

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

SOME ASPECTS OF RABBIT CONTROL

By I. G. McIntosh, Animal Research Station, Wallaceville.

THE previous speaker has produced ample evidence of the necessity for the control of the rabbit pest in New Zealand and the following discussion is based on the acceptance of that fact.

The Rabbit Nuisance Acts of 1908 and 1928 apparently provided all the machinery and powers necessary to provide for adequate control of the pest by giving authority for the setting up of Rabbit Boards charged with the destruction of the pest either through their own servants or by requiring owners or occupiers of land to carry out the necessary work themselves. In areas where Boards were not constituted it was incumbent on Inspectors of Stock, of the Department of Agriculture to serve notice on owners or occupiers to destroy rabbits and to see that such work was carried out, under threat of prosecution.

Provision was also made for Inspectors whether attached to Rabbit Boards or to the Department of Agriculture to enter properties and carry out the work themselves. Finance for the Boards' work was obtained by a rate struck within each rabbit district, usually on an acreage basis, together with subsidies from the Consolidated Fund.

Up to the present about 106 Rabbit Boards, covering approximately 18 million acres have been set up and since they were set up on the requisition of the majority of the potential ratepayers in the various districts it does indicate the general appreciation of the damage caused by and the necessity for adequate control of the pest.

Some indication of the extent of the pest is given by the average number of skins sold annually both for export and for the local market in the three 5 yearly periods 1930-4, the slump years, 1935-9, the immediate pre-war period, 1940-4, the war period, and the 3 year post-war era 1945-7 inclusive. These annual averages are: slump years 9 million, pre-war 14 million, war-time 13½ million, post-war (3 years) 17½ million. When one considers the number of dead rabbits not recovered, unsaleable skins, etc., it is readily obvious that the number of skins sold do not provide an accurate assessment of the numbers of rabbits destroyed.

The Livestock Division in its 1947 bulletin on the Rabbit Pest puts the proportion of skins sold at about half the number of rabbits destroyed or less. The proportion of saleable skins to rabbits destroyed would, however, remain fairly constant provided the methods of destruction did not vary, and hence the above figures are a reasonable index of the numbers destroyed.

There is little doubt that high prices for skins, are conducive to greater efforts to obtain them and this aspect must have contributed to the doubling of the average annual catch from, say, 1932 to 1946. To offset this factor, however, one has only to consider the number of amateur rabbiters operating and the ease of obtaining labour during the slump years compared with the more recent war-time and post-war periods when the labour shortage has been acute. My own interpretation of the figures is that there must be more rabbits in the country now than there were about twenty years ago to allow such catches to be taken.

Our failure to prevent the multiplication of the pest or, if it is not conceded that rabbits are increasing, then our failure to reduce them can be due to a number of factors of which I will mention only three, as follows:—

1. The deliberate restriction of operations by many rabbiters and occupiers of property to such times as skins are most valuable, i.e., the winter months.
2. The virtual farming of rabbits in many cases in order to ensure a continuous crop of skins.

As long as skin prices represent a cash return and until planned publicity can convince land-holders that rabbits, generally speaking, are not good for the national economy the two factors mentioned are bound to operate.

3. The third factor—shortcomings in the methods of destruction available.

Of the methods available, namely, poisoning, fumigating, trapping, shooting and the use of ferrets, poisoning seems to be the most effective although the others have a rightful place in properly planned work.

Phosphorus and strychnine are widely used in New Zealand as in Australia and are easily the most popular poisons. Of these, phosphorus incorporated into pollard has been used for very many years and has been responsible for the destruction of millions of rabbits.

During the past year, however, numerous complaints have been received about the potency of the pelleted material turned out by the Department of Agriculture's Poison Mixing Depot at Frankton Junction.

The assistance of the Animal Research Division was sought and subsequent analytical work confirmed the validity of these complaints. As a result, attempts have been made to improve the quality of the product. Although the lethal dose of phosphorus for a rabbit is not known with certainty we have laid it down that a 2 gramme pellet should contain at least 5mgms. of free phosphorus, which should be a lethal dose. This amounts to a quarter of a per cent of free phosphorus. Phosphorus is a highly reactive substance which combines readily with the oxygen of the air, to form phosphorus pentoxide which, of course, has no poisonous properties.

