https://doi.org/10.29321/MAJ.10.A04661

E—Mercuric chloride solution, 2% for 5 minutes
F—Potassium permanganate solution, 5% for 15 minutes
G—Sulphur dust
H—Water (control)

The experiment was laid out in 15 randomized blocks, each having eight unit plots corresponding to the eight different seed treatments. Only 100 seeds from each treated lot were sown per unit plot. The percentage of germination was calculated on the number of seedlings that come above the soil level. The analysis of variance of the data obtained shows that the seed treatments are significant in their action at 1 per cent level.

Effect of seed treatments on germination of paddy (Summary of results)

	Seed treatments								Standard
	E	A	F	G	H	B	C	D	Error
Average percentage of germination	99·0	98·7	97·6	97·0	97·0	89·3	89·3	87·0	1·34

From the summary of the results given above it will be seen that different treatments have different effects on germination. B (Bordeaux mixture, 1 % for 10 mins.), C (copper sulphate sol., 2 % for 30 mins) and D (formalin—aqueous sol., 2 % for 15 mins.) significantly lower the percentage of germination to the extent of 9 to 10 per cent, while the rest of the treatments have no such inhibitory effect. In fact E (mercuric chloride sol., 2 % for 5 mins.) and A (Agrosan G.) increased the rate of germination by 2 and 1 per cent respectively. But these increases in germination percentage are not statistically significant.

Therefore, when any of the above three chemicals, viz., Bordeaux mixture, copper sulphate solution and formalin are used in seed sterilization the seed rate in sowing should accordingly be increased by 10 per cent.

SELECTED ARTICLES

Improved Breeding for Milk Production

By JOHN HAMMOND, M. A., D. Sc., F. R. S.,
School of Agriculture, Cambridge

In travelling round the countryside to-day one is struck by the vast improvement made in the state of cultivation and in the production of crops during the war. No such improvement has occurred in live stock, however, but most people will probably agree that the time has now come for this to be taken in hand. A widespread movement for the improved breeding of dairy cattle is required, not only for increased production in war time but also to enable the dairy farmer to hold his own successfully after the war. There is every indication that there will be a world shortage of animal products in the immediate post-war years, and we should be prepared to meet this situation. At the present time, and immediately after the war, when supplies of animal feeding stuffs will be difficult to obtain, it is important that the best use should be made of those that are available.

Economy of Production The dairy cow is the most economical animal converter of feeding stuffs into human food. For every 100 parts of protein or starch in the feeding stuffs, the dairy cow produces 20 parts for human food as milk, as compared with only 8 parts as meat by the beef steer. This is one of the reasons for giving the dairy cow priority in the supplies of feeding stuffs.

Individual cows, however vary greatly in their efficiency, and one of our major problems to-day is that of breeding cows with a high efficiency in milk production. High yielding cows are more efficient in the conversion of feeding stuffs into milk than are low yielding cows. The reason for this is that part of the ration of the cow is required for maintenance, that is, to keep the cow alive, before the rest of the ration is used for milk production. A cow producing only 320 gal. per year will use 56 per cent of her ration for maintenance, and only 44 per cent for milk production; on the other hand, a cow producing 850 gal. will use only 35 per cent of her ration for maintenance, but 65 per cent for production. It is obvious, therefore, that by using cows of high productive level we are increasing the economy of production. It is little good to take a lot of trouble in growing oats and other feeding stuffs if we are going to waste them by feeding to low producing cows. The average yield of dairy cows in this country is only about 480 gal. a year, but with improved breeding methods on a large scale there is no reason why it should not be materially increased in the course of a few years.

The practical means by which the improved breeding of dairy cattle can be brought about may be divided into two parts:

(a) the breeding of dairy bulls which will transmit high milk producing capacity *with a high degree of certainty*;

(b) the means by which the commercial milk producer can grade up his herd by the use of such bulls.

Let us consider each of these two problems in turn.

