

A study on the efficiency of zinc phosphide against roof rats in poultry houses

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Summary

In this study the efficiency of zinc phosphide against roof rats (**Rattus rattus**) in poultry houses was determined. Results of applications revealed that in field conditions this chemical was efficient at 118 mg/kg when 2 % bait was used and 103 mg/kg when 3 % bait was used.

Introduction

Poultry houses are among the most attractive areas for rodents providing them optimal conditions both for feeding and harbourage. Rodent problem is one of the major concerns of poultrymen causing economic losses and reducing his incomes. Rats and mice are actual and potential damagers of poultry houses. According to Thornberry (1978) rats waste considerable amounts of feed in addition to destroying the effectiveness of insulation maintaining disease and parasite problems, and damaging equipment.

One of the acute rodenticides used most frequently today in rat control is zinc phosphide. It is moderately toxic and is effective against both Norway rats (**Rattus norvegicus**) and roof rats (**Rattus rattus**) (Howard and Marsh, 1974).

Generally zinc phosphide is toxic to the rodents in less than 24 hours, frequently in 6 to 12 hours. It is more effective against roof rats than

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against Norway rats. However about 40 mg/kg of zinc phosphide are required to obtain an LD-50 with Norway rats. Some writers have reported much higher LD-50 levels for zinc phosphide but the general consensus from the more detailed tests of this type is that 40 mg/kg and a range from 35 to 48 mg/kg are the most valid figures (Schoof, 1970).

Comparing with the other single dose rodenticides, zinc phosphide remains one of the most widely used rodenticides today due to its fairly good safety record, low cost, and reasonably its high effectiveness (Gratz 1973). It is generally used at a strength of 1 % or 2 %. Higher strengths have been used for rat control in other countries (Howard and Marsh, 1974).

The efficiency of poisons observed in laboratory conditions must not be considered as guaranty for practical applications. However, it must be assumed that wild populations might not show the same behaviour. So the real efficiency may be observed in wild populations under natural conditions (Gramet, 1976).

From this point of view the aim of this work was to determine the efficiency of zinc phosphide against roof rats in poultry houses.

Materials and Methods

Poultry houses to which zinc phosphide was applied were 12 m in width, 111m in length, half open type and 1/2 slats from sides including an entrance and 9 pens of 12 m length each. After the chickens were removed, zinc phosphide grain bait in 2 % and 3 % concentrations were placed to the pens. The next day the bait was removed and weighed to determine the amount consumed by rats. The number of dead rats was estimated by sampling different unit areas. The mean body weight of roof rats subject to these applications have been found by random sampling as 222 g ranging from 170 to 290 g. The efficiency of zinc phosphide was determined as the amount of poison consumed per dead rat body weight as mg/kg.

Results and Discussion

The following results were obtained by different applications in different poultry houses using 2 % and 3 % zinc phosphide baits (Table I). The average consumption from the 2 % bait per dead rat was 1,31 g ranging from 0,97 to 1,71 g. On the other hand the average consumption from 3 % bait per dead rat was 0,76 g ranging from 0,74 to 0,78 g.

Table — I

Results of zinc phosphide applications in poultry houses against roof rats

Application data	Zinc phosphide concentration %	Number of dead rats	Consumption of bait per deat rat (g)	Equipment effective lethal dose (mg/kg)
24.8.1977	2	1805	0,97	87
10.9.1977	2	2500	1,14	103
17.11.1977	2	904	1,71	154
24.1.1978	3	658	0,78	105
2.2.1978	2	400	1,30	117
9.2.1978	3	3132	0,74	100
14.5.1978	2	586	1,19	107
13.6.1978	2	1008	1,66	150
2.8.1978	2	51	1,17	105

When values of zinc phosphide in baits are interpreted interms of LD (mg/kg) basis, the values would vary between 87-154 mg/kg with a mean value of 118 mg/kg for the 2 % bait. But with the 3 % bait the LD values would vary from 100 to 105 mg/kg with a mean value of 103 mg/kg.

One of the possible reasons of the variations observed in the efficiency of zinc phosphide in different dates may be the variance occuring in animal body weight. In our study the mean body weight was 222 g for LD calculations, but the variance was from 170 to 290 grams. Thus, the variability in the efficiency of the poison may vary according to the population structure.

A second reason might be some residues and remains of feed present during the applications. Some of the rats would not feed enough causing them to ingest a lethal dose of bait. In the experiment done by Schoof and Maddock (1968) with wild roof rats under free choice between food with and without zinc phosphide bait, zero percent mortality was obtained.

A third reason could be the presence of cats, dogs or birds in the empty poultry houses. In such conditions the rats would be disturbed and forced to draw back from the baiting points without ingesting a lethal dose. After applications dead rats eaten by these animals also may result in lower efficiency of the poison.

The average consumption from 2 % and 3 % baits was different. When 3 % bait was applied the rats consumed 40 % less bait and 12 % less poison than the 2 % bait application. It was assumed as the bait got stronger the rats withdraw from feeding in shortest time.

In conclusion, several applications of zinc phosphide against roof rats in poultry houses has revealed the efficiency of this poison in field conditions to be about three times of its laboratory determined LD-50 value. Low cost, fast action easiness in application are principal advantages of zinc phosphide for controlling rats in poultry houses.

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Özet

Çinko fosfürün tavuk kümeslerindeki kara sıçanlara etkinliği ile ilgili araştırmalar

Tavuk kümeslerindeki sıçanların kontrolü çözümlenmesi gereken önemli bir sorundur. Bu çalışmada kümeslerde zararlı kara sıçan (*Rattus rattus*)'a karşı kullanılan çinko fosfürün uygulamadaki etkinliği ağızdan öldürücü doz olarak belirlenmek istenmiştir. Elde olunan sonuçlar, çinko fosfürün % 2 oranında zehirli yem şeklinde uygulandığında ortama 118 mg/kg'da, % 3 oranında kullanıldığında 103 mg/kg'da etkin olduğunu ortaya koymuştur.

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