DAIRY CATTLE IMPROVEMENT OVERSEAS

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SUMMARY

The improvement of dairy cattle in some overseas countries is described and discussed under the headings of herd recording, progeny testing, and artificial breeding.

DURING a recent study trip overseas the writer had the opportunity of examining systems of herd recording, progeny testing and artificial breeding in several countries. This paper describes these services and discusses certain aspects of them.

HERD RECORDING

An essential pre-requisite of dairy cattle improvement, the herd recording systems in operation in different countries play an important part in determining progeny testing systems and selection methods.

The basis of practically all herd recording systems is the determination of the milk yield, butterfat percentage, and butterfat yield of individual cows. However, there is increasing interest in the recording of protein percentage and protein yields, though apart from the Netherlands where the protein percentage is obtained for nearly half the recorded cows, this has not proceeded past the pilot scheme stage. Production is normally recorded for the whole of the natural lactation, but when the data are used for comparative purposes, such as progeny testing, production recorded after a certain lactation length, generally the 305th day, is excluded.

In addition to recording the yield of milk and butterfat, the recording organizations in several countries also record data on the food consumption and chest girth of recorded cows. These data are used to assist the farmer with his herd management, particularly as a basis for advice on feeding practices. The size of the cow, as assessed from chest girth measurements, is taken into consideration in some countries in fixing production standards for entry into herd books.

Several aspects of the various herd recording services influence the system of progeny testing used, and the success of artificial breeding as a means of dairy cattle improvement:

(1) The proportion of the dairy cow population which is recorded.
(2) The average size of recorded herds.
(3) Whether or not records made under owner sampling systems are accepted for progeny testing.
(4) The facilities for assembling production records at a central office for use for research and progeny testing.

In the United States, herd recording is under the overall control of the Department of Agriculture which has a central records office in Washington. In the field, Herd Improvement Co-operatives and the State College of Agriculture usually organize the service and prepare the farmers' returns.

Two main systems of recording are offered, the D.H.I.A. test and the Owner Sampler test. Both are based on monthly milk weighings and samplings but only records compiled under the D.H.I.A. system are recognized for purposes such as progeny testing.

The overall level of recording in the U.S.A. is low, less than 10% of the national herd being recorded. There is, however, considerable variation from state to state. In New York State, for example, over 20% of the dairy cows are recorded. Nevertheless, it appears that the comparatively low level of recording nationally is an important factor in limiting the number of bulls which can be adequately progeny tested.

Herd recording in the United Kingdom operates under completely centralized control, being carried out in England and Wales by the Milk Marketing Board and in Scotland by the Scottish Milk Records Association. This centralization of control is in marked contrast to the position in most European countries and from a dairy cattle improvement point of view appears to have distinct advantages. This is particularly so in England and Wales where the same organization operates both the milk recording service and the major artificial breeding service. Information required for progeny testing can be sent to the central office with the minimum of delay, while little difficulty is experienced in obtaining extra information, not normally calculated, such as part-lactation records.

Approximately 35% of the dairy cattle in England and Wales are recorded, 25% under the National Milk Records Scheme (N.M.R.) and 10% under the Private Milk Records Scheme

(P.M.R.). Under this latter scheme all weighings are made by the herd owner and butterfat testing is not carried out.

Records made under the P.M.R. scheme are not used for progeny testing and this is of considerable significance to the artificial insemination (A.I.) movement. Over 90% of the members of the P.M.R. scheme are also A.I. users, whereas only 30% of N.M.R. members use A.I. Thus, while the overall level of recording is relatively high, there are a lot of data on the milk yields of daughters of A.I. bulls which are not being utilized. The possibility of using records of this type for progeny testing A.I. bulls is at present being examined. There do not appear to be any real grounds for not using them for this purpose.

The herd recording services in the countries of continental Europe are characterized by three major factors which influence methods of dairy cattle improvement.

(1) The multiplicity of small local recording societies, and the relatively large amount of control at the local level.
(2) With the notable exception of France, the generally high level of recording.
(3) The low average size of recorded herds, which in most countries is about ten cows.

Milk and butterfat yields are calculated from milk weights and samples taken at intervals of not more than one month and in some cases more frequently. Owner sampling systems of recording are in operation in Sweden and Denmark but are not widely used and the records are not used for progeny testing purposes.