Breeding bulls to transmit high milk yields The Dutch breeders have been among the most successful in this sphere, and the secret of the method they use is that of knowing for certain the breeding qualities of the bull before they breed young bulls from him; that is, breeding their young bulls from "progeny tested" bulls only. Here, for example, is a typical pedigree of one of their bulls:

Sire: Athleet	×	Dam: Gerard Bertha	
(6 daughters)		(7 lact. Av.)	
(Av. 11,367 lb)		(11,235 lb 3·67%)	
Sire: Athleet	×	Dam: Grietje 39,223	
(6 daughters)		(5 lact. Av.)	
(Av. 11,367 lb.)		(8,922 lb. 3·86%)	

Sire: Bertus 16,877 × Dam: Grietje 73,078
(6 daughters—Av. 11,000 lb) (4 lact. Av.—13,596 lb. 4·6%)
Bertus 19,517

All the bulls mentioned in this pedigree are 'proven bulls', that is, they are bulls whose daughters had averaged a high level of production. By using a succession of such 'proven bulls' in the herd, it is possible to breed bulls which will transmit high production with a *high degree of certainty*.

Owing to the destruction caused by the war, we shall probably be unable to import more Dutch bulls into the country for some time: we can, however, with great advantage import Dutch methods of breeding for milk and use these methods on all our breeds of dairy cattle.

There is a tendency among some pedigree bull breeders to over stress the value of the dam's production and to pay insufficient attention to the *bull's capability of transmitting milk*. For example suppose one were breeding for red colour in Shorthorns and knew only the colour of the dam and not that of the sire, the chances are that there would be a large number of throw-outs of roans in a herd bred in such a way, even if the cows were selected carefully for red. It is just the same with breeding for milk; you must know the sire's

capacity for milk as well as the dam's if you are to guarantee that the offspring will breed true. It is not enough to say of a bull that his sire's dam had milk, for his sire had a sire as well as a dam, and he may hand down poor milking qualities.

War Agricultural Executive Committees are now establishing registers of approved pedigree and milk recorded herds in their areas for increasing the supply of well bred young bulls for distribution to commercial herds. Provided the sire is well bred for milk there should be no reason why bulls for commercial herds should not be obtained from 'grading-up' cows of high producing capacity.

It is hoped that owners of pedigree, 'grading up' and milk recorded herds will co-operate on these lines in providing a source of supply of bulls for commercial producers. At present a large number of valuable bull calves well bred for milk, are being slaughtered because they are not wanted by other pedigree breeders. The pedigree breeders have not the facilities to rear all their bull calves and to sell them at profitable prices to commercial producers. It is the intention to overcome this difficulty, however, either by rearing the bull calves to breeding age on a war Agricultural Executive Committee's farm (if suitable facilities are available) before sale to the commercial dairy farmer, or by supplying week-old bull calves to the commercial dairy farmer to rear for himself. Since some pedigree breeders may hesitate to sell bull calves because bad conditions of rearing may discredit their stock, War Agricultural Executive Committees have been instructed, where necessary, to earmark these bull calves in a distinctive way, and distribute them to commercial dairy farmers without pedigree or the name of the herd from which they originated, records of these being kept in the Committee's files only.

Grading of herds by commercial milk producers While milk recording and the keeping of heifer calves for rearing from the best cows only is a good practice and one to be encouraged, it is slow, because of the limited number of offspring produced by a cow. A bull will produce on the average 35 calves in a year (and with artificial insemination up to 1,000 given great density of cow population), as compared with only one from a cow. Progress can therefore be made much more rapidly by concentrating attention on the bull used. (For the year ended January 1st, 1942 in the whole of the U. S. A. 111,451 cows were artificially inseminated from 408 bulls; in other words, 273 cows per bull. Ed.)

Whenever possible, it is better for the herd to rear its own replacements rather than to buy them in, not only because of the knowledge of how the animals are bred, but also because of the danger of introducing disease into the herd through purchased animals.

