

Figure 2. Percent mortality of *Rattus rattus*, *R. exulans*, and *M. musculus* exposed to 9 different rodenticides (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum. After 3 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

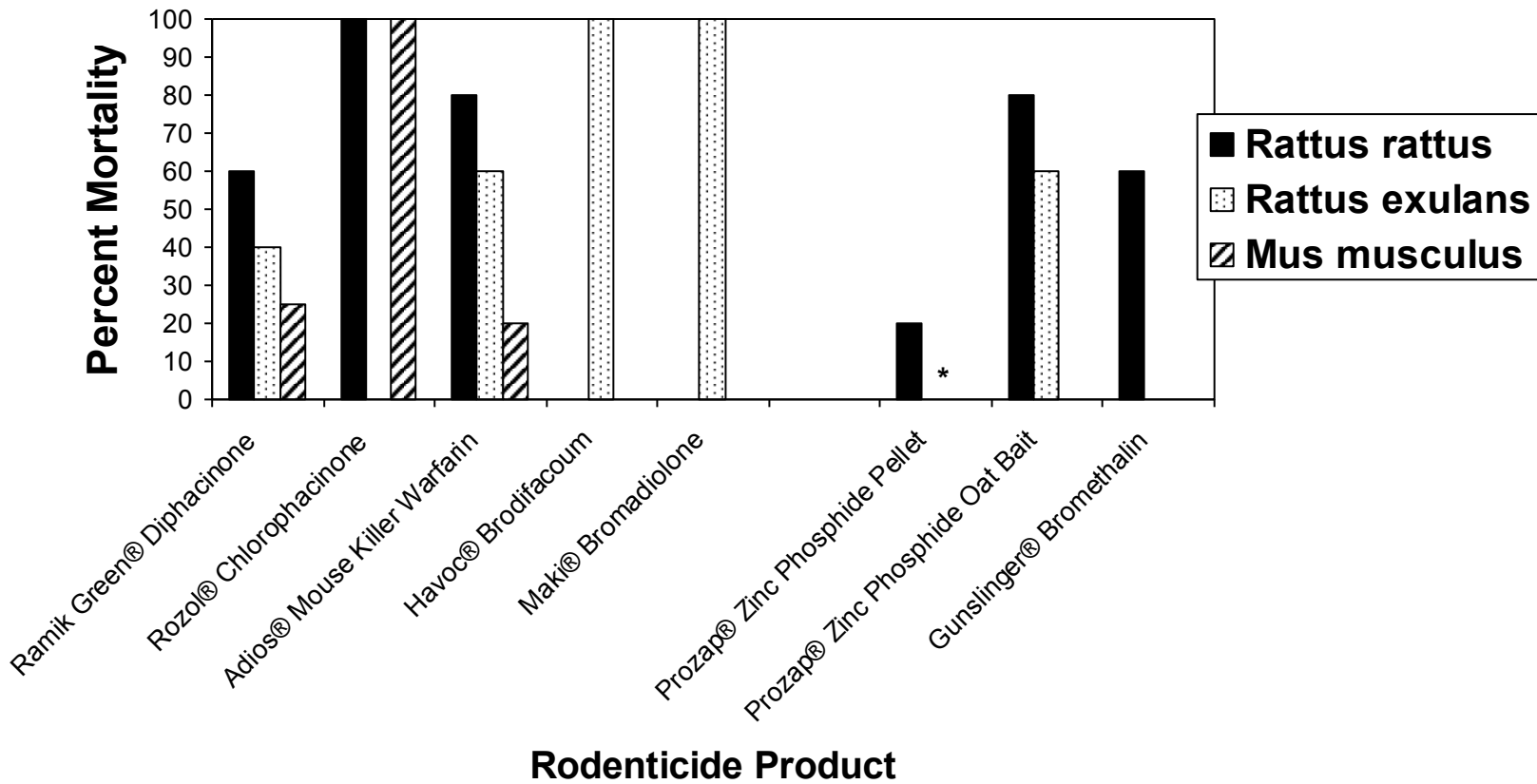


Figure 3. Percent mortality of *Rattus rattus*, *R. exulans*, and *M. musculus* exposed to selected rodenticides (Tier 2). Animals were offered rodenticides for 7 days along with laboratory chow ad libitum. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days. Only rodenticides that failed to achieve 80% mortality in the 3 day trial (Tier 1) were tested in the 7 day trial.

* *R. exulans* had no mortalities for zinc phosphide pellets.

