LABORATORY TESTS OF SOME RODENTICIDE BAITS WITH ANTI-COAGULANT OR HYPERVITAMINOSIS EFFECT IN WISTAR RAT

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In free-choice tests individual rats were exposed for two days to two food containers, each containg either a poison bait or a reference plain bait (EPPO, 1975). The folloving commercial rodenticide baits were tested: RODENTIN (0.0075% chlorphacinone), TALON (0.0025% brodifacoum), LANIRAT (0.005% bromadiolone), STORM (0.005% flocoumafen), BARAKI (0.0025% difethialone), CALCITOX (0.1% ergocalciferol) and QUINTOX (0.0075% cholecalciferol). STORM and LANIRAT had excelent palatability, TALON, BARAKI and QUINTOX had very good and CALCITOX and RODENTIN had low palatability. Most of tested baits had very good mortality, except for RODENTIN, CALCITOX and BARAKI.

Introduction

In our country the prevailing majority of rodent control is carried out with pelleted baits. The main presumtion for succes using them is besides their excellent toxic properties also their good atractivity.The use of material with excellent properties is till now limited in our country owing to the buying possibilities. Therefore, when selecting a limited amount of rodent control materials, there helps the fact, how these materials will prove competent in laboratory rodents.

The excellent properties of effective materials brodifacoum, bromadiolone and flocoumafene were yet many times referred (e.g. Dubock and Kaukeinen, 1978; Marsh, 1977; Buckle, 1985). While the rodenticides are highly selective and less dangerous e.g. against birds (Lund, 1981; Hegdal and Blaskiewicz, 1983), against water animals they are very toxic and with respect to a long half-life-period it is necessary to keep the security precautions (Wohlgemuth, 1988). Chlorphacinone is for rodents more toxic than warfarin (Brooks and Rowe, 1979), but according to Pitchon (1981) it is less toxic against people. Hypercalcemis rodenticides ergocalciferol and cholecalciferol are less toxic against no-target species (Krampitz, 1980) and their

decomposition in the nature is relatively quick, but certain risk these exist (Gunter et al., 1988). Lund (1975) found the ergocalciferol in baits for rodent control more suitable. Lund (1988) also has tested rodenticide difethialone and he obtained 100% mortality of Norwegian rats after five days exposure.

The chosen two-days tests with choice are able to measure the advantage of tested baits for the rodent control. As the comparison of rodenticide baits in groups of comparable in our conditions met with difficulties, we have chosen the way for testing the baits on laboratory rodents.

Materials and methods

Feeding tests were carried out on Rattus norvegicus - Wistar albino rat. The animals were caged singly in the comercial plastic cages and supplied ad libitum with water and standard laboratory diet ST-1 formulated by Velaz, Czechoslovakia.

The rodenticide baits tested were RODENTIN (a.i. 0.0075% chlorphacinone; manufactured by Reanal, Hungry), TALON (0.0025% brodifacoum; Veterinary Pests and Disease Control, Czechoslovakia), LANIRAT (0.005% bromadiolone; Ciba-Geigy Limited, Switzerland), LANIRAT G (0.005% bromadiolone; Uniform Agricultural Cooperative Studenec, Czechoslovakia), STORM (0.005% flocoumafen;UAC Studenec, Czechoslovakia), BARAKI (0.0025% difethialone; Roussel Uclaf, France), CALCITOX (0.1% ergocalciferol;UAC Kosolna, Czechoslovakia) and QUINTOX (0.0075% cholecalciferol; Wellcome Foundation Ltd., England).

The rodenticides were obtained from manufactures as ready-to-use baits in two grain based formulations: TALON, LANIRAT G, STORM, CALCITOX and QUINTOX as pellets, RODENTIN, LANIRAT and BARAKI as impregnated grain - RODENTIN as crushed mize, LANIRAT as skinned oat in 25 g plastic sacks and BARAKI as whole wheat.

Palatability tests ran for 2 days. Rats were given a choice between two foods, each in metal container. The containers were introduced into the cage 3 days before the start of the tests, then after 24 h they were reweighed, replenished with plain and poisoned baits and their positions were interchanged. Final weighings were made 24 h later (EPPO, 1975).

Survivors were kept under observations for at least 3 weeks after exposure to poison.

Results

The results of palatability tests in which Wistar rats were given a choice between plain and poisoned bait are given in Tab.I and on Fig. I.

