Pesticide Discovery and Testing Costly, Dow Scientists Report

An explosion in requirement, coupled with an explosion in technology, has added dramatically to the costs and time devoted to toxicological studies needed for pesticide development, say two scientists from Dow Chemical, U.S.A.

According to Dr. P. J. Gehring, director of toxicology, these costs are "at the expense of pesticide manufacturers and therefore ultimately to the consumer."

In a paper presented to the American Chemical Society he said that he hoped unnecessarily restrictive demands would not "develop into being at the expense of the food supply of the nation and the world as well."

Improved technology does not always result in the replacement of outdated techniques for toxicological evaluation, he said. New methods often are required in addition to rather than in place of older types of evaluation. This has added to the problem, rather than simplifying or speeding results. He said that some standard clinical procedures are still required, although they have long ago been shown to be poor indicators of a particular type of response needed for toxicological evaluation of pesticides.

Requirements for toxicological studies on pesticide compounds in relation to cost and time have climbed from a modest $10,000 and a 30 to 90 day time period in the early Fifties to an investment of up to $700,000 and a time period exceeding four years.

According to Gehring, three factors have served to influence the more rigorous and extensive toxicity testing: increased sensitivity of analytical methods which provide a better measurement of tissue residues, new techniques of increased sensitivity to monitor toxicological parameters, and the increased awareness of the impact of pesticides on non-target organisms.

He suggests that the methods of interpreting test data have not kept pace with the development of techniques. Some tests such as those involving massive dosages may yield positive test results but little information. Striking results attract attention, he said, but do not necessarily contribute to scientific knowledge.

Dr. E. H. Blair, director of research and development for the Ag-Organics Department of Dow, then detailed the steps leading from the initial screening of compounds for biological activity to the eventual marketing of a material as a new pesticide.

One new pesticide emerges for every 10,000 compounds tested, said Blair. The time from discovery to market can be 10 years and the cost for a new pesticide is in excess of $10 million. Those are the odds in the pesticide development game.

Using 1956 as a base year, he said that research and development costs had risen by 245 percent in 1964 and had escalated 340 percent by 1969. He indicated that costs are continuing to climb because of pressure for more extensive toxicological and other testing combined with current high money costs and general levels of inflation.

He pointed out that a successfully developed new product, a "winner," must ultimately bear the costs of the research work done in support of a material eventually abandoned at some stage in research. He said the challenge facing the pesticide industry today is to identify and eliminate the "losers" early. Frequently, the "losers" of today can be associated in some manner with toxicology, metabolism, analytical or ecological factors which make them unsuitable for further development.

These seedlings are about six weeks old. Note the differences in color and height. The Manhattan and Pennfine varieties are fine-leaved, shorter growing and darker green. Photo was taken by Dr. C. Reed Funk.

FLUORESCENCE *(from page 28)*

with the production of seed to see that high standards are maintained in the various steps of production. This assures the ultimate consumer the best possible product when he seeds his turf. Seed testing is that step in production which critically examines the seed for physical impurities. This information appears by law on all containers being offered for sale.

To the extent possible, seed analysts examine the seed for mixtures of other similar kinds of seed. For the best assurance one should use certified seed. Under such a program, a certification agency carefully documents the pedigree of the seed and supervises the growing conditions to prevent outside contamination. It provides an unbiased person to keep a check as the crop is growing.

Once the seed is harvested, cleaned, and in the bag, a sample is drawn and sent to a seed testing laboratory for a detailed analysis. Some seeds or seedlings have characteristics which differentiate them from other kinds. This becomes a useful laboratory method of detecting contamination. The fluorescence of annual ryegrass roots when observed under ultraviolet light is one of these characteristics.

Generally, perennial ryegrass roots do not fluoresce under the same light. Consequently, these two kinds can be separated on this basis at a very early stage of their development.

Four hundred seeds are planted on white filter paper and provided optimum conditions for germination. Complete germination is usually accomplished within fourteen days. The roots of these same germinated seedlings are observed under ultraviolet light and recorded as a percent of fluorescence or non-fluorescence. This information is then calculated into the purity reflecting any contamination which may be present.

