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RODENTICIDES **POULTRY**

FIELD EFFICACY OF SECOND-GENERATION ANTICOAGULANT RODENTICIDES IN MANAGING RODENT PESTS IN POULTRY FARMS

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ABSTRACT

Rodents, mainly rats and mice inflict incalculable losses to the poultry industry. To address the menace of rodents in poultry anticoagulant rodenticides which are chronic in action and safer to non targets were attempted to check the menace of rodents in poultry. Two second generation anticoagulant rodenticides *viz.*, Bromadiolone (0.005%) as ready to use wax block and Difethialone (0.0025%) as freshly prepared bait were evaluated for their efficacy in managing rodents in poultry. The trials were conducted in two poultry farms and evaluation of rodenticide were made by using two census method. The main species responsible for the damage were *Rattus rattus* and *Mus musculus*. The infestation level at both the farms were uniform as evident from pretreatment data of trapping (4.67 and 3.67 rodents per day) and census baiting (1035 and 1005 g total consumption of bait at two sites). The mean control success as assessed by two method of census (Trapping and census baiting) was 80.6% with bromadiolone (0.005%) and 78.14% with that of difethialone (0.0025%) within two weeks of treatment. The mortality in rodents after treatment with anticoagulant rodenticides started from 4th day and lasted upto 14 days.

KEY WORDS: **Anticoagulants, Rodents, Efficacy, Poultry, Difethialone, Bromadiolone.**

Introduction

Rodents, mainly rats and mice inflict incalculable loss to the poultry industry. These tiny vertebrates are always present in poultry farm premises in large numbers due to constant availability of favourable habitat for sustenance and multiplication without any competition and predator free environment (Parshad, 1999). They cause direct damage to poultry structures, poultry feed, chicks and eggs and indirect damage by contamination and deterioration of poultry house environment and by spreading several dreaded disease to poultry birds and workers (Bhardwaj, 1983 and Chopra, 1992). Chopra & Dhindsa (1987) reported that rodents consume 0.18-0.38 and 0.05-0.14 kg of poultry feed daily in poultry feed stores and shed in small and medium size poultry farms. Even egg damage to the tune of 0.12-0.14 per cent eggs has been reported. Similarly daily damage to egg trays and gunny bags was estimated to be 1-1.53 per cent by these authors in Punjab. To minimize such rodent borne problems in poultry farms, there is an immediate need to manage these vertebrate pests effectively. Presently, the rodenticides are the only effective option available for rodent management in the poultry farm. Among these, acute poison like zinc phosphide for their quick action, broad spectrum toxicity and least safety for non-targets along with other associated problems like bait shyness and poison aversion are not at all advisable to be used for rodent control at such sites. However, second generation anticoaulant rodenticides are considered as relatively safer to non-targets due to their low dose requirement in baits (0.002-0.0055) with chronic action. The second generation anticoagulants *viz.*, bromadiolone, brodifacoum, flocumafen, difethialone, etc. have been found effective against a wide range of rodent pests in India (Jain, 1980; Soni *et al.*, 1985; Mathur *et al.*, 1992 and Sridhra *et al.*, 2000). Scientific data on the control of poultry

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Table

Rodenticidal evaluation in poultry farms following census baiting and trapping methods

Treatments (Sites)	Census baiting: Average bait consumption per point/day (g)		Census baiting: Control success (per cent)	Trapping: Animals trapped per day (nos)		Trapping: Control success (per cent)	Mean success by both the methods (4 and 8)
	Pre-treatment	Post treatment (15 DAT)		Pre-treatment	Post-treatment (15 DAT)		
1	2	3	4	5	6	7	8
Bromadiolone (0.005 per cent)	11.50	2.00	82.61	4.67	1.00	78.59	80.60
Difethialone (0.0025 per cent)	11.17	1.84	83.53	3.67	1.00	72.75	78.14
Mean	11.34	1.92	83.07	4.17	1.00	75.67	79.37

rodent pest by using anticoagulant rodenticide is very limited in India (Purushotham *et al.*, 1984; Parshad *et al.*, 1987; Saxena, 1999; Mathur *et al.*, 1992). In the present communication an attempt has being made to workout the field efficacy of two second-generation anticoagulant rodenticides *viz.*, bromadiolone (0.005%) and difethialone (0.0025%) for controlling the rodent pests in poultry farms.

Material and Methods

Trials were conducted at two poultry farms located near Jodhpur city, western Rajasthan (26°18' N latitude and 73°1'30" E longitude). The farms consist of 4 to 5 sheds each housing a total number of 3000-5000 birds. A store room was also maintained at each farm where poultry feed and eggs were stored. The kind of damage caused by rodents in the poultry farms included loss to poultry feed, breaking of eggs, gnawing of electrical wires and wooden structures, besides contamination of the total environment of by their urine, feacal matter, hairs etc.

Three night trapping using Sherman traps were conducted in both the study farms to understand the rodent species composition infesting the farm. Besides, observations were also made on extent of damage and contamination of the poultry feed by census baiting and presence of faecal pellets in per 250 g sample of poultry feed (bagged and spilled water).

Two second generation anticoagulant rodenticides *viz.*, bromadiolone and difethialone were evaluated for their efficacy in management of rodents in poultry. Ready to use wheat based wax block bait containing bromadiolone at 0.005% a.i. was utilized for trial (at Site I), whereas, for difethialone freshly prepared pearlmillet based baits containing 0.0025% a.i. was used (at Site II).

