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Statement
by
M. R. Clarkson, Associate Administrator
Agricultural Research Service, Department of Agriculture
Before the
House Committee on Interstate and Foreign Commerce
Concerning H. R. 7624 and S. 2197

Mr. Chairman and Members of the Committee. Thank you for the invitation extended to the Department of Agriculture to discuss legislation pending before your Committee to amend the Federal Food, Drug, and Cosmetic Act in regard to color additives, as contained in H. R. 7624 and S. 2197.

The Department's position on H. R. 7624, offering no objection to the proposed legislation, was transmitted to the Committee on August 11, 1959. The Department was not requested to file a report on S. 2197 while that bill was pending in the Senate.

The Department has made a thorough review of the impact that both of these bills might have on agricultural practices and upon the activities of the Department of Agriculture in the light of the information previously presented to your Committee and the discussions that have taken place during recent hearings.

The Department believes that legislation on color additives is necessary and would be in the public interest. We support the broad objectives of H. R. 7624 and S. 2197 to provide safeguards for the health of our people -- a matter of first importance.

The purpose of these bills is to provide a scientifically sound basis for listing the colors that may be safely used in foods, feeds, drugs, and cosmetics and to provide for other safeguards in the use of such colors including where necessary

appropriate tolerance limitations on the amount of color that may be used. The bills also would provide for a continuation of the present system of certifying the safety of individual batches of the so-called coal-tar colors and would extend this system where necessary to natural colors not now covered by the certification system.

As we understand it, the legislative proposals are generally in accord with requests transmitted to the Congress by the Department of Health, Education, and Welfare which is responsible for administration of the Food, Drug, and Cosmetic Act, except that that Department has recommended the inclusion of a proviso dealing especially with color additives which may be carcinogenic.

S. 2197 contains several amendments which were, as we understand it, inserted by the Committee on Labor and Public Welfare and agreeable to the Department of Health, Education, and Welfare. The Senate bill as amended is acceptable to the Department of Agriculture subject to the following comments.

In view of the very broad scope of the definition of the term "color additive" it should be made clear that the incidental effect on the development of color in foods or feeds resulting from the appropriate use of plant nutrients, either organic or chemical, or the appropriate use of pesticides and other agricultural chemicals is not included within the definition. The appropriate use of pesticide chemicals is, of course, closely regulated under the pesticide chemicals amendment of the Food, Drug, and Cosmetic

Act and the Federal Insecticide, Fungicide, and Rodenticide Act administered by the Department of Agriculture. It would be disrupting and confusing to require a further clearance of pesticide chemicals because of an incidental effect upon the development of color in agricultural products.

Some plant regulators which are used for the control of undesirable growth of plants and for preventing premature drop of fruits have some effect on the color development of the crops.

Appropriate soil fertility has a marked effect upon the desirable development of color in certain fruits and vegetables. The normal development of the red surface color and the yellow ground color of apples is related to the nitrogen level of the tree at harvest time. The availability to the tree of potassium, an essential plant nutrient and a common constituent of fertilizers, has a noticeable effect upon the color of the fruit. Experiments have shown that appropriate levels of both nitrogen and potassium contribute to improved fruit color as well as to the general health and growth of the tree.

Peas grown in soil containing adequate levels of potassium are of better coloration and better cooking quality than are peas grown in soils without adequate levels of this fertilizer. The same is true in regard to the normal coloration of cabbage, kale, Brussels sprouts, cauliflower, tomatoes, and radishes.

These usages with only incidental color effects should not be handled in the same manner as the addition of a dye or a pigment to food. The legislative record should be clear on this point. If necessary to accomplish the purpose, it is suggested that some additional language be included, such as the following:

Amend Section 101 of S. 2197 by adding before the period on line 10 of page 3:

> "or any soil or plant nutrient or any material subject to registration under the Federal Insecticide, Fungicide, and Rodenticide Act."

Legal responsibility for insuring the safety and wholesomeness of the national food supply is shared on the Federal level by the Department of Agriculture and the Department of Health, Education, and Welfare. General responsibility in regard to safety of food for man and feed for livestock and poultry is vested in the Department of Health, Education, and Welfare under the terms of the Food, Drug, and Cosmetic Act as amended. Other regulatory acts, such as those governing foreign quarantine to prevent the introduction from abroad of human diseases and the licensing of biological products for human use, are also administered by HEW.

The Department of Agriculture, in addition to its over-all responsibilities for the food supply of the Nation, is responsible for the safety and wholesomeness of meats and poultry products moving in interstate and foreign commerce under the provisions of the Meat Inspection Act and the Poultry Products Inspection

Act. The Department of Agriculture also is responsible for administration of the licensing of veterinary biologics for use in the prevention and treatment of diseases of animals and poultry and for the administration of the Federal Insecticide, Fungicide, and Rodenticide Act.

The two Federal departments work together in determining and evaluating the safe use of chemicals by farmers, processors, and distributors of food products. If chemicals are not properly used and foods are found to be contaminated by chemicals, or are found to be otherwise unsafe or unfit for consumption, the Food and Drug Administration of the Department of Health, Education, and Welfare and the meat and poultry inspection services of the Department of Agriculture seize or condemn the products under their respective jurisdictions.

The Department of Agriculture conducts comprehensive inspection operations with respect to meats and poultry products, including preclearance inspection of all carcasses, meats, and poultry products and the approval or rejection of all additives including chemicals and colors. This is done under regulations issued by the Secretary of Agriculture as circumstances and the advance of knowledge require, to assure that the products marked "Inspected and Passed" are sound, healthful, wholesome, fit for human food, and truthfully labelled.

An example of the interrelationship of the two activities may be found in the case of meat or poultry which had been inspected and passed by the Department of Agriculture and found

to be safe, wholesome, free of adulteration, properly labelled in conformity with the meat or poultry inspection laws, and in every way eligible for interstate and foreign commerce. If spoilage or adulteration or mislabelling occurs after the product leaves the inspected establishment, then the provisions of the Food, Drug, and Cosmetic Act apply to the product. When seizure is effected by the Food and Drug Administration, usually the product is returned to the jurisdiction of the meat or poultry inspection service for appropriate handling.

Under the Meat Inspection Act color additives are permitted in meat fat shortenings and on the surface of products in casings with appropriate marking and labelling and with control of the manner of application. Only those materials approved by the Director of the Meat Inspectinn Division may be used and with regard to coal-tar dyes, the regulations limit such use as follows: "coal-tar dyes upon certification by the manufacturer, and the furnishing of authoritative evidence to the inspector in charge, that the dyes are certified under the Federal Food, Drug, and Cosmetic Act for use in connection with foods."

The legislative history of the Food Additives Amendment to the Food, Drug, and Cosmetic Act clearly indicates the congressional intent that nothing in that act is intended to in any way impair the authority and responsibility of the Secretary of Agriculture with regard to meats and poultry products. The provisions of paragraph 902(b) of the Federal Food, Drug, and Cosmetic Act and of section 18 (a) of the

Poultry Products Inspection Act are also clear with respect to the authority of the Secretary of Agriculture.

In order to avoid difficulties that might otherwise arise in administration of the legislation before the Committee, it is suggested that Section 204 of S. 2197 be amended to read as follows:

> "Sec. 204. Nothing in this act shall be construed to affect in any way the provisions of Section 902(b) of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 392) or Section 18 of the Poultry Products Inspection Act (21 U.S.C. 467), or to exempt any meat or meat food product, or poultry or poultry product, or any person from any requirement imposed by or pursuant to the Meat Inspection Act of March 4, 1907, 34 Stat. 1260, as amended or extended (21 U.S.C. 71 and the following), or the Poultry Products Inspection Act (21 U.S.C. 451 and the following)."

These comments and recommendations pertaining to S. 2197 also apply to H. R. 7624. In addition, with respect to the House bill, careful consideration should be given to the provisions of the so-called anti-cancer clause.

We understand that the Committee has before it several suggestions for changes in the wording of this clause, including the suggestions of the Department of Health, Education, and Welfare. The Chairman has indicated the intention of your Committee to make a full review of the various proposals. Also, the Executive

Branch is making a study of this matter in order to develop recommendations that will provide for the exercise of sound scientific judgment to the full extent that current knowledge of the subject makes this feasible and consistent with protection of the public health.

In view of the importance of this subject the Department would prefer to delay making any recommendation with reference to it until there has been opportunity to consider the matter further in the light of the facts developed by these studies.

The Food and Drug Administration of the Department of Health, Education, and Welfare has a proud and distinguished record of protecting the public against unsafe, adulterated, or misbranded food. The Department of Agriculture shares with the general public a deep respect for the scientific competency and the sound judgment of the staff of the Food and Drug Administration to administer complex legislation in accordance with the dictates of the public interest as expressed by the Congress. The Food and Drug Administration can do this if the legislation allows them the essential latitude for the exercise of scientific and professional judgment.

Mr. Chairman, this completes that portion of my statement in regard to the color additives legislation before the Committee. The remainder of my statement includes background and explanatory information which may be of value to the Committee. I shall be glad to go through this statement or file it with the Committee as the Chairman prefers.

The Three Periods of Agriculture

Farming in this country may be divided broadly into three periods. The first -- from Colonial times through World War I -- was a period of physical growth by the development of new lands. In general, total farm output during this first 300 years increased only as additional cropland was put under the plow. Acre for acre, crop yields remained about the same.

Fortunately, there were farsighted individuals during this early period who knew that good farmland would one day all be farmed, and that if we were to build a great Nation something had to be done about farming. The efforts of these individuals brought about the establishment, 100 years ago, of the Land-Grant Colleges and the U. S. Department of Agriculture.

Research was encouraged, and new farm practices began to emerge. But even 50 years later crop yields on the average remained the same. Many changes in land use occurred that should have improved yields. Vast areas of highly fertile virgin land were plowed up, and worn-out areas were discarded. Millions of acres of potentially productive wet land were drained. Fertilizer and lime use increased to substantial quantities. New higher yielding crop varieties were introduced and controls were developed for a number of insect pests and crop diseases. Yet with all these improvements yield levels stayed about the same.

There was only one possible conclusion. All the improvements in farming that had been made had barely succeeded in offsetting the decline in soil productivity that was taking place.

The second period in our farming history -- covering roughly the years between the two World Wars -- is notable for two developments. The first of these was the application of mechanical power in farming, which gradually released millions of acres from the production of feed for horses and mules. These acres became available for food production. The second important development was the action taken through research, on a broad front, by the Federal government, by the States, by industry, and by farmers to improve our agriculture.

The third period in our farming history is the one we are in now. Today, we can see the fruits of the efforts started in the earlier periods.

For example, in 1939, when World War II broke out in Europe, American farmers produced a 2½ billion-bushel crop of corn on 88 million acres. In 1959, they produced a record 69 percent more on 3 million less acres. The story repeats itself with virtually all major crops. The 740 million bushels of wheat produced in 1939 took 52½ million acres. In 1959, on about the same acreage, the crop was 1 billion, 128 million bushels -- half again as much as in 1939. Production of oilseed crops has more than tripled since 1939.

It is the same with livestock. In 1959, we had nearly 4 million fewer dairy cows than in 1939, but each cow produced 9/10ths of a ton more milk during the year. For every two eggs a hen laid in 1939, her descendant is laying about 3 eggs. Total egg and

and poultry production is up 113 percent. We have 100 million cattle and horses on the same pastures and range lands that in 1939 supported only 81 million head. We had a pig crop of 102 million in 1958 on the same farm plant that produced 87 million in 1939.

All told, we produced 58 percent more farm commodities last year on fewer acres than we had in 1939.

Now let us look to the future.

We're all aware of the present rapid increase in our population and the predictions that this trend will continue. The Bureau of the Census estimates that in another 50 years -- by the year 2010 -- we may have 370 million people -- more than twice the present population of our Nation.

This means that just to maintain our present dietary levels, we shall require twice as much food and other farm products as we're consuming today. New knowledge of nutritional requirements, especially of those in older and younger age groups, is emphasizing the need for protective foods -- those important for needed proteins, vitamins, and minerals. Milk and meats, fruits and vegetables are important providers of these nutrients; but they are the foods that are costly to produce, process, store and deliver. To ensure that our people 50 years from now will be as well fed as they should be, farmers then will have to produce at least twice their present crop output and more than twice their present production of livestock products.

At the same time, the amount of farmland available is not likely to be increased much beyond the acreage farmers are using today. As our population increases, considerable of our present farm land will go into urban and other non-farm uses. We can expect that tomorrow's farmers -- with only a little more land and considerably less manpower -- will have to produce for a rapidly increasing population, whose needs and desires will influence, more and more, the kinds and qualities of products produced.

Measuring from a 1956 acreage base, to meet the needs of our people by 1975, will require the equivalent production from an additional 208 million acres at 1956 yields per acre. It is expected that we may increase our cropland by 25 million acres between 1956 and 1975. Putting what is now known in research into practice, that is converting basic information into applied results, will increase production in 1975 enough to be equivalent to 160 million acres at 1956 yields. The remaining 23 million acres required can be achieved by new findings in research. The improvements which farmers must adopt between 1956 and 1975 must be 1.3 times as great as those made for the period of equal length between 1935-39 and 1956.

Now let us look at 2010.

We must improve agriculture enough between 1975 and 2010 to be equivalent to the production from an additional 417 million acres at 1956 yields per acre. This is 1.6 times the annual rate of progress made between 1935-39 and 1956.

To get this done, farmers will have to do a better job of conserving soils and using available water supplies. They will need higher yielding strains of crops and livestock with specific qualities to meet special market demands -- lean, tender beef, for example . . . milk with more solids and less fat . . . eggs that retain their initial high quality . . . fruits and vegetables more suitable for freezing and canning . . . field crops with qualities especially useful to industry. Farmers will need more effective methods of controlling diseases, insects, and weeds . . . better fertilizer practices, machines, and other production tools.

Chemicals in Agricultural Practices

In the early years of American agriculture we got along fairly well with very few chemicals because operations were on a small scale and many of our major pests of today had not yet gained entrance into this country.

Today, a wide variety of chemicals is available for safe use in all phases of food production, processing, and marketing. They include chemical fertilizers, insecticides, and weed killers . . . antibiotics, antispectics, and preservatives . . . feed additives, fumigants, fungicides . . . and others.

It is hard for anyone not closely associated with farming today to realize how utterly dependent we are on chemicals.

These chemicals are as essential for efficient production of foods on the farm as are tractors, improved varieties of crops, and better breeds of livestock. They play as great part in

assuring consumers a continuing supply of nutritious and appetizing foods as do our modern methods of food processing and marketing.

Every discussion of pesticides inevitably raises the question of biological control. We are often asked why we don't employ more natural enemies to control insects instead of using chemicals. We are working on this, too, and have been for 75 years. In that time we have introduced about 400 species of friendly insects from all over the world. Of these about 100 species have become established, and some are doing an effective job. We feel that biological control holds much promise, but it would be a great mistake to assume that this is the answer to the residue problem.

We are aggressively pursuing studies designed to tell us more about the metabolism of new pesticides, to discover what happens to pesticide chemicals inside the animal body, and to show us how to identify chemical structure that is related to pesticidal activity.

Safeguarding the Nation's Food Supplies

The Department considers the adequacy and safety of the Nation's food as our first responsibility. This has been our principal guide in carrying out assignments from the Congress and in serving the people of this country over the past century.

Our research and regulatory programs on crops and the complementary ones of the State agencies have provided adequate supplies of much needed fruits, vegetables, and grain products

of high physical quality and relatively free from imperfections caused by diseases and insects, rot and mold. These are important contributions to the health of the Nation.

Similarly, the research and regulatory programs on livestock and poultry have provided wholesome meat to our consumers. These programs guard our people against many serious diseases which are transmissible from livestock and poultry to man. We are working in our laboratories to find controls and cures for these diseases.

