CHAPTER VII

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SCIENCE IN THE SERVICE OF MAN

Scientific research is a continuing process that constantly achieves new levels. In a speech before the Puerto Rican Sugar Technologists Association in San Juan on November 23, 1968, George W. Irving, Jr., Administrator of the Agricultural Research Service stressed the fact:

> that the work going on in our laboratories today is part of a continuum, a succession of events and discoveries that will help us solve future problems. One finding begets another, then another. From this process comes knowledge, knowledge that is desirable, knowledge that can be used over and over on problem after problem. 1/

As the National Aeronautics and Space Administration was making the arrangements for the sensational Apollo 8 mission, the Department of Agriculture awarded contracts for research in remote sensing to scientists at Purdue University and the University of Michigan using equipment carried in by aircraft and eventually by satellites. Other Departmental scientists working on Department contracts continued research to improve the wash and wear and desirable press qualities of cotton fabrics. 2/

Quarantine inspectors working with other Government agencies at airports, seaports, and border crossings continued their efforts to keep out destructive foreign plant and animal pests and diseases. During the past year they stopped an inbound foreign plant pest on the average of once every 12 minutes and seized nearly 125,000 pounds of foreign meat from countries known to have such dreaded diseases as foot-and-mouth and rinderpest. 3/

1/ USDA Press Release 3723-68.

2/ USDA Press Releases 3576-68, 3938-68, 4005-68.

3/ USDA Press Release 3921-68.

The outbreak of increased infestation of nearly 10,000 cases of screwworms in livestock during the past summer and Fall have highlighted the value of research and disease control. Increased release of sterile flies necessitated a later cutback in the Southwest screwworm eradication program. Department officials have asked livestock growers to use preventative measures such as regular inspection of their stock, spray with pesticides, treatment of wounds and infestations, and reporting of cases. 4/

Science for Better Living, the Yearbook of Agriculture, 1968, released late in 1968, with its infrared photographs, describes the wide scope of Departmental research and achievements of its scientists. Its wide circulation makes the information available to the public.

4/ USDA Press Release 4006-68.

RESEARCH AS AN INVESTMENT

Talk by Dr. George W. Irving, Jr., Administrator, Agricultural Research Service, U.S. Department of Agriculture, before the Puerto Rican Sugar Technologists Association, San Juan, Puerto Rico, November 23, 1968

Everyone who is involved in the field of scientific research is aware, I think, that the profession is undergoing a period of readjustment.

That point is made painfully clear in an article in this month's issue of Fortune magazine. The article is entitled "U.S. Science Enters a Not-So-Golden Era."

It begins as follows:

> After a quarter century of unparalleled public favor and unstinting government patronage, the U.S. scientific community suddenly faces an uncertain future....Despite the contributions of basic scientific research to the Nation's productive capacity and defense capability, from the atom bomb to the laser, a few Congressmen have gone so far as to disparage it as an unproductive activity, a hobby too expensive for an age that calls for quick solution to immediate problems.

Scientists, in other words, aren't as popular as they once were.

They are under increasing pressure to prove their worth -- in terms of dollars and cents. How much is a project going to cost? What will it accomplish? Who will profit? This is what people and legislators want to know.

Presumably, agricultural research would fare rather well under such a system. The value of the Nation's agricultural output has almost doubled in the past two decades. Output per man-hour has tripled. This increased efficiency was made possible by research. According to one estimate, resources saved by agricultural research during the period 1950-1965 amounted to thirteen billion dollars, or nearly a billion dollars a year. Another estimate indicates that money spent on agricultural research returns not less than 35 percent per annum for every dollar invested.

But these are only estimates. Because of the complexities of modern-day research, because of the subtle interrelationships among different laboratories, among disciplines, among institutions public and private, local and national, we have never been able to add up the value of research and enter it on a balance sheet for all to see.

As a result, we have critics -- within the agricultural establishment as well as outside of it -- who question the value of agricultural research as an investment.

