Problems related to nutrition and health beset the dairy industry because milk and other dairy foods or component parts of milk and other dairy foods have been:

**Implicated** as contributing factors in development of diseases or as undesirable in treatment of such diseases as: allergies, arthritis, atherosclerosis, cancer, cataracts, coronary heart disease, dental caries, galactosemia, hypo- and hyper-calcemia, hypoproteinemia, kidney stones, milk-alkali syndrome associated with treatment of ulcers, leg cramps in pregnancy, osteomalacia, osteoporosis, and overweight;

**Challenged** because of unintentional additives or adulterants which inadvertently may get in milk: strontium**, penicillin, pesticide residues, and cancer-producing hydrocarbons in wax and coal tar dyes;

**Kept on the defensive** for lack of basic nutrition information regarding: human requirements for fat, fatty acids, protein, amino acids, calcium, phosphorus, magnesium; hazards of component parts of milk and of unintentional additives in levels found; and specific effects of milk on athletic performance, growth, industrial performance, specific pathologies, etc.;

**Put further on the defensive** by: information published for consumers but originating with authoritative individuals, promoters of competitive products, or food faddists.

Research has already resolved and can continue to resolve those problems which arise from lack of basic nutrition information. Such information can aid: in understanding the causes of dietary or metabolic diseases; in formulating dietary recommendations in prevention and treatment of disease and in promotion of positive health and athletic and industrial performance; and in challenging false statements issued professionally, competitively, or maliciously.

From currently available knowledge, what is the status of dairy products in relation to specific diseases? This complicated question can not be answered without first considering: the physiological needs of healthy human beings; what constitutes a nutritionally adequate diet; the role which milk and dairy products play in such a diet.

**Physiological Needs**

The amounts of energy and essential nutrients needed to maintain good nutrition in healthy persons have been estimated in the Recommended Dietary Allowances, revised 1958, by the Food and Nutrition Board of the National Academy of Sciences—National Research Council (20). These allowances serve as a yardstick by which to plan food guides and meals to provide adequate levels of all essential nutrients; and to evaluate diets consumed by people.

**Essentials of an Adequate Diet**

That it is possible for healthy people to eat an adequate diet from the food supply available in the United States has been demonstrated in a United States Department of Agriculture Home Economics Research Report titled Essentials of an Adequate Diet (34). In this bulletin, the nutrient contributions of four food groups are presented, with evidence showing how combinations of foods from these groups can supplement each other to provide recommended amounts of essential nutrients. The foods are combined in recommended amounts in a pattern called A Daily Food Guide by the United States Department of Agriculture (36) and A Guide To Good Eating by the National Dairy Council (21).
EVALUATION OF MILK IN OUR RECOMMENDED DIETARY PATTERNS

How essential is milk in this pattern? How adequate would be the diet if this group were omitted? We know of only one project in which such an evaluation was made, a study sponsored by the National Dairy Council at Wisconsin Alumni Research Foundation, in which four species of animals were fed foods combined as in A Guide to Good Eating . . . with and without milk.

The difference milk made is shown clearly in the Milk Made The Difference pictures of the animals. These pictures were taken after the animals were on the diets for varying periods of time. The diet without milk was seriously deficient in calcium and phosphorus and was low in riboflavin. The deficient dog went into tetany a week after the poster picture was taken, providing proof of a calcium deficiency (2).

While we do not have as clear cut an evaluation of milk with human subjects, we do have several studies which show that children grow better and are healthier when adequate amounts of milk are consumed (26, 30). In countries where children receive little or no milk, infant and child mortality is high and dietary deficiency diseases are frequently seen (16).

DIET AND DISEASE

But what have our recommended dietary patterns to do with disease? Simply this, some pathological conditions can be treated and some possibly prevented by modification of diet. But to be effective and not harmful, dietary treatment of a disease must have a rational basis. A therapeutic diet must be prescribed on positive information that: what is added has the desired therapeutic value; what is withdrawn is harmful and improvement follows after it is withdrawn; the altered diet is nutritionally adequate, so that dietary deficiencies are not superimposed on existing maladies; and the individual has a minimum of problems in obtaining the prescribed diet and maximum enjoyment of it.

