Ag and Food Interprets . . .

- **Control laboratory deserves better shake from management**
- **Agricultural chemicals industry sees low profits as here to stay**
- **Price will determine role of amino acids in food supplementation**
- **Lead losing ground to plastics for building fertilizer plants and equipment**
- **Well-fed world is still a dream for the future**

Quality Control for Fertilizer

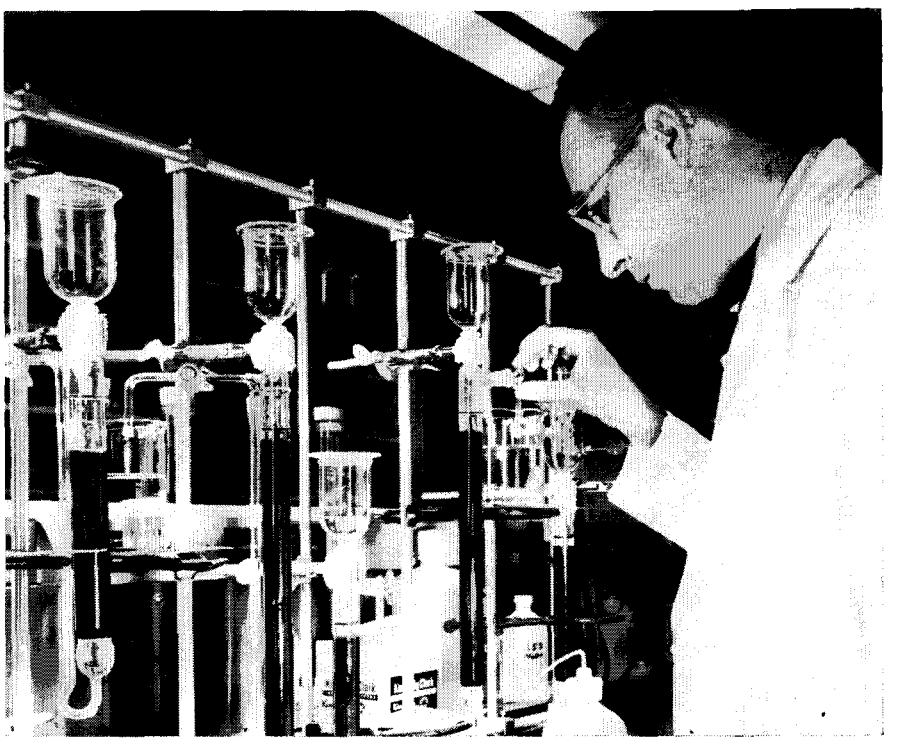
Control laboratory's contribution not understood or rewarded by management

THE CONTROL CHEMIST'S status in the fertilizer industry is far below what it should be, as judged by the contribution chemical control can and does make to the over-all aims and functions of the company. As described by Nelson White of International Minerals, the control chemist's present lot is not an easy one. He must work with bulk materials that are cheap as dirt, of poor physical quality, and handled in high volumes. The control laboratory, he said, is not properly regarded by management and is widely considered only as a defense unit.

Contrasted with the present picture is that of the ideal, as drawn by Mr. White before the conference on chemical control problems sponsored by the National Plant Food Institute last month in the Nation's Capital.

Mr. White's view of the ideal is that of a control laboratory closely linked to research and sales, one that has an active role on the management team. As he put it, the control laboratory is the custodian of a company's most valuable asset—its reputation. Although he sees the control laboratory growing in status, he believes it still has far to go before it achieves the role in management that it deserves.

Delving into history in an effort to understand and explain this gap between the actual and the ideal, Mr. White compared the fertilizer industry with the farm equipment industry.



The lot of the control chemist is not easy. He must work with materials that are cheap as dirt, of poor physical quality, and handled in high volumes

Fertilizer, he said, is a feeble, flabby industry, whose progress is at a crawl compared with that of farm equipment. Farm equipment, he declared, has progressed more rapidly and has done more good for farming and for itself than has the plant food industry. Why? White's answer is that farm equipment manufacturers have traditionally performed their own research and control, while the fertilizer industry has been content to let government agencies fill the void in research and control, because it was cheaper that way.

The fertilizer industry, he stated, preaches quality but practices pricing. It was his suggestion that the fertilizer industry could raise itself from the morass of pricing difficulties by performing its own research and control—that in fact it *must* do its own research and control. He asked the industry to assume more and more of the cost and responsibility for those functions. Then, he said, the industry could ask government to resurvey its role in fertilizer research and control. He pledged that his company would do its part toward achieving such a goal.

