 or more daughters with records). He has 24 daughters that averaged 10881 pounds of butterfat, 5.5 percent butterfat, and 593 pounds of butterfat (mature equivalent) to indicate his transmitting ability.

sire with type and production records from dams with similar information or 10 unselected daughters with type and production records will furnish the minimum basis for evaluating the transmitting ability of a sire for production and type. The transmitting ability of a dam in the pedigree is more difficult to evaluate than a sire, because of the limited number of her offspring. The production and type rating on one or more of her daughters will be helpful. In a similar manner the production and type data on her sons' female offspring will furnish valuable information. Likewise a combination of daughters and sons with daughters would be equally valuable. Owing to the limited number of dams with progeny with records it will often be necessary to use the records of the dam's half sisters along with their own production and type record in evaluating her inheritance. In general, the greater the number of offspring with records the more accurately the inheritance may be appraised. This information in many cases, however, will not be available, especially in regard to the female.

3. *Son of Proved Sire*

In accordance with the principles of Galton's Law, it is advisable when selecting an unproved bull to select the son of a *sire proved desirable*. In this case, records on the daughters of the sire of the bull selected

are given the most consideration. They are sisters or half sisters to the bull in question and bear the closest relationship to him. Thus one may judge the prospective sire by their performance. Genetically both sons and daughters inherit the same general level of production and type from their sire. Although it may not always be true, it may be assumed that the level of production a young bull genetically carries is within the production range of his half sisters.

Not many animals will be found that have all the information indicated in Chart II. Thus breeders will of necessity select sires with less information available regarding them. Such bulls may be sired by desirable proved bulls and come from cows with one or more creditable records who in turn are sired by good proved bulls. The more desirable the information the more assurance the breeder will have that the offspring will be like their ancestors.

Table 4 illustrates the need for considering records of more than one daughter of a bull. In fact it is important to consider the range and the level of production and type for all the daughters. In this table are two sets of five half sisters shown with their butterfat production. In each case four show uniform production, while one does not. Number 3 daughter of Sire A has a much higher record than her half sisters, while Number 4 of Sire B is much lower than her half sisters.

The individual records of these two daughters are not so important as the average of all the records of the half sisters. Their individual

Fig. 5. Michigan Cascade Carol 1693522, who is considered a good Holstein brood cow, and her three daughters. In addition she has produced one daughter, not shown, with four records that averaged 516 pounds of butterfat and a classification rating of "Good". The oldest daughter shown has three records that averaged 458 pounds of fat and classified "Very Good". The next daughter has an incomplete record of 13021 pounds of milk, 3.6 percent, 473 pounds of fat in 339 days as a two-year-old. She has not been classified officially. Two male offspring have also been used in three herds. The brood cow has seven H. I. R. records that average 518 pounds of fat, and she is classified "Very Good".

Fig. 6. Michigan Charming Lottie 55906 is the dam of these four Brown Swiss animals. She has six consecutive lactation records, starting at two years, that average in 302 days, 12362 pounds of milk, 4.5 percent butterfat, and 541 pounds of fat. The two classified daughters average "Good Plus". These same daughters have two records made at two years of age that average 365 days in length, 11501 pounds of milk, 4.2 percent butterfat, and 488 pounds of fat. They are maintaining the high level of production of their dam.

records merely indicate their ability to produce, while they probably have about the same genetic makeup as their half sisters. The variation that does exist in their inheritance comes largely from the dams. It is likely that they would transmit to their offspring a level of production similar to the average of their half sisters. A bull selected from Number 4 daughter of Sire B would likely transmit higher production to his offspring than a bull selected from the Number 3 daughter of Sire A. Likewise a bull sired by A or B would inherit from his sire approximately the average production of his half sisters. This indicates the importance of studying complete progeny records.

TABLE 4—*Production records of daughters of two sires**

Daughters of Sire A	Butterfat Production	Daughters of Sire B	Butterfat Production
1	275 pounds	1	408 pounds
2	305 pounds	2	425 pounds
3	450 pounds	3	415 pounds
4	301 pounds	4	300 pounds
5	290 pounds	5	450 pounds
Average	324 pounds	Average	399 pounds

*Mature equivalent records.

4. *Interpretation of Records*

The proper interpretation of records is essential to evaluate correctly an animal's inheritance. Since a lack of uniformity exists in reporting records, it is necessary to know the basis on which the reported records were made, and to have a knowledge of the differences between different types of records. Dairy Herd Improvement Association records are usually lactation records of 305 days in length made on twice-a-day milking. Herd Improvement Registry records are usually reported for one lactation. Some breed associations report them on the actual number of days on test (not to exceed 365 days), with the number of milkings indicated. Others report only the first 305 days of the lactation. The records of daughters of a sire and their dams are frequently computed to maturity, while the records of the females' parents in the pedigree are usually actual. Some breed associations use letters to indicate ages of animals, number of days in calf during

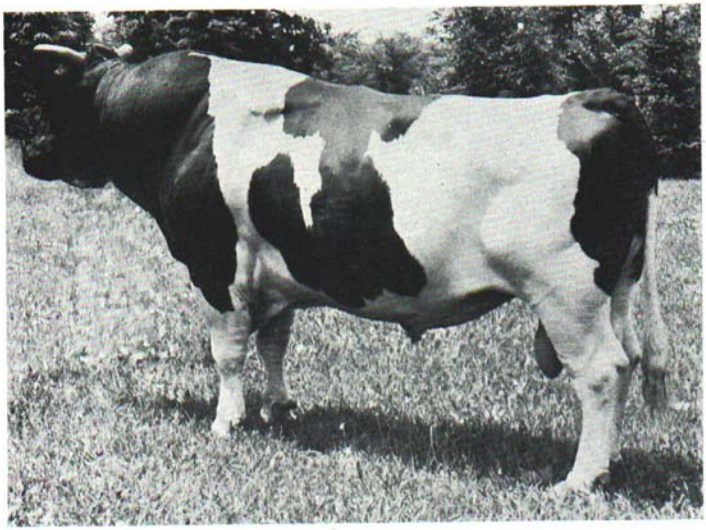


Fig. 7. Prilly Sensation 666430 (V. G.), a Holstein sire, has the following Dairy Herd Improvement Association Proof: Five daughters, with eight records, average 12233 pounds of milk, 3.6 percent butterfat, and 445 pounds of butterfat. Five dams with seven records average 11564 pounds of milk, 3.7 percent fat, and 425 pounds of butterfat. In addition, 16 daughters have an average classification score of 80 points. He is the sire of the young bull shown in Fig. 8.