It is desirable, then, to try to keep therapeutic diets as flexible and as close to normal dietary patterns as possible.

MILK AND DISEASE

Milk plays a varying role in the treatment and prevention of disease because: milk is readily separated into its component parts of milkfat and nonfat milk solids; milk is available in a wide variety of forms and flavors; milk can be combined with other foodstuffs in the preparation of tasty and tempting dishes suitable for use at every course of every meal of the day; milk is easily digested and assimilated; and milk complements the nutrients present in almost every food with which it is combined.

MILK AND GALACTOSEMIA

Galactosemia is the only clearly defined disease entity for which milk of all species must be completely and permanently withdrawn. This is a congenital disease characterized by lack of an enzyme in liver and red blood cells which is required for normal exchange of galactose-1-phosphate to glucose-1-phosphate. When milk is given, galactose-1-phosphate accumulates in the red blood cells and interferes with normal metabolism, particularly in the brain (15). Galactose is a simple sugar which is combined with glucose in lactose, the carbohydrate present in milk, human as well as cow's milk.

The condition of galactosemia is believed to be exceedingly rare. Certainly, there is a very low recorded incidence. However, research efforts have revealed that this is a genetic disease transmitted by simple autosomal Mendelian inheritance. It is detectable in babies shortly after birth by assay for galactose-1-phosphate uridyl transferase in red blood cells. It is predictable as a possible problem in the child when both parents carry the trait. It is hoped that damage to brain and other tissues can be avoided in afflicted infants, and they can be given reasonable chance for normal development with careful dietary supervision, starting at birth (11).

MILK ALLERGY

True milk allergy is another condition for which milk should be withdrawn or should be modified. A true milk allergy is one in which the individual has become sensitized to one of the proteins present in milk. The sensitizing protein may be the lactalbumin or the casein. There is some evidence that heat treatment of the milk will sufficiently alter the allergen protein so that it will not cause an allergic reaction (27). If this can not be done, then the child with a true milk allergy must be fed a carefully worked-out formula or diet which pro-
vides the nutrients normally provided by milk. There is a great deal of confusion and disagreement among pediatricians with respect to milk allergy: its symptoms; incidence among children; fraction of milk which contains the allergen; and treatment of the allergic child.

Symptoms of milk allergy most frequently involve the gastro-intestinal tract and the skin. However, many digestive disturbances and eczematous skin conditions are not manifestations of allergies. Among allergic children, incidence of allergy to milk is an important problem. However, in a cross section of babies, incidence of milk allergy is uncommon. Reported incidences vary: 1.0% among 403 babies under 2 yr. of age; 1.5% among 250,000 individuals; 2.3% among 150,000. Only two pediatricians report incidence as high as 7% among their patients (3, 28, 29).

One group has urged that all children born to families which manifest allergies of any kind be placed on milk substitutes from birth to avoid development of milk allergy (29). This is more generally regarded as a highly dangerous practice, since plant and egg proteins are more apt to be allergenic than is milk protein, and children are seldom well nourished when milk is withheld (28).

Milk fat is sometimes excluded when a child manifests allergic reactions. Actually, tolerance to fat is sometimes one manifestation of an allergic reaction to plant protein. This is true in celiac disease, where an allergy to protein in wheat interferes with normal digestion and assimilation of fat. It is correctable only by removal of the offending protein and is not helped by removing milk fat (13, 14, 33).

MILK AND HYPOPROTEINEMIA

Iron-deficiency anemia is perhaps the nutritional problem most frequently encountered among children in the United States today. Milk has been cited as the cause of such anemia. In reality, lack of other foods is responsible. While most infants have sufficient iron stores at birth to see them through the first 6 mo. of life on a milk diet, other foods must be added to the diet at that time to provide dietary iron, or anemia will develop.