Another point of view on the relationship between government and industry in the field of plant food was expressed by Robert Z. Rollins, chief of California's Bureau of Chemistry.

It has been his experience, he said, that there is nothing better for a state control office than a well organized local industry, such as exists in his state in the California Fertilizer Association. Where there is a friendly, respectful relationship between the state and the industry, he said, the industry does not, as some might expect, try to influence the state control office to liberalize enforcement. On the contrary, he said, industry more often looks with less mercy toward the offender than would the control office.

But it was not the relationship between industry and government which occupied most of the agenda at the fertilizer control conference; it was statistics, a discipline that is becoming more and more important to the chemical analyst.

On the program was W. J. Youden, National Bureau of Standards, whose volume on statistics for chemists is the classic in this field. Youden presented a new method for analyzing statistically the results of the Magruder check sample work to get comparisons of various laboratories and procedures. Also participating were A. J. Duncan, professor of statistical quality control at Johns Hopkins University, and Edwin M. Glocker of W. R. Grace. Glocker showed how each laboratory that takes part in the Magruder check sample project could evaluate by statistical methods its own performance in relationship to that of other participants. R. Z. Rollins of the California Bureau of Chemistry showed how his agency had been able, through statistical methods, to detect and help manufacturers whose records for deficient fertilizer materials had been a source of trouble.

Running through all this was a faint suspicion that, although an analyst might come up with results far divergent from those of the majority, his results still might be closer to the true value than those of the majority. This suspicion was drowned with the observation that it was highly improbable. And, as for the "true value," C. H. Perrin of Canada Packers, Ltd., counseled that the term be discarded. A more practical term, he suggested, is "most probable value."

What does all this mean to the farmer, who is, after all, the ultimate beneficiary of these efforts, Said one agronomist, not much. Experience indicates, he said, that farmers get just as good crop yields with bulk materials, of poor uniformity, put on the field in such a way that there is wide variation in the amount of plant food available to crops at various locations on a field, as they do with more sophisticated materials and applicators. One state control official observed that it is often disappointing to those in state laboratories that few if any farmers ask for, let alone study, the laboratories' annual reports on deficiencies in fertilizer. However, said another, this may be explained by the fact that the farmer expects his state laboratory to protect him, although he is not interested in the details of how it is done.

Ag Chemicals Profits

Low profits for ag chemicals industry are apparently here to stay, but there can be some improvement

AGRICULTURAL CHEMICALS profits—improving, but still the industry's major problem. Such was the conclusion reached at the 26th annual meeting of the National Agricultural Chemicals Association held late last month at French Lick, Ind. Those in attendance seemed resigned to the view that low profits are becoming a fact of life. How to make this fact easier to live with was the theme developed by some of the major speakers on the program.

High on the list of unavoidable causes for the low-profit, low-return-on-investment situation is the large sum of money spent year in and year out on research and development. There's no room here for saving money, says NACA president Jackson V. Vernon, vice president of Food Machinery & Chemical Corp. And, he continues, if the agricultural chemicals industry is to progress, it will find itself spending even greater amounts each year on developing new products and improving old ones.

On the other side of the fence, prices for basic pesticides have been steadily declining over the past 10 years. In contrast, prices of all other goods and services used by farmers have increased.

From a marketing point of view, Vernon notes that falling prices are a mixed blessing. On the one hand, low prices permit more farmers to use more pesticides, thus generally broadening sales of agricultural chemicals. But on the other hand, the same price situation seriously handicaps the industry because its constantly rising research and distribution costs must be paid for out of profits slimmed by lower prices.

Another long time bugaboo for agricultural chemicals is distribution. Vernon says that, as an industry, "We are still plagued by a costly and excessive inventory problem." The industry suffers from the burden of oversized accounts receivable. Somewhere, laments Vernon, agricultural chemicals economics have deviated from accepted business thinking.

Consensus is that one of the biggest marketing steps forward in recent years is the lessening of consignment selling. In the northern half of the central United States, consignment selling of pesticides has been almost completely eliminated; and herbicides have progressed this way nationally, according to Robert S. Thompson, president of Thompson-Hayward Chemical Co.

Thompson believes this development has strengthened the agricultural chemicals industry more than has any other move, and will enable the industry to give better service to the farmer. This step, he continues, has enabled the industry to evolve channels and patterns of distribution which offer promise for the future. He notes that dealers and distributors who traditionally protested that they couldn't pay cash have, in fact, done so.