The American housewife can buy meat and poultry with confidence. The Department's inspection stamps are her guides to safe and wholesome meat and poultry products.

Continuing research is vital for continuing food safety, but there are equally vital and more immediate and direct methods we can and do use in the Department of Agriculture to safeguard the food supply. These methods are employed in our various regulatory programs established to protect agriculture and the public from pests and diseases, both foreign and domestic, and to insure the safety and wholesomeness of meat and poultry.

For more than 50 years -- since passage of the original Food and Drugs Act and the Meat Inspection Act -- the Federal Government has had responsibility for insuring that foods in interstate and foreign commerce are safe, pure, wholesome, and produced under sanitary conditions, and that all such products are honestly and informatively labeled and properly packaged.

Effective enforcement of these laws has resulted in the soundly based confidence that consumers have in the foods they buy.

The Department of Agriculture, the State Agricultural Experiment Stations, and industry research cooperate to develop methods for the safe use of chemicals by farmers and the food industry. Educational programs of the Department and the State Extension Services, geared to this research, provide field guidance to farmers and others in the safe use of carefully tested and approved chemicals.

Testing Pesticides for Safety

The laws governing registration of pesticides are stringent. All applicants for registration must furnish research data to show the effectiveness and safety of the proposed uses of pesticides.

Toxicological tests involve acute toxicity studies on laboratory animals. The results determine how the compound must be used in further experiments.

If the compound still looks promising, field tests are conducted to determine whether residues are left on food crops. At the same time, further animal studies are started to determine the biological effects on laboratory animals. Tests on larger animals may also be conducted. Skin absorption or irritation tests are made and test animals are observed constantly to determine any biological changes that occur. These evaluations may run several years.

Only a few of the hundreds of potential new farm chemicals studied every year are eventually approved for use. Among those that must be rejected as not meeting the exacting demands of

safety in use are many that may do a superior job of killing insects or disease organisms.

The industrial development costs involved in making certain that a chemical is safe before it is put on the market are high. It is estimated that industry will spend $700,000 - $1,500,000 in a three- to five-year period before the product reaches the market.

The Department of Agriculture carries responsibilities for both research and control activities affecting agriculture. In the development and testing of pesticide chemicals, the closest possible relationship is maintained between scientists engaged in research phases of the work and those responsible for pesticide regulatory decisions. The same is true in the field of animal disease research and meat and poultry inspection or other livestock regulatory programs.

Many phases of the Department's research and regulatory work directly or indirectly affect human health. This is especially true in such research areas as human nutrition, entomology, animal pathology, and food processing and marketing, and in the regulatory areas of meat and poultry inspection, crop and livestock pest control, and pesticide regulation.

Preclearance of Food and their Components

In the passage of the original Meat Inspection and Food and Drug Acts, the Congress provided for the surveillance of all foods in interstate and foreign commerce.

In the case of meat, a comprehensive inspection system was established with provisions for preclearance in the form of inspection of all carcasses, meats, and meat food products, including approval or rejection of chemicals and other additives. This is done under regulations issued by the Secretary of Agriculture as circumstances and the advance of knowledge require, to assure that the products marked "Inspected and Passed" are sound, healthful, wholesome, fit for human food, and truthfully labeled.

In regard to other foods, covered under the original Food and Drugs Act, authority was not given for preclearance, but broad authority was established for action against foods found in interstate or foreign commerce to be in any way adulterated or misbranded.

In recent years, the trend in the Congress has been toward more preclearance in order to serve two purposes: (1) to give greater assurance of safety to the consumer; and (2) to give producers, processors, and distributors more precise guidelines for their operations in order to assure the safety of foods to consumers. Five congressional enactments are in point:

(a) The "new drugs" provisions of the Food, Drug, and Cosmetic Act of 1938 provided for the preclearance of drugs not generally recognized among experts qualified by scientific training and experience as safe for use under the conditions recommended.

(b) The Federal Insecticide, Fungicide, and Rodenticide Act of 1947 provided for USDA pre-examination of economic poisons including labeling to insure safety and effectiveness in use.

(c) The "Miller Amendment" to the Food, Drug, and Cosmetic Act in 1954 provided more workable procedures for HEW preclearance of pesticide chemicals in or on raw agricultural commodities by authorizing the establishment of tolerances when needed -- legal levels -- of such chemicals in these products. The directions for use on labels registered by USDA for pesticides are gauged to meet such tolerances in or on the raw agricultural commodities.

(d) The Poultry Products Inspection Act of 1957 provided for extension of the meat inspection type of preclearance to poultry products by USDA.

(c) The food additives amendment of 1958 to the Food, Drug, and Cosmetic Act provided for preclearance of chemicals and other additives to foods not already covered under the meat and poultry inspection acts.

In each case the Congress provided the mechanism which permits the determination of safety of use and wholesomeness of the product to be made by persons qualified to exercise scientific and professional judgment. The legislative histories show the necessity for the exercise of such judgment to cope with the complexity of the problems and the rapidly advancing state of knowledge concerning them.

Meat and Poultry Inspection Services

Under the Meat Inspection Act and the Poultry Products Inspection Act, broad authority is given the Department of Agriculture for inspection of fresh meat and poultry, and processed meat and poultry products to assure that they are wholesome, free from disease and adulteration, and accurately labeled. This inspection applies to all operations in plants that prepare meat or poultry products for interstate or foreign commerce, with limited specified exemptions. It requires, first of all, Federal approval of the construction, equipment, processing procedures, and sanitation of each plant. The inspection begins with live animals or birds in holding pens or receiving rooms. It extends through all phases of plant operations to the final product. This is a continuous inspection beginning with every animal or bird being examined before and during the slaughter process.

All formulas used for prepared meat and poultry products at official plants must have prior approval by this Department. Cereals, dried milk, spices, fats, water, curing materials, chemical additives, colors, and all other ingredients in such products must meet specific standards of safety and quality, and must be used only within approved limits. Rigid controls are maintained also to insure adequate cooking, cooling, and storage facilities required to produce safe, high-quality meat and poultry products.

Labels to be applied to containers or packages of processed meat or poultry products must also be approved before use at

official plants. Standards for meat products are developed and enforced to assure the consumer that he is receiving the kind of product he is entitled to expect from the label.

The Department maintains special chemical and biological laboratories to furnish meat and poultry inspectors with the information they need in making decisions on the wholesomeness of these products.

Meat and poultry inspectors remove from the channels of trade as unfit for human use more than a million pounds of meat and poultry products every working day.

The Federal meat and poultry inspection services are under the direction of veterinary medical personnel. The key determinations of wholesomeness of the product are made on the basis of a knowledge and understanding of the significance of physiological and pathological changes relating to injuries from disease, chemicals, insects, etc. These services are backed up by a strong core of specialists in the pertinent phases of veterinary medicine. Our actions are based on sound scientific judgment and experience.

Also, training is given in these areas by the colleges of veterinary medicine, as this profession has traditionally been charged with the responsibility for the wholesomeness of meats and other products of animal origin.

Pesticide Regulation

Under the Federal Insecticide, Fungicide, and Rodenticide Act and Public Law 86-139, the Department of Agriculture is

responsible for registering and safe labeling of insecticides, fungicides, rodenticides, herbicides, and other chemicals. Before a product is registered, a list of its active ingredients, directions for use to obtain the results claimed, and precautions necessary in handling must appear on the label. All label statements must be factual, clear, and based on determinations that use of the product according to instructions is safe to the operator and the public and when used on food crops will not result in harmful or unlawful residues.

These pesticide labeling regulatory functions are the responsibility of the Department of Agriculture. The Department is also assigned other specific functions in this field under Public Law 83-518 of 1954, often referred to as the Miller Bill.

This amendment gives the Food and Drug Administration responsibility for establishing tolerances, or exemptions from tolerances, for pesticide chemicals that may safely remain in or on raw agricultural commodities which come under the jurisdiction of that agency. In addition, it assigns to the Department of Agriculture responsibility for certifying to the Food and Drug Administration as to whether the product is useful for the purposes specified, and the responsibility to express an opinion as to whether or not the tolerance proposed for a chemical reasonably reflects the residue likely to remain on the crop when the product is used as directed.

The Food and Drug Administration has issued so far more than 2,000 tolerances on various food crops for about 100 pesticidal chemicals.

In carrying out its obligations under the law in regard to pesticide regulation, the Department of Agriculture has registered more than 56,000 chemical formulations involving about 230 active ingredients. Most of these chemicals are used in connection with food production.

Many of the registrations are for chemicals that have residue tolerances. Others are for chemicals that have zero tolerances or for which no tolerances have been established. In either event, the Department requires the registered label to bear directions for use which, if followed, will insure production of a crop that is safe from illegal residues.

Interagency Cooperation

The personnel of the Department of Agriculture and the Department of Health, Education, and Welfare have developed over the years a close working relationship on matters of joint interest and responsibility. There is a continuing informal exchange of technical information between specialists of the two departments.

Scientists in the Agricultural Research Service studying animal diseases and agricultural pests work closely with those in the Public Health Service studying human health.

The Food and Drug Administration and the Agricultural Research Service frequently cooperate in solving problems which arise in the registration of pesticides and the administration of the Miller Amendment to the Food and Drug Act.

There is frequent communication and cooperation between agencies of Health, Education, and Welfare and Agriculture's Institute of Home Economics on problems of human nutrition.

A day-to-day exchange of information exists between regulatory officials of the Agricultural Research Service and the Agricultural Marketing Service and enforcement officials of the Food and Drug Administration.

The growing complexity of food production, processing, and marketing, the increasing reliance upon scientific and technical developments, and the heightened interest in food safety and quality all serve to emphasize the importance of the close liaison which exists between these two departments of Government.

THE JOB AHEAD FOR CATTLEMEN

by

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service
U. S. Department of Agriculture

It is a pleasure to be here with you in Mississippi for your seventeenth annual convention. Cattlemen in this association can be proud of your efforts to help increase the value of livestock production in the rapidly changing agricultural pattern of this area.

About twenty years ago there was a surplus of rumor and misinformation and a scarcity of sound knowledge about livestock production, pastures, and forage for the South.

Over the years, as groups such as yours have worked together to exchange information, to pin-point problems, and then set about to solve them, you have made a great contribution. Southern agriculture has become diversified. It has changed from an area of one-crop farms to a well-rounded agricultural production system. As an example of that change, beef cattle numbers in the South increased more than 325 percent in . . . roughly . . . the past twenty years, while the national average increased only 141 percent.

Part of this growth and diversification has been made possible by progress in better livestock breeding and better over-all feeding and management practices. Part has come through the results of grassland research, applied to make better pastures. Another part has been made possible through disease prevention and control.

As a result, Southern livestock production is making a new and important contribution to the Nation's abundant supply of wholesome meats. Consumers in this country indicate their confidence in the safety of that supply by the increasing acceptance of meat in the diet. In the past 25 years in the United States, the average consumption of meat increased from 127 pounds per person to over 163 pounds a year. Of all the meats consumed in this country, people generally prefer beef, as long as they can afford it.

As this trend of rising demand continues, the job ahead for cattlemen will be challenging. In the first place, population expansion will create its own problems. Current census predictions are that the population of the United States will more than double between now and the year 2000. As the number of people increases, the demand for livestock products is expected to go up even faster . . . if incomes stay high enough for the average family to buy what they want and need nutritionally.

Before the Mississippi Cattlemen's Association, Jackson, Miss., Jan. 18, 1963.

But in order to maintain this full market, cattlemen must continue to produce what consumers want to buy. Consumers want flavorful, tender, juicy meat for the table. They want a high yield of edible meat with a large proportion of lean in relation to fat. When they want fat they can buy it more cheaply in other forms, and they are interested in the part fat plays in human health problems.

This interest in excess fat is very real. A beef marketing survey recently conducted by the National Association of Food Chains resulted in twenty-six recommendations to cattle growers and feeders for improvements to increase sales and consumer acceptance of beef. Fourteen of the recommendations referred to excess fat. The importance of this problem cannot be over-emphasized.

But the solutions to the problem are complex. Just reducing the length of time cattle remain in the feedlot is only the answer to the excess fat in animals fed to extra heavy weights. It is not the final answer. Experience shows that some degree of marbling is essential to tenderness, juiciness, and flavor. That means our beef animals must be given enough finish to provide the marbling of fat. Perhaps the scientists who are working toward providing a meat-type beef animal that will yield well-marbled lean and a minimum of excess fat hold the key to a large part of the answer.

Other scientists are working on an ultrasonic device to determine the amount of fat and lean in a live animal. When it is fully refined, this technique will enable us to predict much more accurately the carcass composition of live animals and should provide a useful new tool in selective breeding programs.

Consumers are also interested in the continued safety and wholesomeness of their meat supply. Cattlemen have a responsibility to protect that wholesomeness and maintain consumer confidence. For example, in using chemicals, it is vitally important to "Follow the label" and avoid harmful misuse. Members of this organization -- and of the American National Cattlemen's Association -- have taken an important leadership role in emphasizing the importance of the safe use of chemicals.

The Federal government shares this responsibility in a unique approach, not found anywhere else in the world. In the U. S. Department of Agriculture, our part of that responsibility starts with the land itself. By conducting a review and registration of agricultural chemicals, we help to maintain a constant vigilance over the types of chemical materials and possible residues that may contaminate the soil or feed and forage crops.

In another part of this responsibility, our scientists carry out research on such chemicals as feed additives to make certain that they can be used safely and effectively. For example, the Agricultural Research Service conducted intensive studies on diethylstilbestrol, beginning in 1955. These tests showed that diethylstilbestrol, properly used, can increase the rate of gain in beef steers without adverse effect on meat quality. We also found that doses heavier than the recommended 10 milligrams a day are less effective and are not economically practical.

After the experimental animals were slaughtered, the Food and Drug Administration made extensive tests on the carcasses and detected no trace of diethylstilbestrol. These tests were sensitive enough to detect traces of residue as minute as 2 parts per billion.

The use of diethylstilbestrol as a cattle feed additive is now an accepted practice. But it is highly important to use the additive as directed: Feed only 10 milligrams a day, and stop its use 48 hours before slaughter. Federal meat inspectors will hold up any cattle for 48 hours if they have reason to believe they have not been taken off diethylstilbestrol for the required period.

Another part of the Department's responsibility for wholesome meats is in animal disease research and control and eradication programs. We are all familiar with the importance of these efforts to southern livestock production. Cattle tick fever threatened the very existence of the cattle industry in the South until research in veterinary medicine traced its cause to the specific cattle tick. Later, the systematic program of cattle dipping eradicated the tick, and with it the disease.

The brucellosis eradication program is another example of regulatory action based on the results of research. The milk ring and blood tests are vital tools in the difficult battle being waged against brucellosis. Twenty-nine States have achieved modified-certified status, and one State -- New Hampshire -- has been declared brucellosis free. A total of 2,345 counties are now modified-certified and another 154 counties are brucellosis-free.

Your efforts here in Mississippi are showing good results, with 65 percent of all cattle in the State under the market cattle testing program. The milk ring tests of dairy cattle are showing up suspicious herds in about one in fifty herds tested. That compares with about one out of every two herds just a few years ago. With constant screening, cattle owners are discovering infection more rapidly and, therefore, getting rid of it more quickly. Your goal of modified-certified brucellosis status by 1965 seems to be an attainable objective. We in the Agricultural Research Service are proud of the part our people have taken in this effort. Dr. Pate and his associates work closely with Dr. Chadwick and his people in cooperation with the Mississippi Livestock Sanitary Board and the Mississippi Veterinary Medical Association.

The study of another serious cattle disease -- anaplasmosis -- has been a part of our research program for a number of years. An efficient antigen and a test for diagnosis have been developed, and have proved to be valuable tools for measuring results of investigations of anaplasmosis. This means of identifying the disease has made it possible for anaplasmosis research throughout the Nation to increase four- or five-fold as compared with the research in progress before the test was available.