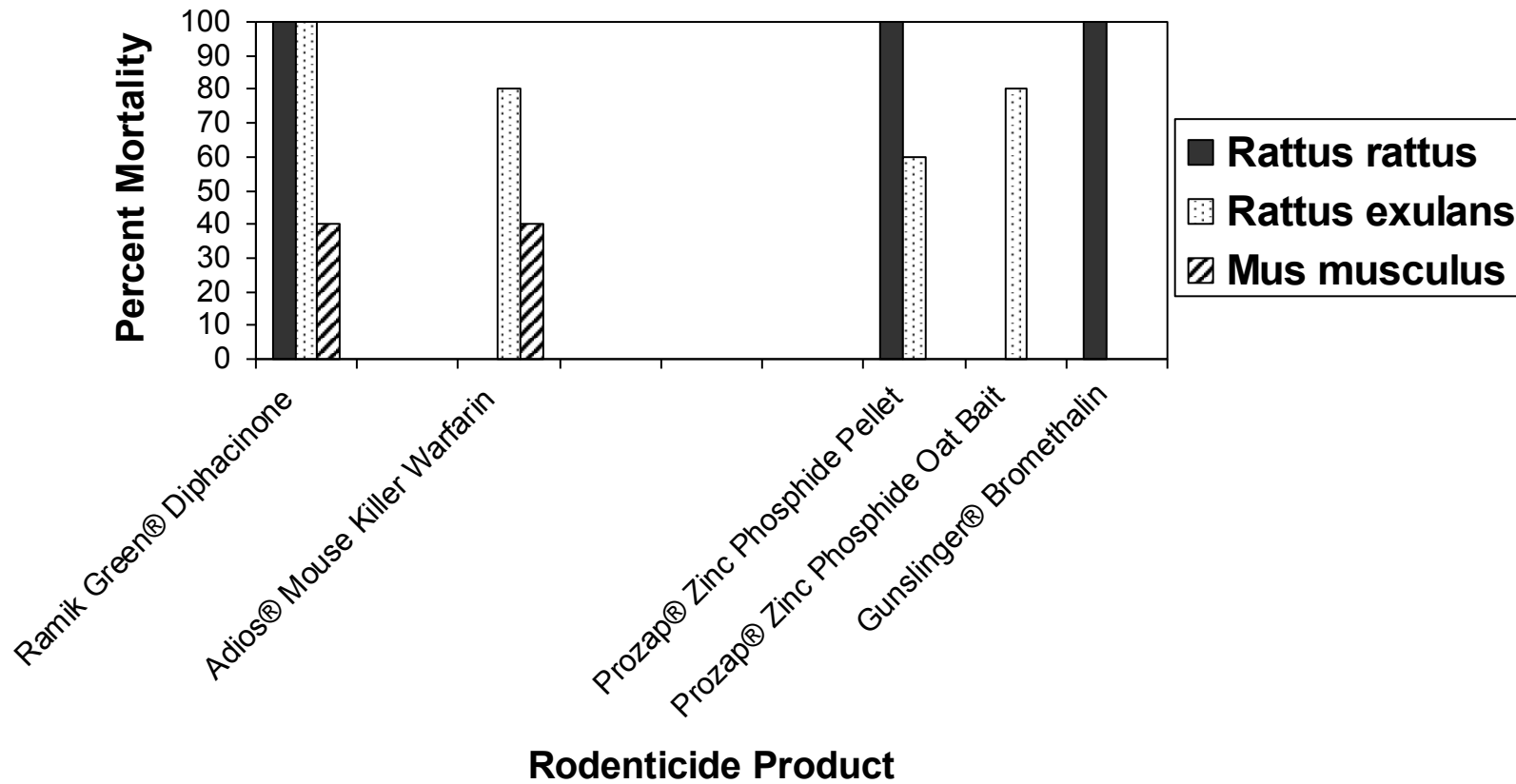


Figure 4. Percent mortality of *Rattus rattus*, *R. exulans*, and *M. musculus* exposed to selected rodenticides (Tier 3). Animals were offered selected rodenticides for 7 days without alternate foods. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days. Only rodenticides that failed to achieve 80% mortality in the two-choice trials (Tier 1 and 2) were tested in the 7 day no-choice trial.