New ryegrass varieties being developed do not necessarily exhibit this same fluorescence, but exhibit their own characteristic pattern. This pattern remains useful because once it is established it remains relatively constant, acting similar to a finger print. Any deviation from this pattern indicates the presence of contaminants. All of which provides us with more tools in our endeavor to provide information which allows the ultimate consumer the opportunity to buy the quality of seed he desires.

Flourescence And The Federal Seed Act

By C. R. Edwards

Conscientious seed producers take a great deal into account when producing certified seed especially of the new turf-type perennial strains. It is, however, also evident and relatively easy for less discriminating growers to produce noncertified

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Ag-Organics Department, Midland, Michigan 48640

Dursban insecticide. Bugs have another name for it.

They call it "The Unsurvivable One!" Because nothing wipes out chinch bugs, sod webworms and many other serious turf pests like DURSBAN* insecticide. And DURSBAN insecticide won't leach. It has excellent residual activity. It's safe, too, for all common turf grasses. And economical—you get more bugs for your buck, because so little goes a long long way. Ask your Dow distributor or your contract applicator for "The Unsurvivable One!"

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Golf Course Builders Elect Ball Pro As President

A builder of 50 golf courses since he retired from big league baseball 11 years ago has been chosen president of the Golf Course Builders of America.

Robert E. Chakales of Richmond, Va., will direct association activities through March, 1973. He succeeds Robert Vicent of Benton, Pa., who presided in 1971, and becomes the third president of the Golf Course Builders organization which is headquartered in Washington, D. C.

Chakales' 50 courses, all built east of the Mississippi, have been constructed since 1961. He is currently associated with R. E. Chakales & Associates.

He began his big league career with the Cleveland Indians under manager Al Lopez, was traded to the Washington Senators in the mid-fifties and pitched for manager Charlie Dressen. He retired from baseball in 1960 after a year with the Boston Red Sox.

As a retirement activity, he built his own Par-3 golf course in the Richmond area, but became so interested in golf course construction that he went into the contracting business full time.

In addition to his activities with GCBA, he is a member of the Mid-Atlantic and Virginia Turf Association.

Bob Chakales, Richmond, Va., (left) receives a congratulatory handshake from Bob Vincent, Benton, Pa., retiring president of the Golf Course Builders of America as he prepares to take over as the association's president for 1972.

Fertilizer Pollution Nil Says MSU Scientist

A Michigan State University soil scientist has concluded that the potential contribution of turfgrass fertilization to water pollution is insignificant "if common sense is used."

Dr. Paul Rieke made the observation in a talk at the annual Midwest Regional Turf Conference at Purdue University in early March. About 600 golf course superintendents, sod growers, architects and developers and industry and university personnel were in attendance.

The researcher reported that work done at Michigan State University showed that no more than 1.5 pounds of actual nitrogen should normally be applied per 1000 square feet at any one time. This is especially true when water-soluble (fast acting) nitrogen is being applied.

Excessive annual nitrogen rates showed that no more than 1.5 pounds irrigation should be applied judiciously, especially on sandy soils.

Low nitrogen requiring grasses, such as creeping red fescue, should be planted on sandy soils in areas where water sources (around lakes and along rivers) could be contaminated by leaching of nitrogen, he continued.

Rieke pointed out that most soils have a high capacity to hold phosphorus, so leaching of phosphorus under turfgrass conditions may not be a significant pollution problem.

For More Details Circle (134) on Reply Card
For More Details on Preceeding Page Circle (140) on Reply Card

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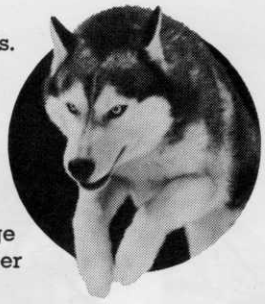
Big claims? Not at all.