The Agricultural Research Service is cooperating with a number of cattle owners in several States in the Southeast to conduct field tests and surveys to discover the extent and location of the disease. We are working together to develop practical methods to prevent the spread of anaplasmosis, to control it, and eventually to eradicate it. Unfortunately, there is a great deal yet to be done.

The research on the various insect vectors involved with the spread of anaplasmosis is part of our work in ARS on parasitism. Now that the new National Animal Disease Laboratory at Ames, Iowa, is in operation, our research program at the Beltsville Research Center near Washington is concentrating on the study of parasites. We are making some progress in identifying the specific parasites causing various cattle disease problems. We are also increasing the emphasis on finding more effective, safe, chemical treatments for these internal and external pests.

The screwworm eradication program is a prime example of the combination of entomology research and animal disease eradication efforts to protect animal health. The successful eradication of this pest in the Southeast has given complete protection to herds and flocks in this whole area, except for the recurring infestations from the West. Now, with the eradication program well underway in the Southwest, the advantages are already apparent in Mississippi and States farther east. Only one infestation was reported east of the Mississippi River during 1962, and this was found on an animal that had just been shipped in from the Southwest. The State of Mississippi reported no infestations during the year. In contrast, during 1961 more than 80 counties in 9 States east of the River reported nearly 700 confirmed screwworm cases.

This year the eradication program is being continued in the Southwest in cooperation with the States of Texas, New Mexico, Oklahoma, Arkansas, and Louisiana, and with Mexico. Recent cold weather has lessened the number of infestations in the eradication area. But if we have mild weather during the remainder of the winter, we could still have trouble with scattered infestations.

Our objective is to free the overwintering area of screwworms this winter, and then maintain an effective barrier next summer. The barrier along the Mexican border should be in full operation by late February or early March. We expect to start out with an area about 100 miles wide in which we will continuously release sterile flies along both sides of the international border. The inspection and quarantine control of livestock coming across the border will add to the effectiveness of the barrier zone. The success of the operation will be determined at the time screwworms normally begin to spread from the south when warmer weather returns.

This is a job, not only of eradicating the pests, but <u>keeping</u> them out once they're gone. The next two years should tell the story.

An important phase of our responsibility in ARS is to keep out dangerous foreign diseases that could create real havoc in our healthy and highly susceptible herds. As an example of the effectiveness of this inspection and quarantine work, we have now passed the thirty-third year in this country without an outbreak of foot-and-mouth disease. By contrast, during the first thirty years of this century, we had six outbreaks of the disease. In 1930 Federal legislation was passed to prevent the importation of animals and fresh meats from countries where foot-and-mouth disease is known to exist. Since that time we have not had an outbreak of foot-and-mouth disease, although Mexico and Canada suffered serious outbreaks and the disease has several times reached epidemic proportions in Europe, Asia, and South America. We have also kept out such diseases as rinderpest, contagious pleuopneumonia, and East Coast Fever.

Maintaining foreign quarantines is never an easy job. But it is important to carry them out impartially and effectively for the protection of the livestock and poultry of all of North America. It is our purpose and our duty to use the laws and regulations that are available to us in the most effective way to prevent the entrance of foot-and-mouth disease and the many other dangerous foreign diseases. At the same time, we must give no more interference to trade and travel than is absolutely necessary to do the job.

The final step in the Department of Agriculture's responsibility in protecting our meat supply and the consumer's confidence in it is through the Federal Meat Inspection Service. Before a slaughtering or processing plant goes under Federal inspection, plans and specifications for construction must be approved. Standards are set up for such qualifications as the location of the establishment itself . . . the water supply, plant drainage, sewage disposal system, and ample space and equipment to allow efficient inspection procedures.

After the plant is approved and operating under Federal inspection service, inspectors assigned to the plant maintain continuing surveillance to see that facilities and procedures meet requirements at all times.

Federal inspection begins with an examination of animals in the holding pens before slaughter. Animals that do not pass the ante-mortem inspection are condemned at this point. At the time of slaughter, the carcass and internal organs of each animal are inspected. Any diseased, abnormal, or unfit carcasses and organs are condemned.

Each stage of further handling of the wholesome meat is carefully supervised by the inspectors and reviewed according to the standards of the inspection service, established through research and long experience. This includes standards for curing, canning, freezing, or other processing procedures.

Federal laboratories are maintained to aid inspectors in checking and approving all ingredients of meat and poultry products before they can be put on the market. Every chemical, for example, must be approved and specifications set for the amounts and methods of its use.

These are just some of the ways the U. S. Department of Agriculture is fulfilling its obligation to protect the wholesomeness of meats for the consumer . . . and to help maintain steady markets for livestock producers. We will continue to work with cattlemen as they face the complex problems in the job ahead.

For example, as livestock numbers increase in answer to rising demands for meat in an expanding population, disease problems increase even faster. When you crowd more cattle into a given space, it is inevitable that disease and parasites will spread more widely and rapidly. Cattle producers are already losing hundreds of millions a year from these causes. Therefore, it is imperative that we find more effective means to combat such problems as the shipping fever complex, trichomoniasis, anaplasmosis, and coccidiosis in calves. It is also imperative that cattlemen keep informed on the latest and best methods of management and disease control . . . and then put them into effect.

It is important to make use of every practical means of increasing efficiency of production. Even though the demand for beef is high and continues to rise, cattle producers are not in the most favorable position in a highly competitive market.

For example, we use about 8.5 pounds of total digestible nutrients to produce a pound of liveweight of cattle and calves. That's about twice what we use to produce a pound of liveweight in pigs or turkeys, and more than three times what we use to produce a pound of liveweight of broilers.

We need to know a lot more than we do now about feed efficiency in cattle production. We need basic research to determine when and to what extent efficiency can be improved through breeding, through nutrition, through improved management practices.

Research has demonstrated the heritability of feed efficiency in beef cattle. Results of the studies have varied greatly, but the average findings of numerous recent tests show the heritability of efficiency of feedlot gain at 39 percent. Some individual studies have shown as high as 75 percent heritability.

As a direct result of this type of research, practical performance testing programs have been set up across the country to keep records and select the most efficient animals to improve beef cattle herds. We can hope that these programs will expand and grow in number in order to bring the best available stock to your commercial herds.

We need more information on the best mixture of pasture, range, hay, grains, and byproducts to provide the maximum efficiency under given circumstances. We need more specific understanding of the proper use of cooling devices for holding areas in hot climates. We need more efficient methods of feeding and handling cattle, and more knowledge about how to combat the inefficiencies of reproduction.

Progress along these lines can be vitally important to cattlemen in the years ahead, because market competition is increasing -- not only from other domestic meats -- but also from imports. We are now importing over a billion pounds of meat a year. We're also importing nearly 700,000 head of cattle a year from Canada and Mexico, compared with a little over 140,000 just ten years ago.

So it's clear that there are problems to be solved by those of us in research, and in cattle production. But I believe that we can tackle them with confidence. Looking back to the years about the turn of the century and noting the progress since then gives some encouragement for the future. The cattle that made the long, dusty drives to marketing centers in those days didn't look much like those in your beef herds today. Their long legs and horns, their small light bodies, were the result of survival under rugged conditions. The meat they provided was almost accidental.

In the normal span of one man's lifetime beef production has changed from the old cattle drives to today's mechanized feedlots and highly mobile marketing systems. Where we stand now is just one point along the way in that continuing progress. Research scientists and cattlemen, working together, will continue that progress as we face the job ahead.

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THE ROLE OF ARS IN POULTRY IMPROVEMENT

By Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service, U. S. Department
of Agriculture.

I am especially glad to have this opportunity of meeting with you this morning as one of my last official functions with the Agricultural Research Service.

We can all look back with a great sense of satisfaction at the successful record you have made in the National Poultry and the National Turkey Improvement Plans. Your record has been a memorable achievement in coordinating the efforts of many different groups, working together to improve an important $3.3 billion industry.

One way of measuring the extent of that improvement is in consumer acceptance of the industry's end product. For example, in 1940 civilians in this country consumed an average of 17 pounds of poultry meat per person. By 1963, we were consuming nearly 38 pounds a year. This means that people are selecting chicken and turkey for their dinner tables because these are popular, flavorful, and nutritious meats. But it also means that all poultry products have become an increasingly better buy over the years.

In 1930, forty-eight minutes of working time were required to buy a dozen eggs; in 1963, less than fifteen minutes. In 1950, twenty-four minutes of work bought a pound of chicken, but in 1963 less than nine minutes were required. Turkey products have become correspondingly economical items in the food budget.

Increased efficiency of the poultry industry is the key element in this progress. Improvements in feeding and nutrition have reduced the feed required to produce a pound of broiler meat from four-and-a-quarter to two-and-a-quarter pounds. Breeding has increased the eggs per hen from 112 to 212 a year. Better disease control has reduced poultry mortality four-fold. Improved housing and equipment have tripled the density of bird populations that can be raised in a single operation. Advances in processing have reduced costs and increased quality of the major poultry products.

The Agricultural Research Service has been vitally concerned with supporting these improvements . . . since 1884, really . . . when the former Bureau of Animal Industry began its notable research and regulatory programs for the protection and improvement of the Nation's livestock and poultry.

By the late 1920's and early 1930's, State and Federal research had developed a fund of useful knowledge about poultry breeding, feeding, management, and disease control. Hatchery chicks had become readily available and the poultry industry was prepared to expand. But the expansion was being held up by two principal barriers: (1) Communicable diseases -- particularly pullorum disease at that time -- were hindering the development of large-scale operations; and (2) there was a lack of standards to identify the quality of hatching eggs and chicks being sold.

Talk before the National Plans Conference, Washington, D. C. July 8, 1964.

The poultry industry expressed the need for leadership in setting official and uniform terms to denote differences in breeding background and in disease control practices. Poultrymen recognized the need for joint action by breeders, hatcherymen, State agencies, and the U. S. Department of Agriculture to achieve this uniformity.

Out of these needs, the National Poultry Improvement Plan was started in 1935, and the National Turkey Improvement Plan in 1943.

In the early days of NPIP, the Record of Performance and the Register of Merit breeding classifications identified superior stock . . . in uniform terms. That stock has now been distributed to commercial poultrymen throughout the world.

Recently, the changes in breeding systems have made it more practicable to divert the emphasis of the program to Random Sample Performance Tests. These tests identify and measure 16 outstanding characteristics. ARS uses its automatic data processing equipment to compile and analyze the data collected by the tests. We have combined, published, and made the information available for the use of all poultrymen. Thirty-thousand copies of this publication are distributed annually throughout the world.

The control of pullorum disease was one of the important initial objectives of both NPIP and NTIP. Typhoid control was added a short time later. Since the Plans have been in effect, the incidence of these diseases has been dramatically reduced.

Under NPIP, in the first year of operation the number of reactors to the pullorum test was 3.66 percent of the birds tested. Last year, incidence of reactors on the first test of breeding birds was down to .005, the lowest on record. This represents one reactor in every 20,000 birds tested. Under the NTIP last year, the percentage of reactors returned to the all-time low of .003, first achieved three years ago.

This is a notable achievement. But as long as there is any pullorum disease in flocks participating in the Plans -- in fact, as long as there is pullorum disease anywhere in the country -- those who have accomplished so much cannot be safe. We must find ways to eliminate the remaining centers of infection. We believe you have shown the way -- it can be done.

In the fields of improved breeding and disease control, the Plans do not operate alone. An impressive array of other groups -- including State, Federal, and industrial -- are active in working out solutions to related problems, vitally affecting the health and quality of the Nation's poultry flocks.

Salmonellosis, as an entity, is receiving greater emphasis in scientific and medical circles. Over 800 serotypes of the Salmonellae have been differentiated to date; all are considered potentially infectious to man. About 50 serotypes have been known to produce clinical disease in livestock and poultry. The very fact that this group of numerous organisms affects man, as well as livestock and poultry, emphasizes the importance of continuing strong programs of research, epidemiology, control, and prevention of spread. In recognition of this, we have recently formed a Salmonella Evaluation Group representing the combined talents of the Department's research, inspection, extension, and regulatory divisions. It is the duty of the group to provide leadership in this important field.

Many of you are actively participating in the Reporting System for Pullorum Disease and Fowl Typhoid. The program, initiated by the National Plans in 1955, has been expanded to give more complete coverage through the combined activities of several divisions of ARS.

ARS also conducts cooperative programs with individual States for specific purposes. For instance, a program is under way, in cooperation with the State of Maine, to show that common poultry diseases can be controlled through the vigorous application of sound disease management practices . . . and that prevention is preferable to treatment of diseases after they become firmly established.

In Minnesota, a cooperative pilot study is designed to combat sinusitis in turkeys. The program consists of serological testing of all turkey breeder hens and toms and inspections of each flock during the laying season. All infected flocks are discontinued as a source of hatching eggs.

We also cooperated with the State of Virginia in making a study of the causes of the high incidence of disease on poultry farms. Our poultry epidemiologist worked with State poultry specialists in surveying the situation and made recommendations on ways to assist Virginia poultrymen in lowering disease losses.

ARS also conducts an extensive research program to develop new knowledge about the control and eradication of poultry diseases. We conduct this research at three principal laboratories; parasitic disease research at the Beltsville Parasitological Laboratory, Beltsville, Maryland; exotic disease research at the Plum Island Disease Laboratory in New York; and domestic disease research at the National Animal Disease Laboratory, Ames, Iowa. In addition to the research program, the laboratory at Ames furnishes a valuable typing service for Salmonella isolations.

Our Regional Poultry Research Laboratory at East Lansing, Michigan is conducting highly significant research on avian leukosis; and funds have been provided for an expansion of the facilities for this work.

Two new laboratories have been established in the South to expand research on poultry health. These are the Southeast Poultry Research Laboratory at Athens, Georgia; and the South Central Poultry Research Laboratory at State College, Mississippi. Investigators at these laboratories will give special emphasis to the study of disease problems having to do with condemnation of poultry -- particularly broilers -- at processing plants. The new facilities are designed specifically for research on interrelations of disease, environment, and management. Three of our ARS Divisions are cooperating in these studies.

We have still other laboratories and field stations devoted entirely to poultry research work. These include the Southwest Poultry Experiment Station at Glendale, Arizona; the Southern Regional Poultry Breeding Project at Athens, Georgia; the North Central Poultry Breeding Project at Lafayette, Indiana; and the Avian Anatomy Project at East Lansing, Michigan.

We also have facilities for other phases of poultry husbandry research at the Agricultural Research Center at Beltsville. Some of you will see these facilities when you tour the area tomorrow afternoon. You will find we are conducting research there principally in the areas of poultry breeding, nutrition, and physiology. In recent years, we have been putting more and more emphasis on basic research in the Beltsville research program. This is an effort to dig deeper into the unknown, to provide a wider background of knowledge from which we can develop more effective programs of applied research.

The specific answers that research is finding today are based on fundamental knowledge developed perhaps 10 to 20 years ago. We must continue pushing ahead on the frontiers of science in order to keep up with the needs for new knowledge to solve new problems -- and to solve some of the old problems that we have been living with for much too long.

ARS is also concerned with the standardization and licensing of poultry biologics. The objective of the procedures is to assure poultry producers that these products are effective for the purpose claimed in protecting poultry health, and that they are safe to use.

We are also responsible for preventing the entry into this country of foreign poultry diseases, such as fowl pest and Asiatic Newcastle disease. This responsibility is carried out through a program of inspection and quarantine at borders and ports of entry. The job of disease control and eradication would be much more difficult than it is now if we had no methods of stopping these foreign diseases before they gain entry and become firmly established. In today's world of fast travel from all parts of the world, the entry of exotic diseases is more critical than ever before. Therefore, this function of ARS is of increasing importance to the poultry industry.

An exceedingly helpful benefit in disease control is gained through the poultry inspection service, by the location of infection through condemned birds. When we know where a disease exists, we are in a better position to combat it.

