

COOPERATIVE CAMPAIGNS FOR THE CONTROL OF GROUND SQUIRRELS, PRAIRIE-DOGS, AND JACK RABBITS.

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NATIVE RODENTS cause losses of crops in the United States amounting to many millions of dollars each year. Everywhere present, when a region is first settled they persist and frequently adapt themselves in a surprisingly short time to feed upon cultivated crops. Because of their great abundance and remarkable fecundity they have resisted successfully the sporadic individual efforts of the tillers of the soil to eradicate them. Their long-continued inroads into the profits of the farmer, when not disregarded altogether, are too frequently looked upon as inevitable. Often the margin destroyed by them makes the difference between a comfortable profit and a wretched failure. Even experienced agriculturists too commonly fail to realize the enormity of their cumulative exactions upon the financial resources of the country and the possibility of applying more intelligently the means of combating them.

Farming operations tend to provide ideal conditions for the abnormal multiplication of those rodents which readily turn from supplies of native vegetation to feed upon growing crops or stored agricultural products. Indiscriminate destruction of their natural enemies, the hawks, owls, and predatory mammals, disturbs still further the balance in nature by removing these checks upon them. Hence, the numbers of these animals have increased, as have also the losses inflicted by them, in spite of individual attempts to control them. Under these conditions lands cleared of the pests by progressive farmers soon become reinfested by invasion from adjacent areas where less thrifty practices permit these rodents to remain and multiply.

THE BOUNTY SYSTEM INADEQUATE.

The payment of bounties for the destruction of native rodents has cost States, counties, and townships excessive sums annually. In 1916 counties in Iowa paid \$77,279 in

bounties upon pocket gophers alone. Of this sum a single county paid \$11,138. One county in California paid out in bounties upon ground squirrels \$18,570 during 1916. Such typical bounty expenditures have usually served to reduce the numbers by less than the annual reproductive increase, thus leaving each year a larger breeding stock of mature animals to propagate and with their progeny to continue their devastating ravages upon the crops.

GREAT DAMAGE DONE BY RODENTS.

In States west of the Mississippi River prairie-dogs, ground squirrels, pocket gophers, rabbits, cotton rats, and field mice have taken a continually increasing toll from the crops of wheat, oats, corn, barley, and other cereals; from alfalfa, potatoes, beans, fruit, melons, and almonds; and from pasture ranges. States east of this boundary have suffered heavily from the depredations of rabbits, woodchucks, and meadow, pine, and white-footed mice in gardens, field and truck crops, orchards, and vineyards. The value of crops destroyed annually from these sources in the United States has recently been estimated to be in excess of \$150,000,000. This amount is based upon information regarding conditions reported by field representatives of the Biological Survey, county agricultural agents, other competent officials, and farmers; it does not include losses inflicted by house mice and rats.

Some idea of the losses suffered by individual States from native rodents may be obtained from the following estimates recently submitted by directors of agricultural extension: Montana, \$15,000,000 to \$20,000,000; North Dakota, \$6,000,000 to \$9,000,000; Kansas, \$12,000,000; Colorado, \$2,000,000; California, \$20,000,000; Wyoming, 15 per cent of all crops; Nevada, 10 to 15 per cent of all crops, or \$1,000,000; New Mexico, \$1,200,000 loss to crops and double this amount to range. In a single county of Virginia losses of orchard trees from depredations of pine mice during the last two or three years are estimated at not less than \$200,000. Similarly heavy losses are being disclosed in other States as attention is being directed to these causes of decreased production, causes which have too frequently been overlooked, unrecog-

nized, or considered unavoidable. That such losses constitute an entirely unnecessary drain upon the productive capacity of the farms, and that they may be permanently eliminated at a cost which is but a small fraction of the damage occasioned during a single year, has been abundantly proved by the extensive work already accomplished in campaigns conducted by the Biological Survey in cooperation with State and county organizations.