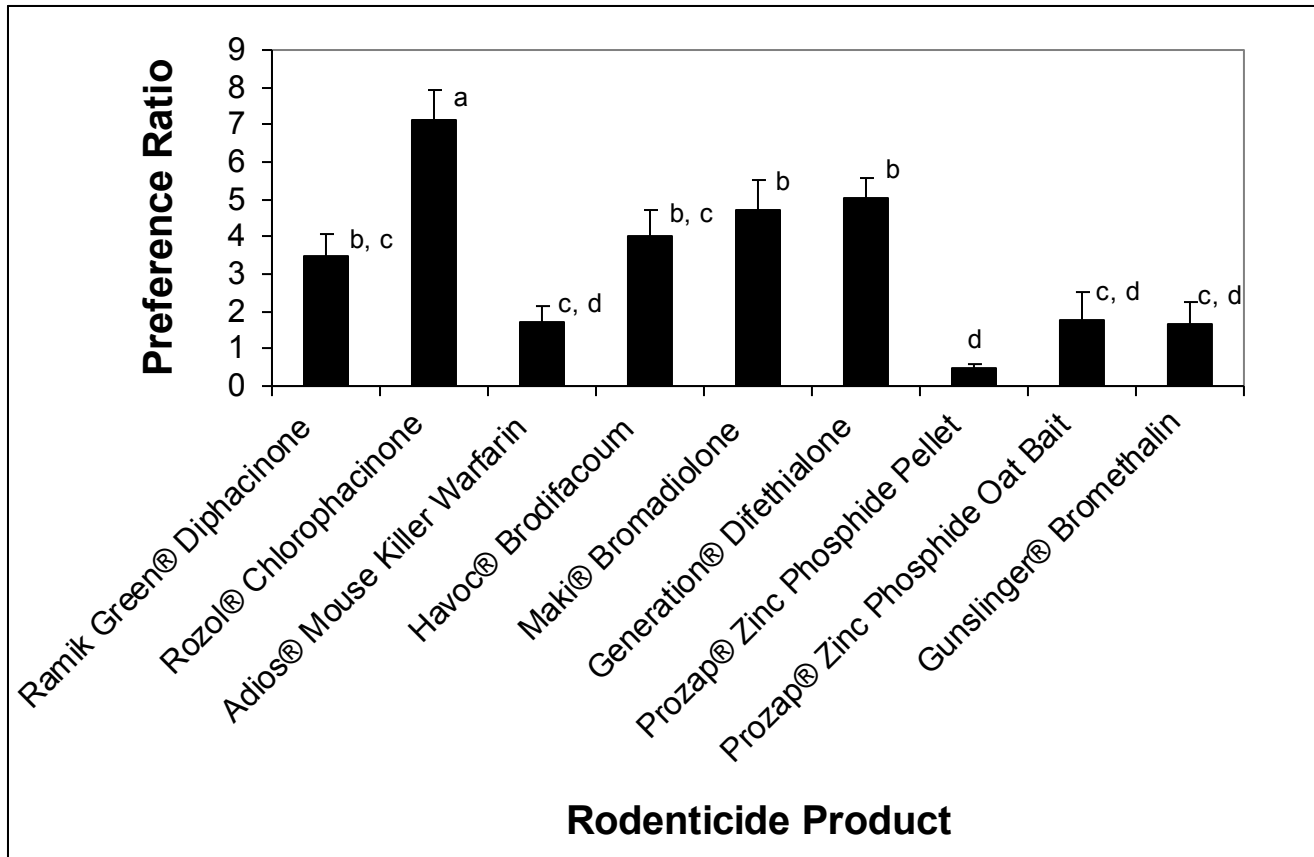


Figure 5. The mean amount (\pm SE) of selected rodenticides consumed divided by the amount of laboratory chow consumed (preference ratio) over 3 days for all rodent species combined (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum. Means that do not share the same letter differ statistically based on Students Newman Keuls multiple range test.

