This interested group, attending the UA conference on A. B., represents owner-management of over 4,000 dairy cows.

Artificial Breeding Of Dairy Cattle

Extends Better Paternity Farther, Safer and Longer

J. B. Fitch

Department of Dairy Science

One of the most outstanding examples of applied research in agriculture is the widely adopted use of artificial insemination in the breeding of dairy cows. Recently the Department of Dairy Science at the University of Arizona sponsored a four day conference on artificial breeding.

We originally limited the conference-workshop to the first 15 persons who would send in $10 apiece for advanced registration. Interest in the meetings forced us to increase the group to 20 and even then many were denied opportunity to attend because of lack of laboratory facilities.

Studious, Interested Group

This group of 20 owners and herdsmen represented a total of 4,000 dairy cows. Some of the men who attended the conference planned to use artificial breeding within their own herds. Others expected to purchase semen from established private or cooperative organizations. The interest displayed by these 20 dairymen at our conference was amazing, the questions and comments informed and continuous.

This is typical of the wide interest in a practice which was first adopted in organized units in the United States only 20 years ago, yet has spread until currently 5,800,000 dairy cows—over 22 per cent of the nation's total—are bred artificially. Today artificial breeding service is available to dairymen in nearly every county in the United States.

Cost Is Moderate

The service can be furnished at moderate cost. It is furnished by cooperative farmer-controlled groups, by private associations and by individual breeders. Cost varies from $5 to $7.50 per service per cow, this sum including two or three repeat services when required. Conception rate in A.B., under supervision of a careful technician, is equal to, or better than, natural service.

Like many of America's best dairy practices, artificial breeding through cooperative units was copied from Denmark. An Extension dairyman in New Jersey, after studying the Danish system, organized America's first A.B. association in New Jersey in 1937. This plan was assisted at its start by an experienced technician from Denmark.

However, long before that time artificial breeding was practiced in this country. In the years 1915-20 when the famed Holstein sire, Sir Pietertje Ormsby Mercedes was injured so his usefulness by natural service had ended, Robert Melin, manager of a leading Holstein herd in western Minnesota, and Dr. W. L. Boyd of the University of Minnesota, continued to procreate the famed sire's dairy qualities by artificial insemination. Other instances of early individual use of A.B. can be recalled.

Has Many Advantages

Attractive features of A.B. are:

1. It extends through both quantity and time the usefulness of a proved sire with outstanding dairy heredity. A bull can serve thousands of cows instead of just 30 or 40, as he would by natural service. This is done by "extending" the semen through dilution. Also, by modern techniques of freezing semen at −110°F. it can be held for months and even years before using. A bull in New Jersey can be mated to cows in California, and a newborn calf in a governmental dairy improvement herd in Chile or Bolivia may have a daddy in Minnesota or Wisconsin. Thus A.B. cancels time and geography.
2. Bulls may be used that due to injury or other reason cannot be used by natural service. (In the University of Arizona Hereford herd cows are served artificially by a bull of fine quality but so injured in his hind legs that he could no longer serve cows naturally.)
3. A.B. eliminates the need and cost of maintaining a herd sire. Because of the potential danger to the dairymen who handle an emotional dairy sire it has been, interestingly, the dairy farmers' wives in the dairy states of the Midwest who were the lively proponents of A.B. To get rid of the herd bull removed a constant worry from the mind of the dairy farmer's wife.

(Continued on next page)

Factors Increasing Boll Rots And Fatty Acids in Cotton Seed

R. B. Streets, Alice Boyle and Helen Simonsen

Department of Plant Pathology

The high free fatty acid content which occurred in many lots of seed in the 1954 cotton crop, in a smaller number in 1955, and in relatively few lots in 1956, is correlated directly with the per cent of seed with discolored kernels. This is shown in a tabulation of data from 460 samples of cotton seed from the 1955 crop in Arizona fields.

*This project was financed by a research grant from the Oil Mills through the Arizona Cotton Planting Seed Producers.

Sampling Procedure

Seed samples were carefully chosen by random sampling from each lot of cotton seed. An attempt was made to grade seeds by the condition of the short lint. Seeds covered by dense lint were considered healthy, those showing over one-fourth of seed surface bare, "black seeds" were considered diseased, and those with less than one-fourth the surface black were considered doubtful.