Thompson suggests that getting away from consignment selling should be carried a good deal further. He emphasizes that basic manufacturers should not sell their technical products on a consignment or dating basis. When they do so, they are really weakening the formulator-distributor, key link in the distribution chain. "Free warehousing" is only a fictitious advantage, while advantages of preseason discounts are only mythical, too.

Thompson lists these advantages for regular, or normal, sales terms:

- Producers have more accurate knowledge of inventory investment and of the inventory's physical condition.
- Inventory can be shipped quickly from one territory to another to meet demands, without first having to negotiate with a buyer who may have warehoused the material for many months.
- Costs of carrying inventory can be more precisely calculated, and then included in the selling price.

Thompson disagrees with the direct selling policies of some basic producers. These policies involve by-

passing what Thompson calls "natural distribution outlets"—formulators and distributors—and leaving the handling of sales to direct representatives. In Thompson's opinion, this trend has moved too fast and too far without the producers' fully analyzing the entire marketing scheme.

Thompson's claim: There is no segment of the chemical industry in which a strong local or regional organization fits better into the marketing scheme than it does in distributing agricultural chemicals. He says also that strong local formulator-distributors will always be able to give better service than their larger national competitors. Why? One reason is that local distributors are closer to markets, and are flexible enough to move quickly to meet changing demand.

Thompson has some advice for local formulators and distributors, too. To be really successful, they must also be jobbers or distributors of proprietary specialty pesticides which are manufactured and formulated by basic chemical makers (hence the term formulator-distributor). And he recommends maintaining enough capital to sustain the business volume which the distributor hopes to reach. This capital should be either self-generating or advanced by local bankers—not money which is invested by suppliers because of delayed payment, or through consignment merchandising.

Dietary Proteins and Amino Acids

ACS symposium speakers explore varied role of supplements in human and animal nutrition

WHAT FOODS can be properly called high-quality sources of protein? How does cooking alter the proteins in meat? What are the special protein requirements of people who are aged or chronically ill? How do amino acid supplements affect the growth of poultry? Even if amino acid supplements do improve weight gains in animals, are the farmer's profits increased enough to justify the extra expense of the additive?

These are just a few of the questions explored in a symposium on protein and amino acid supplementation, sponsored by the ACS Division of Agricultural and Food Chemistry. The day-long program at the Atlantic City meeting featured reports on everything from the protein requirements of infants to the effects of amino acids on the growth of turkeys.

Research on the value of proteins in the human diet has focused considerable public attention on these nutrients, says J. A. Campbell of Canada's Department of National Health and Welfare. In some cases, extravagant claims have been made for a food's protein content when actually the product was a comparatively poor source of protein. Today, a very definite need exists for a standard method of determining the relative merits of foods as protein sources, he says.

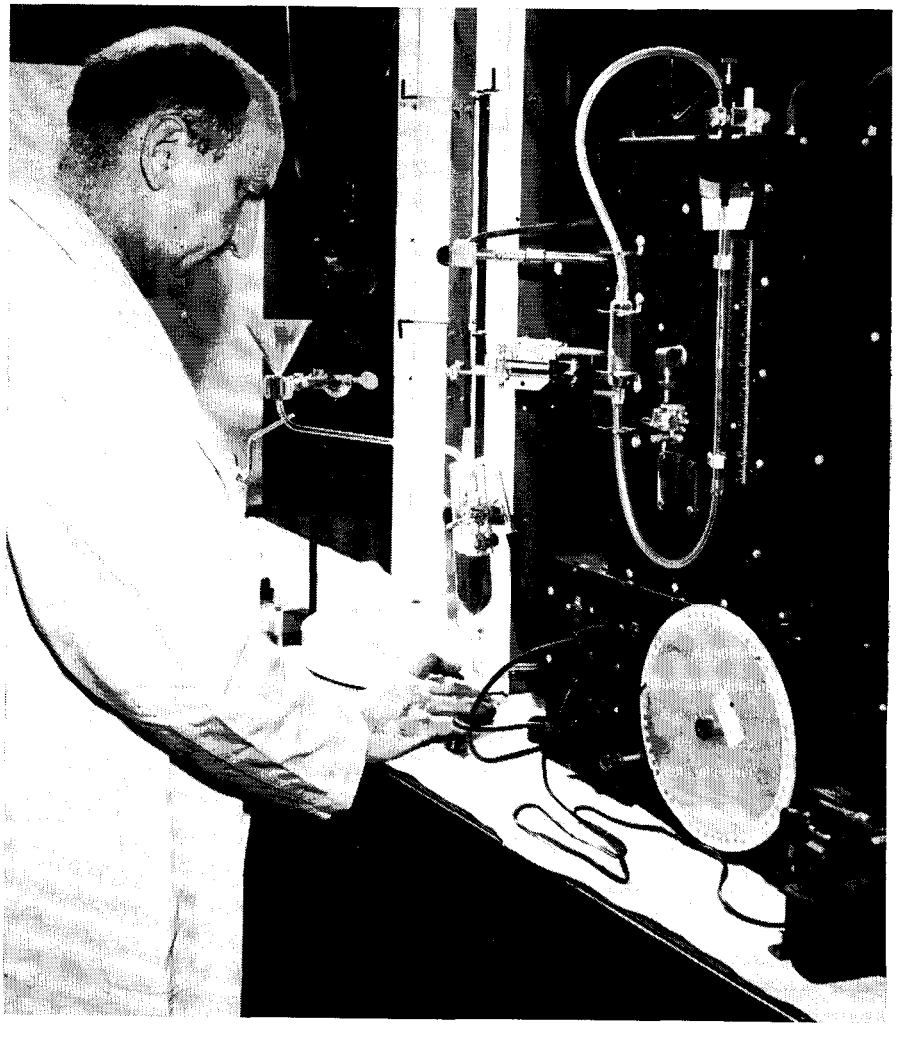
One way to determine a food's protein quality is to feed it at a level of 10% protein to rats in a standardized four-week growth test. But this determination of the so-called protein efficiency ratio (P.E.R.) is slow and requires special facilities for performing animal assays.