Yes, they admit, you've done well in the past.

Yes, you've made food plentiful.

Yes, you've raised living standards.

Yes, you've bolstered the economy.

But haven't you done enough for the time being, or possibly too much? Look at all the surpluses.

Let's cut back on agricultural research, our critics say, and use the money for some other, more pressing farm problem. At the least, let's postpone research until there's some indication that we need it.

This is a shortsighted view, and anyone who is concerned with research, or indeed the economy as a whole, should be prepared to refute it. Some day we may be able to predict just what research needs to be done and what doesn't. Some day the gap between what man knows and what he needs to know may disappear altogether. But that day has not yet arrived in agriculture, and critics of research must be so advised.

We members of the scientific community in particular must learn to speak out on the importance of research. We have been quick to admit our worth to ourselves, but we have not done an adequate job of telling others about it. We have not sold the public on the merits of research as a long-term investment.

How can we do this?

To begin with, it seems to me, we must somehow make clear -- clearer than we have in the past -- that the work going on in our laboratories today is part of a continuum, a succession of events and discoveries that will help us solve future problems. One finding begets another, then another. From this process comes knowledge, knowledge that is durable, knowledge that can be used over and over on problem after problem. The process has been going on since the dawn of civilization. The one notable exception occurred during a period that we now refer to as the Dark Ages.

If continuity in the search for knowledge is important from an intellectual standpoint, it is also important from a managerial standpoint. To attract the skilled and talented employees needed for scientific research, you must be able to offer stability of surroundings, and a chance for professional advancement. Similarly, investments in costly scientific hardware are practical only on a long-term basis.

Another thing that I think we must stress, in our case for agricultural research, is that no one knows exactly what the problems of the future are going to be. Nature and circumstances may not permit us to choose the pace at which we will conduct research. History tells us that the crash program in research often breeds difficulties. Many of you will recall, I am sure, the situation in the American sugar industry following the outbreak of World War II:

Sugar imports from the Philippines and other sources were cut off. Shortages and rationing followed. American growers were called on to increase domestic production, and to do it with a drastically reduced labor force. The result was almost instant mechanization. By war's end, 90 percent of all cane and beet crops on the mainland were being harvested by machine.

This was a notable achievement. But it generated many new problems for the sugar industry. The mechanically harvested crops contained far more soil and field trash than hand-picked ones. Varieties that seemed well suited for machine harvest proved wanting in other respects. Problems arose in storage, in handling, in processing. There was nothing wrong with mechanization _per se_, but the research data needed to make it an unqualified success were simply not yet available.

By way of contrast, let us look at the way mechanization developed in another specialized segment of agriculture: The tomato industry.

Like all stoop labor, tomato picking is a laborious and time-consuming chore. As with so many difficult jobs, there just didn't seem to be any other way to do it.

Scientists in California began working on a mechanical tomato harvester about 25 years ago. It was obvious at the outset, however, that no ordinary tomato would withstand machine handling. So at the same time, they began developing a tomato to fit the machine.

By the early 1960's, plant breeders had the tomato they wanted: A firm, oblong fruit that resisted bruising. Engineers were also putting the finishing touches on their mechanical picker, a contraption that picks up tomato vines, strips off the fruits, and leaves the debris behind.

Up to that time, tomato growers had shown little interest in the research. But at just that juncture, a momentous announcement emanated from the U.S. Department of Labor: Immigrant laborers would no longer be allowed to pass freely into the United States in search of work. This meant, of course, that the number of hands available for the vegetable harvest in California would be sharply reduced.

Now the idea of mechanical harvesting gained favor rapidly. In a few years, 90 percent of the processing tomato crop in California was being harvested by machine. Some work remains to be done to improve the quality of machine-harvested tomatoes. Nevertheless, growers are already crediting research with saving their industry.

