

profit. There has been strong emphasis on cash crops in the past few years at the expense of forage and legume crops and cash crops like corn do not show startling results from use of lime. A lower profit margin on cash crops might emphasize the need for lime.

Limestone use has dropped in Wisconsin—from 2 million tons during 1946-49 to slightly more than 1.5 million tons in 1953. It is expected to drop again during calendar 1954, although other fertilizers were up about 4% during fiscal 1953-54. Wisconsin, to feed dairy cattle, has over two million acres of alfalfa, more than any other state. Alfalfa, like other legumes, is particularly sensitive to lime shortage, although lime applications do not give startling results as compared with some of the other fertilizers. Wisconsin needs about 20 million tons of limestone to bring its soil up to par and 2 million tons a year to keep it there.

In Ohio, stone must now be graded according to its neutralizing ability. Farmers are paid on the basis of how much neutralizing they have done rather than on the basis of tonnage used. This restriction hurts over-all stone consumption, but the total effect is to cut out much use of poor grade stone.

The Oklahoma ASC office indicated 230,000 tons of limestone were used during 1952 in the ASC or PMA program. In 1953 the total was about 130,000 tons. Estimates for 1954 have been set at 150,000 tons—a further slight increase is expected in 1955. Slight recoveries from the low point of 1953 are attributed to more flexibility in the Oklahoma ASC program.

In Oklahoma, which has passed through its third successive year of drought, income that otherwise would have been available for lime has been spent for livestock feed.

Decrease Is Not Entirely an Economic Problem

Soil chemists at the Florida Agricultural Experiment Station say the decrease in lime consumption is one that should have been expected. Since initial applications are generally greater than the amount needed to maintain soil reaction at the desired level, consumption has fallen off somewhat. A microbiologist says that in Florida the consumption-requirement lag has finally caught up with itself.

Florida experts say decreases there are also due to the effect liming has on minor elements, although bad crop years plus reductions in ACP payments have made it difficult for farmers to buy the necessary amounts.

In Texas, the decrease is due partly to economic and partly to technical reasons. Farmers have seen little value

from lime applied in previous years. Poor crop response has resulted from a lack of understanding about when and where to lime and what crops will give a good response. These factors have blocked increased use except under direct grants. Texas consumption during 1954 will probably equal that of 1953.

How much FHA can help the farmer use more limestone, in the face of ACP cutbacks, remains to be seen. [FHA was authorized by the last Congress to grant insured and direct loans for basic applications of lime and fertilizer, in addition to the installation of water facilities (AG AND FOOD, January, page 16).]

Pretesting Food Additives

Pretesting? Yes — but who will be the referee? MCA favors FDA, but opposes requiring specific approval

INCLUSION OF MANDATORY pretesting requirements for new food additives in any new food law changes now has the support of almost all food and food chemical manufacturers. The food industry has generally been in favor of such a requirement for some time, but it was not until Jan. 27 of this year that the chemical industry, as represented by the

Manufacturing Chemists' Association, committed itself and made a policy statement favoring mandatory pretesting of new food ingredients.

It may appear surprising that there could be any hesitation about using such a seemingly simple means of protecting the public from "poisonous or deleterious" substances in food, especially since all reputable companies carry out pretesting programs anyway. The trap lies, of course, in interpretation of test results. That it is impossible to establish absolute assurance of safety was clearly brought out by Henry F. Smyth, Jr., of Carbide & Carbon and Mellon Institute, at the joint meeting of the Commercial Chemical Development Association and the Chemical Market Research Association at Chicago Jan. 20.

Tests Cannot Assure Absolute Safety

The first stipulation for a hypothetical test to prove absolute safety is that the subjects be human, according to Smyth. The population sample must be large enough to include a representative portion of the population, the very young, the middle aged, the geriatric problems, those who eat freely whatever they want, the various food faddists, those who must consume a limited diet for financial reasons, and also those with each of a variety of defects and chronic diseases. While being fed food containing the proposed ingredient, each subject must be carefully observed for possible effects and detailed records kept, yet nothing must interfere with his normal daily routine. Similar observations must be made on the subjects' children and grandchildren, with matings both within

Difficulty of negative proof in food additives pretesting may encourage blanket disapprovals, says Henry F. Smyth, Jr., Carbide & Carbon (left), shown at the CCDCA-CMRA meeting with Lawrence Coleman, Allied Chemical & Dye Corp.



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and without the experimental group. At the same time an identical control group must be studied.

Each group would probably have to contain about 100,000 individuals to distinguish between random extraneous differences and slight effects with the desired degree of certainty. Complications arise because there are perhaps 20 important diet constituent with which the ingredient may interfere. Then there may be 20 others which may be synergistic with the additive. Testing, at both high and low dosage levels, of these substances in conjunction with the ingredient multiplies the previous number of subjects by 160. After all this work our great-grandchildren may be certain that the additive is not harmful when used in its proposed manner and quantity—provided living conditions and diet composition are not changed.