COMMUNITY COOPERATION ESSENTIAL.

The fact has been recognized for many years that community cooperation is essential to the effective control of rodents which feed upon agricultural crops and migrate or wander from place to place in search of food and shelter. During the last four years plans have been conceived and put into operation which have effected the required cooperation of many thousands of farmers and have resulted in practical elimination of rodent pests over millions of acres of valuable agricultural land, attended by an enormous direct saving and followed by increase in crops produced. The eagerness with which farmers have availed themselves of the opportunity to join in concerted movements to obtain relief from these pests, where the effectiveness of modern poisoning methods has been demonstrated, is most significant and gratifying, while the returns in increased crop yields upon the amount of labor and money invested in the community campaigns have exceeded all expectation. A successful fight against rodent pests requires that all local, State, and National agencies concerned be brought into harmonious and effective cooperation and that methods of proved efficiency be used.

COOPERATIVE CAMPAIGNS EXTERMINATING GROUND SQUIRRELS IN NORTH DAKOTA.

In the great grain-producing areas of North Dakota there has been developed the most extensive and thoroughly organized campaign, with a comprehensive plan of State-wide eradication of rodent pests, that has yet been witnessed.

This campaign was organized under a cooperative project agreement between the Bureau of Biological Survey and the

States Relations Service of the United States Department of Agriculture and the North Dakota Agricultural Experiment Station and Extension Service, including the county-agent organization. With commendable foresight the State legislature provided a revolving fund, available for use in procuring and maintaining the required stock of poison supplies. State enactments also authorized county commissioners upon petition of resident landowners to provide funds and to enforce the destruction of prairie-dogs, ground squirrels, pocket gophers, and certain other rodents which were declared a nuisance.

The initial campaign was launched against the Richardson ground squirrel, commonly known locally as "gopher." This animal each year caused enormous losses of grain, despite large sums which were being expended in unavailing efforts to combat it. Farmers were so familiar with these losses that little effort was required to convince them of the importance of eradicating this pest. So many kinds of poison preparation had been tried by them at great expense and with unsatisfactory results, however, that they were skeptical about the practicability of all such means applied to field conditions.

The Biological Survey and the North Dakota Agricultural Experiment Station had planned and conducted an extended series of experiments with many kinds of poisons and baits to determine a method which would be effective and economical under the usual farm practice. Such a poison was devised and tested thoroughly at many points within the range of this ground squirrel and was recommended for use. Wide publicity was given the work by publications, farmers' meetings, and field demonstrations throughout the infested portions of the State. The demonstrations, affording, as they did, ocular evidence in the form of scores of dead ground squirrels, were so convincing that skepticism gave way to the greatest enthusiasm and willingness to join in a concerted organized movement.

Further evidence that the method offered a practical solution of the problem of eradicating these rodents was afforded by a field party of the Biological Survey operating with poison on the Fort Totten Indian Reservation near Devils Lake, where the ground squirrels were being practically

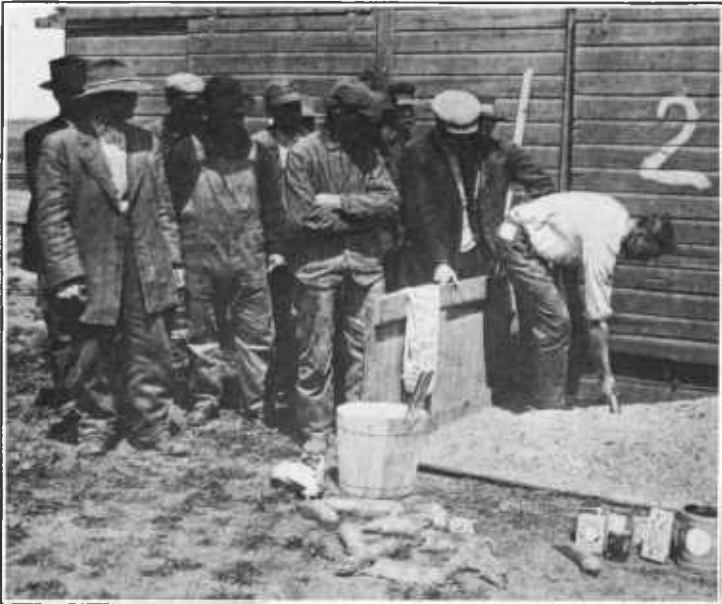


PHOTO FROM N. OAK. AOR. COLLEGE.