If the research had not got underway many years earlier, the story almost certainly would have been different. Engineers might conceivably have been able to develop a harvester on short notice, but there would have been no way to speed up the breeding experiments that were necessary to produce the new tomato. It was only through a sustained effort that researchers were able to have a workable solution ready when the problem arrived.

And it is this type of sustained effort that is needed to solve agricultural problems all over the world.

One of the finest scientific success stories of this decade, from the standpoint of increasing world food supplies, has been the development of dwarf, or short-stem, wheat. This plant was bred by scientists of the Rockefeller Foundation in an effort to raise wheat production in Mexico. Seeds were first released to Mexican farmers in 1961. The very first year, wheat yields on many Mexican farms more than doubled. Since then, Mexico has been transformed from an importer to an exporter of wheat.

In this remarkable development, we have further proof of the importance of continuity in research. For the story of dwarf wheat really began back in 1946 when S. C. Salmon, a scientist with the Agricultural Research Service, U.S. Department of Agriculture, went to Japan to help with postwar reconstruction.

While there, he noticed that farmers were growing a number of remarkably stiff, short-stemmed wheat varieties. Unlike most wheats, these varieties responded favorably to fertilizers, remaining erect to maturity and giving excellent yields.

Dr. Salmon brought several of the varieties back to the United States with him. The seeds themselves did not perform well in this country, but the potential was there, and they became the basis for extensive crossbreeding experiments under the direction of Dr. O. A. Vogel, a USDA scientist stationed in Washington State. One result of this research was the now-famous variety Gaines, which has broken all winter wheat yield records in the Northwest.

N. E. Borlaug, a Rockefeller Foundation research leader in Mexico, learned of Vogel's work in 1953. He obtained some of Vogel's crosses, and succeeded in making crosses of his own, joining the short-stem wheat with Mexican and Colombian lines.

In addition to its astonishing success in Mexico, dwarf wheat is now being planted in parts of Africa, India, Pakistan, South America, and Turkey. Further breeding programs are underway in many of these countries to make the grain even more productive. If current plans succeed, Pakistan, for example, will be self-sufficient in wheat production by 1970. Short-stem wheat has become a prominent feature of the so-called "green revolution" -- the trend toward increased agricultural productivity in underdeveloped countries.

Over the years, wheat has been one of the most vigorously damned of all American farm commodities. The surpluses that the Government has seen fit to carry have been the subject of perennial attack. Spend money to improve wheat yields? Perish the thought. And yet just such an enterprise, carried out over a period of years by skilled and dedicated scientists, has spawned a beneficence that could change the world.

Thus far I have limited my remarks to food production, the traditional concern of the agricultural scientist. Research achievements in this area have been outstanding, to be sure; but they don't tell the half of it. They don't begin to show the pervasive effect that agricultural research has had on the everyday lives of all citizens. In cities as well as in the country, in homes and factories as well as on the farm, agricultural research findings are being put to increasingly profitable use. And more often than not they are being taken for granted.

Look at wash-wear cotton, for example.

This product is the commercial success that it is today largely because of research performed in a USDA laboratory. Our scientists learned how to alter the chemical makeup of the fabric so that it would be comfortable to wear as well as wrinkle resistant. They did the basic research that led to permanently pressed wash-wear garments. Then they found ways to improve the durability and soil resistance of the product. Right now they are working on ways to make it flame resistant. USDA scientists hold patents for more than a dozen important processes involved in wash-wear manufacturing.

Wash-wear has earned the enthusiastic endorsement of millions of American consumers; yet how many of them associate the product with agricultural research?

Let's look at another phase of agricultural science that affects millions of people: Pollution control.

Environmental pollution is a threat to human health and comfort in almost every major population center in the country. The problem is not likely to be resolved without the extensive use of agricultural research data.

Water quality, for example, is closely related to land use. Bare land erodes rapidly, filling streams and reservoirs with mud. This is precisely what is happening around many fast-growing cities, where thousands of acres of land have been scraped bare to make way for construction.