Cutting the seeds showed that this method of grading was usually accurate. Most of the "black" seeds (about half of the doubtful) and very few of the healthy seeds showed discolored kernels. There was usually a close correlation between the percent of discolored kernels and the percent of free fatty acid. About four per cent discolored kernels gave an increase of one per cent free fatty acids.

Seeds were surface sterilized, cut in half and the kernel halves plated on sterile agar. Fungi present were identified as they produced spores.

Various Fungi Isolated

The fungi most frequently isolated from infected kernels were diplodia, aspergillus, and fusarium, in that order, all boll rots. A half dozen other organisms occurred less frequently.

Boll Rots Seasonal

The occurrence of boll rots was seasonal. They were prevalent and severe in early pickings in some districts. Boll rots were scarce in the main picking season, but increased sharply in late pickings, especially the final cleanup pickings. This correlates with moisture conditions as summer rains occur during early pickings, the weather is dry during fall months, but the late pickings often contain many immature bolls which are subject to morning dews.

Boll rots become prevalent under conditions of high humidity around the cotton bolls. The major factors influencing boll rots (exclusive of boll worm and other insect injuries) are those which increase humidity such as (1) rankness of growth, (2) close spacing of cotton in the row and (3) poor aeration.

List 3 Suggestions

Possible remedies are (1) control of excess rankness by reducing irrigation and fertilizer, (2) spacing not less than six inches in fields producing large plants, and (3) improving aeration by bottom defoliation. Skip row planting (plant four, skip four) greatly improves aeration as half the rows are outside rows, and even the inside rows are better aerated.

The presence of free fatty acids in excess of 0.5% to 0.7% in cottonseed oil is very objectionable to oil mills as it gives the oil a darker color and rancid flavor. While such oil can be reclaimed, the treatment is an added expense.

Oil mills may expect to encounter high free fatty acid in early pickings and in very late pickings. Poor lots could be detected either by cutting samples on the spot, or by free fatty acid analysis before the lot is mixed with good seed. Years when free fatty acid content is high will probably be infrequent, but oil mills should run a careful check to detect these bad years.

(Continued from previous page)

Controls Disease

4. Artificial insemination assists in control of certain diseases. Dairy cattle are subject to venerial and other service-transmitted diseases which could be spread through a herd by natural service, and spread from herd to herd in areas where neighboring farmers might share ownership or use of the same bull.

A proved sire is one that has demonstrated his ability to sire desirable high producing daughters, as indicated by comparing records of his daughters with records of their dams. At present the supply of favorably proved sires for dairymen and breeding associations has not met the demand. Less than 40 per cent of the sires in the 1,500 bull studs in the United States are proved sires. Many partially proved and carefully selected young sires are being used.

Best Genes Spread Widely

Instead of a bull servicing 50 to 75 cows a year or even less by natural service, bulls in A.B. serviced an average of 2,210 cows each per year in the United States bull studs in 1955. In 1956 some 2,553 sires serviced 5¾ million cows in 673,970 dairy herds in the U.S. Of this number, 883 had daughters that averaged 11,265 pounds of milk and 476 pounds of butterfat, an increase of 690 pounds of milk and 40 pounds of butterfat over the production of their dams. Sires that have been re-proved in bull studs show about this same increase on their daughters. Two outstanding proved Holstein-Friesian sires have serviced over 50,000 cows each. One bull already has 35,000 progeny, the other 30,000.

The use of A.B. for dairy cows and heifers has reduced the demand for purebred sires and consequently the number of bulls registered by the dairy breed associations. At the same time, the A.B. program has increased the value of proved sires and well bred young sires.

The extent of the adoption of the use of A.B. is shown by the number of purebred artificially sired animals registered by the breed associations. This number increased from 10 per cent in 1946 to more than 30 per cent in 1955. The Holstein-Friesian Association registered more than 41 per cent from artificial service in 1955.

A. B. Growing In Arizona

The use of A.B. in Arizona dairy herds has not increased as rapidly as in the dairy states, due perhaps to the cost in the larger herds in the state and to the fact that the dairy herds outside of Maricopa County are too widely scattered to use the services of a technician economically. It is estimated that more than 10,000 Arizona dairy cows were serviced last year by A. B. organizations in addition to several hundred cows serviced artificially within the owners' herds. Several organizations in Arizona are offering the services of well proved sires and interest in the plan is increasing. The use of frozen semen has extended the use of A.B. to isolated herds.

Adequate feeding and good management are the most rapid and the most important factors in maintaining high production in our dairy herds but A.B. is a potent means of extending the inheritance of superior sires.