This Bolens 18 hp tractor hitches up to 35 separate attachments. So it cuts big jobs down to size in a hurry; mowing, snow removal, tilling, cultivating, grading, terracing, weed cutting, loading, sweeping, seeding, fertilizing, hauling, aerating, scarifying, spraying, fogging, trenching, thatching, compost shredding, post-hole digging, and many others.

It shifts from one job to the next quickly, because Bolens exclusive collar-locking PTO system makes it a snap to change attachments. Foot pedal hydrostatic transmission lets the driver get through a job quicker. No time is lost in reaching to shift. A touch of the foot does it all.

Of course, any tractor that claims to be a one tractor maintenance crew would have to have a two-spool hydraulic system, large fuel tank, an inside turning radius of 54", and a twin-cylinder engine. The Bolens 18 hp Husky has all those, plus power steering and a three-point hitch as optional equipment.

Interested in hearing more on how this Bolens tractor can do your big jobs quicker, easier, cheaper? Mail the coupon below. But do it today! There's a big demand for a one tractor maintenance crew.



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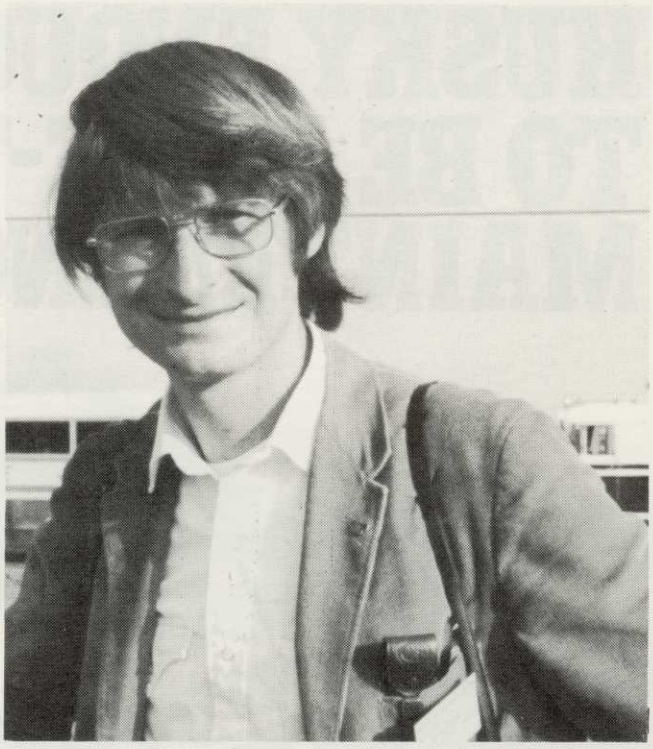
Chicken Feed From Clippings



Research specialist Steve Cockerham helped develop the Cal-Hy pilot program.

A CALIFORNIA turfgrass farm has found a way to turn clipping disposal from several hundred acres of grass into a money-making sideline.

Cal-Turf, Camarillo, the largest turfgrass grower in western U.S. currently grows more than 600 acres of bluegrass, dichondra and hybrid bermudagrass. Manicuring and constantly maintaining this much acreage is a large, round-the-clock job. The byproducts of this care are large, too, primarily consisting of mountains of grass clippings. More than 1,000,000 pounds per month.

Getting rid of this huge volume of clippings has never been easy. And today, when pollution regulations make open burning impossible, the problem is compounded. Cal-Turf's solution is unique. They feed the clippings to chickens!

Basically, Cal-Turf has perfected a process for turning dried grass clippings into a high-quality poultry feed supplement. Called Hy-Gold, the material has proved to be a rapid success among chicken ranchers.