Who is better prepared to deal with this problem than the agricultural scientist? Principles developed by our watershed experts have helped innumerable farmers cope with the problems of water conservation. These same principles can be used to preserve water quality in cities.

Of at least as much concern as water quality, in many areas, is the quality of the air that people must breathe. Agricultural scientists have concentrated primarily on learning how smog affects plants. But their findings have advanced the cause of human health as well. Plant tissue, they have learned, responds to pollution in much the same way as animal tissue. Plants, therefore, are useful tools in the search for ways to repair pollution damage. Too, they provide a warning system by which man can judge the level of toxicity in the air.

Finally, agricultural scientists are checking soil samples from all over the country, to guard against any buildup of chemical residue in cropland. We must have farm chemicals, to produce the food we need, but we must also make sure that their use is safe beyond question.

Water, air, soil -- resources that no one can do without. And agricultural science is providing the means to keep them free of pollution.

In the area of business and industry, we find still other adaptations of agricultural research. In 1941, two USDA scientists -- Lyle Goodhue and William Sullivan -- figured out a way to put insect spray in a pressurized can. Today that invention -- the aerosol bomb -- is put to so many uses that it is hard to keep up with them all, and industry representatives estimate that the gadget brings in something like two billion dollars a year.

Other bestsellers with origins in USDA research include frozen orange juice concentrate and instant mashed potatoes. In industry, USDA-developed compounds are being used in the manufacture of paper, plastics, paints, detergents, and many other products.

One does not normally think of agricultural research as a means of curing human disease. Nevertheless, USDA scientists are helping conduct one of the most important campaigns in the annals of medical research: The fight against cancer. Our botanists have found that the bark from a certain tree -- the camptotheca acuminata -- yields a substance that shows excellent potential as an anticancer agent. Other USDA researchers are studying avian leukosis, a malignant disease of chickens; this work should furnish information that will be useful in related studies on man.

Space travel has captured the imaginations of all of us, and one cannot fail to marvel at the possibilities for new knowledge that this technological miracle affords. Here, too, USDA scientists are involved. Under the sponsorship of the National Aeronautics and Space Administration, they have developed the remarkable system of data collection known as remote sensing. This system features sensing devices that record images on as many as 18 different electromagnetic wavelengths. The images can be converted to punched tape and run through a computer, permitting rapid analysis of huge volumes of data.

Such a system, mounted in an orbiting space vehicle, would do much to take the guesswork out of resource inventory. The possibilities are exciting. New farmland could be located, water supplies checked, out-of-the-way places surveyed. Forest fires, insect infestations, salinity buildup, and other trouble spots could be spotted. Crop yields could be predicted, animal herds counted. In time, remote sensing may prove to be one of our most important applications of the new space technology.

All of these achievements mean something to the man on the street. They are the result of efforts to cure specific ills. For the most part, they constitute the attainment of stated goals. We set out to do something and we did it.

There is another form of research payoff: The unexpected one. Many of our greatest scientific discoveries came about, not because of the need to solve a particular problem, but because some inquisitive human wanted to know more about nature's machinery. One thinks of Galileo, of Newton, of Darwin; of Mendel patiently tending his bean plants.

Hybrid corn was developed by researchers who were really more interested in abstract genetic theories than in yield increases. Penicillin was discovered by a bacteriologist who was studying staph organisms. Think of all that man has derived from these two discoveries alone. Think how difficult it would have been to work out a cost/benefit ratio that would have justified the research.

During the past decades, scientists in USDA labs have uncovered the secrets of photoperiodism, that fascinating process by which light governs the rhythms of living organisms.

They have determined the structure of some of the nucleic acids, thus helping man move closer to an understanding of protein synthesis. This work earned former USDA scientist R. W. Holley a share of the 1968 Nobel prize for medicine and physiology.

Such projects, though they solve few every-day problems, provide the stimulus for decades of applied research.