Dairy cattle should be bred pure or graded up to a pure breed. Cross breeding, except with the definite purpose of continuing 'grading-up' to the new breed introduced, should be strongly discouraged. Unlike the producer of beef cattle, which are all sold off for slaughter, the farmer who breeds cross-bred dairy heifers has to continue to breed from them, and unless the 'grading-up' is continued, a zoological collection of nondescript cows is soon obtained.

In each herd a careful consideration is required of the pure breed to which it should be graded up. In deciding this there are two main considerations: (1) the suitability of the soil, climate and environment of the holding for a particular breed; and (2) the purpose for which the herd is kept. For example, if the owner is a producer-retailer he will probably require a high butter-fat breed with good coloured milk, while if he is rearing and feeding his steer calves he will require a dual purpose type. If beef is the primary consideration, however, it would be better to use a beef bull of distinctive colour markings (Aberdeen Angus-black, or Hereford-white face), so that the heifer calves do not

get on the market under the guise of dairy-bred calves and, when purchased by some other dairy farmer, ruin his output of milk.

In dealing with a low producing herd of nondescript cows, there are some people who would probably say, "Fatten off and slaughter the lot", while, no doubt, a certain amount of weeding out and slaughter of old and diseased cows may with advantage be carried out. In the writer's opinion the present is not the time for the slaughter of even poor dairy stock on a large scale, for there is a shortage of cattle in Europe, and this country needs all the milk that can be produced. Rather, I believe, should we begin immediately to grade up these poor cows by the use of good bulls.

A good herd in two generations The rapidity with which 'grading up' to the high producing pure breed can be effected is probably not fully appreciated by those who have not seen it in practice. A low producing nondescript herd can in two generations be made into a herd of quite reasonably good production and type by 'grading up' with high producing, pure bred bulls. The movement for the better breeding of dairy cattle would be given a great impetus if all dairy cattle breed societies would institute a 'grading-up' herdbook, either with or without entry into their present herd book.

The small herd—one too small to justify keeping a well bred bull—is a problem in many areas. The purchase of bull calves should in most cases solve this problem, although an alternative, and perhaps more convenient and less costly means—by artificial insemination from a well bred dairy bull—is now under trial in the Reading and Cambridge districts.

In conclusion, it is evident that there is a need for the problem of breeding for milk production to be attacked on a broad community basis for the common good of dairy farmers—to prevent bad dairy cattle ever being born rather than merely to accept them as inevitable and push the bad ones off on somebody else, thus lowering the efficiency of the industry as a whole. *J. Min. Agri. Sept. 1943.*

Fruit Bottling

By Miss K. I. NOBLE,

Demonstrator, Ministry of Food, England.

Introduction Fruit bottling not so long ago, was regarded as a typical country occupation, but the war has made the town housewife equally "preserve minded" and, judging from the queries and general interest in this subject, even keener than her country sister who wisely bottles and preserves every year as a matter of course. To be successful, it is necessary to make sure that everything is done to avoid mistakes, and so whatever method is chosen should be followed carefully and the following points noted.

Objects The object of preserving fruit is to destroy bacteria, moulds, yeasts, and enzymes which would otherwise cause deterioration.

Methods The methods of doing this are by (1) sterilizer, (2) oven, (3) pulping, and (4) Campden method.

Water or Syrup Fruit can be bottled very successfully in plain water, although if sugar can be spared flavour is improved by using syrup, viz.; 2—8 oz. sugar to each pint of water. Preparation of syrup: dissolve sugar in water and boil for a few minutes, strain. Note—syrup with honey: add two parts of water to one part of honey.

Preparation of fruit and jars Fruit should be fresh, dry, sound and firm. It should also be ripe, and whenever possible graded according to size and ripeness. The only exception is gooseberries, which should be bottled when green and hard. Cherries: the dark and red types are best for preserving, e. g., 'Morella'