This condition has been erroneously represented as hypoproteinemia, with claims that children drinking 1 to 2 qt. of milk a day supplemented with crackers and cookies were nutritionally deficient in protein. This claim is made with no biochemical measurements of the protein or amino acid levels in the blood and no evidence of dietary lack of protein (19). One to two quarts of milk supply 34 to 68 g. of high quality protein (8). The recommended allowance for the child 1 to 3 yr. of age is 40 g. of protein per day (20).

MILK AND PROTEIN MALNUTRITION

Protein malnutrition is frequently seen in underdeveloped countries among children who receive no milk after weaning and subsist largely on carbohydrate diets. Such children have very low blood levels of total amino acids, individual amino acids, albumin, and total protein. They are in negative protein balance; are edematous, fretful, apathetic, and have fatty livers. These children can be cured if they are fed milk before changes become irreversible. Addition of milk to the diet is the preferential and only necessary treatment to correct protein malnutrition, whether it be called kwashiorkor, marasmus, or any other name locally applied to this condition. When the children are given milk, blood levels of amino acids and albumin return to normal; protein is stored as positive nitrogen balance is established; the edema recedes; and growth and health and natural childish happiness and interest return (16).

Attempts have been made in Mexico and in Africa to supply protein to these children as combinations of corn and beans, beans and peanuts, or beans and peanut flour or soy bean flour. Although these combinations of plant foods provided levels of essential amino acids and total protein comparable to those supplied by milk, the protein was not well utilized. Many of the children failed to respond to these foods and remained in negative nitrogen balance, with low blood levels of amino acids and albumin. Others showed some improvement, but none responded as well to these sources of protein as to milk protein. The plant proteins were somewhat better retained when lysine and tryptophane were added to the diet. Amino acid supplementation of milk did not increase protein retention, already good with milk (9).

It is of special interest that in populations where protein malnutrition is rampant, where eirrhosis of the liver is common, where milk and other sources of animal protein are minimal in the diet, blood cholesterol levels are very low. With very low intakes of protein, it is not possible to elevate blood cholesterol levels. Although largely unattended, the question is being raised, "Are very low blood levels of cholesterol a manifestation of protein deficiency?" Indeed, it has been suggested that elevation of blood cholesterol levels be taken as a measure of improvement of children being treated for kwashiorkor. Such elevation occurs with improvement as a response to the feeding of nonfat milk solids alone (31).

MILK AND DENTAL CARIES

In the United States, about the most commonly encountered nutrition-related health problem among children is dental caries. The extent to which fluoridation of communal water supplies is now in effect is indicative of the scope of the problem. While fluoridation can reduce the incidence of the disease, it can not be expected to wipe it out. There is still a need to
understand the role which diet plays in dental
health.
Milk provides essential nutrients needed for
the development and maintenance of sound
tooth structures and supporting bone. But to
what extent can milk in its various forms pro-
tect against decay of the teeth? At least par-
tial answers to that question have been pro-
vided by a study reported by Dr. James H.
Shaw of Harvard School of Dental Medicine
and sponsored by National Dairy Council. Rats,
with a highly predictable incidence of dental
caries when fed a standard cariogenic diet,
were fed: milk, chocolate milk, and combina-
tions of each of these with cheese and ice
cream. Part of the cariogenic diet was replaced
with these dairy foods. A percentage of cal-
ories was provided by the dairy foods which
would be comparable to the per cent of calories
they would provide a child of comparable age,
if the child were to consume recommended
levels of milk. Marked reduction in dental
caries occurred in the rats when any dairy food
replaced part of the cariogenic diet. Many
animals who received the dairy foods had no
caries at all. There were some differences but
no statistical differences in the extent of re-
duction of caries affected by the different forms
of milk (32).
At this time, there is need for a study in
which children who have a high incidence of
dental caries are given a quart of milk a day in
its different forms to determine the effect on
incidence of tooth decay.