Fortunately, a faster and simpler method is available, says Campbell. It is based on the fact that most common foods are deficient in either lysine, methionine, or cystine. The content of these three amino acids is a good index of the food's protein quality. A simplified chemical scoring system that has been worked out correlates well with the P.E.R. values determined on the same samples of over 40 different foods.

In addition, a so-called protein rating has been calculated for a great variety of foods. It takes into account not only the quality of a food protein but also the amount of that protein consumed in a reasonable daily intake of the food. Meats, eggs, and milk have protein ratings varying from 40 to 70. Cereals and vegetables have ratings of 12 or less.

Foods with ratings of 40 or more,

Evaluating a food's protein quality means determining amino acid content. Here, USDA chemist Millard J. Horn is determining the amount of histidine in Navy beans



says Campbell, can be justifiably called "excellent dietary sources of protein." Those with ratings of 20 to 39 can be called "good dietary sources of protein." And no claims should be made for foods with ratings of less than 20. This numerical system, he says, should help remove some of the present uncertainty about the classification of food protein sources.

Effects of Heat

Standard cooking procedures and commercial processing methods do not have a damaging effect on three of the essential amino acids in meat—lysine, methionine, and tryptophan, says Channing H. Lushbough, formerly of American Meat Institute Foundation and now at Mead Johnson & Co. These, he says, are three of the eight amino acids essential to human nutrition. And it is these that are most likely to be deficient in low-quality diets.

However, lengthy heat treatment, such as heating under steam pressure for 16 hours, does reduce the nutritional quality of meat protein. In fact, such treatment makes unavailable about one third of the lysine, methionine, and tryptophan. Certain vitamins also are destroyed by extensive heating, says Lushbough.

Proteins for the Aged

Researchers have widely varying opinions about what really constitute the protein requirements of different segments of the population. In particular, there is much disagreement about the protein needs of the aged. According to Donald M. Watkin of National Institutes of Health, people over 65 have protein requirements quite similar to those of the younger population. In addition, various studies have shown that there are no significant differences between the abilities of the young and the aged to adapt to sudden decreases in protein intake.

The problem is that older persons, partly because of economic factors and a general lack of interest in food, tend to consume less protein than do younger people. Furthermore, says Watkin, "emotional problems in the elderly create nutritional problems probably more than in any other age group. Food faddism is extremely common. Panaceas for all sorts of ills are readily accepted. Patent medicines, especially those with vigorous appeals on radio and television, are far more readily accepted by the aged than is advice based on scientifically sound nutritional principles. . . . Consequently, steps toward improving the quality of low cost, readily available, and acceptable foods for the aged are worth serious consideration when scientifically justified."

As far as the chronically ill are concerned, these patients' protein requirements vary with type and severity of disease. In chronic liver disease, for example, a patient needs adequate dietary protein to permit tissues to be properly maintained and repaired. In chronic cardiovascular-renal disease, a protein or amino acid mixture of high biological value is needed to meet the patient's amino acid requirements without adding excessively to the nitrogen load on the impaired kidneys. A patient suffering from gastrointestinal disorders involving faulty digestion needs proteins and amino acid mixtures that are readily available, easily digestible, and of high biological value.