FIG. 1.—DEMONSTRATING THE PREPARATION OF POISONED GRAIN.
Strychnin paste is mixed with oats or other grain in a box or on a smooth floor by means of a shovel.



PHOTO FROM N. OAK. AOR. COLLEGE.

FIG. 2.—DISTRIBUTING PREPARED GRAIN TO FARMERS.
The poisoned grain is placed in sacks plainly labeled to show the character and the purpose of the contents before being distributed to cooperating farmers.



PHOTO FROM N. DAK. AOR. COLLEGE.

FIG. 1.—A "POISON SQUAD" AT WORK.

The men engaged in distributing poison to exterminate ground squirrels form in line and zigzag back and forth to meet one another as they move across a field in search of burrows.



PHOTO FROM N. DAK. AOR. COLLEGE.

FIG. 2.—RICHARDSON GROUND SQUIRRELS KILLED NEAR BURROW BY POISONED OATS.

The squirrels die in a few minutes after taking the poisoned grain into their cheek pouches.

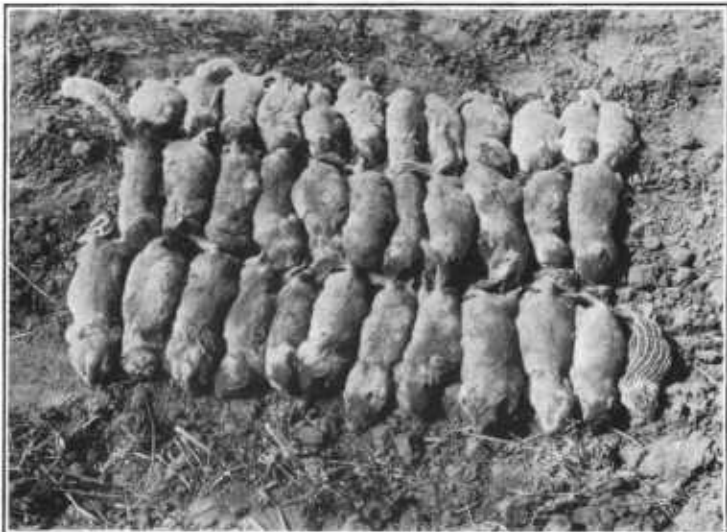


PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 1.—A FEW OF THE MILLIONS OF GROUND SQUIRRELS KILLED IN THE NORTH DAKOTA CAMPAIGNS.

Three species are shown, the striped or thirteen-lined, the short-tailed Richardson, and the bushy-tailed Franklin ground squirrels.



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FIG. 2.—ONE DAY'S KILL OF PRAIRIE-DOGS IN ARIZONA.

Sixteen hundred and forty-one dead prairie-dogs were collected from 320 acres which had been treated the day before by one man. Eighty quarts of poisoned rolled barley were used, the total cost, including labor, being \$9.79. Only a part of the prairie-dogs poisoned are shown, as a large proportion of them die in the burrows.

exterminated upon thousands of acres. Over 98 per cent of the animals have now been killed by the first application of the poison.

The support of county commissioners and township supervisors was enlisted in several counties where it was desirable to undertake the control of native rodents, and funds were provided by them to purchase poison supplies in large quantity, thus obtaining much more favorable price quotations. Experts in rodent control detailed by the Biological Survey, aided by county agricultural agents, interested and organized the farming communities. Entire counties were organized in this systematic voluntary warfare upon the rodents, using the township as a convenient working unit. Poisoned grain was prepared in quantity, placed in plainly marked containers, and distributed to farmers, who then applied it according to directions about the ground-squirrel burrows upon their farms. More than 5,000,000 acres were treated with poison in 1916.