Of course, as I indicated, all of this is not a one-man show, conducted by one organization. The support of poultry improvement is cooperative in every sense of the word -- with State Experiment Stations, Colleges of Veterinary Medicine, Departments of Animal Husbandry, State Departments of Agriculture, our own research and regulatory activities -- all working with industry.

Now, what about the future?

One of the first responsibilities to be met is to continue supporting a broad program of poultry research. Even though a good job has been done to improve the quality of the product and the efficiency of production during the past thirty years, we still need to do a better job. And the road to further improvement starts with research.

During the present era of scientific revolution, new research tools are being developed that make it possible to attempt studies that would have been too complex and time consuming for us even to consider just a few years ago. As a result, many projects -- investigation of blood antigens . . . studies in biochemical genetics and in virology -- can be attempted for the first time. But the primary consideration for future research is still in the fundamental areas of breeding, nutrition, management, disease control, and marketing. No matter what new trends may develop in the poultry industry, real improvements must grow from these areas. Continuing advances in these fundamentals will serve as the basis on which to build new additions to our research efforts.

At present, poultry flocks are becoming larger in size and fewer in number. As producers increase the size of their operation, they need better methods of protecting their increasing investment. They need better methods of controlling diseases. For example, we are attempting now to standardize Mycoplasma gallisepticum antigen for use as an effective tool in curbing PPLO. With this tool we may be able to reduce the severe economic drains to the producer from this disease. When we can assure the production of PPLO-free breeding stock as part of the National Plans, it will be an important improvement for the poultry industry.

We need to know more about the effects of environment on the health of poultry flocks. Environment is a primary consideration in preventing the spread of disease. But we need additional information. For the past fifteen to twenty years, poultry production has become mechanized at an almost unbelievable rate. This has included an increasing use of partial or complete environmentally controlled facilities. Producers have moved forward so rapidly in this direction that research has not kept pace in providing adequate information on the precise effects of all the environmental controls being used.

We need to know more about the point of diminishing returns in the increase of bird densities to keep down the housing cost per bird. We are not quite sure where the decreasing performance offsets the savings in building and equipment costs.

Nutrition research should be continued and expanded in several directions. The progress that has been made in feed efficiency -- impressive though it is -- will not be enough to keep the industry moving ahead in the future. The poultry of today is quite different from that of 25 years ago. The growth of chickens has been increased from about $2\frac{1}{2}$ pounds of weight at 10 weeks to as high as 4 pounds at 8 weeks.

The dietary requirements of the poultry of even 10 years ago are probably not the same as those of today's birds. Nutrition has been found to vary for different breeds, even strains within breeds; and changes according to sex, age, environment, and management for the same strain. These and many other changing aspects of poultry nutrition need to be studied more thoroughly.

Methods of breeding, feeding, and management have become vastly more complex, and poultry "husbandry" is truly poultry "science." The producer of today -- and of tomorrow -- must be well grounded in many fields in order to keep his operation on a paying basis. He must have the best and latest information in order to make knowledgeable decisions and as few mistakes as possible. He cannot afford too many mistakes and stay in this highly competitive business.

The National Plans help their participants to keep up-to-date. The Plans' agents and inspectors are in close contact with participants, and can put new information and recommendations quickly into the hands of hatcheries and flockowners all over the country.

As you meet here this week, I know you have a number of important questions before your Conference. Not the least of these is the question of including other diseases in control programs of the Plans. Perhaps a program for the control of Mycoplasma gallisepticum . . . and some or all of the paratyphoids . . . can be made practicable. The surveys and other activities to locate and type Salmonella infections that have already been conducted should be helpful in formulating such programs.

The progress in pullorum control that you have made demonstrates the effectiveness of your program. The welding of the activities of poultrymen, hatcherymen, official State agencies, and the U. S. Department of Agriculture has not always been an easy job. You have made it work.

The NPIP and the NTIP can be an even more effective force in serving and improving the rapidly changing poultry industry of the future. For this objective, I assure you of my continued interest and sincere best wishes.

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MUSHROOMS -- OLD CROP IN A NEW WORLD

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service, U. S. Department of Agriculture

It is indeed a pleasure to be with you here. A meeting such as this can hardly fail to be stimulating, as scientists and growers from across the world exchange ideas and experiences in the bracing atmosphere of a Pennsylvania autumn.

I am glad that your Congress chose Philadelphia for its first meeting in the United States. Here, the towering skyscrapers of modern times have not crowded out the modest buildings that witnessed the birth of this republic. In these surroundings, the heritage that made possible our present progress comes alive.

The Secretary of Agriculture was unable to be here to address you. Secretary Freeman has asked me to bring you this message:

> "I regret that I cannot be in Philadelphia to welcome you personally. It is especially fitting that the Fifth International Mushroom Congress should meet in this country in 1962, while the U. S. Department of Agriculture and the Nation's Land-Grant colleges are celebrating their Centennial. From the beginning, one of the main purposes of these institutions has been to acquire and disseminate new agricultural knowledge. This aim is in close accord with the emphasis you place on research and cooperation.
>
> "I share with all of you a deep desire to improve the quality, nutritional content, and variety of the world's food supply. Scientists and growers of many nations, pooling their knowledge and attacking common problems together, offer our greatest hope of ultimately banishing hunger and malnutrition from the earth.
>
> "I hope this will be a profitable and enjoyable week for you.
>
> "Orville L. Freeman, Secretary of Agriculture."

Talk before the Fifth International Mushroom Congress, Benjamin Franklin Hotel, Philadelphia, Penna., Monday, October 29, 1962.

Just as Philadelphia revives our memories of the Nation's beginnings, this centennial year has been reviving for us the history of our agriculture. We've been acknowledging our debt to the past and to other countries.

The agriculture of this country was, of course, based on practices and knowledge developed in Europe over past centuries. The colonists obtained seeds for many crops from abroad to supplement those they borrowed from the Indians. Their only meat would have been turkey and other game had domestic livestock not been imported. Here in Pennsylvania, Swedish, German, and Scotch-Irish farmers brought their own skills with them to diversify the English colony's agriculture.

Going back into the early history of this country, we find nearly all of our great public leaders deeply concerned with the needs of agriculture. Many of them were familiar figures in this city. One was the man for whom this hotel was named, whose presence one feels even today in the streets of Philadelphia. In colonial times, Benjamin Franklin sent back, from his sojourns in Europe, seeds and plants to improve American agriculture. So did Thomas Jefferson. Both Jefferson and George Washington were members of the Philadelphia Society for Promoting Agriculture, which dates from 1785.

A hundred years ago, President Abraham Lincoln paused in the midst of a tragic war to sign two pieces of legislation vital to American agriculture. This legislation created the U. S. Department of Agriculture and laid the basis for this country's extensive system of Land-Grant colleges.

The Department and the Land-Grant colleges joined hands during the century that followed to create agricultural services without equal in the history of man. State agricultural experiment stations were added to strengthen research and education. Agricultural extension work, in cooperation with the Land-Grant colleges, channeled research results out to the people and into practice. A network of Federal and State regulatory services evolved to safeguard the wholesomeness and abundance of our food.

These State and Federal agencies, working together, have helped to shape the agricultural revolution that has swept this country. Rapidly advancing technology has multiplied the yields of a young, fertile, and uncrowded land. Our farmers today are producing more food and fiber, on less land, with less manpower than ever before. In 1862, one farmer produced enough food and fiber for 5 people; today, he supplies 27 people. Americans spend only 20 percent of their take-home pay for food. In some other countries, people have to spend 30 to 50 percent, and even more, of their income for food.

Increased agricultural efficiency is the keystone to our industrial strength. It has freed a tremendous manpower force to run our business and industry, to spur economic growth, and to raise our level of living. Farm workers comprise less than 4 percent of our population.

The United States is not the only country to profit by this abundance. It is an asset to the world. It proves that free men can and will develop an agricultural efficiency and productivity far beyond the reach of people under any other system of government. Our Food for Peace program has given strength and hope to hungry people of many nations. In addition to this, other countries benefit from the high regulatory standards that we require of our own people. These standards protect the safety and quality of the meats and other foods we ship abroad.

The agricultural revolution of this country has been repeated, in miniature, in mushroom growing here.

Our mushroom culture was borrowed from other countries, but it got off to a rather late start. Ancient civilizations of China, Egypt, Greece, and Rome knew how much mushrooms added to the pleasures of eating, but we in the United States were slow in making this discovery. Mushrooms came to us from Europe, probably through English and French gardeners. Mushroom culture emerged in this country from cellars and under greenhouse benches in the late 1800's to become a highly specialized business.

Research has greatly benefited mushrooms, just as it has other crops. The Federal research on mushroom culture that began early in this century has often been interrupted and limited in manpower. We have no apologies to make, however, for the quality of that manpower. You are familiar with the contributions that our master of ceremonies, Dr. Edmund B. Lambert, and his associates have made to this industry.

We are proud that a scientist of Dr. Lambert's caliber heads the mushroom research of this Department. This year, our Department awarded him its superior service award for research accomplishment and leadership in the field of mushroom physiology, nutrition, diseases, and commercial culture.

The research of scientists such as Dr. Lambert, in this country and abroad, has in 30 years helped to make 3, 4, 5, or 6 pounds of mushrooms grow where 1 pound grew before. It has helped to make U. S. mushroom culture the important industry it is today.

I doubt if many Americans realize what an important vegetable crop mushrooms have become in this country. This may be partly because we cannot see them growing along our highways and roadsides. Probably few grocery shoppers know that the farm valuation of mushrooms is almost as high as that of such staple vegetables as sweetpotatoes, onions, cabbage, and celery. Or that it is higher on mushrooms than it is on peas and carrots.

The tremendous increases in efficiency of mushroom production in the past have been due to technical contributions and to the initiative, imagination, and courage of our growers. The increased world production of mushrooms today presents a challenge to both scientists and growers. A continuing flow of research advances is essential if growers in this country are to produce efficiently enough to stay in business.

Growers need an improved artificial compost. They need strains of mushrooms of greater productivity and marketability. They need to know the physical and chemical environment under which mushrooms fruit best. And they need more effective disease controls.

The answers to these and other needs may lie waiting in laboratories for public or private research here or abroad. If technological improvements in mushroom culture keep pace with those of other crops, we can look forward in coming decades to gains comparable to those of the past 10 years.

As research picks up momentum and becomes more and more highly specialized, scientists sometimes find it hard to keep abreast of all that is happening. International interchanges such as this meeting can do much to bridge differences in time, distance, and languages. And when scientists meet with those who apply their research findings, the benefits multiply.

I am confident that the meeting now opening, and the scientific papers presented here, will be provocative and beneficial. They will stand as a landmark in the international development of the mushroom industry.

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WELCOME TO WASHINGTON

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service, U. S. Department of Agriculture

It's a pleasure, indeed, to welcome to Washington so many of our partners in the vital mission of safeguarding the livestock of the United States.

I know you are disappointed that Secretary of Agriculture Orville L. Freeman was unable to address this session. It is my privilege to bring you the following message from Secretary Freeman. He says:

> "I am sorry I cannot be with you this afternoon to extend a personal welcome to the Nation's Capital as you open this Sixty-sixth Annual Meeting of the United States Livestock Sanitary Association.
>
> "Let me assure you of my warm regard for your long and distinguished service in the protection of animal health. I know that you have worked side by side with the Department to help make this country probably the safest place in the world to raise livestock.
>
> "And the world marvels at the results: Our people enjoy an unmatched abundance of wholesome meat, dairy, and poultry products that are high in quality, wide in variety, and reasonable in price.
>
> "All of us recognize, of course, that there is still a great deal to be done in reducing the losses from animal diseases and increasing the efficiency of production. I am sure this challenge will be met as all of us concerned with the health of the Nation's livestock continue our work together to move forward toward these goals.
>
> "You have my best wishes for a most successful meeting.
>
> "Orville L. Freeman."

I'm sure this will be one of <u>many</u> successful meetings in the long history of this Association.

Talk at opening of Sixty-sixth Annual Meeting of United States Livestock Sanitary Association, Washington, D. C., Tuesday, October 30, 1962.

You last met here in Washington in 1908. It is fitting that you have returned to Washington in 1962, while our Nation is celebrating the centennial of two momentous events: Just a century ago this year, Abraham Lincoln signed the bills that created the U. S. Department of Agriculture and opened the way for the States to establish Land-Grant colleges.

Who is in better position than you are to appreciate what happened? The "people's colleges" -- as Land-Grant institutions came to be called -- began to make higher education available to Americans like ourselves. And the "people's department" -- as President Lincoln referred to USDA -- began to acquire and diffuse new knowledge of agriculture.

These two institutions of the people joined hands . . . over the century that followed . . . to foment the revolution that swept American farms.

Some of this revolution's most significant advances have come in the area of animal health. I know you share our pride in these accomplishments, because many of them have also been <u>your</u> accomplishments.

It was cattle tick fever that brought together the little group of State regulatory officials who formed this organization in 1897. The State-Federal eradication effort begun in 1906 eventually wiped out tick fever and saved the livestock industry of the South.

This principle of State-Federal cooperation goes back to 1884, when Congress created the old Bureau of Animal Industry as a result of cattle losses from contagious pleuropneumonia. This disease was completely eliminated from the United States by 1892.

Several other costly diseases have since been eradicated: dourine, glanders, foot-and-mouth disease, and vesicular exanthema. These were explosive diseases that could quickly reach epidemic proportions.

Together, we have also succeeded in bringing under control some of the most serious chronic diseases that threaten our livestock. Tuberculosis has been reduced to a low point. And the campaign against brucellosis is steadily advancing.

It will be difficult to surpass some of the accomplishments of this last century.

I believe we have been able to do so well because we give the livestock industry a <u>united effort</u>. We have come a long way in this respect.

States no longer sit back and rely on the Federal Government to take care of animal diseases. You State people have developed effective disease-control organizations and outstanding competence in operating them. This Association has made invaluable contributions in promoting the adoption of improved control and eradication procedures.

We identify our problems scientifically and call on cooperative research to find the answers. This Association has contributed by helping direct attention to the areas where further research is needed.

The result of this united effort is that few countries even begin to approach our level of livestock health. We have been able to keep many of the worst diseases from getting into the United States at all. And the safety and wholesomeness of our meat and poultry food products set the standard for the world.

And yet, as Secretary Freeman pointed out, our work is far from done.

We realize just how big the job ahead is when we remember that diseases still cost livestock growers of this country a staggering $2 billion a year. It has been estimated that an average farm of 160 to 200 acres loses around $1,500 a year from livestock diseases.

We realize how hard the job ahead will be when we remember that there's still no fully effective way of getting rid of some diseases. In other cases, it's increasingly difficult to separate the reactions to our diagnostic tests. Then, too, the rising concentration of livestock is intensifying the threat of serious disease outbreaks. And air transportation has brought many new diseases within a few hours of our shores.

So the challenge is great . . . and still growing.

But so is our ability to deal with this challenge. Our cooperative procedures for fighting animal diseases are getting better every year, and our techniques are constantly being improved. New laboratories are bolstering our research capacity. We know that some of the most difficult questions in this area still remain to be answered, so our goal in ARS is a scientific effort of the highest quality.

It's not just our ability to deal with animal diseases that we need to be concerned about today. It's also necessary that there be a strong national determination to meet this challenge with all the vigor that you and I know it takes to win the fight.

Look at some of our major problems:

We've been living with tuberculosis in this country since colonial days. We set out to eradicate it 45 years ago. We did fine for the first quarter of a century and came very close to complete eradication. But now, the scattered cases that remain are not only harder to search out but also harder to identify with certainty. There has been no real progress against tuberculosis in nearly 2 decades.

We've been living with brucellosis for at least 57 years. It's true that substantial gains have been made since the cooperative eradication program was started in 1934. But here, again, we find it difficult to identify and root out some of the more atypical cases that remain. We have some hard work ahead to meet our goal of complete eradication of brucellosis by 1975.