Baiting technique

Both the test rodenticides were evaluated by utilising two assessment methods *viz.*, census baiting and trapping, simultaneously in two phases i.e. pre-treatment post treatment periods. Plain bajra (with 2% groundnut oil) was used as census bait during the trials. On an average 50 bait stations (earthen pots) were maintained at an interval of 5-10 metre each in order to cover the entire study area. The baits (50 g/bait station) were placed in bait stations hung/secured by thin steel wire close to the path frequented by rodents. Poison baiting with bromadiolone (0.005%) and difethialone (0.0025%) at respective sites was done for two days. All care was taken to avoid any accidental exposure of birds to poison baits. The bait stations were checked at regular interval and consumption of bait recorded and replenished each time. Monitoring of sites was initiated after three days of poison baiting and continued upto 15 days for dead rodents. On 15th day post treatment census was initiated which continued for three consecutive days.

For the two methods efficacy of rodenticide was evaluated using the formula of Cowan and Townsend (1994).

Control success (%)

$$= 100 \times \frac{\text{Pre treatment census} - \text{post treatment census}}{\text{Pre treatment census}}$$

treatment. Thus there was significant reduction in pest population with both the test rodenticides.

Anticoagulant rodenticides being chronic in action caused delayed death in the target animals. Data presented in *Fig.1* revealed that mortality in Site I baited with bromadiolone started from day 5 and continued upto 13th day, whereas, at Site II, where difethialone was used the mortality initiated on day 4 and lasted upto 14th day. Thus the mortality pattern followed similar pattern.

Both the test rodenticides proved quite efficacious in reducing the pest population as revealed from the significant differences between the pre and post treatment data. The combined effect of both the methods (census baiting and trapping) yielded 80.6 and 78.14 percent reduction of rodent pest population with bromadiolone and difethialone treatment, respectively.

The efficacy of both the anticoagulant rodenticides against commensal rodents has been reported from different regions. Meehan (1978) reported that seven days exposure to bromadiolone (0.005%) yielded 90 per cent control of warfarin resistant population of *R. norvegicus*, whereas, Frantz (1982) reported that one day exposure of bromadiolone (0.005%) was quite effective in killing susceptible Norway rat *R. norvegicus*. Similarly bromadiolone and flocumafen (0.005%) was found quite effective in managing pest rodents in pig farms (Avylov, 2001) and poultry farms (Parshad *et al.*, 1987; Parshad, 1999 and Mathur *et al.*, 1992). Lechevin and Poche (1988) reported that difethialone (0.0025%) provided 100 and 94 per cent mortality of resistant *R. norvegicus* and *M. musculus* respectively and 96.80 per cent kill of *R. norvegicus* in duck, phesant and partridge farm and 97.40 per cent kill of *R. rattus* in swine farm. Similary, Marshall (1992) reported that difethialone (0.0025%) was quite effective in controlling *R. norvegicus* and *M. musculus* under field condition. In all these studies only one census technique, either live burrow count or census feeding was used. In the present study two-census techniques were employed, providing more accurate and valid inferences. Kaukeinen (1979) suggested at least two methods should be followed in evaluating the efficacy of any candidate poison. Previously Maddaiah *et al.* (1987) used two census methods in evaluation of bromadiolone (0.005%) against commensal rodents. Percent reduction in rodent activity as reported by these workers was quite consistent between the two methods and is also in agreement with the present study.

Earlier reports of laboratory trials under choice condition indicated cent per cent kill of *R. rattus* with difethialone (0.0025%) baiting was achieved after three days exposure (Chaudhary and Tripathi, 2003) and with that of bromadiolone (0.005%) after 3-4 days exposure (Jain, 1980). In the present study two days exposure yielded 78.14 and 80.60 per cent control of pest rodents with respective rodenticides. Thus the present results corroborate with the laboratory findings under choice condition. Saxena (1999) has also reported 86.90 and 92.40 and 90.40 and 92.74 per cent control success with bromadiolone (0.005%) and difethialone (0.025%) after 5 and 7 days exposure respectively in poultry farms near Jaipur.

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Climate change making cassava toxic

Cassava, the staple of 75 million impoverished people in Africa, Asia and Latin America, is turning more toxic with much smaller yields, thanks to global warming and carbon levels.

Monash University researcher Ros Gleadow and her team tested cassava and sorghum under a series of climate change scenarios to study the effect on plant nutritional quality and yield.

Both species belong to a group of plants that produce chemicals called cyanogenic glycosides, which break down to release lethal cyanide gas if the leaves are crushed or chewed.

The team grew cassava and sorghum at three different levels of CO2; just below today's current atmospheric levels at 360 parts per million (ppm), at 550 ppm and double at 710 ppm. Current levels in the air are approximately 390 ppm.

"What we found was the amount of cyanide relative to the amount of protein increased," Gleadow said. "At double current CO2 levels, the level of toxin was much higher while protein levels fell. The ability of people and herbivores, such as cattle, to break down the cyanide depends largely on eating sufficient protein."

"Anyone largely reliant on cassava for food, particularly during drought, would be especially at risk of cyanide poisoning."

"While it was possible to use processing techniques to reduce the level of toxin in the cassava leaves, it was the 50 percent or greater drop in the number of tubers that caused most concern," Gleadow said, according to a Monash release.

"Reducing carbon emissions wouldn't be a bad idea either," Gleadow said. The findings underscore the need to develop new cultivars to feed rapidly growing human populations. The findings were published in Plant Biology.