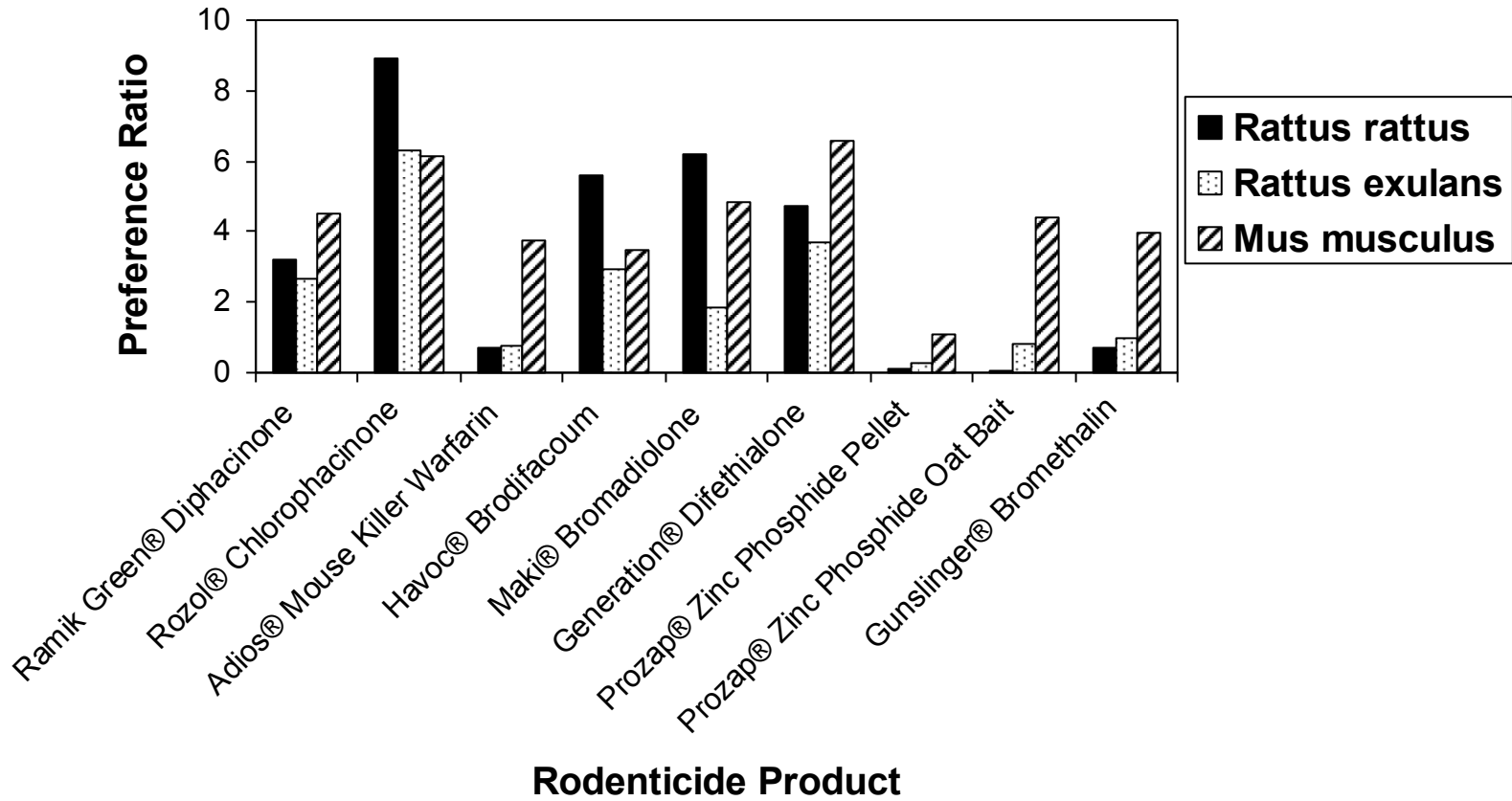


Figure 6. Preference ratio (amount of selected rodenticides consumed divided by the amount of laboratory chow consumed) over 3 days for 3 rodent species, *Rattus rattus*, *R. exulans*, and *M. musculus* (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum.