During the spring of 1917 more than 16,000 farmers in North Dakota joined in this movement. The ground squirrels were poisoned on 4,500,000 acres, resulting in a practical elimination of the pest in the areas treated and a saving in the year's crop of more than \$1,000,000. Including hire of labor to distribute the poison, the cost averages less than 5 cents per acre under North Dakota conditions, and where landowners perform the labor the actual cash outlay per acre is materially reduced. As a small amount of follow-up work serves to exterminate the animals entirely and thus to free the land permanently from their depredations, the increased production becomes an annually recurring one, effected at a total cost much less than the loss formerly experienced during the single year.

The continuance of this campaign, which is planned progressively to cover the entire infested portion of the State, will at the present rate of progress practically exterminate this destructive pest from North Dakota in about five years. The achievement in this systematic campaign marks a distinct advance in procedure for the control of rodent pests in agricultural regions. It has conclusively demonstrated the possibility, when local, State, and Federal agencies cooperate heartily in meeting a real agricultural need, of

effecting the organization of farmers on the scale required for a practical coping with or complete elimination of some of the rodents which are most destructive of crops over extensive areas.

GROUND-SQUIRREL CAMPAIGNS PROMISING RELIEF IN OTHER STATES.

More recently, in response to bitter complaints and urgent requests for assistance from farmers, campaigns have been undertaken against ground squirrels in Montana, Idaho, and Oregon under plans of cooperation essentially the same as those employed in North Dakota. In these States the organization has centered in farm bureaus and pest clubs, which, under the stimulus and guidance of experts from the Biological Survey and county agricultural agents, have distributed many tons of poisoned grain. This was prepared in accordance with methods which have been proved by extensive investigations and field operations of the Biological Survey most effective and economical for the various species and seasons. In some instances county commissioners provided the funds necessary to obtain the supply of poison, and this was distributed free to farmers who participated in the campaign. In other cases funds were advanced to purchase in quantity the essential poison ingredients. These were then prepared and sold to the cooperating farmers at cost, effecting a considerable saving in price, in addition to furnishing a supply of poison of standard strength and known efficacy against the particular species of rodent involved.

Where it has been impracticable for county commissioners to advance funds for the purpose, farm bureaus and pest clubs have pooled their orders so as to avail themselves of the advantage of the reduced price. The increase in crop production resulting from the extermination of these pests is so direct and obvious that the vigorous and enlarged prosecution of these campaigns is assured.

The initial steps have also been taken in Nevada and California to place the work of ground-squirrel control upon an organized cooperative basis.

COOPERATION EFFECTIVE AGAINST PRAIRIE-DOGS.

Prairie-dogs also, which greatly reduce the carrying capacity of the pasture ranges of the West and lay waste the grain and vegetable crops of the farmers, are giving way before the systematic poisoning campaigns organized to eradicate them. The extermination of these animals upon large areas of national forest and other public land in Arizona, New Mexico, Colorado, Wyoming, South Dakota, and Oklahoma by field parties of the Biological Survey showed conclusively that these foes of the agriculturist can be effectually and economically exterminated by properly directed effort. Their ravages have been so severe as not only to cause a marked reduction in the products that could have been harvested from the acreage planted, but also to discourage settlement and in many cases actually to drive out settlers who were not able to maintain themselves in the face of such depredations.