MILK AND OBESITY

Obesity is the most commonly encountered
nutrition-related health problem among adults
in the United States today. If it is not the
most commonly encountered, it is the problem
with which people are most commonly pre-
occupied . . . if the number of articles in the
professional and lay press is a suitable
criterion.
Despite the popular concept that milk is
fattening, Dr. Margaret A. Ohlson claims that,
"Milk does more for the reducer than any other
single food." She also points out that, with
low-calorie intake, inclusion of milk becomes
increasingly necessary if the diet is to be ade-
quate in essential nutrients. These conclusions
were reached after many years of experience
in: helping people from all walks of life to
lose weight; evaluating the nutrient content
of self-chosen and controlled diets; and evalu-
ating physiologically, biochemically, and psy-
chologically the effects of different diets and
food combinations on the people consuming
them.
The effectiveness of such diets has been dem-
onstrated (5, 7). The results are documented
in the National Dairy Council film titled
Weight Reduction Through Diet.

Small, active women can control weight with
daily meals like these:

The meals shown in the pictures provide
about equal amounts of protein, carbohydrate,
and fat, a mixture comparable to that present
in whole milk. Calorie value and fat content
can both be decreased by avoiding added fats,
trimming meat fat, and using skim milk. How-
ever, lower fat and lower calorie diets are
harder to stay with over a long period of weight
reduction.
Large, active women and men can control weight with daily meals like these:

is best done by careful regulation of: food intake with an adequate diet containing a fairly fixed ratio of protein, carbohydrate, and fat; insulin administration at a level established for the individual; and regular exercise and rest so that energy balance is maintained.

There is a trend away from very high fat—very low carbohydrate diets for the diabetic. Milk is particularly valuable for the diabetic because of its favorable protein-carbohydrate-fat ratio and high nutrient content; and the extent to which the concentration of milk fat and nonfat milk solids can be varied, when desired, by use of different dairy foods. Special products can be made, and some are available commercially in which nonsugar sweetening agents have been used. An artificially sweetened ice cream is available in some areas. These are not labeled as, and should never be called, diabetic ice creams. Instead, they should be referred to as legally labeled, artificially sweetened (36).

Milk and Diabetes

Some obese and some non-obese people are diabetic. It is highly desirable that the diabetes of an afflicted individual be controlled. This

Milk and Ulcers

The objectives in dietary treatment of ulcer patients are twofold: to reduce gastric acidity; and to protect the mucosa of the stomach. Milk and cream taken at frequent intervals aid these objectives. These foods do not stimulate gastric secretion in the way many other foods do; they are nonacid-contributing; they are acid-neutralizing; they protect the mucosa of the stomach when milk fat acts as a physical barrier between the acid contents of the stomach and the mucosal tissue.

Milk and cream continue to be used, although to a lesser extent, alone or in combination with alkalizing agents as a preferential and effective dietary control of ulcers. Care should be taken that the rest of the diet is adequate; that the individual does not unduly gain weight from a too high calorie intake; and that the person does not become over-alkalized. The milk-alkali syndrome, which has been occasionally observed in the ulcer patient, does not occur with high milk intakes without the use of alkalizers.

The ulcer patient may be affected by three factors which may also be involved in development of atherosclerosis leading to coronary heart disease: stress, mineral imbalance, and high fat intake. A recently reported study of autopsy and clinical records of ten hospitals in the United States and of five hospitals in Great Britain indicates a higher incidence of myocardial infarction among ulcer patients treated with high milk diets and alkalizers than among non-ulcer patients (6). In another study, patients fed corn oil (or corn oil stripped of vitamin E) developed a higher incidence of ulcers than did patients fed a regular hospital diet. These shreds of evidence leave completely unanswered the question: Does currently practiced treatment of ulcers foster heart disease?
Does currently practiced treatment of heart disease foster ulcers? Do these two chronic diseases have some common origin?

**Milk and Gallstones**

Fat and cholesterol are intimately involved with each other, in foodstuffs of animal origin, in body tissues, in digestion and metabolism. Not all of these relationships are fully understood, but they are recognized. Cholesterol is removed from circulation in the liver and is excreted as bile salts from the gall-bladder into the intestine. Bile salts are essential for normal digestion and absorption of fat.