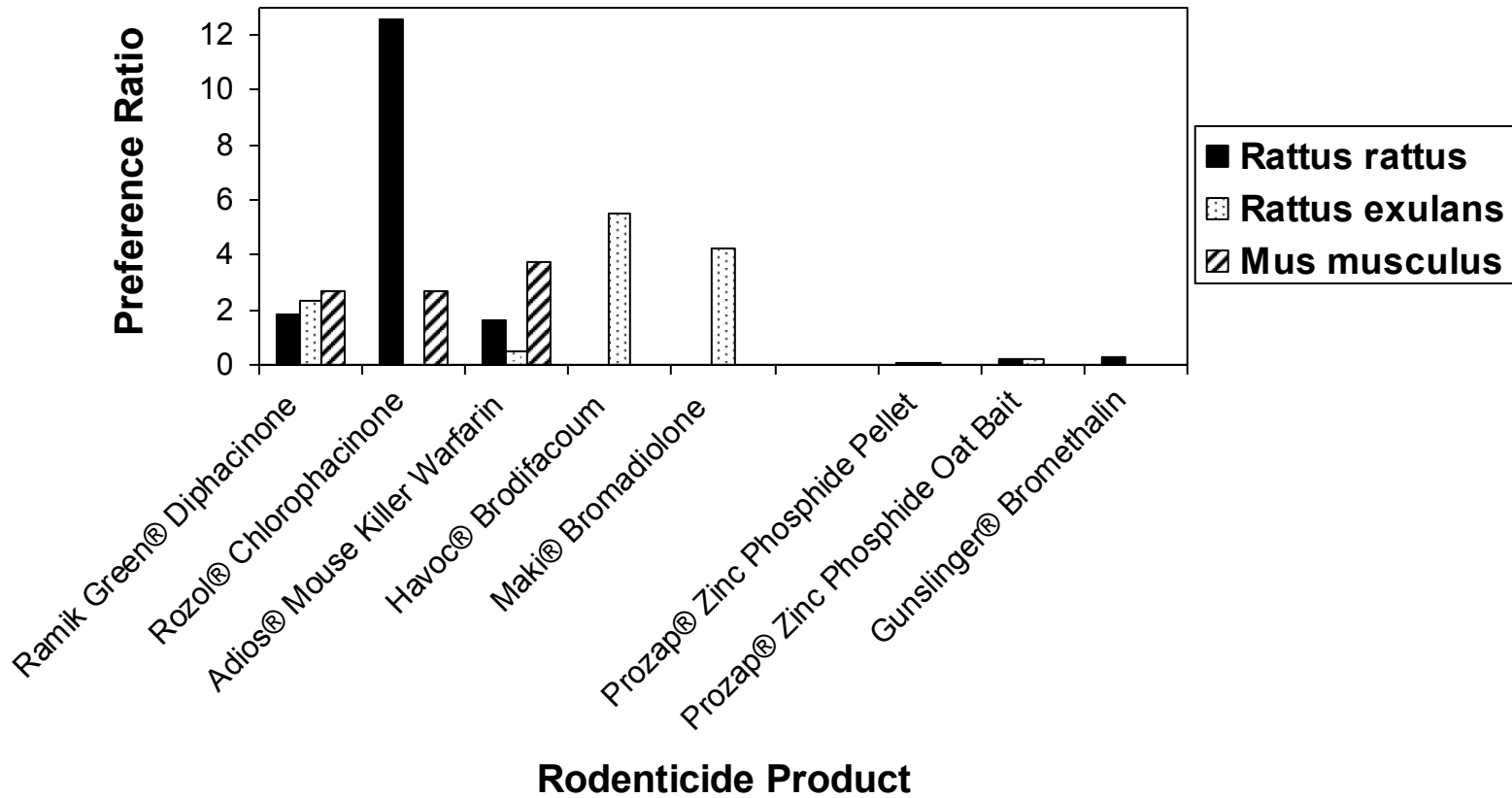


Figure 7. Preference ratio (amount of selected rodenticides consumed divided by the amount of laboratory chow consumed) over 7 days for 3 rodent species, *Rattus rattus*, *R. exulans*, and *M. musculus* (Tier 2). Animals were offered rodenticides for 7 days along with laboratory chow ad libitum. Only rodenticides that failed to achieve 80% mortality in the 3 day trial (Tier 1) were tested in the 7 day trial.

Table 1. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Rattus exulans* exposed to 9 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum. After 3 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Mean preference ratio (g/g)	Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)		
Generation® difethialone	90	9	yes	42	103	5.59	13.30	218.83	4.12	3-9
		1	no	43	43	11.77	1.37	31.93	0.12	0
Gunslinger® bromethalin	80	16	yes	36	70	4.13	3.08	60.64	1.19	1-3
		4	no	46	80	21.30	1.20	19.64	0.08	0
Havoc® brodifacoum	70	7	yes	46	69	9.34	15.72	288.80	4.09	4-8
		3	no	60	73	19.81	1.79	27.03	0.15	0
Control Group	0	15	no	33	70	19.21				0
Maki® bromadiolone	70	7	yes	41	68	9.49	16.38	289.15	3.93	4-8
		3	no	46	81	19.92	8.97	142.69	1.05	0
Adios® Mouse Killer warfarin	30	3	yes	48	62	9.20	14.66	273.53	1.61	4-8
		7	no	44	75	22.25	4.21	58.11	0.43	0
Ramik Green® diphacinone	20	2	yes	37	57	9.21	11.84	238.21	1.50	6
		8	no	46	70	10.98	9.94	179.42	2.94	0
Rozol® chlorophacinone	80	8	yes	48	69	2.89	17.22	297.65	6.26	3-7
		2	no	41	52	4.16	17.05	377.51	6.45	0
Prozap® zinc phosphide oat	70	7	yes	39	58	3.51	1.60	34.48	1.07	1-3
		3	no	55	68	18.51	2.35	39.65	0.13	0
Prozap® zinc phosphide pellet	20	2	yes	40	46	2.97	2.24	51.90	0.75	1
		8	no	43	69	17.19	2.90	55.29	0.17	0