It was suspected that phosphorus was being lost during the mechanical mixing of the ingredients and so the time of mixing was cut down to a minimum.

By this means a highly potent bait was produced but recent tests have shown that the potency is often lost very quickly, even in sealed tins, rendering the material valueless as a rabbit poison. Wherever phosphorised pollard is made at a central depot, keeping quality is of great importance both as regards potency and palatability, since a considerable time often elapses before the material is used.

Rabbit Boards making the same product have also been experiencing difficulty in turning out a good product and this difficulty has coincided somewhat with the introduction of the higher extraction rate flour now in use, and a consequent poorer quality of the pollard available. Present day pollard seems to give an open texture instead of a compact type of pellet and work is proceeding in the Department of Agriculture to determine whether the pollard quality is the factor responsible for the poorness of keeping. Strangely enough it seems to be very difficult to improve the quality of pollard merely by adding flour to it.

There is little doubt that even in the days before high extraction flour was introduced some of the phosphorised pollard turned out by the Department of Agriculture was of poor quality and not of sufficient potency to effectively destroy rabbits. The reactive and unstable properties of phosphorus will always be a disadvantage in its use in rabbit poisoning, to say nothing of its inflammable properties and its danger to the health of men engaged in manufacturing baits.

Strychnine with various baits is used to a considerable extent and is a highly satisfactory poison in that unlike phosphorus it is extremely stable and kills quickly, thus allowing skins to be reclaimed easily.

Its disadvantages are its extremely bitter taste and the necessity for pre-feeding with unpoisoned baits. It is disliked by many operators because of the danger to dogs eating the carcasses of rabbits poisoned with it. This position arises partly through the use of too high amounts of strychnine, especially in jam bait.

The lethal dose of strychnine for a five pound rabbit is about 8 mgms. by mouth, and hence 1 ounce contains 3,500 lethal doses. The Department's present recommendation is to use 1 ounce of strychnine to 12lb. of jam, each bait to be 1 dessertspoonful or about one-third of an ounce. This gives just under 600 baits each containing about six lethal doses.

I think the recommendation should be altered so that 1 ounce of strychnine be added to 36lb. of jam, 1 teaspoonful of the latter to be used per bait. The result would be to give 3,250 baits each containing 8.7 mgms. of strychnine, or just over a lethal dose. This procedure would result in economy in the use of strychnine, would increase the palatability and would reduce slightly the danger to dogs. Unfortunately it will never be possible to ensure that a rabbit will take only one lethal dose and no more and hence the danger to dogs will always be present during poisoning with strychnine.

Although arsenic has been recommended for many years, I do not think its possibilities have yet been fully explored. The technique of bait preparation recommended has been to sprinkle white arsenic on boiled oats or chopped carrots.

As a poison, white arsenic is rather uncertain in its action since its toxicity varies with the crystalline form of the oxide. For instance, the hard vitreous or glassy form of the oxide is scarcely absorbed at all by the animal and this fact explains why the Styrian arsenic eaters were able to eat apparently massive doses with impunity. If white arsenic is dissolved in soda however, it is readily absorbed in the gut and its toxicity is increased about tenfold, and I think that this property should be exploited.

The lethal dose of dissolved arsenic for a rabbit is well known at 10.5mgms. per kilogramme of body weight. For a five pound rabbit this is 24 mgms. Hence one pound of white arsenic (arsenic trioxide) contains 14,000 lethal doses. Dissolved in two pounds of soda, this amount would be sufficient to poison 62 pounds of pollard pellets, and give a lethal dose in each pellet, provided that they ran out at the same size as those manufactured at Frankton, that is, about 25 to the pound. For different sized pellets the dose rate could be easily adjusted. Like strychnine, arsenic is highly stable and there could be no possibility of the loss of potency such as occurs with phosphorus baits.

A great advantage over strychnine is the lack of taste in such an arsenic bait, so that if the latter were mixed with pollard there would be no need for pre-feeding with unpoisoned baits.