Let us summarize our case for research as an investment:

*Research has increased food supplies throughout the world.

*It has improved the lot of producer and consumer.

*It has provided tools for a pollution-free environment.

*It has laid a foundation of knowledge for discoveries as yet undreamed of.

Here is a story worth telling. It must be told. It must be told in language that the layman can understand. Research as we know it cannot survive without public support. People have a right to know what they are getting for their dollar, and we, within the limits of our ability, must show them. We must prove to them that their investment in research is sound.

Beyond that, and perhaps more important, we must do more than we have done to make people feel that they are a part of research; that they are them<u>selves</u> instruments for scientific advancement, not merely paying spectators; that the course of scientific progress is influenced by <u>their</u> needs, <u>their</u> wants, <u>their</u> ambitions, <u>their</u> beliefs, and not entirely by scientific whim.

They must be encouraged to explore the effects that science has on society. Scientific advancement, after all, brings problems as well as blessings. In agriculture, we point to the farm labor that we have freed through production efficiency. But not all farmers who leave the land are freed in the sense that they go on to better things. So with the victims of progress in other fields. People must be made aware of these considerations, so that they do not blindly accept the gifts of research and ignore the responsibilities that it imposes.

Science, in other words, faces an enormous educational task. In agriculture, the task is complicated by a dwindling political base. Still, our research affects everyone. We deal with the essentials of life. The agricultural research story is sound. All we need is spokesmen to carry it to the public.

So I want to ask your help. Your organization, and others like it, can do much to focus public attention on the merits of research. I know that you can be counted on to back research affecting your own industry. But I hope you will not hesitate to speak for the many other aspects of agricultural research as well. Many research ideas are cross-pollinating, and a successful innovation in one field often stimulates advances in another.

More significant, though, is the fact that no one area of research is going to prosper if the agricultural research complex as a whole is allowed to deteriorate. We must have broad support for research in general or our specialized efforts will lose their vigor.

Take the research story to your friends in and out of the agricultural community. Tell them what they're getting for their research dollar. I think they will agree that agricultural research is a good investment.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Leonard DU 8-3977
McDavid DU 8-4026

Washington, Nov. 13, 1968

USDA Awards Contracts for Remote Sensing Research:

Ways to identify agricultural resources by remote sensing equipment carried by aircraft (and eventually satellites) will be studied by scientists at Purdue University, Lafayette, Ind., and the University of Michigan, Ann Arbor and Willow Run, under contracts awarded by the U.S. Department of Agriculture.

The studies are sponsored by USDA's Agricultural Research Service in cooperation with the National Aeronautics and Space Administration.

Agricultural surveys by satellites equipped with optical and electronic sensors could, among other things, identify the world's agricultural resources, and help underdeveloped countries in stepping up lagging food production and in developing natural resources, according to ARS officials.

Under the terms of a $429,000 contract, Purdue scientists under the direction of Robert B. MacDonald will design ways to collect and process data gathered by remote sensing equipment. The contract is for a period of 11 months.

The $85,000 contract awarded to the University of Michigan calls for the perfecting of a sensing technique that identifies plants by the particular wave length of light reflected or emitted by the plants. The contract is for 1 year and Donald S. Lowe is principal investigator for the University.

Dr. A. B. Park is ARS technical representative for both contracts.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Leonard DU 8-3977
McDavid DU 8-4026

Washington, Dec. 18, 1968

Experimental Cotton Finish May Lead to Ideal Durable-Press Cotton Garments:

An experimental chemical finish for durable-press cotton, which allows alterations to be made without leaving in old creases, has been developed by scientists of the U.S. Department of Agriculture.

In tests by USDA's Agricultural Research Service, creases were taken out and re-set where desired by pressing with a hot iron.

Wrinkle resistance and durability of creases in cotton depend on resilience imparted by chemically tying the molecules of cellulose together. This cross-linkage, as it is called, causes the fabric to resist mussing, wrinkling, and the removal of creases put in during treatment.