"Actually," says Watkin, "we know virtually nothing about the requirements for amino acid balance in most of our serious chronic illnesses. Hence, the greatest need for the moment is more intensive study of amino acid metabolism in normal human beings of various ages and in patients suffering from the more common of our chronic illnesses."

Amino Acids for Poultry

According to Hans Fisher of Rutgers University, the amino acid requirements of poultry are now reasonably well established. In a typical chick starting ration composed of corn and soybean meal, the amino acids lysine and methionine are present in quantities that just match the requirements. Therefore, even if these two amino acids are available at low cost, their use as supplements to the standard starting ration would not be worthwhile, he says.

For the laying hen, a standard 15% protein laying ration composed mainly of corn and soybean meal appears to be on the borderline of deficiency in methionine. Use of supplementary methionine will improve production. However, Fisher points out, there are a variety of natural protein sources that can be added or substituted much more economically than can synthetic amino acids. Nevertheless, in other parts of the world where protein materials are scarce and must be conserved, the use of synthetic amino acid supplements might be highly desirable.

In the U. S., amino acid supplements can play an important role in diets of growing turkeys, he says. A typical turkey ration contains 28% protein, derived from a variety of sources, including some rather expensive materials. Actually, relatively cheap mixtures of corn and soybean meal containing 20% protein can be fed equally well if supplemented with methionine and lysine. These amino acids, says Fisher, are the two most often limiting in ordinary rations for the growing turkey.

What about Swine?

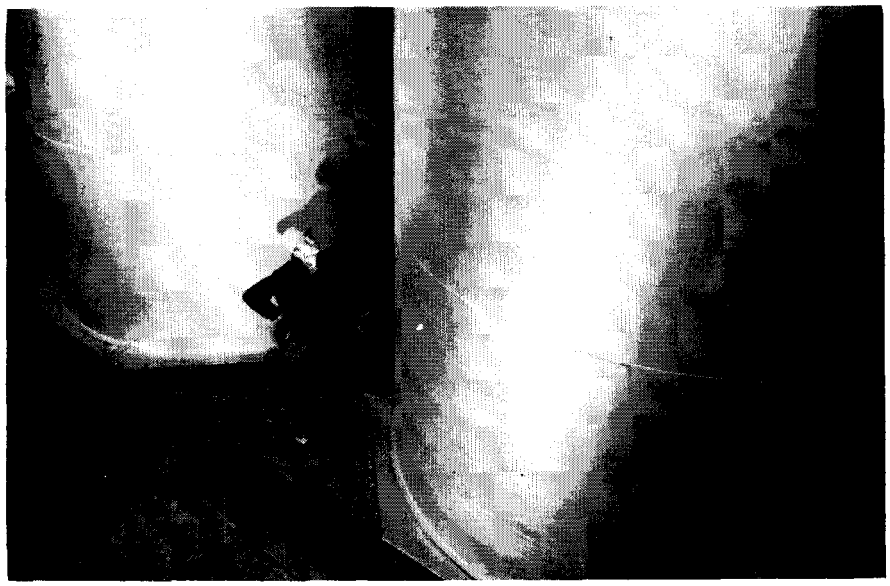
As yet, there is not enough evidence to make a very strong case for the use of supplementary amino acids, even in semipurified form, in swine feeding, says N. R. Ellis of the U. S. Department of Agriculture. Admittedly, however, present knowledge of swine nutrition is not as far advanced as that of poultry.

For the production of 50-pound pigs (for which data are most plentiful), a corn-soybean diet appears reasonably adequate in amino acids, with the possible exception of lysine, methionine, and cystine. If the protein supplement were exclusively cottonseed meal, linseed meal, or peanut meal or any combination of these, the diet would definitely be deficient in lysine, with methionine and cystine on the low side.

Most tests do not show a consistent benefit from amino acid supplementation when swine are fed a conventional diet of corn and soybean meal. However, when the soybean meal is replaced by tankage, fish meal, or meat scraps, the addition of tryptophan has been beneficial in some cases.

Two recently completed experiments at Beltsville on corn-cottonseed meal diets indicate that addition of 0.2% of lysine increases the rate of weight gain, says Ellis. On the other hand, supplementation with tryptophan and methionine does not produce consistent improvement.