We've been living with hog cholera for 129 years. We've talked for a long time of trying to eradicate this virulent disease. I am happy -- as I know you are -- that we are finally ready to tackle this job. Present thinking is that hog cholera can be eradicated in about 10 years . . . for the price of just 2 years' losses.

Hog cholera, brucellosis, and tuberculosis are the foremost threats today. But we are also living with other diseases that could spread rapidly throughout the country with serious consequences.

This challenge must be faced. The United States can no longer afford to live with such diseases indefinitely. Even now, there's a critical need to improve our production efficiency. And in the future, we will have to feed a population that's expected to double within 40 to 50 years.

Now -- as this centennial year comes to a close -- this country should resolve to focus on animal diseases the full power of our cooperative research and regulatory resources.

At the same time, let us who carry on this work resolve to reinforce the traditions of leadership that distinguish our cooperative endeavors: alert recognition of new developments . . . sober evaluation of changing conditions . . . consistency in our official actions . . . persistence in carrying out our duties . . . constant exercise of sound, cool judgment under fire. These traditions are the key to success in regulatory operations.

We in the Department take the greatest pride in our fine working relationships with State regulatory officials, with private practitioners, with those in the livestock industry, and with the Land-Grant colleges. Together, we will meet the challenge of protecting the Nation's livestock.

In closing, I urge you to find time, while you are in Washington to visit the ARS offices here as well as our installations at Beltsville. Please accept this as your personal invitation to drop by. We hope your stay in Washington will be both pleasant and profitable.

DISEASES OF ANIMALS ACQUIRED FROM MAN -- DEVELOPMENT OF PROTECTIVE MEASURES

by

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service
U. S. Department of Agriculture

Some 70 billion people are supposed to have lived on this earth in the two million years of man's existence on this old planet.

Somewhere in that remote past, the relationships that are integral to our way of life gradually began to assert themselves. The animals that existed alongside man became his food supply -- first, by random hunting, and then, by planned production. Others that he didn't need for food he domesticated to perform useful services for him. Contacts between man and animal increased and multiplied. Animals became a source of disease and infection to man as well as an important part of his food supply.

Today, we recognize the seriousness of this source of human disease and are doing everything we can to avoid or minimize it. This is as it should be.

But these increasing contacts between man and his animals have given rise to another set of serious if less dramatic problems -- those associated with the transmission of disease from man to animals.

The significance of man as a disease reservoir for animals is not nearly so evident as it is the other way around because of the relative importance of the two classes of animals.

The clinical evidence of man-to-animal transmission is not clearcut, partly at least because scientists and practitioners have not given the problem sufficient thought. Most of them have to face the everyday realities of trying to hold down or prevent disease by using the most practical and immediate means at their disposal. This has not often enough included investigations of man as the dispenser of disease to animals.

I believe it is important for us to study and better understand this mode of disease transmission, in order to gain a deeper insight into the many complex ways that disease can spread in living organisms. Rinderpest, distemper, and measles are certainly unrelated in the symptoms they cause and the subjects they attack. Yet, they are caused by viruses of similar antigenic properties. Anything we learn about the role of man in transmitting disease is a step forward in our understanding of the relationship of all living things.

Talk before the Institute on Occupational Diseases Acquired from Animals, University of Michigan, Ann Arbor, Michigan, January 9, 1964.

It has been estimated that losses from animal diseases throughout the entire world amount to well over $4,000 million each year. An ability to pinpoint sources of infection -- man or animal -- is vital in efforts to reduce these losses.

More and more, we may have to look to man as a possible source of infection when we are faced with outbreaks of disease in animals.

Let me illustrate what I mean by a few examples.

The virtual elimination of bovine tuberculosis in the United States has been accompanied with a great decrease in bovine-type tuberculosis among human beings. When the nationwide campaign to control tuberculosis in cattle began in 1917, well over 2,000 cattle per 100,000 were condemned under Federal meat inspection because of tuberculosis. This year, we are losing less than 2 cattle per 100,000 due to tuberculosis.

As the disease was controlled in the cattle herds, tuberculosis in man decreased from a death rate of over 125 per 100,000 in 1917 to a little over 5 this year. Although the control of tuberculosis in cattle is not responsible for all of the decrease in the disease in man, it has certainly played a major role.

But now that it is rare for man to acquire tuberculosis from cattle, we are becoming more acutely aware of the problem of cattle contracting the disease from man. Organisms from the sputum or sores of a tubercular individual working with livestock or with their feed or water can readily produce the disease in the animals. Some cattle have become tuberculin reactors from infections acquired from people, but have shown no gross lesions upon autopsy. This has added to the complexity of dealing with "problem herds" wherein the usual testing procedures have not been effective to identify all the sources of infection in cattle herds.

The problem is not ours alone. In the Netherlands, cases of tuberculosis in cattle are reported to be of human origin. In Israel, human sources are strongly suspected of causing the disease in dairy cattle ... to such an extent that some urban dairies are being eliminated to solve part of the problem. Substantial evidence has been uncovered in Great Britain showing the transmission of bovine type tuberculosis from man to animals.

Veterinary scientists, practitioners, and regulatory officials have done a magnificent job in <u>almost</u> eradicating tuberculosis as one of our greatest scourges. In carrying out mop-up operations to complete the job, some better means must be found to prevent contact of infected human beings with livestock. Improved sanitation, better methods of prompt discovery, and removal of infected human beings from contacts with livestock are essential.

The tuberculosis eradication program has been paralleled in many respects by the program to eliminate brucellosis. Cases of brucellosis in livestock have been reduced by more than 90 percent in the United States within the last 15 years and in human beings by more than 93 percent. Eradication of this disease in cattle and other livestock, once considered a remote possibility, is now a good probability.

In the current state of our knowledge, it appears that brucellosis is transmitted from animals to man, but not from man to animals. However, the frustrations of dealing with problem herds affected with this disease suggest the desirability of more precise knowledge of the likelihood of transmission from man to animals under special conditions favorable to the causative organism.

The importance of man in transmitting Salmonellosis must not be underestimated. Each year, cases are reported that incriminate human carriers as the source of infection for animals. How often man is responsible for outbreaks among animals is not clearly known partly because of gaps in reporting procedures and inadequate reports from a small number of States.

Recent cases in Germany strongly suggest a human to animal transmission. In Poland, man has frequently been recognized as the carrier of types of Salmonella organisms before they could be recovered from livestock. It is an exceedingly difficult and time-consuming job to reliably detect the carriers in order to break the cycle of infection. The important point is that it must be done, as Salmonellosis is a continuous threat to both animal and human health.

Influenza is assumed to be transmissible from man to swine. There exists much indirect evidence that the swine influenza virus was the agent that caused the great epidemic among humans in 1918, that the current swine influenza virus is a surviving prototype of the 1918 strain, and that swine originally acquired their infection from man. There also exists some direct evidence that man can and does spread even the milder strains of the influenza virus. European scientists recently completed work which clearly showed that lambs were susceptible to the human strains of influenza virus, and that cattle and calves may also be susceptible.

A great deal of research needs to be done to determine the exact role of man and animals as reservoirs of infection for influenza.

Man is known to be capable of transmitting human strains of staphylococci to animals by contact. He can transmit occasional diphtheric infections. Individuals who have been vaccinated for smallpox can transmit cowpox. Infections of this kind are not as economically important as they were at one time. Nevertheless, they are important to keep in mind as a possibility in diagnosing any illness in an animal or in a herd.

Man apparently is also capable of transmitting infectious hepatitis to primate animals, according to some interesting studies conducted by the U. S. Public Health Service. Available evidence also indicates that animals can transmit the disease to each other as well as to humans. The studies have been limited and we are far from knowing all the details involved. But we can be sure that the mere knowledge that such transmissions are possible pose challenging new problems to veterinarians. Further research may show that primates are not the only recipients of this disease from man.

Human beings also play an important (if not a necessary) role in transmitting some internal parasites, such as taenia saginata and taenia solium. Cattle and swine are infected by ingesting the eggs in their feed or water, which have been contaminated by infected human carriers. Man, in turn, acquires the disease by eating infected meat that is eaten raw or not cooked sufficiently to destroy the cysts of the tapeworm. Cysticercosis is increasing in many parts of the world. Evidence of infection in the country of Chad, Africa, for example, has doubled in only four years' time. Paradoxically, at least part of the increase is due to a higher standard of living. This has brought about increased cattle holdings and greater consumption of beef, slaughtered without benefit of proper inspection.

Our own country is not immune. Each year a small proportion of our cattle becomes infested, especially in feed lots. Infestations derive from unsanitary habits of infested laborers. Even with efficient meat inspection, control of human wastes, and treatment of human carriers and educating them in proper sanitary habits are needed to better control and eventually eradicate this disease.

Some evidence from countries of the Far East indicates that while man is not the primary host, he may play an important role in infesting and reinfesting swine with stomach flukes. Studies by the World Health Organization have shown that many people in these countries are infested with liver flukes. The suggestion has been made that these parasites can be passed back to animals.

Special mention might be made of Rift Valley Fever. This insect-borne virus disease can cause heavy mortality in sheep and cattle and acute illness in man. The Department of Agriculture maintains a quarantine guard to prevent the introduction of this disease into the United States. Diagnostic materials are available at the Plum Island Animal Disease Laboratory should the disease break out of Africa and reach our shores, where it could spread rapidly with devastating consequences. The Department of Defense has developed an effective killed-virus vaccine for use by human beings in case it should be needed to protect our population and those working with the disease. A live-virus vaccine is also available to protect cattle and sheep. Our research and regulatory people are in constant touch with scientists in Africa who are working on the disease, in order to keep up with the latest research findings and the patterns of disease spread.

The current large scale importation of primates from Africa poses a new hazard for the introduction of Rift Valley Fever into the United States. At least seven species of African monkeys have been found to carry antibodies against Rift Valley Fever. Experimentally, a non-clinical viremia in primates lasts for several days. A similar non-clinical viremic stage in man might provide a source of infection to animals with the Culex and Aedes mosquitoes acting as the potential means of transmission. Additional studies are required for more definite information on this probability.

The protozoal and arthropod-borne infections pose continuing problems because of the complexity of their disease cycles and the wide range of their contacts. The seriousness of these infections for man and animals cannot be overestimated. Control depends upon the fullest possible cooperation among physicians, veterinarians, and government authorities, and understanding and support from an informed public.

Leptospirosis, a relative newcomer in our understanding of disease phenomena, is difficult to control among both animals and man. The ubiquitous nature and many varieties of the causative organism give special importance to studies of the epidemiology of this disease. Veterinarians and physicians alike are often confused and confounded by the alternating appearances, disappearances, and re-appearances of this disease.

Anthrax is a classic among diseases of man and animals. It is a "scare" disease, with highly fatal consequences if uncontrolled. The most effective cooperation among physicians and veterinarians is required for control. The dangers of the disease have made such cooperation traditional.

We know little enough about poultry ornithosis, but we do know that it can be extremely serious in both birds and man. There is some evidence that human beings who have gotten the disease from birds, particularly turkeys, can transmit it to other human beings. There has been substantial interest in this disease because of the possibility of human infection among the growing numbers of people working in our expanding poultry processing industries.

Along a different but related line, it is important to remember that most of the neoplasms occurring in domestic animals are prototypes of the many forms that develop in man. The similarity in cell structure, growth, and chemistry is striking. The extensive studies of neoplasms, supported as they are by the most intensive public interest, may be expected to show us what relationships exist between man and animals in the patterns of development of cancer, and the routes of its transmission.

We know of at least 80 diseases and a larger number of parasites that can be transmitted between animals and man, with tragic consequences to both. There is no method for estimating the economic losses directly or indirectly affecting human welfare. The toll, especially in some of the most severely afflicted developing countries, is tremendous in terms of sapping human strength and vitality -- the very qualities most needed to help with the complicated job of building a nation. The toll in terms of livestock losses due to death or decreased production is also staggering.

What to do about it? We have been asked for suggestions to protect the health of our animals and our people. I would list the following for your consideration:

(1) Perhaps most important in the long run is our state of mind toward disease and the philosophy we adopt and maintain in our daily work. We must refuse all compromise with disease and reject the notion that disease in all its forms is inevitable. Healthy flocks and herds are essential for a wholesome food supply and a sound economy. Healthy animals and birds contribute immeasurably to the health of our people and the improvement in our standard of living.

(2) Veterinary medical research is in great need of strengthening and enlargement to keep pace with today's requirements for better knowledge of the mechanisms of infection, immunity, tolerance, and the perfection of techniques of diagnosis and treatment.

(3) The flow of communications between veterinary medicine and human medicine must be maintained and strengthened. The fundamental principles of diseases and their transmission are the same in man as in other animals. The veterinarian and the physician each has his professional task to perform, but neither can do a complete job without the help of the other if we may presume in the future a healthier and more productive life for both man and animals.

(4) Increased attention must be given to epidemiology. In this area veterinary medicine occupies a unique position between human medicine and agriculture. It is the bridge over which knowledge and the increase of knowledge must flow to protect the health of man and animals. The strength of this bridge is dependent upon the knowledge, the initiative, and the forward progress of the veterinary profession.

THE JOB AHEAD FOR CATTLEMEN

by

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service
U. S. Department of Agriculture

It is a pleasure to be here with you in Mississippi for your seventeenth annual convention. Cattlemen in this association can be proud of your efforts to help increase the value of livestock production in the rapidly changing agricultural pattern of this area.

About twenty years ago there was a surplus of rumor and misinformation and a scarcity of sound knowledge about livestock production, pastures, and forage for the South.

Over the years, as groups such as yours have worked together to exchange information, to pin-point problems, and then set about to solve them, you have made a great contribution. Southern agriculture has become diversified. It has changed from an area of one-crop farms to a well-rounded agricultural production system. As an example of that change, beef cattle numbers in the South increased more than 325 percent in . . . roughly . . . the past twenty years, while the national average increased only 141 percent.

Part of this growth and diversification has been made possible by progress in better livestock breeding and better over-all feeding and management practices. Part has come through the results of grassland research, applied to make better pastures. Another part has been made possible through disease prevention and control.

As a result, Southern livestock production is making a new and important contribution to the Nation's abundant supply of wholesome meats. Consumers in this country indicate their confidence in the safety of that supply by the increasing acceptance of meat in the diet. In the past 25 years in the United States, the average consumption of meat increased from 127 pounds per person to over 163 pounds a year. Of all the meats consumed in this country, people generally prefer beef, as long as they can afford it.

As this trend of rising demand continues, the job ahead for cattlemen will be challenging. In the first place, population expansion will create its own problems. Current census predictions are that the population of the United States will more than double between now and the year 2000. As the number of people increases, the demand for livestock products is expected to go up even faster . . . if incomes stay high enough for the average family to buy what they <u>want</u> and <u>need</u> nutritionally.

Before the Mississippi Cattlemen's Association, Jackson, Miss., Jan. 18, 1963.

But in order to maintain this full market, cattlemen must continue to produce what consumers want to buy. Consumers want flavorful, tender, juicy meat for the table. They want a high yield of edible meat with a large proportion of lean in relation to fat. When they want fat they can buy it more cheaply in other forms, and they are interested in the part fat plays in human health problems.

This interest in excess fat is very real. A beef marketing survey recently conducted by the National Association of Food Chains resulted in twenty-six recommendations to cattle growers and feeders for improvements to increase sales and consumer acceptance of beef. Fourteen of the recommendations referred to excess fat. The importance of this problem cannot be over-emphasized.

But the solutions to the problem are complex. Just reducing the length of time cattle remain in the feedlot is only the answer to the excess fat in animals fed to extra heavy weights. It is not the final answer. Experience shows that some degree of marbling is essential to tenderness, juiciness, and flavor. That means our beef animals must be given enough finish to provide the marbling of fat. Perhaps the scientists who are working toward providing a meat-type beef animal that will yield well-marbled lean and a minimum of excess fat hold the key to a large part of the answer.