The results of choice tests show that the palatability of tested rodenticides was as follows: STORM 87.8%, LANIRAT G 71.9%, BARAKI 68% and 19.9%, TALON 62.6%, LANIRAT-s (in PE sacks) 50.3%, QUINTOX 47.2% and 44.7%, CALCITOX 31.8% and RODENTIN 17.8%. The considerable significant diference was found only between intake of wheat and STORM ($t= 4.2$, $p=0.05$, Student's t-test) and between LANIRAT G and wheat ($t= 3.5$, $p=0.05$, Student's t-test). In choice tests between rodenticides BARAKI and QUINTOX against mixtured plain bait palatability of BARAKI was very low. The bait consumption of QUINTOX and plain was very low in day 2 owing to the onset of the toxic effects of cho-

Table I. Poison intake and mortality of Wistar rats given a choice between plain and poisoned baits within 2 days feeding period.

Poisoned bait	Sex	Body wt ($\bar{x}\pm$s.d., g)		Mortality	Intake of a.i.($\bar{x}\pm$s.d., mg/kg)		Palatability (%)	Days to death	
Rodentin	M	454 ±	30.5	2/10	0.7 ±	0.5	13.9	9.5 ±	0.5
	F	308	38.8	2/10	1.6	0.9	21.7	7.0	1.0
Talon	M	384	24.2	5/5	2.0	0.7	67.1	5.6	1.0
	F	324	28.0	5/5	1.3	0.2	58.1	7.0	2.5
Lanirat G	M	419	14.6	5/5	3.0	0.8	58.7	7.2	1.7
	F	241	6.8	5/5	6.2	0.7	85.0	7.2	0.7
Lanirat-s	M	339	32.1	5/5	3.0	0.8	61.2	7.8	1.2
	F	249	7.7	4/5	1.9	1.1	39.4	8.0	1.4
Storm	M	323	12.0	5/5	5.3	0.3	89.8	6.6	0.5
	F	246	9.6	5/5	6.5	0.5	85.7	7.0	0.6
Baraki	M	206	3.4	5/5	3.4	0.5	74.8	7.0	1.1
	F	196	6.0	5/5	2.4	0.8	61.1	8.0	1.5
	M	207	9.0	2/5	0.6	0.5	12.8 +	6.0	1.0
	F	207	7.6	4/5	1.0	0.5	27.0 +	7.5	0.9

Table I. (continued)

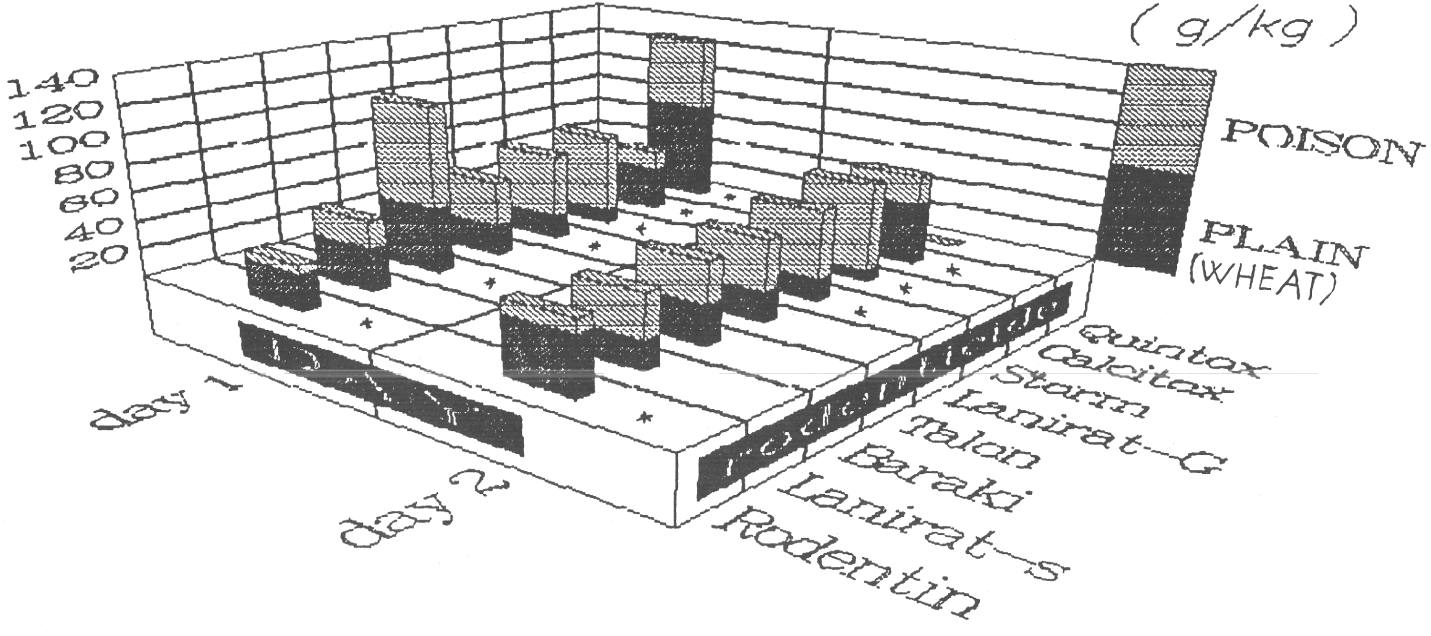
Calcitox	M	338	± 21.0	7/10	32.4	± 22.9	31.8	6.0	± 2.8
	F	312	24.3	9/10	36.1	18.9	31.9	6.2	1.5
Quintox	M	88	5.0	5/5	56.7	44.5	44.8	3.0	0.6
	F	91	5.2	5/5	58.8	6.7	37.7	2.8	0.7
	M	348	21.7	5/5	35.6	2.4	62.0	5.4	0.5
	F	243	13.1	4/5	18.5	6.5	44.4	4.0	0
	M	90	6.7	5/5	30.5	17.9	33.6 +	3.0	0
	F	83	4.5	5/5	64.2	35.4	34.9 +	3.2	0.7
	M	291	14.1	5/5	56.4	24.3	69.0 +	5.2	1.7
	F	245	9.7	5/5	16.3	9.2	41.4 +	4.2	0.4