The price of amino acid supplements will be a key factor in determining whether they will be used as feed supplements, Ellis emphasizes. Also to be considered is the possibility that new protein products still to be developed will be especially rich in the essential amino acids needed to supplement grains and related foods. Production of such materials, possibly microbiologically, might be another major step forward in improving animal nutrition.



Two 20,000-gal. acid tanks at Colorado Fuel & Iron's DAP plant are lined with Neoprene. On a concrete base, they are caulked with pitch at the junctures

Construction Materials

Lead loses ground to plastics for construction of fertilizer plants and equipment

FERTILIZER and phosphoric acid plants are undergoing a slow shift in materials of construction. Plastics got off to an uncertain start in the early 1950's and there were many failures. But they are now firmly established as construction materials. At the same time, lead, an old standby, is being used less and less.

This is the picture that emerged as E. Pelitti of Chemical Construction Corp., New York, outlined materials of construction for fertilizer plants and phosphoric acid service to the American Institute of Chemical Engineers, meeting recently in St. Paul.

Pelitti aimed his survey mainly at materials to handle phosphoric acid solutions (with various concentrations, temperatures, and impurities) and slurries. Also included: exhaust gases containing entrained phosphoric acid and/or fluorine compounds; wastes, contaminated with phosphoric, sulfuric, and fluosilicic acids, and containing various amounts of solids, such as gypsum; superphosphates and superphosphate slurries; ammonium phosphates and ammonium phosphate solutions or slurries; and phosphate rock.

Phosphoric acid solutions, Pelitti explains, are corrosive to most of the common materials. And the corrosion rate increases in most cases with acid concentration, temperature, and impurities. Wet process phosphoric acid plants run into a further problem. They have to contend with sulfuric acid, fluosilicic acid, and fluorine gases, by themselves or combined with phosphoric acid.

However, says Pelitti, there are some cases in which conditions are only mildly corrosive. Here, he points out, common materials work out all right for short periods of operation or for limited use. But they will not take continuous service over long periods of time. Thus the choice is a matter of economics.

Plastics Popular

Plastics, both thermosetting and thermoplastic, says Pelitti, are popular since they do not corrode in the normal sense of the word. As electric insulators, they break up galvanic effects between dissimilar metals. They are also light, strong (especially with reinforcement), and in many cases inexpensive.

With these properties available and with continuing development, plastics are a relatively inexpensive source of new materials with which plant personnel can experiment, Pelitti points out. And experimenting, he says, is still the only reliable method for choosing materials of construction for specific uses. A material that has worked out well in one plant has sometimes failed quickly in another plant even though conditions appeared to be similar. Different impurities are often the cause. But slight variations of temperature, turbulence, or flow patterns may also be to blame. And these are often almost impossible to detect or control, Pelitti adds.

Of the thermosetting plastics, polyesters, epoxies, phenolics, and furane have all found use in reinforced parts and linings. In addition phenolic and furane resins are used to impregnate carbon and graphite. And glass-reinforced polyester or epoxy pipe shows great promise for handling phosphoric acid at high temperature and pressure.

Thermoplastics find their biggest outlet in piping, says Pelitti, and vinyls probably lead the field. A major advantage of plastic piping is its adaptability to field fabrication. Saran, a copolymer of vinylidene chloride and vinyl chloride, is used mainly for lining steel piping.

Rigid polyvinyl chloride (PVC) also finds extensive use for piping, fittings, and valves. Much more normal PVC than high-impact PVC is being installed in fertilizer plants, says Pelitti, because it has better tensile and flexural strength and a higher temperature limit.

Polyethylene, too, is supplying its share of the piping and is now preferred over Saran for instrument lines. But this is the conventional type; there are still no known commercial uses of linear polyethylene or polypropylene in fertilizer plants, according to Pelitti. However, he feels their properties clearly point to future uses as soon as their cost is more in line with that of the conventional material.

Lead Losing Ground

Lead—onetime extensively used material of construction—is losing out to elastomers and plastics. And with less of the metal being used, the number of skilled lead burners in the country has dropped, making lead even less attractive. In fact, says Pelitti, use of lead today in phosphoric acid applications in the United States is limited to special parts and to applications in which temperature is too high for rubber.

Lead's chief competition other than plastics is compounds based on natural rubbers. With but few exceptions, says Pelitti, synthetic rubbers have failed to find wide application in the fertilizer and phosphoric acid field. Rubber goes mainly for lining vessels and piping. Principal reasons are lower cost plus ease of applying the materials and making minor repairs.