Other scientists are working on an ultrasonic device to determine the amount of fat and lean in a live animal. When it is fully refined, this technique will enable us to predict much more accurately the carcass composition of live animals and should provide a useful new tool in selective breeding programs.

Consumers are also interested in the continued safety and wholesomeness of their meat supply. Cattlemen have a responsibility to protect that wholesomeness and maintain consumer confidence. For example, in using chemicals, it is vitally important to "Follow the label" and avoid harmful misuse. Members of this organization -- and of the American National Cattlemen's Association -- have taken an important leadership role in emphasizing the importance of the safe use of chemicals.

The Federal government shares this responsibility in a unique approach, not found anywhere else in the world. In the U. S. Department of Agriculture, our part of that responsibility starts with the land itself. By conducting a review and registration of agricultural chemicals, we help to maintain a constant vigilance over the types of chemical materials and possible residues that may contaminate the soil or feed and forage crops.

In another part of this responsibility, our scientists carry out research on such chemicals as feed additives to make certain that they can be used safely and effectively. For example, the Agricultural Research Service conducted intensive studies on diethylstilbestrol, beginning in 1955. These tests showed that diethylstilbestrol, properly used, can increase the rate of gain in beef steers without adverse effect on meat quality. We also found that doses heavier than the recommended 10 milligrams a day are less effective and are not economically practical.

After the experimental animals were slaughtered, the Food and Drug Administration made extensive tests on the carcasses and detected no trace of diethylstilbestrol. These tests were sensitive enough to detect traces of residue as minute as 2 parts per billion.

The use of diethylstilbestrol as a cattle feed additive is now an accepted practice. But it is highly important to use the additive as directed: Feed only 10 milligrams a day, and stop its use 48 hours before slaughter. Federal meat inspectors will hold up any cattle for 48 hours if they have reason to believe they have not been taken off diethylstilbestrol for the required period.

Another part of the Department's responsibility for wholesome meats is in animal disease research and control and eradication programs. We are all familiar with the importance of these efforts to southern livestock production. Cattle tick fever threatened the very existence of the cattle industry in the South until research in veterinary medicine traced its cause to the specific cattle tick. Later, the systematic program of cattle dipping eradicated the tick, and with it the disease.

The brucellosis eradication program is another example of regulatory action based on the results of research. The milk ring and blood tests are vital tools in the difficult battle being waged against brucellosis. Twenty-nine States have achieved modified-certified status, and one State -- New Hampshire -- has been declared brucellosis free. A total of 2,345 counties are now modified-certified and another 154 counties are brucellosis-free.

Your efforts here in Mississippi are showing good results, with 65 percent of all cattle in the State under the market cattle testing program. The milk ring tests of dairy cattle are showing up suspicious herds in about one in fifty herds tested. That compares with about one out of every two herds just a few years ago. With constant screening, cattle owners are discovering infection more rapidly and, therefore, getting rid of it more quickly. Your goal of modified-certified brucellosis status by 1965 seems to be an attainable objective. We in the Agricultural Research Service are proud of the part our people have taken in this effort. Dr. Pate and his associates work closely with Dr. Chadwick and his people in cooperation with the Mississippi Livestock Sanitary Board and the Mississippi Veterinary Medical Association.

The study of another serious cattle disease -- anaplasmosis -- has been a part of our research program for a number of years. An efficient antigen and a test for diagnosis have been developed, and have proved to be valuable tools for measuring results of investigations of anaplasmosis. This means of identifying the disease has made it possible for anaplasmosis research throughout the Nation to increase four- or five-fold as compared with the research in progress before the test was available.

The Agricultural Research Service is cooperating with a number of cattle owners in several States in the Southeast to conduct field tests and surveys to discover the extent and location of the disease. We are working together to develop practical methods to prevent the spread of anaplasmosis, to control it, and eventually to eradicate it. Unfortunately, there is a great deal yet to be done.

The research on the various insect vectors involved with the spread of anaplasmosis is part of our work in ARS on parasitism. Now that the new National Animal Disease Laboratory at Ames, Iowa, is in operation, our research program at the Beltsville Research Center near Washington is concentrating on the study of parasites. We are making some progress in identifying the specific parasites causing various cattle disease problems. We are also increasing the emphasis on finding more effective, safe, chemical treatments for these internal and external pests.

The screwworm eradication program is a prime example of the combination of entomology research and animal disease eradication efforts to protect animal health. The successful eradication of this pest in the Southeast has given complete protection to herds and flocks in this whole area, except for the recurring infestations from the West. Now, with the eradication program well underway in the Southwest, the advantages are already apparent in Mississippi and States farther east. Only one infestation was reported east of the Mississippi River during 1962, and this was found on an animal that had just been shipped in from the Southwest. The State of Mississippi reported no infestations during the year. In contrast, during 1961 more than 80 counties in 9 States east of the River reported nearly 700 confirmed screwworm cases.

This year the eradication program is being continued in the Southwest in cooperation with the States of Texas, New Mexico, Oklahoma, Arkansas, and Louisiana, and with Mexico. Recent cold weather has lessened the number of infestations in the eradication area. But if we have mild weather during the remainder of the winter, we could still have trouble with scattered infestations.

Our objective is to free the overwintering area of screwworms this winter, and then maintain an effective barrier next summer. The barrier along the Mexican border should be in full operation by late February or early March. We expect to start out with an area about 100 miles wide in which we will continuously release sterile flies along both sides of the international border. The inspection and quarantine control of livestock coming across the border will add to the effectiveness of the barrier zone. The success of the operation will be determined at the time screwworms normally begin to spread from the south when warmer weather returns.

This is a job, not only of eradicating the pests, but <u>keeping</u> them out once they're gone. The next two years should tell the story.

An important phase of our responsibility in ARS is to keep out dangerous foreign diseases that could create real havoc in our healthy and highly susceptible herds. As an example of the effectiveness of this inspection and quarantine work, we have now passed the thirty-third year in this country without an outbreak of foot-and-mouth disease. By contrast, during the first thirty years of this century, we had six outbreaks of the disease. In 1930 Federal legislation was passed to prevent the importation of animals and fresh meats from countries where foot-and-mouth disease is known to exist. Since that time we have not had an outbreak of foot-and-mouth disease, although Mexico and Canada suffered serious outbreaks and the disease has several times reached epidemic proportions in Europe, Asia, and South America. We have also kept out such diseases as rinderpest, contagious pleuopneumonia, and East Coast Fever.

Maintaining foreign quarantines is never an easy job. But it is important to carry them out impartially and effectively for the protection of the livestock and poultry of all of North America. It is our purpose and our duty to use the laws and regulations that are available to us in the most effective way to prevent the entrance of foot-and-mouth disease and the many other dangerous foreign diseases. At the same time, we must give no more interference to trade and travel than is absolutely necessary to do the job.

The final step in the Department of Agriculture's responsibility in protecting our meat supply and the consumer's confidence in it is through the Federal Meat Inspection Service. Before a slaughtering or processing plant goes under Federal inspection, plans and specifications for construction must be approved. Standards are set up for such qualifications as the location of the establishment itself . . . the water supply, plant drainage, sewage disposal system, and ample space and equipment to allow efficient inspection procedures.

After the plant is approved and operating under Federal inspection service, inspectors assigned to the plant maintain continuing surveillance to see that facilities and procedures meet requirements at all times.

Federal inspection begins with an examination of animals in the holding pens before slaughter. Animals that do not pass the ante-mortem inspection are condemned at this point. At the time of slaughter, the carcass and internal organs of each animal are inspected. Any diseased, abnormal, or unfit carcasses and organs are condemned.

Each stage of further handling of the wholesome meat is carefully supervised by the inspectors and reviewed according to the standards of the inspection service, established through research and long experience. This includes standards for curing, canning, freezing, or other processing procedures.

Federal laboratories are maintained to aid inspectors in checking and approving all ingredients of meat and poultry products before they can be put on the market. Every chemical, for example, must be approved and specifications set for the amounts and methods of its use.

These are just some of the ways the U. S. Department of Agriculture is fulfilling its obligation to protect the wholesomeness of meats for the consumer . . . and to help maintain steady markets for livestock producers. We will continue to work with cattlemen as they face the complex problems in the job ahead.

For example, as livestock numbers increase in answer to rising demands for meat in an expanding population, disease problems increase even faster. When you crowd more cattle into a given space, it is inevitable that disease and parasites will spread more widely and rapidly. Cattle producers are already losing hundreds of millions a year from these causes. Therefore, it is imperative that we find more effective means to combat such problems as the shipping fever complex, trichomoniasis, anaplasmosis, and coccidiosis in calves. It is also imperative that cattlemen keep informed on the latest and best methods of management and disease control . . . and then put them into effect.

It is important to make use of every practical means of increasing efficiency of production. Even though the demand for beef is high and continues to rise, cattle producers are not in the most favorable position in a highly competitive market.

For example, we use about 8.5 pounds of total digestible nutrients to produce a pound of liveweight of cattle and calves. That's about twice what we use to produce a pound of liveweight in pigs or turkeys, and more than three times what we use to produce a pound of liveweight of broilers.

We need to know a lot more than we do now about feed efficiency in cattle production. We need basic research to determine when and to what extent efficiency can be improved through breeding, through nutrition, through improved management practices.

Research has demonstrated the heritability of feed efficiency in beef cattle. Results of the studies have varied greatly, but the average findings of numerous recent tests show the heritability of efficiency of feedlot gain at 39 percent. Some individual studies have shown as high as 75 percent heritability.

As a direct result of this type of research, practical performance testing programs have been set up across the country to keep records and select the most efficient animals to improve beef cattle herds. We can hope that these programs will expand and grow in number in order to bring the best available stock to your commercial herds.

We need more information on the best mixture of pasture, range, hay, grains, and byproducts to provide the maximum efficiency under given circumstances. We need more specific understanding of the proper use of cooling devices for holding areas in hot climates. We need more efficient methods of feeding and handling cattle, and more knowledge about how to combat the inefficiencies of reproduction.

Progress along these lines can be vitally important to cattlemen in the years ahead, because market competition is increasing -- not only from other domestic meats -- but also from imports. We are now importing over a billion pounds of meat a year. We're also importing nearly 700,000 head of cattle a year from Canada and Mexico, compared with a little over 140,000 just ten years ago.

So it's clear that there are problems to be solved by those of us in research, and in cattle production. But I believe that we can tackle them with confidence. Looking back to the years about the turn of the century and noting the progress since then gives some encouragement for the future. The cattle that made the long, dusty drives to marketing centers in those days didn't look much like those in your beef herds today. Their long legs and horns, their small light bodies, were the result of survival under rugged conditions. The meat they provided was almost accidental.

In the normal span of one man's lifetime beef production has changed from the old cattle drives to today's mechanized feedlots and highly mobile marketing systems. Where we stand now is just one point along the way in that continuing progress. Research scientists and cattlemen, working together, will continue that progress as we face the job ahead.

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AGRICULTURE -- FOOD SUPPLIER TO THE NATION

by

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service
U. S. Department of Agriculture

It's a real pleasure to join with you in paying tribute to the Food and Drug Administration and, in particular, to commemorate the 25th anniversary of the enactment of the Food, Drug, and Cosmetic Act.

Passage of the 1938 Act was in itself a vote of confidence in the effectiveness, integrity, and leadership of the Food and Drug Administration. The bills which eventually emerged as the new legislation were most carefully considered in an atmosphere of recognition of the good job being done by the enforcement agency, and the need to further strengthen its effectiveness. The objective of all this legislation has been to protect the American people by insuring the safety and wholesomeness of their foods.

In the broad sense, the safety and wholesomeness of our foods begins with agriculture -- from the time the farmer selects tested, disease-free seeds for planting, and healthy, productive animals for breeding.

Agriculture continues its concern for our foods through a long and complicated chain of growing, feeding, harvesting, storing, processing, and distribution.

The end products are the familiar items that crowd the shelves of modest neighborhood grocery stores as well as the huge, gleaming supermarkets that have become a hallmark of the American way of life. And what foods they are -- varied beyond belief, plentiful, nutritious, easy to prepare, attractive, and relatively inexpensive to buy compared to other products in the economy.

Even here, agriculture is concerned with how foods look and taste . . . how they've been affected by processing . . . how much nutritive value they have . . . and the kinds of foods that people of all ages should eat to be strong, healthy, and productive.

Food has always been the main interest of the Department of Agriculture . . . from the time it was first organized a little over a century ago in 1862. That interest continues greater than ever today, now that our food supply is recognized as a vital national asset . . . the keystone of our national strength and international power . . . a symbol for other nations of the success that <u>can</u> be achieved in a free society.

Other nations, in fact, seem to be much more aware of our success in agriculture than our own people.

Talk before annual meeting of the New York State Bar Association, New York City, January 22, 1963.

Far too few Americans realize the tremendous significance of our abundance . . . of just plain having enough to eat. Nor do they realize the significance of the scientific and technological revolution in agriculture that has made this abundance possible.

It has come about because millions of farmers have applied new discoveries and new methods to their own operations. They have done this so successfully that increases in farm productivity far overshadow increases in other major sectors of the economy. During the 1950's, output per manhour in agriculture increased more than three times as fast as it did in other industries.

Other figures further demonstrate this increasing productivity.

In 1900, 37 percent of our labor force was in agriculture. Today, the figure is about 8 percent. That 8 percent, using only two-thirds our cropland acres, provides all our food and plenty to spare. Last year alone, we exported a record total of $5 billion worth of agricultural products.

As farmers have become more efficient through use of research-based technology, more people have been released from agriculture to produce other goods and services. Our industrial economy could never have come into being except for the development of our efficient, specialized system of producing basic agricultural commodities.

This system gives us a tremendous advantage over nations that utilize time-consuming and unrewarding systems of farming.

As Secretary Freeman said in a recent speech:

"No feudal estate, no state-owned farm, no plantation, no collective has ever achieved the productivity of the American farm. No one of these has ever produced an agricultural economy that has contributed so much to overall economic growth. No one of these has ever equalled it in the development of a high level of citizenship and sense of personal dignity and worth.

"These are facts that we should remember and bring home whenever and wherever we can. People throughout the world are not nearly as much impressed with our industrial development, as by the fact that we're able to produce more than enough food with only 8 percent of our labor force."

We can truly be thankful for the marvelous achievements of American agriculture over the past hundred years. But we must also remember that increases in productivity cannot continue indefinitely. Simply because we have all the food we need and want doesn't automatically guarantee that future generations of Americans will have all <u>they</u> need or want.

Our ability to feed our people may well be challenged some day.

The current rapid increase in population is expected to continue. In another 50 years, say population experts, we may have close to 400 million people in our country, more than twice our present population of 188 million. They say, too, that world population may exceed 7 billion early next century.

These are staggering prospects if we think of them only in terms of food, disregarding the great social, political, and economic implications. They're even more staggering when we realize that population growth estimates are generally on the low side. And they're positively depressing when we consider that despite our present miracles of production, we are still living in a world where the vast majority of its 4 billion people are often hungry and always malnourished.

What this all means for our own country is that we'll need at least twice as much food just to keep on eating the way we are now. In fact, by 1975, only 12 years away, it's estimated that we'll have to produce 54 percent more soybeans than we're producing now, 47 percent more beef, 35 percent more corn, and 28 percent more poultry. In all likelihood, we'll have to do it on less cropland than we're using today.

And that brings us to the important question: How are we going to do it?

For one thing, we can make better use of present information. We can increase production a great deal simply by applying more fully the knowledge and the tools we already have.

Beyond that, we're going to have to apply the whole vast range of science to agriculture on a scale never known before. Given new information and tools and sufficient incentive, our farmers can do an outstanding job of farm management.