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.)= (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed
Range days to death = Date animals died from first exposure	

Table 2. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Rattus rattus* exposed to 9 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum. After 3 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Bait Consumption			Range days to death	
				Minimum	Maximum	Mean Chow Consumption (g)	Mean (g)	Mean (g/kg body wt.)		Mean preference ratio (g/g)
Generation® difethialone	90	9	yes	90	192	10.69	31.51	225.51	4.43	4-10
		1	no	90	90	4.03	30.33	336.98	7.52	0
Gunslinger® bromethalin	20	2	yes	123	145	9.23	5.79	42.09	0.60	3
		8	no	108	176	11.99	4.62	34.46	0.73	0
Havoc® brodifacoum	90	9	yes	69	198	10.62	35.14	272.23	5.59	4-9
		1	no	148	148	7.35	39.90	269.59	5.43	0
Control Group	0	20	no	67	192	35.39	N/A	NA	NA	0
Maki® bromadiolone	90	9	yes	83	179	7.69	34.69	277.66	6.65	4-13
		1	no	154	154	12.53	26.68	173.22	2.13	0
Adios® Mouse Killer warfarin	20	2	yes	114	156	22.19	31.37	250.36	1.50	4-6
		8	no	107	218	38.34	12.29	90.48	0.44	0
Ramik Green® diphacinone	40	4	yes	113	262	9.89	25.57	170.57	4.68	7-11
		6	no	117	193	13.31	22.45	140.30	2.26	0
Rozol® chlorophacinone	50	5	yes	111	235	6.62	27.54	179.28	8.93	4-7
		5	no	116	210	11.85	26.08	189.30	8.90	0
Prozap® zinc phosphide oat	10	1	yes	251	251	9.68	2.15	8.55	0.22	1
		9	no	93	224	32.79	1.79	11.08	0.06	0
Prozap® zinc phosphide pellet	20	2	yes	102	116	9.45	2.64	24.38	0.31	2
		8	no	116	204	28.18	2.43	16.30	0.09	0

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed
Range days to death = Date animals died from first exposure	

Table 3. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Mus musculus* exposed to 9 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 1). Animals were offered rodenticides for 3 days along with laboratory chow ad libitum. After 3 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Mean preference ratio (g/g)	Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)		
Generation® difethialone	80	8	yes	9.5	16.2	1.64	9.44	728.19	6.55	5-13
		2	no	15.1	17.2	1.66	10.37	641.13	6.73	0
Gunslinger® bromethalin	100	10	yes	13.2	18.4	0.73	1.01	62.82	3.95	1-3
Havoc® brodifacoum	100	10	yes	9.8	17.8	2.82	9.49	715.90	3.49	5-11
Control Group	0	15	no	10.8	19.0	9.97				0
Maki® bromadiolone	90	9	yes	12.6	17.8	4.04	9.76	649.23	5.36	4-12
		1	no	15.8	15.8	11.04	1.33	83.84	0.12	0
Adios® Mouse Killer warfarin	40	4	yes	13.2	17.0	3.50	6.72	448.28	3.59	4-6
		6	no	11.2	15.9	3.32	7.69	546.71	3.84	0
Ramik Green® diphacinone	30	3	yes	12.3	15.0	2.14	11.01	839.65	5.37	3-6
		7	no	12.9	19.1	5.20	9.67	640.79	4.11	0
Rozol® chlorophacinone	50	5	yes	8.1	19.4	1.44	8.56	606.63	6.28	3-5
		5	no	11.7	15.0	1.72	9.56	715.66	6.03	0
Prozap® zinc phosphide oat	100	10	yes	11.1	17.3	0.32	0.36	25.25	4.42	1-2
Prozap® zinc phosphide pellet	90	9	yes	11.6	17.7	2.70	1.61	111.49	1.17	1-10
		1	no	15.9	15.9	5.89	2.01	126.23	0.34	0

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 3 days)/ (Number of animals in the group)	Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed
Range days to death = Date animals died from first exposure	

Table 4. Generalized linear model ANOVA examining the influence of species, treatment, sex on rodent preference ratio (rodenticides consumed divided by the amount of laboratory chow consumed) (Tier 1).