However, the success of Hy-Gold didn't come easily. The project started as no more than an idea in the mind of Toby Grether, president and founder of Cal-Turf. In mid-1969 he

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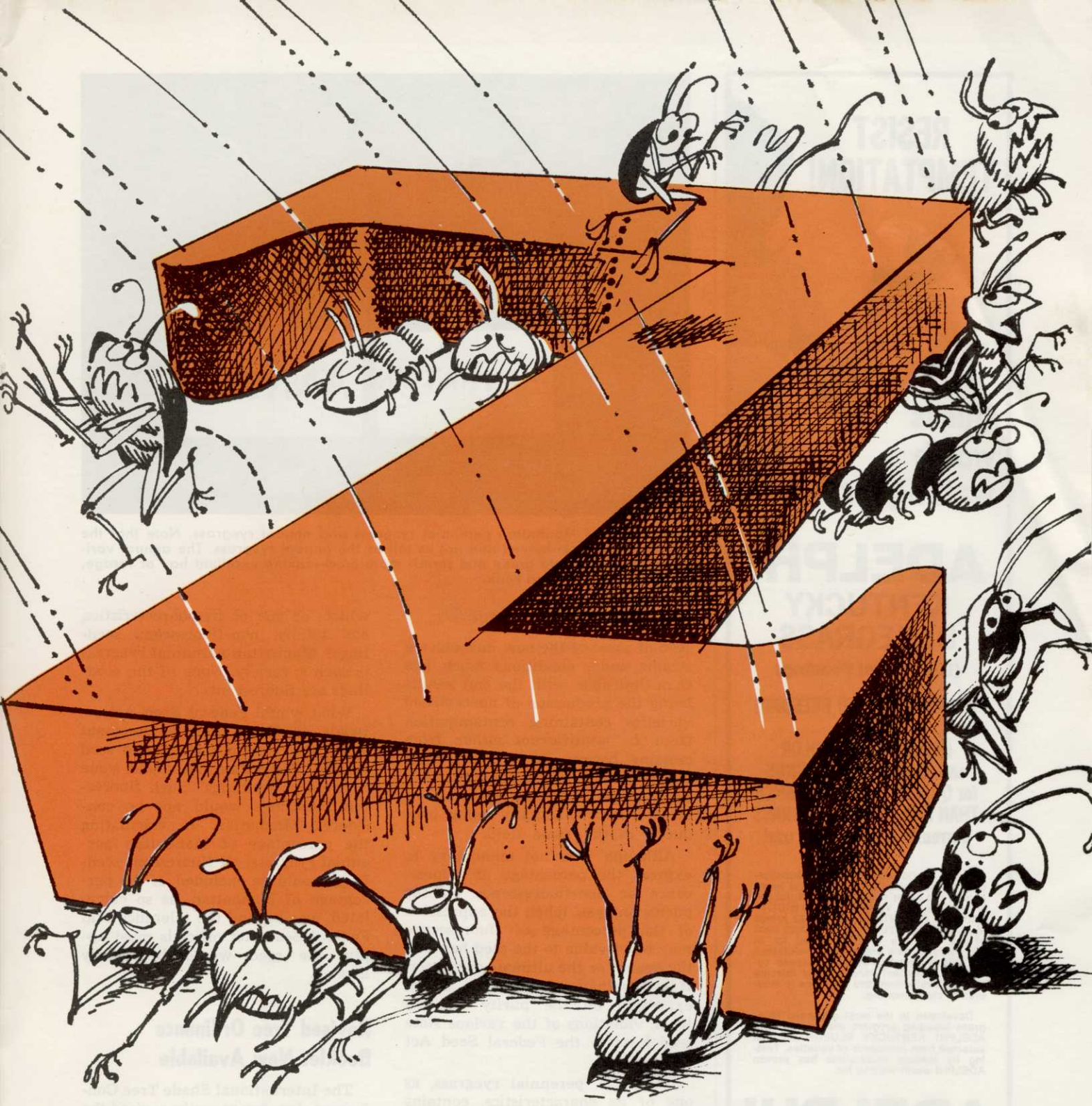
Custom built 12-foot flail mower is used in grass clipping program at Cal-Turf. Clippings are processed within 45 minutes of cutting.