Nothing that we do to increase production will be of much value, however, if the foods we grow aren't safe, wholesome, nutritious, and high in quality. Our foods must be protected at every stage from the contamination and filth of insects of every variety and description, from rodents, and many other pests.

This need was recognized early this century. And, by coincidence, Congress on the same day set up two of the Nation's major regulatory agencies to do part of the job of protecting our foods. Both the Food and Drug Administration and the Meat Inspection service of the Department of Agriculture came into their present form from acts signed on June 30, 1906. Food and Drug was first organized as part of the Department of Agriculture. Here were forged the basic philosophy underlying the work of the Food and Drug Administration, and the machinery to put it to use.

So, for more than half a century, we in Agriculture have maintained the closest working relationships with the Food and Drug Administration in a common effort to keep our foods safe. These relationships have been built on mutual trust and confidence. The effectiveness of these efforts has been enhanced still further by close cooperation with the States.

My own career in the Department has given me many opportunities to work with Food and Drug officials. I began in 1930 as an inspector in the Meat Inspection Division.

Soon after coming to Washington in 1939, I became acquainted with George Larrick, present commissioner of the Food and Drug Administration. In common with others in the Department of Agriculture, I quickly developed an appreciation of his scientific competence and professional integrity. Because of the dedicated work of Commissioner Larrick and his assistants, it has been easier to meet our own responsibilities in plant and animal disease and pest control, the regulation of pesticides, the inspection of meats, and our farm, utilization, human nutrition, and consumer-use research.

At a time of mounting nation-wide concern over the growing use of chemicals in our everyday lives, Commissioner Larrick is performing an exceedingly difficult job in an outstandingly effective and conscientious manner.

At best, a regulatory agency's job is hard and thankless. And today, those regulating the use of chemicals are very much in the spotlight. It is indeed a curious fact that the more active our regulatory agencies become, and the more knowledge we acquire about chemicals, the more apprehensive the public gets about their continued use.

Let's take a long look at chemicals from the standpoint of agriculture to clear up at least one area of possible misunderstanding.

Pests cost our agricultural economy more than $13 billion every year. That's nearly one-third our potential national production. It's clear that the prosperity of our agriculture and our high standard of living are related directly to effective control of pests.

Our food supply would probably be rationed if we had no chemicals to protect our crops and livestock. Many of our major foods would be in the luxury class and available only to the wealthy. Housewives would have to buy inferior foods -- when and if they were available -- and pay 25 percent more for them. We'd lose nearly a third of our protein supply. More than 80 percent of our high-vitamin foods could not be produced.

Fortunately, we've managed to control many of nature's worst pests here in our own country. Consequently, no one is willing to take the losses from contamination by many different kinds of pests that were once considered normal. Modern housewives and food processors simply won't buy insect-infested, scabby, scaled, or blotched produce. The American public will not tolerate insect pests in their foods, or their homes or possessions.

An often-repeated belief is that we can control these insects and enable them to live in harmony with man by restoring the so-called "balance of nature."

Nature has not been "in balance" since man entered upon the scene as an aggressive and intelligent animal determined to wrest a comfortable and secure life for himself and his family at the expense of other forms of life. With the advance of civilization, man has worked continuously to tip the balance in his favor. Where he has succeeded, he lives in relative comfort and security. Where he hasn't succeeded, he lives in poverty.

Another commonly-held belief is that agriculture uses most of the chemicals in the country today.

The truth is that agriculture uses only about 165 million pounds of the 225 million pounds of chemicals applied for insect control in the United States in an average year. The rest is applied in urban areas.

Agriculture is far from satisfied that our present-day chemicals are the last word in insect control. We're deeply involved in research to show us how we can do a better job.

First of all, I want to emphasize that the intensive safety evaluations on all aspects of our food supply -- from field to freezer -- must be continued. There should be no let-up on this important basic function.

Beyond that, our scientists are probing for new types of chemicals and new ways to use them. We are developing various baits and lures and natural and synthetic sex attractants that can be used with other chemicals right in the field to attract and kill insects. The advantage of such techniques is that only small amounts of chemicals are used and they leave no residues. In effect, we are literally harnessing bug power so the bugs can kill themselves.

Not all insects respond to chemical sex attractants. Some may be attracted by sound, by chemicals and sound, or by light. We're investigating all these areas of research and they all look extremely interesting and promising.

We're also developing techniques to make insects sterile so they can't reproduce and will thus die out. Our scientists got rid of screwworm flies in the Southeast, for example, by raising them in large quantities, irradiating them to make them sterile, then releasing them to mate with native flies. The eggs that resulted from these matings were infertile and the screwworm population gradually died out. We're now experimenting with chemicals that can sterilize the insects right in the field.

And finally, we're developing various biological control methods to disturb the "balance of nature" more and more in our favor. Some of the older ones include the milky-spore disease to control Japanese beetle, and an insect imported from Australia to control Klamath weeds out West. Many others are being studied, such as the use of parasites to control the alfalfa weevil in the East . . . and still other parasites imported from Israel to control brown soft scale of citrus in Texas.

In short, we're investigating any area of work that looks like it has possibilities. Many of the newer approaches are extremely complex, expensive, and time-consuming.

But we feel our efforts are amply justified when we consider the goal -- to help provide a wholesome and continuing supply of food for now and the future, and to help bring about a world free of hunger and malnourishment. I know of no greater challenge in the world today.

To meet this challenge on the worldwide scale that is needed will require the fullest possible cooperation of all industries and Federal and State agencies concerned with food production.

Research and regulatory activities will have to receive greater public understanding and support . . . on the part of national leaders, farm groups, commodity and trade groups, of farmers themselves, and the nonfarm public as well. It is these functions, after all, that are most closely geared to the objective of providing food for the Nation and much of the world.

A great many things have combined to help our Nation get where it is today. Certainly, one of them is the rule of law that governs all our activities. This is the reason we can all talk here today, while science provides the motive for our being here. The relationship between these two great forces -- law and science -- has already been forged in our past working experiences. It will deepen in the years ahead.

A recent editorial in Science refers to a book by Jacob Bronowski called "Science and Human Values." Bronowski says that honesty and objectivity -- reliance on the evidence rather than upon bias, wish, authority, or personal advantage -- are some of the greatest gifts that science has given to society. I am sure that you would insist, as prominent members of the New York State Bar, that your profession had already achieved these excellent qualities.

Nevertheless, let the tradition of complete honesty and objectivity that characterize science stand as a constant challenge to each of us, whatever work we may do. Let each of us make the best use of our talents and thus contribute toward the realization of these high goals. In the final analysis, our professions, our agriculture, and the Nation itself are based on the accomplishments of people, not operating as a mass, but contributing separately as individuals.

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THE SAFE USE OF AGRICULTURAL CHEMICALS

Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service
U. S. Department of Agriculture

It is a pleasure to be with you today. I'm not sure whether I represent a former customer or a former competitor of yours, because the U. S. Department of Agriculture has, in times past, been both to the seed industry. In the days of Federal seed distribution, the Department bought from seed producers, and Congressmen gave the seeds away.

Free seed distribution had its beginnings almost 125 years ago, and continued until 1923. Its peak volume was reached about 1913. That year the Department obtained, under bid from growers and dealers across the country, more than 63 million seed packets — enough to fill 20 boxcars.

It's interesting to speculate how many packets would be given away, with today's population, if Congressional distribution had continued at that rate.

This free distribution served America well, although it outlived its greatest usefulness. It laid the basis for the seed industry as we know it now. When World War I made it impossible to obtain many seeds from Europe, as had been done in the past, new domestic and foreign markets were created, and the American seed industry expanded to serve them.

Just as World War I marked the beginning of an era for the seed industry, so World War II ushered in another era of importance to you. The new chemicals that were developed about that time have brought about many changes in farming and gardening, particularly in the control of pests.

The increasing use of chemical pesticides parallels the burst of productivity on U. S. farms over the past decade. Secretary of Agriculture Freeman, in a recent speech, said of that period:

"Far too few Americans realize the tremendous significance of the changes brought about by the scientific and technological revolution in agriculture. Millions of farmers . . . have applied new discoveries and new methods to their own operations so successfully that the increase in productivity in agriculture far overshadows increases in other major sectors of our economy."

Talk before the Horticultural Seed Section of the American Seed Trade Association at Chicago, Ill., January 26, 1963.

Pesticides have contributed greatly to such productivity by controlling crop and livestock pests. They have also increased man's productivity — and his life span — by helping to eliminate or minimize the effects of pests that transmit human diseases.

Chemicals in agriculture are not new. Ancient and medieval man, like modern man, used them to protect his food supply. The chemicals of today, however, have an increasing variety, complexity, and usefulness in our world. The onrush of science has put basic materials into new forms and to new uses. New compounds, and new methods of applying them, are developing rapidly.

A wide variety of chemicals is available today for safe use in all phases of food production, processing, and marketing. They include chemical fertilizers, growth regulators, antibiotics, food and feed additives, preservatives, and pesticides such as insecticides, weed killers, fumigants, nematocides, and fungicides.

Agricultural chemicals are only a part . . . but a very important part . . . of the chemical age we live in. The problems that such an age produces cannot be solved by eliminating chemicals. If we tried to do without them, we would soon be short of food.

Pests cost our agricultural economy more than $13 billion a year — nearly a third of our potential national farm production. The prosperity of our agriculture thus depends in large part on control of insects, plant diseases, weeds, rodents, and other pests.

Without pesticides, food quality as well as quantity would drop rapidly while prices would climb. Many everyday foods would move into the luxury class. For example, economical production of commercial quantities of many of our common vegetables would cease. Winter supplies of many fresh vegetables from the South and Southwest could all but disappear from the markets. Producers of potatoes and tomatoes would lose every second or third crop. Some of our vegetables might be largely priced out of the market if weeding were still done by costly hand labor instead of herbicides.

It would be difficult indeed to get along without agricultural chemicals. But we must use them with meticulous care. The same factors that measure the importance of chemicals also measure out the responsibility of those who would presume to use them. The more we use them, the greater grows our responsibility to use them safely.

Lots of people share in this responsibility.

First, there are the manufacturers, the formulators, and the distributors. It is their responsibility to be sure the chemical products are free from contamination . . . will do what they are supposed to do . . . and are packaged and represented in a way that will protect the user as well as anybody who comes in contact with the chemical or with the

product on which it is used. Distributors also have a responsibility to see that proper materials are chosen and that the user is informed how to apply them safely and effectively.

Second, there are the research organizations that are responsible for developing suitable and safe uses for chemicals.

Third, there are the State and Federal Governments which regulate the use of chemicals. Scientifically grounded legislation must be responsibly administered.

Fourth is the public itself. Only the person who applies a pesticide can make sure that it is properly used. And since both the agricultural chemical field and the pest-control field are changing so rapidly, it is also up to the public to ask for research assistance when new problems arise.

The meeting of all of these responsibilities must somehow be meshed and worked out together. And whether we like it or not, the government -- federal and state - is the focus of these widely shared responsibilities. In the protection of the public interest, it is a function of government to correlate the activities of the industrialist, the research scientist, the law enforcer, and the man with the spray gun in promoting the safe use of chemicals.

The Agricultural Research Service has responsibilities in three areas -- as a research agency, as a pesticide regulation agency, and as a user of agricultural chemicals. All of these responsibilities are placed upon us by Congress.

Each year, our research entomologists issue the Department's recommendations for insecticide use -- recommendations that embody the findings of many years of research. They are published in an agricultural handbook that is distributed to State agencies and to county agents. The recommendations are widely accepted and followed in the choice and application of insecticides throughout the country.

Our regulatory scientists register all pesticides shipped in interstate commerce. To obtain registration, pesticide manufacturers or formulators must first prove to our experts that the product, applied as directed, will be useful and effective. They must prove that when properly used it is safe -- safe for users, safe for people living in the area where it is used, safe for crops and livestock, and safe in respect to residues in foods.

If any residue is left on foods when the product is used as directed, the Food and Drug Administration of the U. S. Department of Health, Education, and Welfare enters the picture. The manufacturer must obtain from the Food and Drug Administration a tolerance to cover the residue present. This tolerance sets a legal limit on the amount of the chemical permitted to remain on foods. Tolerances are set no higher than the residues indicate to be necessary, even though higher tolerances might still be safe.

In addition to its pesticide research and regulatory functions, the Agricultural Research Service takes its place among the other users of pesticides in pest control and eradication programs carried out in cooperation with State agencies and growers and home owners.

All such programs are reviewed by a Federal Pest Control Review Board to consider the soundness of the planning and possible hazards to the public generally and to wildlife. This Board was established in 1961 at the request of the Secretary of Agriculture. Members include representatives from the Departments of Agriculture, Defense, Interior, and Health, Education, and Welfare.

Most of the cooperative programs are for eradication of introduced foreign pests that are confined to limited areas in this country. To allow such pests to spread without such control would require an unending outlay in labor and money for insecticides, year after year, and would thus substantially increase the amounts of chemicals used.

Eradication, on the other hand, uses chemicals sparingly in the long run, because eliminating a pest eliminates the need for pesticides.

Cooperative pest control programs keep two-thirds of our cotton acreage free of pink bollworm, 84 percent of our productive lands free of Japanese beetle, our entire potato production free of golden nematode, our fruits and vegetables free of the Mediterranean fruit fly, our riceland free of hoja blanca disease, and our stored grains free of the khapra beetle, to name just a few examples. The protection afforded against these pests cannot be measured in dollars and cents.

Although attention is often focused on these programs, they use less than 2 percent of all pesticides sold. In comparison, it is estimated that the home and garden market uses more than 8 times that much — a sixth of all pesticides sold.

Seedsmen selling to this market — to housewives and backyard farmers who don't have much basic information on pesticides — carry an especially heavy responsibility in giving advice and counsel on chemical usage . . . to see that the right chemicals are chosen and that they are properly used.

Your customer sometimes has no idea what he really wants. Sometimes he wants to buy the wrong chemical to solve his problem. By making sure that he gets the right product and knows how to use it, you can do him a favor, benefit your own business, and perform a public service.

If you give counsel on pesticides, the key to your information program should be one that has been followed consistently by the Department of Agriculture, the Food and Drug Administration, and the chemical industry . . . "Read and Follow the Label." Reading the directions and precautions carefully and following them exactly will guard against misuse.

If recommended methods fail to work, you and the public in general have an obligation to refer your pest-control problems to qualified research people, perhaps through your county agents and extension workers.

In spite of the best advice that you or anyone else may give, some plant diseases and pests may not be satisfactorily controlled. If there are no chemicals that will control a certain pest within the limitations prescribed by registration, it's a great temptation to try some more drastic measure that has not been approved -- such as trying a material not registered for such use. Or doubling a recommended dose on the theory that "if a little is good, more is better." Such solutions may appear tempting, but pesticide users must avoid them.

Instead, users must bring the need for a safe control method forcefully to the attention of research people -- the only ones who can develop a proper answer. This may seem to be -- and often is -- a very slow route to the solution of an immediate problem, but there is no safe alternative. The frustrated public must be urged to live with the problem, not add to it, until a solution can be found.

As one of the research agencies, we are not looking for additional problems, but every year a great many such difficult situations are brought to our attention -- far more than we can take care of immediately.

The State experiment stations and, I assume, the chemical industry, are in the same situation, with the needs often outrunning the means to do the time-consuming and painstaking research required.

Our information on the behavior of pesticidal chemicals in plants, insects, domestic animals, and soils is far from complete. A new laboratory for study of the metabolism of pesticides is now under construction at Fargo, North Dakota -- it is to be finished in 1964.

We do not rely solely on chemicals for pest control. For example, at Columbia, Missouri a laboratory is being constructed to strengthen our research on biological control of insects. This laboratory also should be finished in 1964.

Research on sterilization of insects by radiation and other means -- such as chemical sterilants -- will also be carried on at Fargo. The continuous release of sterile pests can stop reproduction in the entire natural population of an insect species and eventually eliminate it.