When gallstones are formed (chiefly from cholesterol) in the gall-bladder or its duct leading into the intestine, flow of bile is interrupted. Under these circumstances, dietary fat must be restricted, because it will not be properly digested and absorbed and will create severe gastrointestinal disturbances for the individual. Although not documented in scientific reports, medical opinion indicates that unheated milk fat is better tolerated than other fats by people with gallstones or with other intolerances to fat. This may be because of the natural emulsion of milk fat; its concentration of lower short-chain fatty acids; or to other characteristics not identified. While milk fat may be tolerated in small amounts consumed in milk, butter, cheese, ice cream, or other dairy foods, it may have to be strictly avoided by some people with gallstones or other gall-bladder difficulties. In such cases, nonfat milk solids can still be consumed by the patient to help maintain an adequate diet.

Gallstones occur in 5 to 10% of all adults over 40 yr. of age. It is more frequent among women, especially those who have borne more than one child. Occurrence of stones does not appear related to blood levels of cholesterol. Although gallstones have been caused in some animals by feeding cholesterol, they have occurred in others fed diets free of cholesterol and very low in fat. Adding 10% linoleic acid to such diets did not prevent stones, but removing sucrose and replacing with some grains did prevent gallstones from forming. Restriction of dietary cholesterol will not insure that stones will not form in human beings, since this substance is readily formed in the body.

**Milk and Kidney Stones**

Kidney stones are another type of abnormal deposit or accretion which occurs in the body. A kidney stone forms when mineral deposits of calcium or magnesium and phosphorus are laid down in an orderly fashion on a protein matrix. Cholesterol may also be involved in such stones. In this country, kidney stones rarely occur among children. They occur more frequently in men than in women. The incidence of kidney stones is greatest in the southeastern states, where milk production and consumption are least; and lowest in Wisconsin, the state of highest milk production. Some persons who have repeatedly formed kidney stones have developed their largest stones while on a milk-free, low-calcium diet.

**Milk and Coronary Heart Disease**

Cholesterol and fat, combined with protein, are pathologically deposited as atheroma in the inner wall of the artery in a degenerative disease called atherosclerosis, the forerunner of coronary heart disease, the primary cause of the death of adults in the United States. What causes these deposits is unknown. Atheroma are more extensive and severe among people who have abnormally high blood cholesterol levels related to idiopathic hypercholesterolemia, diabetes, hypothyroid activity, or hypertension. Coronary heart attacks occur more often among individuals with these diseases and, during middle age, more often among men than among women. However, coronary heart attacks occur even among people with very low blood cholesterol levels; and many people with high blood cholesterol levels live to old age and die of something else.

Blood cholesterol levels vary with individuals; are low among population groups with limited food supplies and are higher among groups with generous food supplies; increase with age; are about the same for men and women until the fourth decade, when levels are a little higher for men for about an 8-yr. span and higher for women after that time; can be affected by diet and mode of life, but cannot be used as a predictive measure of susceptibility of the individual to a coronary heart attack.

Blood cholesterol levels are a little higher when human beings consume milk fat than when they consume fats with a high concentration of unsaturated fatty acids.

Babies who consume breast milk have serum cholesterol levels which are slightly higher than in babies who consume cow's milk formulas. When vegetable oils are substituted for milk fat in cow's milk formulas, the serum cholesterol values are very low, comparable to those of babies suffering from protein malnutrition. Which serum cholesterol values are desirable for a baby is not known.

Milk fat has not been demonstrated to contribute to development of atherosclerosis or coronary heart attacks. It has not been demonstrated that lowering blood cholesterol levels by substituting vegetable oils for milk fat has reduced incidence among groups of people or delayed onset of coronary heart attacks for individuals.

If it should prove valuable for individuals to avoid milk fat, they can still enjoy the nutritional benefits of the nonfat solids in fluid skim milk and dry nonfat milk solids, skim milk, cheeses, and other products. If there is a need for and a market for other products modified
with respect to fat content, they can and should be provided by the dairy industry. At the present time, and according to the Food and Nutrition Board: "It is not yet possible to indicate the fatty acid mixture most favorable for support of human health. A diet of a wide variety of foods of vegetable and animal origin is most likely to maintain good health" (20).