Ag-Organics Department, Midland, Michigan 48640

How to make a lasting impression on bugs. Give them a dose of ZECTRAN* insecticide–the big, powerful, broad-spectrum insect killer. The one that works on almost all major foliage-feeding insect pests –even effective on the hard-to-kill kinds. And it's easily the most versatile. Use ZECTRAN on over 600 different flowers, ground covers, trees, shrubs, house plants and turf. It's biodegradable, non-staining, easy to apply. In liquid or powder. In our formulation, or to mix with yours. Get ready, bugs!

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Comparison of Manhattan perennial ryegrass and annual ryegrass. Note that the Manhattan is finer-leaved and not as tall as the annual ryegrass. The annual variety is generally light green and stands more erect making excellent hay or forage. Photo is by Dr. C. Reed Funk.

FLUORESCENCE *(from page 52)*

seed of some of the new unprotected strains under conditions much less than desirable, with the end results being the production of noncertified varieties containing contamination from *L. multiflorum* either from crossing because of pollen sources to close to the seed production field, or from physical contamination of *L. multiflorum* actually being produced in the same field.

Although it is not mandatory to express the percentage of fluorescence or non-fluorescence on the purity analysis label, the expression of the percentage of fluorescence may be of value to the seed handler, the dealer, or the ultimate consumer. If contamination exists and is not expressed on the purity analysis label, violations of the various state seed laws or the Federal Seed Act may exist.

Generally, perennial ryegrass, as one of its characteristics, contains a small percentage of fluorescent seedlings; most of the seedlings are non-fluorescent.

When dealing with such perennial ryegrass, do seed law enforcement officials consider the small percentage of fluorescent seedlings to be perennial ryegrass? Yes.

Under Federal Seed Act testing rules, allowance is made for that small percentage of fluorescent seedlings. They are considered to be perennial ryegrass.

But, what if a breeder develops a new variety of perennial ryegrass which, as one of its characteristics, has totally non-fluorescent seedlings? Manhattan perennial ryegrass is such a variety. None of the seedlings are fluorescent.

What would Federal Seed Act officials do if, in their enforcement work, they tested a sample of seed labeled Manhattan, but found some fluorescent seedlings? Such fluorescent seedlings would not be considered Manhattan. In calculating the percentage of Manhattan perennial ryegrass, all fluorescent seedlings would be excluded. If the percentage of Manhattan, as so calculated, was beyond the tolerance that Federal Seed Act officials must apply, the seed would be falsely labeled.

Revised Tree Ordinance Booklet Now Available

The International Shade Tree Conference, Inc. has recently revised the publication entitled "A Standard Municipal Tree Ordinance".

This fourteen-page booklet contains information of value to persons and municipalities who are interested in creating, revising, and improving municipal ordinances relative to the planting, maintenance, and preservation of shade and ornamental trees.

To obtain the publication, send request and prepayment of $1.00 per copy to the International Shade Tree Conference, Inc., P. O. Box 71, Urbana, Illinois 61801.

CHICKEN FEED *(from page 56)*

sent a batch of grass clippings, dried in the summer sun, to Los Angeles to be analyzed for xanthophyll content. He found it in abundance.

Xanthophyll is the substance that produces the desired yellow pigmentation in a chicken's fat, its skin and in the yolk of its eggs. Chickens do not procure a large amount of xanthophyll naturally; it must be added to their diet in their feed. In the past, ranchers have used expensive corn gluten meal or marigold petals to fulfill the xanthophyll requirement for their birds. Less costly dehydrated alfalfa also has been used, but large quantities of this material are required in the ration to gain the proper level of pigmentation.

Based upon initial findings, Cal-Turf's dried grass clippings promised a high-level source of xanthophyll that was far less costly than corn meal or marifold petals, yet required only half the quantity needed with alfalfa to gain an equal degree of pigmentation. Best of all, the raw materials for this exciting new feed concept were plentiful and close at hand.

Getting from fresh clippings to today's finished product, however, involved many stages, plenty of manhours and the creative thinking of Cal-Turf people.

One of these men is Steve Cockerham, Cal-Turf's chief research scientist. Steve, a graduate of Purdue with a masters degree in turfgrass from New Mexico State, played an important role in determining how the clippings should be harvested to preserve and maximize the all-important xanthophyll.