PROGENY TESTING

Methods of progeny testing fall into one or other of two broad categories.

(1) The use of progeny testing stations at which groups of daughters of different bulls are milked under standard conditions.
(2) The use of field records with or without attempts to allow for environmental differences in the field.

The progeny testing station approach, which is used mainly in Denmark, is the principal means of progeny testing bulls in that country. It has been criticized because of the low repeatability of the station results in the field. A further criticism would be that the number of bulls which can be tested is limited by the number of testing stations. In Denmark there are 34 testing stations, each of which has facilities for testing three bulls per year on the performance of 20 first calving daughters.

A large amount of data are recorded at these stations and include, besides the yields of milk and butterfat, data on feed intake, liveweight gain and milking characteristics. The recording of such data is simplified when animals are gathered at a testing station and it is only under these conditions that objective information is available on these points.

Progeny testing methods based on field records vary considerably according to circumstances in the individual countries.

The daughter-average method which shows the average production of a bull's daughters, without comparison with dams or herd mates, is still in use in the United States, the Netherlands and some of the smaller dairying countries. When used to compare bulls which have daughters scattered in many herds it can provide useful information. Under other conditions its value is limited by the effects of environment in causing differences between daughter averages. Consequently this system is used mainly where facilities are not available for collecting the data required for comparisons with dams or herd mates or where the publicity value of a high daughter average is important.

The daughter-dam comparison has in the past been the major system of progeny testing throughout the world and is still widely used. The comparison is made by using records made at the same age or by the use of age-corrected records. It can be criticized, as it was in this country when used, because of the emphasis on the relationship of the animals compared, rather than the uniformity of their environment. In practice this may not be so important in European countries, as it was found to be in New Zealand, owing to the idividual feeding of cattle on fairly standardized rations. Nevertheless, it is recognized as a weakness of the method and in some countries the records of daughters and dams are expressed as percentages of the local recording association average, in an endeavour to overcome this weakness.

The deficiencies of the daughter average method and the daughter-dam comparison have led to the introduction of the method of comparing daughters with herd mates, as used in New Zealand.

The fundamental principle of this method is the elimination of environmental effects by comparing daughter records with the records of animals milked under the same environment. In European countries where the average herd size is small, the comparison may be made with animals in the same district, instead of with herd mates.

The simplest form of the method is the contemporary comparison used in Great Britain. This is a within-herd-year comparison of heifer records, weighted according to the number of daughters and contemporaries in each herd. In other countries the records of older daughters and herd mates are also included and the comparison is made with an expected level of production for each age group or by the use of age-corrected records.

Refinements to the method are used in some countries with the object of increasing the accuracy of assessment or reducing the age at which a bull is first tested. These include the correction of all records to a standard lactation length, allowance for the genetic portion of differences between herd production levels, correction for number of daughters and the use of part-lactation records. The British "contemporary comparison" when adjusted for daughter numbers and genetic differences between herd production levels, becomes the "relative breeding value" (R.B.V.) with the sire's estimated breeding merit expressed as a percentage figure, 100 being average. Part-lactation records are now being used in England and Wales and Western Germany (180 day and 100 day).

The "contemporary comparison" and the "relative breeding value" provide an interesting illustration of the difficulty sometimes experienced in gaining acceptance of progeny testing methods among the farming community. The relative breeding value is an abstract term and therefore not as easily interpreted as the contemporary comparison. There was considerable opposition among British farmers to the R.B.V. method when it was first introduced, which resulted in the later introduction of the basically similar "contemporary comparison" which was much more readily accepted.

In some countries there are a number of different organizations carrying out progeny tests and using a variety of methods. This is the position in the United States where, in addition to the Department of Agriculture, progeny tests are published by some of the State Colleges of Agriculture, the various breed societies, and many A.I. centres. This has probably been the reason for the continued use of the daughter average and the daughter dam comparison in many parts of the country.

ARTIFICIAL BREEDING

As in New Zealand, there has been a rapid expansion of artificial breeding in many overseas countries. Consequently, genetic improvement of dairy cattle depends to an ever increasing extent on the policy of the organizations controlling artificial

breeding services. In most cases the service is based on the principle of increasing the use of progeny tested bulls. There are, however, considerable differences in the types of organization which have developed.