Some experimenting would be needed to determine whether pollard with arsenic could be made at a central depot and stored without going sour or mouldy. There are no difficulties, however, in the way of it being made in the field immediately prior to use. Taking British list prices as a guide, the cost of arsenic would be about one-third that of phosphorus and about one-eighteenth that of strychnine, for a given number of baits. In other words, the cost of the actual poison per thousand baits would be roughly as follows: for arsenic, 1½d; for phosphorus, 4d; and for strychnine, 2s 3d. These cannot be regarded as more than mere approximations, however.

So much for the poisons at present in use.

As far as I know, zinc phosphide, which is extensively used as a rat poison in Great Britain, has not yet been tried against rabbits in this country. This compound which is relatively inert, insoluble in water, stable except in the presence of acids, and which is about as toxic as arsenic, seems, on paper anyway to have very desirable properties as a rabbit poison. It is not obtainable in this country but

we have a small batch on order for experimental purposes and to check its properties. Before it could be recommended for use some work would be necessary to determine its safety for operators.

A poison which would certainly be effective against rabbits is the newly developed rat poison, sodium fluoroacetate, commonly known as "1080". It is extremely toxic to all animals and to men and unfortunately there is no known antidote. It would be extremely dangerous to place such a material in the hands of rabbiters and others, and workers in America, where this substance has been developed, urge the greatest caution in handling it. I understand that its use has been banned completely in Australia, and accordingly I would not advocate its use here.

We are often asked about the possibility of the discovery of a poison which will be specific for rabbits and not harmful to other animals or to man.

The idea of a poison specific to a particular animal has been stimulated by the discovery of the very effective rat poison "Antu." This substance is about $5\frac{1}{2}$ times as poisonous to rats as to the next animal on the list, the dog, on an equivalent body-weight basis. It is not very poisonous to rabbits and its greatest value as a rat poison lies in the fact that it is relatively harmless to fowls.

The toxicity of "Antu" to rats was found purely by accident during routine toxicity tests of thiourea derivatives in the course of investigations seeking improved drugs for the treatment of toxic goitre in man, and there is the possibility that a substance with specific poisonous properties towards rabbits may be found, either by accident or as the result of a planned research. Such a research might be costly and fruitless, and at present I think we should concentrate on the poison weapons we have available already, for if they are properly handled they can be made a more potent force in rabbit destruction than they are at present.

At the moment it looks as though combined field and laboratory work could do a lot to remedy the present difficulties in the use of available poisons, provided that efforts could be directed toward the destruction of rabbits and not towards the maintenance of the rabbit skin trade. I don't want it to be thought that I have not considered the field aspects of rabbit poisoning during this discussion merely because I have not mentioned them. I fully realise that the skill of the rabbitier is a highly important factor in successful poisoning operations and hence I think it desirable that there should be the closest collaboration between the field men and the laboratory worker in the future.

Before leaving the poisoning sphere, I would just mention in passing, the techniques of poisoning by fumigating warrens with carbon bisulphide, cyanogas and smoke. These are well proved methods and I can add nothing to the present techniques.

Under the 1947 Amendment to the Rabbit Nuisance Act there has been established a Rabbit Destruction Council charged with the guidance and co-ordination of the activities of the Rabbit Boards, the promotion of measures for the destruction and control of rabbits and the making of general recommendations to the Minister of Agriculture on related matters.

Their major task will be to help the Boards who are sincerely trying to control rabbits in their districts and to fearlessly enforce control where the efforts are not so wholehearted. They will certainly have an enemy of a fair proportion of $1\frac{1}{2}$ million pounds per annum, being the present value of rabbit skins, to fight against.

With the poisoning methods brushed up as I have indicated I think the prospects of effective control of the pest are brighter than they were twenty years ago, even though we have lost ground since then.

Discussion on Mr. McIntosh's Paper

Mr. LONGWILL. One point that puzzled me was Mr. McIntosh's recommendations to spread strychnine more sparsely through the jam. Is it not difficult to obtain an even spread with one ounce to 36lb? Is it practicable to get such a small amount evenly spread?