Source	df	F	P
Species	2	8.42	0.0003
Treatment	8	10.97	<0.0001
Sex	1	0.34	0.558
Mortality	1	6.89	0.009
Species X Treatment	16	1.19	0.281
Species X Sex	2	0.56	0.572
Species X Mortality	2	0.22	0.801
Treatment X Sex	8	0.88	0.532
Treatment X Mortality	8	0.45	0.893
Sex X Mortality	1	0.02	0.875

Table 5. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Rattus exulans* exposed to 6 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 2). Animals were offered rodenticides for 7 days along with laboratory chow ad libitum. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Mean preference ratio (g/g)	Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)		
Havoc® brodifacoum	100	5	yes	47	76	6.19	28.08	452.20	5.54	4-9
Control Group	0	5	no	46	81	54.70				0
Maki® bromadiolone	100	5	yes	51	80	6.06	22.88	343.33	4.26	3-10
Adios® Mouse Killer warfarin	60	3	yes	48	82	29.06	14.87	230.20	0.53	6-8
		2	no	49	71	28.50	10.85	178.51	0.41	0
Ramik Green® diphacinone	40	2	yes	70	74	8.46	25.53	352.02	5.34	3-6
		3	no	49	62	41.80	7.48	140.88	0.27	0
Prozap® zinc phosphide oat	60	3	yes	48	64	9.89	1.83	33.93	0.27	2-4
		2	no	59	75	44.34	2.37	35.77	0.05	0
Prozap® zinc phosphide pellet	0	5	no	51	75	59.89	3.45	58.04	0.06	0

KEY:

n = number of animals in treatment group

Mortality = Did any animal in the group die?

Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)

Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)

Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)

Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed

Range days to death = Date animals died from first exposure

Table 6. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Rattus rattus* exposed to 6 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 2). Animals were offered rodenticides for 7 days along with laboratory chow ad libitum. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Mean preference ratio (g/g)	Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)		
Control Group	0	10	no	109	230	101.99				0
Adios® Mouse Killer warfarin	80	4	yes	149	203	28.79	33.88	197.99	1.96	4-8
		1	no	205	205	61.06	34.50	168.28	0.56	0
Gunslinger® bromethalin	60	3	yes	156	204	20.54	8.61	48.70	0.41	2-3
		2	no	116	135	81.60	8.45	69.70	0.16	0
Ramik Green® diphacinone	60	3	yes	137	191	25.84	71.57	468.88	3.05	8-12
		2	no	119	159	113.23	5.46	39.05	0.05	0
Rozol® chlorophacinone	100	5	yes	167	213	10.86	69.10	382.12	10.67	5-9
Prozap® zinc phosphide oat	80	4	yes	121	167	15.00	2.98	20.76	0.23	1-2
		1	no	142	142	102.32	4.79	33.71	0.05	0
Prozap® zinc phosphide pellet	20	1	yes	124	124	47.12	3.61	29.10	0.08	4
		4	no	117	168	98.19	4.02	28.99	0.04	0

KEY:

n = number of animals in treatment group

Mortality = Did any animal in the group die?

Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)

Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)

Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)

Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed

Range days to death = Date animals died from first exposure

Table 7. Mortality, body weight, bait consumption, chow consumption, preference ratio, and fate of *Mus musculus* exposed to 3 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 2). Animals were offered rodenticides for 7 days along with laboratory chow ad libitum. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Mean preference ratio (g/g)	Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)		
Control Group	0	5	no	7.4	16.9	25.36				0
Adios® Mouse Killer warfarin	20	1	yes	10.9	10.9	4.78	12.57	1153.17	2.63	7
		4	no	11.7	15.2	4.73	16.37	1208.77	3.99	0
Ramik Green® diphacinone	25	1	yes	13.2	13.2	2.68	13.00	984.92	4.85	8
		3*	no	10.7	14.8	15.54	7.89	583.31	1.98	0
Rozol® chlorophacinone	100	5	yes	9.9	17.2	6.56	11.59	905.30	2.69	8-9

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)	Mean preference ratio = Average of grams of bait consumed/grams of rodent chow consumed
Range days to death = Date animals died from first exposure	* One mouse was accidentally killed while cleaning the cage and thus excluded from analysis

Table 8. Mortality, body weight, bait consumption, chow consumption, and fate of *Rattus exulans* exposed to 4 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 3). Animals were offered rodenticides for 7 days. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)	
Control Group	0	5	no	57	92	48.79			0
Adios® Mouse Killer warfarin	80	4	yes	50	97		23.58	307.41	4-6
		1	no	67	67		28.64	429.37	0
Ramik Green® diphacinone	100	5	yes	46	85		31.00	458.68	5-8
Prozap® zinc phosphide oat	80	4	yes	45	88		2.11	33.03	1-7
		1	no	82	82		3.29	40.13	0
Prozap® zinc phosphide pellet	60	3	yes	46	75		2.14	36.84	1
		2	no	76	88		3.61	44.28	0