Elsewhere in the nonferrous metals area, copper—used mainly for instrument air lines—is losing out in this application to plastic tubing. Zirconium, one of the newest engineering metals, has outstanding corrosion resistance to phosphoric, sulfuric, and hydrochloric acids, according to reports. But, says Pelitti, there is no information on its use in specific phosphoric acid applications, and its price is still quite high.

Plastics and elastomers may be finding larger and larger markets in phosphate and fertilizer plants. But, says Pelitti, carbon steel is still the one material, with the possible exception of concrete, having the largest tonnage use today. Steel frame construction, he points out, is almost universally used in the United States for both process and storage buildings. And steel is also the most common material for tanks, hoppers, and bins.

Type 316 stainless steel is the alloy most commonly used for handling phosphoric acid, says Pelitti. Where type 316 corrodes too rapidly, high alloy stainless materials have been used. High nickel alloys, on the other hand, are limited to especially severe applications because of their high cost.

The latest addition to the group of Inco alloys, Nionel, shows much promise. It has been initially tested in several Florida plants, Pelitti says. In submerged combustion concentrators, where the burner is subjected to the most severe corrosive conditions, Nionel has outlasted type 316 L stainless steel three to five times, according to Pelitti.

How the World Fares at the Dinner Table

Daily calories	% of Total Population (data cover about 80% of the world's population) Prewar	Postwar (1952)
Over 2700	30.6	27.8
2200 to 2700	30.8	12.7
Under 2200	38.6	59.5
Daily Animal Protein		
Over 30 grams	22.1	17.2
15 to 30 grams	18.9	24.8
Under 15 grams	59.0	58.0

Source: FAO

Malnourished Millions

A well-fed world is still a dream for the future despite efforts of many groups working in under-developed areas

A child born in Guatemala today has a life expectancy of about 45 years. And for every 1000 births, 89 infants will die before they are one year of age; of every 1000 children that reach one year, nearly 200 will die before they are five. Most of these children who die will starve to death—some because of an outright lack of food, and others because of a lack of proper nutrients in their diets.

Guatemala, of course, is only one of many countries with serious nutrition problems. In large areas of China, India, Latin America, and Africa there just isn't enough of the right kind of food to go around. One expert estimates that two out of every three babies born today are doomed to suffer severe malnutrition.

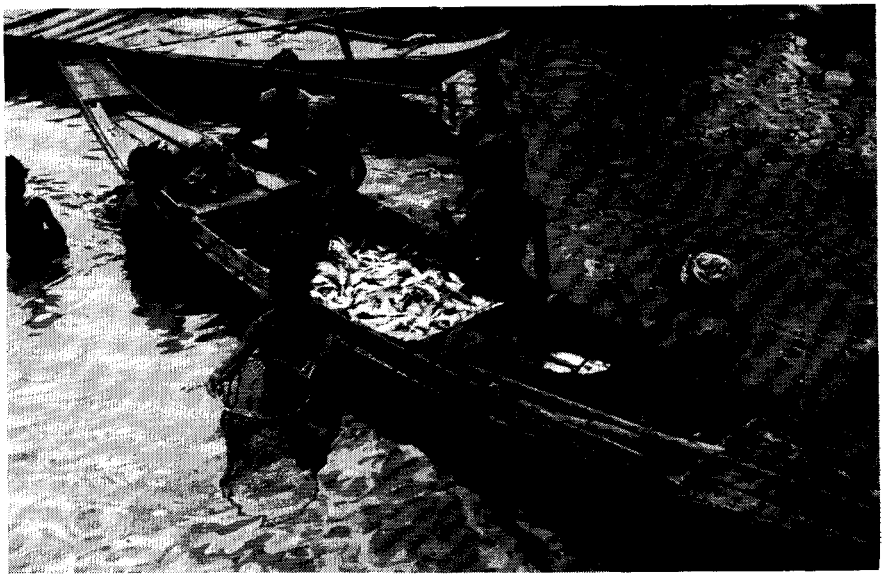
On the plus side, many organizations are aligned in the battle to provide more and better food for the underdeveloped areas of the world. Among them are the World Health Organization (WHO), the United Nations' Food and Agricultural Organization (FAO) and International Children's Emergency Fund (UNICEF), the Meals for Millions Foundation, and CARE. This is only a partial list of the groups that are active, but despite the attention given to food problems, workers are hard-pressed just to keep up with the galloping population increases in underdeveloped areas. Before major progress can be made toward hiking nutrition standards, much additional time and money will be needed.