With the cooperation of the United States Department of Agriculture and several independent research laboratories, Steve supervised a one-year pilot project. Many experiments were conducted, including tests of stability and duration of xanthophyll content, time and temperature of processing for optimum quality of product, potential yields with varying methods of processing, and other important questions. Small dehydrators were constructed to determine these factors. The USDA, with larger facilities, helped pinpoint them. Finally, with their thesis proved in the laboratory, Cal-Turf turned toward developing commercial production of the new feed.

One of the major factors in processing grass clippings is speed, since Cal-Turf researchers learned that as much as 40% of the xanthophyll

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CHICKEN FEED *(from page 59)*

content can be lost through oxidation just one hour after mowing. To solve this problem, unique harvesting equipment was developed to permit clippings to go from the field to the processing plant in less than 45 minutes.

The plant itself was the major item in the project. The job of building it fell to another Cal-Turf specialist, project manager Bob Chase. In his lengthy analysis, Bob toured at least 22 dehydrators which were being used for such various products as alfalfa, wood pulp, sawdust and grape pomace. After investigation and evaluation, an alfalfa-drying type was finally chosen for the core of the new plant. Added to it were facilities for grinding, pelletizing, cooling and storing the product, as well as a complex series of electronic controls to maintain critical temperature levels. Actual construction of the plant started in December, 1970. The first batch of Hy-Gold was produced on March 24, 1971.

The processing of the feed occurs in five main stages. First the raw clippings are dehydrated. Then, primary milling takes place, increasing the product density from 12 to 18 pounds per cubic foot. Next is the pulverizing step (secondary milling) followed by pelletizing (which compacts the material to 48 pounds per cubic foot.) Finally, the pellets are crumbled for delivery to the consumer. In this last step different sizes of crumbled particles can be produced to fit the varying needs of the poultry industry.

The plant is currently processing more than one million pounds of raw clippings per month. It is

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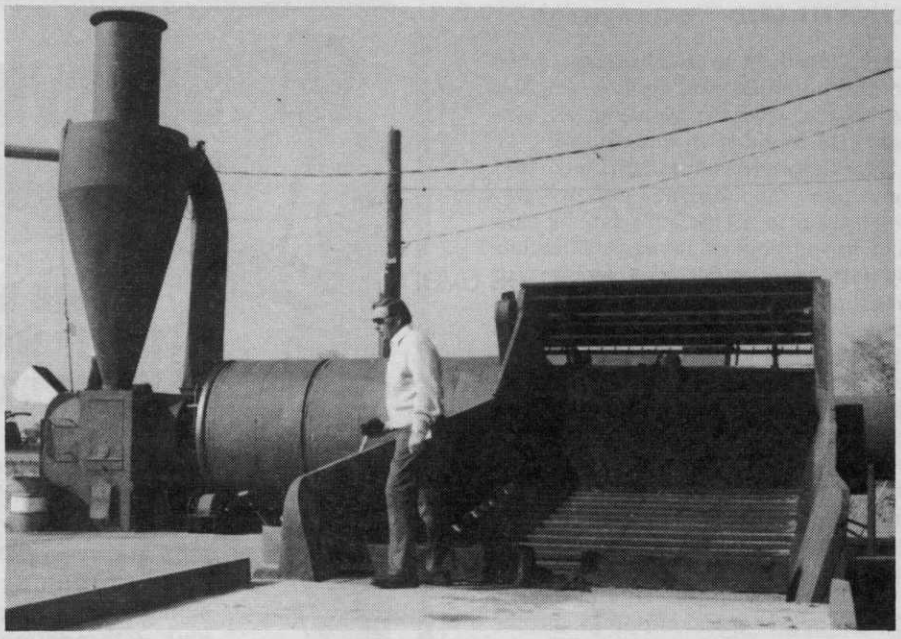

Dehydrator built on Tobias Grether ranch is used to convert grass clippings into Cal-Hy poultry feed. Unit was demonstrated at recent American Sod Producers annual conference.