The United States is a notable example of the growth of different types. In this country there are at least 50 individual artificial breeding services, some privately owned but mostly co-operative, operating independently of one another. Under these conditions there is, of course, no uniform policy on questions of dairy cattle improvement but the approach used is, in general, similar. The emphasis in most of these organizations is on the use of proven bulls selected on the performance of naturally bred daughters.

The principle of proving young bulls in the artificial breeding service has also been adopted by many of the co-operatives and has been developed to a marked degree in New York State. The centre serving this State now relies almost entirely on bulls proven on artificially bred daughters. After the required number of proving inseminations has been made, young bulls are laid off and not used again until proven. This principle of laying off is also used in New Zealand and some European countries and has recently been introduced in Great Britain.

Two privately-owned centres, both located near Chicago, have an important influence. One offers a 100% proven bull service with naturally-proven bulls, the other appears to place little emphasis on progeny testing. Together these two services are responsible for inseminating nearly one-third of the seven million cows inseminated and they compete with practically all co-operatives in their local area. This competition undoubtedly affects the approach made by many co-operatives on methods of bull selection and use of bulls.

In England and Wales two-thirds of the national herd is mated artificially. Several artificial breeding organizations are in existence, but the service operated by the Milk Marketing Board is the important one from the point of view of national coverage. The Board operates 23 centres and selection of proven bulls is made from bulls proven on either naturally or artificially bred daughters. Young bulls are used initially to obtain 500 inseminations in recorded herds and may then be laid off. Many of the young bulls must, however, continue to be used owing to lack of proven bulls. A feature of artificial breeding in England and Wales has been its major role in enabling the rapid swing from the Dairy Shorthorn to the Friesian to take place.

Artificial breeding in continental Europe has the common feature in most countries of a large number of bull centres controlled by local societies. There is, however, a varying amount of co-ordination and direction of policy at the provincial or national level. Bulls are generally purchased as young bulls and, with the exception of Denmark, proven on the records of daughters in farmers' herds. The coverage of artificial breeding in these countries varies from 30 to 95% of the national herd. The high percentage in some countries is undoubtedly due in part to the desire of farmers to avoid the relatively heavy cost of keeping bulls on the farm.

CONCLUSIONS

In most countries, genetic improvement of dairy cattle is largely the responsibility of organizations operating artificial breeding. The success they achieve depends on their ability to offer a service with a high percentage of semen from proven bulls of high merit.

In practice, the proportion of the semen which is from proven bulls varies considerably. In some cases it is 100% but it is generally below 50%. Further, there must be doubt as to the real merit of some of the proven bulls used.

Factors which appear to be reducing potential improvement include:

(1) The rapid increase in the demand for the service which has outstripped the ability of the organizations to obtain proven bulls. Where this is the major limiting factor it will, of course, cease to apply with the passage of time.

(2) A low level of herd recording both within and outside the service, which reduces the number of proven bulls from which selection can be made.

(3) The use of progeny testing systems of doubtful efficiency.

(4) The effects of competition which in certain circumstances influence the approach to bull selection and proving.

(5) The extent to which criteria other than production are considered. It should be pointed out that in many cases there are good grounds for considering other criteria. Beef production in the dual-purpose breeds of Europe is an example. Further, it is not desirable that certain aspects of the conformation of dairy cattle be ignored, if the user is to continue to have confidence in the service. One questions, however, some of the rigid bull licensing requirements in certain countries, particularly where the conformation of the bull is the major feature.

(6) The type of organization, which has particular reference to the inability of some organizations to progeny test their bulls as soon as they would wish. Many artificial breeding services rely on other organizations for progeny test information. Unless the co-ordination between them is at a high level it is difficult to plan an improvement programme.

However, it is necessary to emphasize that where the factors just mentioned are affecting the improvement obtained, the organization concerned is usually well aware of them.

In New Zealand, artificial breeding is fortunate in that it was an addition to an already well organized herd recording and progeny testing movement. There is evidence, both here and overseas, of the value of artficial breeding in improving production. Artficial breeding services, however, have many common problems, the solution of which, as with research, is facilitated by the interchange of ideas.