Observing the results obtained by "poisoning parties" of the department upon public land, ranchmen and farmers have petitioned urgently for assistance. The pressing need for increasing food-crop and live-stock production emphasized the importance of eliminating this direct and preventable source of loss. Poisoning parties upon Government land were stationed where the work would be of the greatest possible value, by increasing the live-stock carrying capacity of the Government ranges, and would protect the forage and crops of ranchmen and farmers from destruction by prairie-dogs coming from the Government lands. At the same time an active campaign of demonstrations was undertaken in cooperation with the State extension services in Arizona and New Mexico to promote extermination of these pests on privately owned agricultural and grazing lands. This resulted in the planting to crops of considerable areas which would have been left uncultivated but for the successful extermination of the prairie-dogs and in the saving of important yields of wheat, oats, corn, potatoes, beans, and alfalfa from destruction by them.

JACK RABBITS DESTROYED BY THOUSANDS.

Satisfactory progress was made also in the campaigns undertaken against jack rabbits in California, Oregon, Nevada, Idaho, and Utah. These animals at certain seasons congregate in large numbers upon wheat, oats, rye, barley, and alfalfa fields, often completely devastating them, besides destroying great quantities of alfalfa hay in the stack. A farmer in Oregon writes, "Jack rabbits are so bad they destroy all our grain. If we can not obtain some help to get rid of these pests, we will have to do as other settlers are compelled to do, leave." This statement is characteristic of expressions from farmers throughout the regions where these animals occur in destructive abundance. The farmers' clubs organized for systematic poisoning of these pests in Crook County, Oreg., succeeded in destroying 59,000 during the winter of 1916-17, making a total of at least 134,000 jack rabbits killed in this county alone since the campaigns there were first undertaken. Many thousands of these animals have been destroyed in campaigns at a cost of less than one-tenth of a cent each. To the effectiveness of this work the saving of succeeding crops is largely attributed.

AN INSTANCE OF SUCCESS AGAINST GROUND SQUIRRELS.

The following statement is typical of the great number of expressions of approval received from farmers and orchardists who have used the Government poisoning methods in organized campaigns:

A hill near my house has been infested by these "ground diggers" since the year one, I should judge, and for the last three years they have carried off most of the fruit from my orchard adjoining, in spite of all the poisoning and smoking I could do. To-day I don't believe there is a live squirrel in the hill, and this with only two applications of the poisoned grain recommended by the Department of Agriculture. A large percentage of them must have died in the holes, as I found comparatively few on the surface. By thorough cooperation and perseverance I believe this pest can be practically exterminated and at small cost. Let this good work go on. If there is anything else in the making that is only half as good, let the farmer have the benefit of it at the earliest possible moment; he needs it, and our country needs it.

THOROUGH COOPERATION AND WISE DIRECTION ESSENTIAL TO SUCCESS.

Losses due to the depredations of rodent pests have too long been considered inevitable and uncontrollable. With modern improved methods of poisoning and systematic organization and prosecution of cooperative campaigns this heavy drain upon production need no longer be tolerated by progressive communities. The details of organization must vary somewhat according to the requirements for the particular animal pest involved and the conditions prevailing in the community where the work is undertaken.

As suggested by the campaigns which already have been conducted effectively, the more important features essential to ultimate success are: (1) Cooperation of all agencies involved, including farmers, local organizations, county, State, and Federal officials; (2) leadership trained and experienced in methods of rodent control and in organization; (3) a unit plan to systematize activities and cover a sufficiently large territory to prevent reinfestation; (4) financial support to procure supplies in large quantities; and (5) legal provision for the extermination of pests upon neglected areas.

Plans for the campaigns against the animals should be laid sufficiently in advance of the season favorable for beginning field operations to effect preliminary arrangements and procure necessary supplies. The need should be foreseen and the work of extermination undertaken at a time when the animals will take poison most readily and previous to the time they usually make their attacks upon growing crops. When an abundance of succulent food is available poisoning is more difficult, and when damage to a crop becomes apparent it is usually too late to develop the organization required for obtaining the most effective and lasting results. With due foresight, proper organization, and a direction of campaigns by men trained and experienced in approved methods, success in the eradication of noxious rodents is practically assured.