MILK AND DISEASES OF CALCIUM METABOLISM

Milk is the best source of calcium, not only because it is a rich source but also because it simultaneously provides protein and lactose, phosphorus, magnesium, other minerals and vitamins, and vitamin D when so fortified. Absorption of calcium from the intestines is aided by the presence of vitamin D, protein, and lactose. Deposition of calcium in bones and teeth is aided by the presence of vitamin D, phosphorus, magnesium, protein, and possibly lactose and other vitamins and minerals. The minerals are needed component parts of the calcium salts which are deposited in bones and teeth. The protein is needed to form and maintain bone cells which, in turn, build the bone itself. The precise function of vitamin D in deposition of calcium salts is unknown.

The hormone of the parathyroids maintains a constant level of calcium in the blood by favoring deposition in bone when intake is high and withdrawal from bone when intake is low. The precise mechanism by which this hormone acts is unknown.

Pathologies related to calcium metabolism, as observed in the U.S.A., appear to be more related to low than to high intakes; to be related more to hormonal imbalance or other physiological imbalance than to excess dietary intake of calcium (37).

We know relatively little about processes that produce calcification of soft tissues. Dietary deficiency of magnesium tends to create such calcification. So does excess of vitamin D. Excess parathormone leads to excess bone resorption and deposition of calcium in the tubules of the kidney. Hyperparathyroidism, apparently an inherited tendency, is correctable by surgery. There is need for more efficient and accurate early diagnosis for this condition, because it leads to kidney stones and bone demineralization (ostesitis fibrosa cystica). Blood levels of calcium and phosphorus may be normal in this disease and, therefore, can not be depended upon for diagnosis (37). Osteitis or Paget's Disease is a disease of local resorption of bone in people over 40, often accompanied by pain and deformity. Its cause is unknown, although it may be an inherited defect in metabolism or in adrenal gland activity. Cortisone promotes healing, but there is no truly effective treatment (37).

Osteoporosis, a disease of insufficient bone substance, is believed due to failure of the protein matrix to effect mineralization. It occurs chiefly in older women, is treated, largely ineffectively, with a combination of estrogen and androgen (female and male hormones). Storage of calcium is very little improved by the hormones unless calcium intake is generously increased to a mean of 1.1 g. per day. The disease is frequently seen in people who use little or no milk or dairy foods. Although diet has not been given much consideration in prevention and treatment of this disease, there is a need for serious alteration in both concept and treatment of this disease (37).

Among children, neonatal hypocalcemic tetany sometimes occurs during the first five days of life, in which an infant suffers convulsive muscular contractions resulting from low blood levels of calcium. Cause is unknown. Chronic hypocalcemia appears to be the result of an abnormal functional relationship between the parathyroid and adrenal glands. Infantile hypocalcemic syndrome, a new disease observed in Great Britain but rarely in the U.S.A., has been related by some clinicians to excess intake of vitamin D. However, the cause is, as yet, unknown.

In none of these diseases of calcium metabolism is there indication that they are caused by excessive milk intake. If calcium metabolism is deranged, there may be a need for controlling intake of this nutrient. However, restriction of milk intake or use of calcium compounds in treatment of any specific disease should have a rational basis and should be used with other rational therapy—not as a cure in itself.

MILK AND PREGNANCY

While pregnancy is not a disease, it is a period of stress and a period when diet is extremely important. At the present time, it is unfortunate that obstetricians are minimizing the importance of milk in the diet of pregnant women and prescribing calcium pills as a replacement. Such pills are not and can not be a replacement for milk. Not only do pills fail to provide the high quality protein, calories, vitamin A, B-complex vitamins, and a wide assortment of essential trace minerals found in milk—they fail to provide phosphorus or enough calcium and often contain an excess of vitamin D, which could be harmful.