About two-thirds of the Department's research on insects is now devoted to biological controls, use of chemicals specific to a particular insect, attractants, and basic studies of insect physiology and pathology.

We are looking for substances that have specific action against insects but have little or no effect on warm-blooded animals. We want to put the pesticide where the pest is, or get the pest to come to it. The use of highly specific insect lures and attractants, natural or synthesized, is being explored, to harness the insect's own "bug power" to bring him to his death.

Our agricultural engineers are developing and improving both ground and air equipment, seeking precision methods for applying chemicals where they will eliminate pests but will not affect growing plants or animals.

Many insects are greatly attracted to blacklight, a light that is near ultraviolet in the spectrum. Blacklight traps developed through research are being used increasingly as insect detection tools. The traps indicate both the spread of pests and the need for insecticidal treatment. The possibility of controlling some insects by use of these traps is being explored.

Breeding crops that resist insects and diseases is a slow but rewarding process. In vegetable crops research, most of our efforts are going into breeding for disease resistance. Most plant breeding for insect resistance has been concentrated on grain and forage crops. We'd like to do more with vegetables. Seed growers would benefit greatly if insect-resistant vegetables could be bred, because such plants might solve a number of pest problems without harming the pollinating insects that are so essential to seed production.

A small group of our scientists working on vegetables and ornamentals has been doing basic research for about six years on the micro-ecology of soil, particularly the disease-causing organisms that live there. Some day we may be able to influence the balance of the teeming bacterial and fungal life in the soil so that we can suppress harmful organisms and favor beneficial ones.

I think you are all familiar with the outstanding research being done by Dr. Victor Boswell and his associates in the Vegetables and Ornamentals Research Branch. Many of the preferred varieties now in everyday use would not have been possible without their dedicated work.

In common with other research agencies, we are putting renewed emphasis on basic research. Just one example of this is the formation of pioneering laboratories. We take one or two outstanding scientists, free them of most administrative duties, and give them well-equipped laboratories where they can delve deep into some of the mysteries of plant and animal life without seeking any immediate practical applications.

We now have 20 of these pioneering laboratories. Some of these may give us new insight into pest control problems. For example, from basic research on plant physiology may come more efficient weed control -- through understanding of the effects of light on seeds. At a new laboratory for research on plant hormones and regulators, studies of the movement of chemicals downward in plants and out into the soil may lead to a more effective means of controlling pests attacking the underground parts of plants.

Scientists at our plant virology laboratory want to find out how viruses reproduce themselves . . . a question that involves the fundamental nature of life. Their studies might give us more effective chemotherapy for plants and more timely field treatments to control plant diseases. Fifty years from now, virus-free plant stocks might be as available as today's certified seed.

A new pioneering laboratory on the physics of fine particles promises to give us more basic knowledge of the behavior of both liquid and dry particles. Such knowledge may lead to improved methods of applying pesticides and fertilizers, or help to reduce air pollution.

Our insect pathology laboratory seeks to learn how to turn insect diseases into a control tool -- an inexpensive tool that would leave no residues and present no hazard to man, animals, or useful insects.

From research of our pioneering laboratory on insect physiology, we may find a way to interrupt or interfere with an insect's life cycle so as to provide plant and animal protection.

These are just a few of our hopes for the future.

Meanwhile, let us neither berate nor glorify the role of agricultural chemicals in today's world. Let us assess their value, accept their limitations, and handle them with the respect they demand.

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THE ROLE OF ARS IN POULTRY IMPROVEMENT

By Dr. M. R. Clarkson, Associate Administrator
Agricultural Research Service, U. S. Department of Agriculture.

I am especially glad to have this opportunity of meeting with you this morning as one of my last official functions with the Agricultural Research Service.

We can all look back with a great sense of satisfaction at the successful record you have made in the National Poultry and the National Turkey Improvement Plans. Your record has been a memorable achievement in coordinating the efforts of many different groups, working together to improve an important $3.3 billion industry.

One way of measuring the extent of that improvement is in consumer acceptance of the industry's end product. For example, in 1940 civilians in this country consumed an average of 17 pounds of poultry meat per person. By 1963, we were consuming nearly 38 pounds a year. This means that people are selecting chicken and turkey for their dinner tables because these are popular, flavorful, and nutritious meats. But it also means that all poultry products have become an increasingly better buy over the years.

In 1930, forty-eight minutes of working time were required to buy a dozen eggs; in 1963, less than fifteen minutes. In 1950, twenty-four minutes of work bought a pound of chicken, but in 1963 less than nine minutes were required. Turkey products have become correspondingly economical items in the food budget.

Increased efficiency of the poultry industry is the key element in this progress. Improvements in feeding and nutrition have reduced the feed required to produce a pound of broiler meat from four-and-a-quarter to two-and-a-quarter pounds. Breeding has increased the eggs per hen from 112 to 212 a year. Better disease control has reduced poultry mortality four-fold. Improved housing and equipment have tripled the density of bird populations that can be raised in a single operation. Advances in processing have reduced costs and increased quality of the major poultry products.

The Agricultural Research Service has been vitally concerned with supporting these improvements . . . since 1884, really . . . when the former Bureau of Animal Industry began its notable research and regulatory programs for the protection and improvement of the Nation's livestock and poultry.

By the late 1920's and early 1930's, State and Federal research had developed a fund of useful knowledge about poultry breeding, feeding, management, and disease control. Hatchery chicks had become readily available and the poultry industry was prepared to expand. But the expansion was being held up by two principal barriers: (1) Communicable diseases -- particularly pullorum disease at that time -- were hindering the development of large-scale operations; and (2) there was a lack of standards to identify the quality of hatching eggs and chicks being sold.

Talk before the National Plans Conference, Washington, D. C. July 8, 1964.

The poultry industry expressed the need for leadership in setting official and uniform terms to denote differences in breeding background and in disease control practices. Poultrymen recognized the need for joint action by breeders, hatcherymen, State agencies, and the U. S. Department of Agriculture to achieve this uniformity.

Out of these needs, the National Poultry Improvement Plan was started in 1935, and the National Turkey Improvement Plan in 1943.

In the early days of NPIP, the Record of Performance and the Register of Merit breeding classifications identified superior stock . . . in uniform terms. That stock has now been distributed to commercial poultrymen throughout the world.

Recently, the changes in breeding systems have made it more practicable to divert the emphasis of the program to Random Sample Performance Tests. These tests identify and measure 16 outstanding characteristics. ARS uses its automatic data processing equipment to compile and analyze the data collected by the tests. We have combined, published, and made the information available for the use of all poultrymen. Thirty-thousand copies of this publication are distributed annually throughout the world.

The control of pullorum disease was one of the important initial objectives of both NPIP and NTIP. Typhoid control was added a short time later. Since the Plans have been in effect, the incidence of these diseases has been dramatically reduced.

Under NPIP, in the first year of operation the number of reactors to the pullorum test was 3.66 percent of the birds tested. Last year, incidence of reactors on the first test of breeding birds was down to .005, the lowest on record. This represents one reactor in every 20,000 birds tested. Under the NTIP last year, the percentage of reactors returned to the all-time low of .003, first achieved three years ago.

This is a notable achievement. But as long as there is any pullorum disease in flocks participating in the Plans -- in fact, as long as there is pullorum disease anywhere in the country -- those who have accomplished so much cannot be safe. We must find ways to eliminate the remaining centers of infection. We believe you have shown the way -- it can be done.

In the fields of improved breeding and disease control, the Plans do not operate alone. An impressive array of other groups -- including State, Federal, and industrial -- are active in working out solutions to related problems, vitally affecting the health and quality of the Nation's poultry flocks.

Salmonellosis, as an entity, is receiving greater emphasis in scientific and medical circles. Over 800 serotypes of the Salmonellae have been differentiated to date; all are considered potentially infectious to man. About 50 serotypes have been known to produce clinical disease in livestock and poultry. The very fact that this group of numerous organisms affects man, as well as livestock and poultry, emphasizes the importance of continuing strong programs of research, epidemiology, control, and prevention of spread. In recognition of this, we have recently formed a Salmonella Evaluation Group representing the combined talents of the Department's research, inspection, extension, and regulatory divisions. It is the duty of the group to provide leadership in this important field.

Many of you are actively participating in the Reporting System for Pullorum Disease and Fowl Typhoid. The program, initiated by the National Plans in 1955, has been expanded to give more complete coverage through the combined activities of several divisions of ARS.

ARS also conducts cooperative programs with individual States for specific purposes. For instance, a program is under way, in cooperation with the State of Maine, to show that common poultry diseases can be controlled through the vigorous application of sound disease management practices . . . and that prevention is preferable to treatment of diseases after they become firmly established.

In Minnesota, a cooperative pilot study is designed to combat sinusitis in turkeys. The program consists of serological testing of all turkey breeder hens and toms and inspections of each flock during the laying season. All infected flocks are discontinued as a source of hatching eggs.

We also cooperated with the State of Virginia in making a study of the causes of the high incidence of disease on poultry farms. Our poultry epidemiologist worked with State poultry specialists in surveying the situation and made recommendations on ways to assist Virginia poultrymen in lowering disease losses.

ARS also conducts an extensive research program to develop new knowledge about the control and eradication of poultry diseases. We conduct this research at three principal laboratories; parasitic disease research at the Beltsville Parasitological Laboratory, Beltsville, Maryland; exotic disease research at the Plum Island Disease Laboratory in New York; and domestic disease research at the National Animal Disease Laboratory, Ames, Iowa. In addition to the research program, the laboratory at Ames furnishes a valuable typing service for Salmonella isolations.

Our Regional Poultry Research Laboratory at East Lansing, Michigan is conducting highly significant research on avian leukosis; and funds have been provided for an expansion of the facilities for this work.

Two new laboratories have been established in the South to expand research on poultry health. These are the Southeast Poultry Research Laboratory at Athens, Georgia; and the South Central Poultry Research Laboratory at State College, Mississippi. Investigators at these laboratories will give special emphasis to the study of disease problems having to do with condemnation of poultry -- particularly broilers -- at processing plants. The new facilities are designed specifically for research on interrelations of disease, environment, and management. Three of our ARS Divisions are cooperating in these studies.

We have still other laboratories and field stations devoted entirely to poultry research work. These include the Southwest Poultry Experiment Station at Glendale, Arizona; the Southern Regional Poultry Breeding Project at Athens, Georgia; the North Central Poultry Breeding Project at Lafayette, Indiana; and the Avian Anatomy Project at East Lansing, Michigan.

We also have facilities for other phases of poultry husbandry research at the Agricultural Research Center at Beltsville. Some of you will see these facilities when you tour the area tomorrow afternoon. You will find we are conducting research there principally in the areas of poultry breeding, nutrition, and physiology. In recent years, we have been putting more and more emphasis on basic research in the Beltsville research program. This is an effort to dig deeper into the unknown, to provide a wider background of knowledge from which we can develop more effective programs of applied research.

The specific answers that research is finding today are based on fundamental knowledge developed perhaps 10 to 20 years ago. We must continue pushing ahead on the frontiers of science in order to keep up with the needs for new knowledge to solve new problems -- and to solve some of the old problems that we have been living with for much too long.

ARS is also concerned with the standardization and licensing of poultry biologics. The objective of the procedures is to assure poultry producers that these products are effective for the purpose claimed in protecting poultry health, and that they are safe to use.

We are also responsible for preventing the entry into this country of foreign poultry diseases, such as fowl pest and Asiatic Newcastle disease. This responsibility is carried out through a program of inspection and quarantine at borders and ports of entry. The job of disease control and eradication would be much more difficult than it is now if we had no methods of stopping these foreign diseases before they gain entry and become firmly established. In today's world of fast travel from all parts of the world, the entry of exotic diseases is more critical than ever before. Therefore, this function of ARS is of increasing importance to the poultry industry.

An exceedingly helpful benefit in disease control is gained through the poultry inspection service, by the location of infection through condemned birds. When we know where a disease exists, we are in a better position to combat it.

Of course, as I indicated, all of this is not a one-man show, conducted by one organization. The support of poultry improvement is cooperative in every sense of the word -- with State Experiment Stations, Colleges of Veterinary Medicine, Departments of Animal Husbandry, State Departments of Agriculture, our own research and regulatory activities -- all working with industry.

Now, what about the future?

One of the first responsibilities to be met is to continue supporting a broad program of poultry research. Even though a good job has been done to improve the quality of the product and the efficiency of production during the past thirty years, we still need to do a better job. And the road to further improvement starts with research.

During the present era of scientific revolution, new research tools are being developed that make it possible to attempt studies that would have been too complex and time consuming for us even to consider just a few years ago. As a result, many projects -- investigation of blood antigens . . . studies in biochemical genetics and in virology -- can be attempted for the first time. But the primary consideration for future research is still in the fundamental areas of breeding, nutrition, management, disease control, and marketing. No matter what new trends may develop in the poultry industry, real improvements must grow from these areas. Continuing advances in these fundamentals will serve as the basis on which to build new additions to our research efforts.

At present, poultry flocks are becoming larger in size and fewer in number. As producers increase the size of their operation, they need better methods of protecting their increasing investment. They need better methods of controlling diseases. For example, we are attempting now to standardize Mycoplasma gallisepticum antigen for use as an effective tool in curbing PPLO. With this tool we may be able to reduce the severe economic drains to the producer from this disease. When we can assure the production of PPLO-free breeding stock as part of the National Plans, it will be an important improvement for the poultry industry.

We need to know more about the effects of environment on the health of poultry flocks. Environment is a primary consideration in preventing the spread of disease. But we need additional information. For the past fifteen to twenty years, poultry production has become mechanized at an almost unbelievable rate. This has included an increasing use of partial or complete environmentally controlled facilities. Producers have moved forward so rapidly in this direction that research has not kept pace in providing adequate information on the precise effects of all the environmental controls being used.

We need to know more about the point of diminishing returns in the increase of bird densities to keep down the housing cost per bird. We are not quite sure where the decreasing performance offsets the savings in building and equipment costs.

Nutrition research should be continued and expanded in several directions. The progress that has been made in feed efficiency -- impressive though it is -- will not be enough to keep the industry moving ahead in the future. The poultry of today is quite different from that of 25 years ago. The growth of chickens has been increased from about $2\frac{1}{2}$ pounds of weight at 10 weeks to as high as 4 pounds at 8 weeks.

The dietary requirements of the poultry of even 10 years ago are probably not the same as those of today's birds. Nutrition has been found to vary for different breeds, even strains within breeds; and changes according to sex, age, environment, and management for the same strain. These and many other changing aspects of poultry nutrition need to be studied more thoroughly.

Methods of breeding, feeding, and management have become vastly more complex, and poultry "husbandry" is truly poultry "science." The producer of today -- and of tomorrow -- must be well grounded in many fields in order to keep his operation on a paying basis. He must have the best and latest information in order to make knowledgeable decisions and as few mistakes as possible. He cannot afford too many mistakes and stay in this highly competitive business.

The National Plans help their participants to keep up-to-date. The Plans' agents and inspectors are in close contact with participants, and can put new information and recommendations quickly into the hands of hatcheries and flockowners all over the country.

As you meet here this week, I know you have a number of important questions before your Conference. Not the least of these is the question of including other diseases in control programs of the Plans. Perhaps a program for the control of Mycoplasma gallisepticum . . . and some or all of the paratyphoids . . . can be made practicable. The surveys and other activities to locate and type Salmonella infections that have already been conducted should be helpful in formulating such programs.

The progress in pullorum control that you have made demonstrates the effectiveness of your program. The welding of the activities of poultrymen, hatcherymen, official State agencies, and the U. S. Department of Agriculture has not always been an easy job. You have made it work.

The NPIP and the NTIP can be an even more effective force in serving and improving the rapidly changing poultry industry of the future. For this objective, I assure you of my continued interest and sincere best wishes.

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