Fig. 8. Michigan Prilly Cascade 892844 is considered a good prospective young Holstein bull. His sire, Prilly Sensation (see Fig. 7), has proven to be a sire of desirable production and type. The dam, Michigan Cascade Carol 1693522 (V. G.) is the brood cow shown in Fig. 5. The entire pedigree of this young bull indicates that he carries the inheritance for desirable production and type which he should transmit to his offspring.

the lactating period and number of times milked per day. There is a tendency toward the greater use of 2x 305 day records either in actual or mature equivalent form.

The number of times a cow is milked per day has a great influence on the record. Other conditions being the same, three time milking will increase the production an average of 15 to 20 percent over two time milking and four time milking will be 5 percent higher than three times. The age of the animal also has an important bearing on the level of production. In general a two-year-old may be considered 70 percent, a three-year-old 80 percent and a four-year-old 90 percent as productive as at maturity. This will vary with individual animals and with breeds. Mature equivalent factors based on the study of many records may be secured from the publications of the five major dairy breed associations and the Bureau of Dairying of the United States Department of Agriculture. Records usually increase until the animal is 5 to 8 years of age and then may slowly decrease.

There is a tendency to place only desirable records on a pedigree. Inheritance or probable transmitting ability can usually be determined most accurately from all the records of all animals and their progeny in the pedigree.

III. The Type

The type or appearance of a cow is not a true indication of her production. The type classification of cows of the several breeds does indicate in general that those classifying in the upper brackets are the higher producers. It seems reasonable to expect that even a greater correlation might be observed in lifetime production. Studies made by Copeland on Jersey cattle show a reasonable correlation between the type of cows and the production of their offspring. Such a correlation was not indicated when the type of the sire was compared with the production of his offspring. This would indicate that the type of a prospective sire would alone be of little value in selecting a sire. When sires are selected only on their individual type they are likely to lead to disappointment.

GREATEST IMPROVEMENT IN LOW-PRODUCING HERDS

The statement is often made that a herd of scrub cows does not warrant the use of a purebred bull from production-tested ancestors. Such a statement can be challenged. Scrub herds or herds of low inheritance for production can expect the greatest improvement provided a sire, well selected for production and type, is used. The dairymen with a herd that will average 350 or more pounds of butterfat may have much more difficulty maintaining that level of production than the one with a 200-pound butterfat herd average will have in increasing it with the help of well selected bulls.

The average production of cows in Michigan is approximately 205 pounds of butterfat per year. Thus, approximately one-half of the cows are producing less than this. Unless cows are tested, there is no accurate way of telling which ones fall below the average and which ones produce more than the average. Buying a scrub bull or one from untested ancestors is like reaching blind-folded into a grab bag for a prize. Likewise, accepting one to keep for its use for a period of one or two years from a trucker or "bull jockey" who *has not* selected bulls according to the principles outlined in this bulletin, benefits only the man who loans the bulls. The great majority of these bulls are scrubs from the standpoint of transmitting desirable production and type. During the year or more that a farmer keeps them, they frequently double in size, and increase in value per hundredweight. This makes a lucrative business for the trucker or "bull jockey," but is often a sure road to disaster for the dairyman.

The chances are very great that such a bull will not transmit more than the average of all cows, and there is a 50-50 chance he may transmit less. Since production is the key factor in determining whether a

cow returns a profit, it is highly important that a dairyman use a herd sire that shows every indication of having the ability to transmit production that is higher than the herd he is to be used in for herds below a 350-pound butterfat average and, at least, to maintain this production in herds above that level. For reasonable assurance of success, the factors that are desired in the herd should be found to predominate in the first three generations of the sire that is selected.

WHERE INFORMATION MAY BE FOUND

It is important to know where records of production and classification may be found. The Bureau of Dairy Industry and the dairy breed associations publish these records.

The sires proved in Dairy Herd Improvement Associations are published monthly in mimeographed form. At the end of the year these are combined into printed form by the Bureau of Dairy Industry, U. S. D. A. A copy is available at all county agricultural agents' offices.

The records of purebred cattle made under the supervision of the national breed associations are published currently in the official breed publications and later in their established systems of publishing records. These records may be obtained by subscribing to the particular breed publication, purchase of the type and performance records from the national breed association, purchase of pedigrees from the national breed association or pedigree companies, and by request to the national breed secretary.

NATIONAL BREED ASSOCIATIONS

The Ayrshire Breeders Association, Brandon, Vt.
The Brown Swiss Cattle Breeders Association, Beloit, Wis.
The American Guernsey Cattle Club, Peterboro, N. H.
The Holstein-Friesian Association of America, Brattleboro, Vt.
The American Jersey Cattle Club, 324 W. 23rd St., New York 11, N. Y.
The American Dairy Cattle Club, 33 North LaSalle St., Chicago 2, Ill.
The Purebred Dairy Cattle Association, Port Chester, N. Y.