One of the drug companies has promoted calcium pills for treatment of leg cramps in pregnancy, based on one report (25). The objective appears to be the lowering of phosphorus intake. Unfortunately, this recommendation has been incorporated in some of the obstetrics textbooks and is being widely accepted. Without milk, our recommended dietary pattern does not provide enough phosphorus. Low intake of phosphorus can be more immediately hazardous than low intake of calcium. Although little attention has been paid to the dietary requirement for magnesium, it is a vitally important nutrient during pregnancy as at other times. Milk is one important source
of this element. In the United States, that amount of milk which will provide a pregnant woman with the National Research Council's Recommended Allowance for calcium and calories is well balanced with respect to other nutrients, and provides the needed safety factors in the diet (20, 22).

While there is evidence that some people in the United States have abnormally high calcium intakes, there is evidence that the greater number have low calcium intakes. Unfortunately, this is particularly true of teen-age girls and adult women. Low calcium intakes mean low milk intakes. As was pointed out early in this paper, the dietary pattern recommended for consumption in the United States does not provide an adequate diet if milk is not included, as such or in other dairy foods (2, 22, 34).

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ADULTERANTS IN MILK AND MILK PRODUCTS

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The objectives of the Federal Food, Drug, and Cosmetic Act are to ensure a national food supply that is safe and wholesome as well as honestly and informatively labeled. At the time of its passage in 1938 the law stood as a landmark in modern-day food regulation.

In the light of the tremendous technological developments and economic trends over the past 20 yr., it has been necessary to make major amendments in the law to prevent its becoming obsolete. Two such amendments were the Pesticide Amendment of 1954 and the Food Additives Amendment of 1958. Both were in recognition of the spectacular increase in the use of chemicals in our national economy and to ensure that this use is surrounded by sufficient safeguards to protect the public health.

It has been stated that since 1939 sales in the chemical industry have increased fivefold and that today the industry stands fourth in size among all the industries of the country. It has produced hundreds of thousands of chemical entities, more than 10,000 of which are being manufactured for commercial use. Indeed, we are living in a chemist's world. To appreciate the validity of that statement one has only to view the magnitude of the problem of developing adequate analytical methods to detect a countless number of complex compounds in use today or proposed to be used in or on foods and to understand that the assurance of the safety of our national food supply can not be given without the problem's solution.

The research contributions of the drug and insecticide branches of the chemical industry have had a profound effect on world-wide health and economic gains. Outstanding among the drug achievements has been the discovery and mass production of penicillin. Notable among insecticide achievements was the discovery and mass production of DDT beginning in World War II. While the health and economic gains from these developments have been tremendous, this must not blind us to their potentialities for harm.

These useful chemicals are today presenting you and us with a major problem in insuring that they are properly used. The two governmental agencies primarily responsible for the proper and adequate labeling of these commodities to insure safe use are the U. S. Department of Agriculture and the Food and Drug Administration. The Food and Drug Administration and State and local authorities have the responsibility to deal with situations arising out of their misuse.

The U. S. Department of Agriculture enforces the Federal Insecticide, Fungicide, and Rodenticide Act of 1947. Labels for all economic poisons must be registered with the Department before they are shipped in interstate commerce. Following the directions for use on labels of pesticides thus registered should yield products without illegal residues. Dairymen and growers of agricultural commodities have one simple rule to follow—use pesticides according to label directions—on the crops or kinds of animals specified, in the amount specified, and at the times specified.

The Food and Drug Administration enforces the labeling provisions of the Federal Food, Drug, and Cosmetic Act, which require, among other things, adequate directions for proper use and warnings against misuse in the labeling of drugs.

Accordingly, pesticides and drugs in interstate commerce coming into the hands of farmers and dairymen for their use contain the kind of label instructions and warnings that, if followed, will insure the production of an uncontaminated milk supply. Specifically, U. S. Department of Agriculture registered labels for DDT and other pesticide preparations warn against use of the chemical on or around dairy animals and against feeding treated forage to dairy animals. The labeling of penicillin preparations for the treatment of diseased dairy animals warns milk producers to reject milk from such animals.

The Pesticide Amendment to the Federal