In their exploratory research ARS chemists Mrs. Mary Ann F. Brannan and Dr. Stanley P. Rowland were able to crosslink the cotton molecules after previously locking the catalyst in the fibers.

Ordinarily a catalyst, used to trigger a chemical reaction, is unchanged and does not become a part of the product of the chemical reaction. In this case, however, Mrs. Brannan and Dr. Rowland deliberately change the catalyst from one form to another to make it a part of the final product and available for use when creases need to be relocated.

Thus far, only limited testing has been done on small fabric swatches. The tests indicate the only apparent difference in performance between the experimental fabric and present commercial durable-press cottons is that old creases can be ironed out and new ones ironed in.

The research to this point, carried out at the ARS Southern utilization research laboratory, New Orleans, La., leaves many unanswered questions that stand between the laboratory and consumer products. It is but one more step in the long search for the ideal all-cotton durable-press garment.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Leonard DU 8-3977
McDavid DU 8-4026

Washington, Dec. 26, 1968

USDA Awards Contract for Research on Chemical Treatments for Cotton:

A research contract for work on the development of basic scientific principles necessary for the production of wash-wear and durable-press cottons treated with different kinds of polymers has been announced by the U.S. Department of Agriculture.

The Department's Agricultural Research Service awarded the contract, for \$79,952, to the Gulf South Research Institute, New Orleans, La. The work is to be completed in 2½ years.

Cotton will be treated with polymers that are known to increase wrinkle resistance. Both cotton fibers and fabrics will be treated and tested to determine the effects of the polymers on individual fibers, between fibers, between yarns, and on the surface of the fabric. The scientists will systematically examine fiber, yarn, and fabric properties such as tenacity, elongation at break, and recovery from tensile strain.

The research, to be directed by Dr. Elias Klein of Gulf South Research Institute, is sponsored by the ARS Southern Utilization Research and Development Division, New Orleans, La. ARS technical representative is Dr. Sidney L. Vail.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Leonard DU 8-3977
McDavid DU 8-4026

Washington, Dec. 17 , 1968

Agricultural Quarantine Inspectors Busy in 1968, USDA Reports:

Wormy "chocolates" that turned out to be poorly-disguised foreign figs, "pets" that were really serious "pests" from overseas, and meats sealed up in cans labelled "sardines" and "olive oil" were among the potentially dangerous items that U.S. Department of Agriculture quarantine inspectors stopped at the Nation's ports last year.

Quarantine inspectors of USDA's Agricultural Research Service work with other Government agencies at the Nation's airports, seaports, and border crossings to keep out destructive foreign plant and animal pests and diseases. Last year they stopped an inbound foreign plant pest on the average of once every 12 minutes and seized nearly 125,000 pounds of foreign meat from countries known to have such dreaded animal diseases as foot-and-mouth and rinderpest.

Inspectors found about half of these foreign plant pests and most of the prohibited meats in travelers' baggage. Prohibited material was also discovered in cargo, mail, and ship and airplane stores. Most foreign fruits, plants, and meats are restricted or prohibited by U.S. agricultural quarantine laws to prevent the introduction of destructive foreign insects or plant and animal diseases that could seriously damage U.S. crops, livestock, forests, lawns, or ornamentals.

Some travelers deliberately try to smuggle in foreign fruits, plants, or meats; others bring these items without realizing the hazard they present. One of the most optimistic smugglers of the year was a woman who arrived at San Ysidro, Calif. She vigorously denied having any fruits or plants while trying, unsuccessfully, to hide eight pounds of foreign strawberry plants under her miniskirt.

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On the other hand, a Florida-bound woman didn't hesitate to show agricultural quarantine inspectors at Dulles International Airport a jar she carried containing 14 live snails from Spain. She explained that she planned to raise them as pets. The inspectors, finding several species that attack plants overseas, had no alternative but to seize and destroy her "pet" snails.