Danger of Government Control

Absurd? Not entirely. Smyth's tongue in cheek description points out the obvious impossibility of setting up an experiment to prove the safety of any additive absolutely. In the last analysis it is impossible to prove a negative anyway. What worries people in the industry is that this lack of absolute proof might cause government officials to tend to play it safe and disapprove all, or almost all, proposed additives. Today there is almost no such thing as a "natural" food. Through the years adoption of new additives has continued to improve all types of food products by lowering costs, retarding deterioration, enhancing palatability, and improving nutritive qualities; it would be unthinkable to cut off this advancement at its present level.

MCA therefore proposes that test data be submitted to FDA before a new additive is introduced so that there can be adequate opportunity for review. If questions come up they could probably be settled by informal conferences. In practice almost no manufacturer would use a product which the FDA has condemned, but MCA recommends that provisions for court action be included in new legislation. In this way FDA would retain its traditional "policing" policy rather than enlarge its "licensing" activities.

Practical Pretesting

Impossibility of absolute proof does not mean good substantial evidence cannot be obtained that a substance is harmless. An often mentioned point is that no one should be his own referee. Under commercial pressure a manufacturer might not be quite as objective about his experiments as someone else. The very fact that test results will be scrutinized by the FDA will go a long way toward assuring that pretesting is adequate.

The ideal pretesting program, according to Smyth, will include not only the usual animal feeding studies, but will also involve determining just what the harmful biological effects of overdosage are. If ascertainable, the actual biochemical reactions of the substance in the body should be discovered.

Some discretion should be shown in margin of safety requirements; a substance used only in trace quantities need not be given the same searching examination given one used in large amounts. Likewise a highly toxic substance should be considered very carefully regardless

of quantity used. It should be remembered that toxicity is a matter of degree since all substances are toxic under certain conditions or if the dosage is high enough.

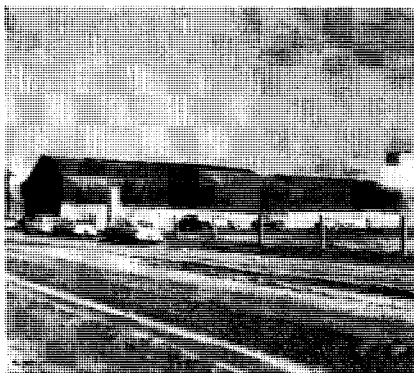
To avoid elimination of a product after a long development program and to decrease the time required in getting on the market, pretesting should be carried on simultaneously with other developmental work. Costs of pretesting programs come high, but they are small when considered in the light of public safety and the condemnation of the entire food chemical industry which would follow introduction of a harmful additive.

Khapra Beetle, Threat in the West

KHAPRA BEETLE, first found in Tulare County, Calif., in 1953, now threatens to be one of the most serious grain insect infestations facing the country. Since that first finding, beetles have been found in 10 additional California counties and in Arizona and New Mexico as well. As a result, a spate of quarantines has been established. Colorado was the first to act, embargoing products from the three infected states. California soon followed suit with an intrastate quarantine on infectable products, and now a federal quarantine is expected to be in effect this month, one of the few such quarantines established.

To test effectiveness of its quarantine measures, California Department of Agriculture undertook the largest building fumigation ever tried in the state early in January. Cooperating were USDA and University of California. Methyl bromide, the most effective eradicator, was furnished by Dow and Eston. The test building—a 1-million-cubic-foot warehouse at Imperial—was completely

Million-cubic-foot warehouse at Imperial, Calif., prior to a test fumigation for Khapra beetle eradication. About 5600 pounds of methyl bromide were used in this largest single fumigation tried in the state—for a complete kill of nearly 700,000 beetles



enclosed with vinyl-coated nylon tarp and polyethylene. Khapra adults, larvae, and eggs were spotted in test cages throughout the building. About one mile of Saran tubing strung about the interior permitted continuous monitoring of fumigant concentration at strategic points during the test.

By Jan. 6, all was ready, and about 5600 pounds of methyl bromide was introduced for 48 hours. Five acres surrounding the warehouse got five sprayings of malathion in oil to prevent reinfestation of the building.

Result: complete kill, as indicated by examination of nearly 700,000 beetles and larvae taken from the building. California quarantine officials now know their measures are effective and that the prescribed treatment—4 or 5 pounds (depending on temperature) methyl bromide per 1000 cubic feet—does the job.

Eradication, however, comes only at a price. Two pest control firms bid in application at \$3500, about cost for the project. Methyl bromide at about 75 cents a pound would have cost about \$4200 had it not been furnished for test purposes. Total approaches \$8.00 per 1000 cubic feet. California Bureau of Entomology men estimate costs will probably be closer to \$5.00 per 1000 feet for average-size buildings.

One advantage to Khapra beetle sanitation procedure is that other infestations, if any, can be cleaned up at the same time.

Meanwhile, the search for beetles continues. They have already been found in wheat, powdered milk, nuts, spaghetti, rice, oats, barley, bran, rye, malt, and seeds of various leguminous crops. USDA has increased its survey staff in the three states from one to seven men. Fumigations continue apace, and University of California is studying effects of various fumigants on seeds and food products now under quarantine.