Palatability = the consumption of poisoned bait from all food ingested

\+ = as plain bait was used the mixture of 90% milked wheat, 5% powdered sugar and 5% corn oil; in others tests was used pure wheat

Figure I.

Mean intake of plain and poisoned baits



* = signifikance of difference ($\bar{p} < 0.05$) uptake of plain and poisoned bait was calculated from the day 1 and from the day 2 using Student´s t-test.

lecalciferol.

In folloving Tab. II the values of active ingredients in survived animals are given.

Table II. Intake of active ingredients in survived animals

Bait and a.i.	No. survived/No. tested	Intake of a.i.($\bar{x}\pm$s.d., mg/kg)	LD_{50} (mg/kg)	Author
RODENTIN (chlorphacinone)	16/20	1.0 ± 0.8	2.1	WHO(1988)
CALCITOX (ergocalciferol)	3/20	10.5 3.4	5.0 (neat)	Krampitz(1980)
BARAKI (difethialone)	4/20	0.2 0.1	no found	
QUINTOX (cholecalciferol)	1/40	8.2	50-500 (neat)	Krampitz (1980)

Discussion and conclusions

A high palatability of STORM and LANIRAT G could be influenced by the fact, that the baits were most fresh of rodenticides tested.

The results of tests show clearly that most of these poisons caused excelent mortality in a resonable time. RODENTIN was the least efective. A longer duration intake of chlorphacinone by animals tested is necessary for reaching better results, than for other baits. The higher palatability of baits with chlorfacinone is needed too. Meehan (1984) stats that where chlorphacinone baits are eaten well, the kill is usually good. High mortality was found in using QUINTOX, when younger animals died earlier than the older animals. Thus, our results did not confirme those by Krampitz (1980) who reported that younger rats were more resistant against hypercalcemia than adults.

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LES ESSAIS DE LABORATOIRE SUR APPATS RODENTICIDES AUX ANTICOAGULANTS ET SUR LES EFFETS DE L'HYPERVITAMINOSE SUR LE RAT BLANC WISTAR

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Résumé

On a offert à des rats isolés, un choix alimentaire de deux mangeoires de nourriture, chacune contenant soit un appât toxique, soit un aliment témoin placebo. Deux formules de base (A et B) ont été préparées pour recevoir les substances actives:

A) 90 % de blé moulu, 5 % de sucre en poudre, 5 % d'huile de maïs

B) blé pur non conditionné.

On a étudié les appâts rodenticides du commerce suivants :" Rodentin" (0,0075 % chlorophacinone); "Klerat" blocs paraffinés (0,005 % brodifacoum); "talon" (0,0025 % brodifacoum); "Calcitox" (0,1 % ergocalciférol); "Quintox" (0,075 % cholécalciférol). Les rats ont été exposés pendant deux jours aux rodenticides puis alimentés ensuite avec l'aliment de laboratoire habituel.

Les valeurs suivantes de la mortalité: [Nbre d'animaux morts / Nbre d'animaux expérimentés]; de l'acceptation des appâts: [proportion de rodenticide / la consommation totale] et de la quantité de matière active ingérées ont été trouvées :

Rodenticide		Mortalité	Acceptation %	Quantité de M.A. ingérée mg/kg
"Rodentin"		4/20	B 19,5	1,6
"Klerat"		10/10	A 31,7	2,5
"Talon"		5/5	B 63,6	1,6
"Calcitox"		16/20	A 31,6	13,6
		15/20	B 56,6	53,7
"Quintox"	jeune	10/10	A 34,4	47,3
	adulte	10/10	A 53,6	29,7
	jeune	10/10	B 39,3	57,7
	adulte	9/10	B 50,7	24,2