Two passengers arriving at Miami, Fla., were less innocent. They carried cans labelled "olive oil" and "sardines" which actually contained prohibited foreign meat. Inspectors looked a little farther and found another 25 pounds of meat and several prohibited fruits pinned to the linings of their sleeves and topcoats. Another traveler arriving at New York's John F. Kennedy International Airport attracted the attention of agricultural quarantine inspectors when he appeared to have chocolates that were wormy. His "wormy" chocolates turned out to be chocolate covered figs that were heavily infested by foreign insect larvae.

During the fiscal year which ended June 30, 1968, more than 40 million pieces of baggage, 28.5 million hand carried packages, and 68 million incoming mail parcels were examined. Inspectors destroyed nearly 600,000 lots of prohibited fruits and plants and over 5 million pounds of prohibited garbage from ship and airplane stores in their continuing battle to protect America's food, forest, and ornamental resources against damaging foreign plant and animal pests and diseases.

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USDA 3921-68

Leonard DU 8-3977
McDavid DU 8-4026

Washington, Dec. 26, 1968

Screwworm Program Faces Reduction:

Southwest livestock growers will have to bear down harder on screwworm prevention measures in the next six months to compensate for a necessary reduction of the Southwest Screwworm Eradication Program, the U.S. Department of Agriculture announced today.

Officials of USDA's Agricultural Research Service said that it is more important than ever that all animal owners should inspect their stock regularly, spray with approved pesticides, treat all wounds and infestations with effective smears, and collect suspected larvae for identification. Cases should be reported to local veterinarians, county agents, or the Southwest Screwworm Eradication Laboratory, Mission, Tex.

ARS officials went on to say that in order to continue the sterile fly release program they must cut production to 50 million flies per week until June 30, 1969. The cutback became necessary after unusually heavy fly releases had to be made throughout the massive 1968 screwworm outbreak. Weekly fly production ran as high as 200 million during the fall, compared to the originally programed 150-million per week.

"We had an explosive situation on our hands, brought on by warm wet weather and relaxed preventive measures by many ranchers," said Dr. E. E. Saulmon, Director of ARS Animal Health Division. "To hold down the spread of screwworms, we released as many flies as possible; even then we had nearly ten thousand cases."

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Screwworms are the larvae of a species of blowfly that infest the living flesh of warm-blooded animals, causing serious injury or death if untreated. Scientist had eradicated the insect from the United States by releasing sexually sterile screwworm flies; their matings with wild flies produce no offspring. However, favorable weather conditions along the Mexican border this year contributed to the pest's resurgence northward.

Now that cold weather is killing the insect over much of its seasonal range, program officials are concentrating on the overwintering areas in Texas, Arizona, and southern California. With severely limited production, however, they point out that little coverage will be possible over Mexico, from which flies migrate into the United States.

They are uneasy about prospects for next spring, especially if another mild winter occurs along the Mexican border.

With 9,860 cases confirmed through December 23, the Southwest has experienced the most screwworm attacks since 1962, when USDA and the Southwest Animal Health Research Foundation launched the screwworm eradication program. The program reduced outbreaks from 51,000 in 1962 to an average of only about 1,000 for the years 1964-1967, most of the latter traceable to reinfestation from Mexico. This year there were 4,155 cases in October alone, compared to 872 for all 1967.

Long noted for destruction of livestock, pets, and wildlife, screwworms gained added notoriety in November when a 41-year-old Texas woman died following a screwworm infestation of her sinus and nasal passages. ARS scientists report that human cases have occurred in the past, the chance of infestation being greatest when animal populations are heavily infested.

ARS veterinarians are seeking the maximum support of livestock and pet owners to compensate for the loss of sterile screwworm fly production. They estimate that thorough precautions and treatment of all animals can be as effective as ten million or more sterile flies on the range.

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USDA 4006-68