Statistics First

Statistics on food consumption are a key item in any effort to upgrade an area's food supplies. For this reason, FAO encourages governments to collect reliable data on food consumption. In Latin America, for instance, food balance sheets (estimates of food supplies available per person) are maintained for countries which represent about 80% of total Latin American population.

The balance sheets help to show how food supply patterns vary from region to region. In Mexico and Central America, maize is the staple of most diets. It accounts for 43% of the calories consumed in El Salvador

FAO has helped to train native Thai technicians in methods of improving and developing their inland fisheries, one way of overcoming protein malnutrition



FAO project in India is is aimed at improving hybrids of rice, basic food of more than half the world's people. FAO calculates that 50% more rice could be produced from areas already under cultivation by applying modern technology

and Honduras, and 60% in Guatemala. Farther south, the dependency on maize decreases and more rice and wheat appear in national diets.

According to FAO, food consumption data from Latin America show that in most countries the mass of the population depends on a diet based on cereals and starchy roots. More nutritious foods are present in relatively small quantities. And while total agricultural output in Latin America is on the increase, the extra production can scarcely keep up with population growth. Thus, per capita supplies have not changed much in recent years.

At the fourth conference on nutrition problems in Latin America, FAO suggested some targets for protein intake. A child at one year should have 1.5 grams of protein per kilogram of body weight each day, while 0.35 grams per kilogram per day should be enough for an adult. These figures are in terms of protein of high biological value. In countries in which a great deal of maize is consumed, total protein intake generally is not low, but the amino acid pattern in the proteins is seriously unbalanced. In several Latin American countries, FAO reports, less than 15 grams of animal protein is available per person per day.

Protein from Vegetables

One answer to nutrition problems is to develop and make available vegetable protein mixtures. A joint FAO/WHO committee on nutrition suggests these criteria for any protein-rich food worthy of study:

- It must be available or producible locally.
- Production and/or purchase by all sections of the population must be feasible from agronomic and economic standpoints.
- It must be easily transportable and have long storage life without refrigeration under prevailing conditions of heat and humidity.
- It must not be toxic or have other deleterious qualities.
- It must have acceptable taste, odor, and physical properties, and be easy to include in ordinary diets.
- Its protein value must be such that it effectively supplements existing diets.

Six protein sources that measure up to these standards are under study: fish flour, soya products, peanut flour, sesame flour, cottonseed flour, and coconut flour. In the coordinated FAO/WHO program to investigate these foods, the first step is to locate at least one source for each product and produce a batch under carefully defined conditions. The composition of each batch is studied, together with its biological value, safety, and protein value for children and adults.

When the product's food value is known and its safety established, it is made available to research groups in underdeveloped areas and elsewhere. At the local level, the product's effectiveness in preventing or curing protein malnutrition is determined.

The next step is to learn if manufacture of the product in the area concerned is practical. UNICEF aid is usually required at this stage. Two products, fish flour and soya-bean extract, have now reached this stage in the current FAO/WHO program.

Supplementary Feeding

While efforts to produce nutritious foods at the local level will probably yield the best long-term solution to food problems, immediate needs are partly provided by supplementary feeding programs handled by groups such as UNICEF and CARE. In Brazil alone, for example, some 3 million school children get milk and enriched flour through national services and bilateral groups. Beneficiaries of similar programs number 160,000 in Guatemala, El Salvador, and Costa Rica combined; 68,000 in Nicaragua; 200,000 school children in Chile; 140,000, of whom 90% are school children, in Panama.

Another outstanding effort in the field of supplementary feeding is handled by the Meals for Millions Foundation. Over the past 13 years, some 56 million "3-cent meals" have gone out to fight starvation in more than 100 countries. The Meals for Millions Multi-Purpose Food (MPF) was developed in 1945 at the California Institute of Technology. MPF is a fortified soybean meal. A two-ounce serving costing about 3 cents provides 200 calories and about one-third of the protein, vitamins (except C), and minerals required by an adult for one day.

Although progress continues on many fronts, world nutrition problems are still far from being solved. Henry Borsook of Caltech, developer of MPF, says one of the big obstacles to progress lies in the minds of those who still think of nutrition only in terms of agriculture rather than of all available sources. Bulk diets derived from natural sources, he says, should be supplemented with pure nutrients—amino acids, vitamins, and minerals—available from industry. To advance such a program as quickly as possible, Borsook suggests setting up a world nutrition agency that would be a co-equal with WHO and FAO. Such an agency could mobilize the available resources of vegetable-protein concentrates, manufacture pure nutrients, and allocate present cereal grain supplies. This approach could provide adequate nutrition for most of the world's people at a cost within their means, concludes Borsook.