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)	Range days to death = Date animals died from first exposure

Table 9. Mortality, body weight, bait consumption, chow consumption, and fate of *Rattus rattus* exposed to 3 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 3). Animals were offered rodenticides for 7 days. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight (g)		Mean Chow Consumption (g)	Bait Consumption		Range days to death
				Minimum	Maximum		Mean (g)	Mean (g/kg body wt.)	
Control Group	0	5	no	124	186	108.15			0
Gunslinger® bromethalin	100	5	yes	107	183		7.00	50.10	1-2
Ramik Green® diphacinone	100	5	yes	117	196		86.87	599.54	6-10
Prozap® zinc phosphide pellet	100	5	yes	119	189		3.06	21.14	1-5

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)	Range days to death = Date animals died from first exposure

Table 10. Mortality, body weight, bait consumption, chow consumption, and fate of *Mus musculus* exposed to 2 different rodenticides and control groups offered only laboratory chow (maintenance diet) (Tier 3). Animals were offered rodenticides for 7 days. After 7 days, the rodenticides were removed, rodent chow was provided ad libitum, and animals were observed for an additional 10 days.

Treatment	% Mortality	n	Mortality	Body Weight		Mean Chow Consumption (g)	Bait Consumption		Range days to death
				Minimum (g)	Maximum (g)		Mean (g)	Mean (g/kg body wt.)	
Control Group	0	4*	no	10.6	15.3	25.08			0
Adios® Mouse Killer warfarin	40	2	yes	11.4	16.3		16.44	1189.38	5-8
		3	no	12.4	14.7		16.33	1219.89	0
Ramik Green® diphacinone	40	2	yes	13.4	14.6		19.00	1360.67	6
		3	no	12.9	15.2		19.93	1384.51	0

KEY:

n = number of animals in treatment group	Mortality = Did any animal in the group die?
Mean laboratory chow (control) consumption (g)= (Total of lab chow eaten in grams by group during the 7 days)/ (Number of animals in the group)	Mean bait consumption (g/kg body wt.) = (Average grams of rodenticide bait eaten) / (kilogram of body weight)
Mean bait consumption (g)= (Total of rodenticide bait eaten in grams by group during the 7 days)/ (Number of animals in the group)	Range days to death = Date animals died from first exposure
* One mouse was accidentally killed while cleaning the cage and thus excluded from analysis	

Appendix 1: Product details of baits and feeds used.

Product Name	Active Ingredient	Category	Manufacturer	Bait Matrix
Rozol® Pellets	0.005% chlorophacinone	1 st Generation Anticoagulant	Liphatech Milwaukee, WI	Pellet, extruded 0.22 g/pellet
Ramik Green®	0.005% diphacinone	1 st Generation Anticoagulant	HACCO Randolph, WI	Pellet, round 0.13 g/pellet
Adios® Mouse Killer	0.025% Warfarin	1 st Generation Anticoagulant	Adios Products Lafayette, LA	Wax, grain block 23.3 g/block
Havoc® Rodenticide Bait Pack (Pellets)	0.0025% brodifacoum	2 nd Generation Anticoagulant	HACCO Randolph, WI	Pellet, extruded 0.30 g/pellet
Generation® Pellets	0.0025 % difethialone	2 nd Generation Anticoagulant	Liphatech Milwaukee, WI	Pellet, extruded 0.20 g/pellet
Maki® Paraffinized Pellets	0.005% bromadiolone	2 nd Generation Anticoagulant	Liphatech Milwaukee, WI	Pellet, extruded 0.24 g/pellet
Prozap® Zinc Phosphide Pellets	2% zinc phosphide	Acute	HACCO Randolph, WI	Pellet, extruded 0.07 g/pellet
Prozap® Zinc Phosphide Oat Bait	2% zinc phosphide	Acute	HACCO Randolph, WI	Grain Bait 0.03 g/piece
Gunslinger® Placepacks	0.01 % bromethalin	Acute	Liphatech Milwaukee, WI	Pellet, extruded 0.10 g/pellet
Lab Diet® 5001 Rodent Diet	None	Rodent Laboratory Chow	PMI Nutrition International LLC Brentwood, MO	Large pellet, grain 3.7 g/pellet