Mr. McINTOSH: I do not think there is any difficulty in the mechanical mixing of it. It will probably dissolve in the acid of the jam. I have allowed for a 5lb. rabbit which is higher than the normal, but I think 5 mgms. is about the average lethal dose.

Mr. MARPLES: I would draw Mr. McIntosh's attention to a recent paper in the British Science News. The author's objections to the poisons such as strychnine for rats is the danger to other animals, pre-baiting is necessary and the rat very quickly learns that poisoned bait is not quite the same as the pre-bait and one never gets rid of a whole population by using these poisons. He used Dicoumarin, a drug used in medicine for the removal of blood clots in thrombosis. He found that prolonged ingestion over about 14 days of minute quantities of Dicoumarin had the curious effect of causing the capillaries to dilate and the rat died of internal haemorrhage. The principal advantages of this method are that Dicoumarin is tasteless, it is non-poisonous under ordinary conditions. One or two doses have no effect.

Mr. McINTOSH: I have not seen that particular article yet. There is one serious disadvantage—the prolonged feeding. Fourteen days seems to me to be a tremendous disadvantage. Is there any information on rabbits at all?

Mr. MARPLES: No. It is entirely confined to rats.

Dr. CUNNINGHAM: Dicoumarin is toxic to other animals as it occurs in sweet clover causing losses in cattle. There is a risk to other animals.

Mr. McINTOSH: It seems at present that until a specific poison is found—if one is ever found—the danger to other animals cannot be avoided. I do feel if we cut down the amounts to the lowest necessary to kill rabbits, we do to some extent reduce the danger of baits to other animals.

Dr. FILMER: What proportion of the rabbit population has to be destroyed each year in order to keep the breeding population stationary? I suspect it might be very high. For example, in the sheep industry with a population of 21,000,000 breeding ewes we actually kill each year about 17,000,000 sheep and are still able to keep our breeding population stable. With the rabbit, which is a much more rapidly breeding animal, the percentage to be killed each year might be in the 80's or 90's. If that is true, is it any use at all trying to control the population by trapping and poisoning?

Mr. McINTOSH: I do not think we will ever eradicate rabbits. It seems that it will be a continuous job to keep them down when the farmer decides it is better to control them than let them thrive. I cannot say what percentage should be killed each year to keep the population stable.

Dr. WODZICKI: I believe that if the population is largely reduced the rabbit will breed much longer, its litters will be much larger, and its powers of surviving much greater. The work on rats proved that we have very good poisons but when one poison was employed it killed off a large number of the rats, but a small proportion of the population which was left was so poison-shy that another method had to be tried.

Mr. McINTOSH: I think poisoning can never be regarded as more than one of the many methods. Perhaps the veterinary members can make some comments on biological methods of control.

Mr. ROACH: Risk of spread of disease in other animals will always attend the use of common pathogenic organisms except where these are highly specific for the rabbit. There is always the added difficulty of the rapid development of an immune body of rabbits, which would not take very long to materialise.

Mr. BARRY: On behalf of the Livestock Division of the Department of Agriculture I would like to express my thanks and appreciation of the work which Mr. McIntosh has done and the assistance he has given to officers of the Livestock Division in connection with difficulties which had arisen in the preparation of certain rabbit poisons. I am looking forward to the continuance of the help of the laboratory workers to the field men along these lines. I quite anticipate that within a very short time there will be an increased demand for work of this particular kind, i.e. work which will be directed towards the destruction of rabbits by material which is harmless to other livestock and birds. We all appreciate the danger of attempted control by any disease which is possible of spread to other livestock. We have seen, of course, the work carried out by the C.S.I.R. in Australia some 10 to 12 years ago, who undertook extensive work there to determine whether a disease of rabbits from South America would be any use in their destruction. The experimental work was carried out on an island and where the rabbits confined in a small area were inoculated with this virus they died out very rapidly. But in open areas, unfortunately, the infectivity did not appear to be very high and the resulting mortality in the rabbits was very low. It was proved to have been harmless to other classes of livestock so that great hopes were entertained at the time but they did not materialise. The only investigation that has been carried out in New Zealand, as far as I know, was not in the control but in a mortality of rabbits in certain areas associated with parasitic disease, which was studied by Gilruth.