ACT HEALTH PROTECTION SERVICE

INCIDENCE OF SALMONELLA IN ACT AQUARIUMS

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OBJECTIVE

- To determine the incidence of *Salmonella* species in ACT commercial tropical aquariums.
- Determine semi-quantitatively the level of *Salmonella* in positive tanks.

BACKGROUND

Approximately six million tropical fish a year are imported into Australia, mainly from Asian countries. Tropical fish are popular pets in Canberra with 18 suppliers advertising in the yellow pages. World Wide a number of studies have established the presence of human pathogen stains of *Salmonella* in tropical fish tanks and small outbreaks associated with these strains. *Salmonella* are not known to be pathogenic for tropical fish and the fish can act as reservoirs of *Salmonella* for many weeks. *Salmonella* can survive in tank water and in sediments for considerable periods of time. Purchased fish are transported in their tank water, which is then added to the home tank adding to the chance of contaminating the home tank. Currently there is no requirement for imported fish to be certified as *Salmonella* free.

SURVEY

This survey was conducted between the 8 October and 17 December 2003. During this period a total of 42 samples from 9 different establishments were collected. The samples consisted of 38 tank-waters and 4 gravels. The samples were collected by the Environmental Health Technical Officer and processed by the Microbiology Unit of the ACT Government Analytical Laboratory. Initially 100mL quantities of water or 25 gram samples of gravel were each tested for the presence of *Salmonella.* When positive samples were detected they were re-sampled and 100, 10 and 1mL volumes tested for the presence of *Salmonella*.

STANDARDS

There are no standards for *Salmonella* in aquarium waters or gravel.

RESULTS

Salmonella was isolated from 4 of the 42 aquarium samples. Three water and one gravel samples, see table 1

Table 1

Isolate	Type	*Salmonella* Serotype	Resample	Semi Quantitative	Fish
1	Water	Saintpaul	Positive	1-9 cfu/mL	Coral Courama
2	Water	Paratyphi B bv Java Battersea	Negative	NA	Neon Tetras/bronze cats/ hatchet fish
3	Gravel	Paratyphi B bv Java 3b var	Negative	NA	Vacant, previous tortoises
4	Water	Hull	Positive	1- 9 cfu/mL	Albino cats

NA = not applicable

DISCUSSION

9.5% of the 100mL samples tested were positive for *Salmonella*, which is consistent with a previous study from England. In one of the positive samples (2) the water came from a system of tanks with a common filtration system, thus it is probable that all susceptible fish in that system were colonised with *Salmonella*. Upon retesting, two of four positive tanks (2) and (3) were negative, which tends to indicate that the level of *Salmonella* was either low, the tanks were cleaned or the water diluted in some way. Tank (3) was vacant at the time of sampling but had contained tortoises. None of salmonella isolates were highly resistant to antibiotics. See Table 3. All of the stains have caused human disease in Australia, with some of the cases occurring in the ACT. See Table 2.

Table 2 Incidence of identified serotypes Australia wide and in the ACT

Salmonella serotypes	1999		2000		2001		2002	
	Aust	ACT	Aust	ACT	Aust	ACT	Aust	ACT
S. Saintpaul	300	0	341	6	287	1	383	1
S. Para B bv Java Battersea	15	0	14	0	15	0	6	0
S. Para B bv Java 3b var	13	0	10	1	7	1	5	0
S. Hull	0	0	0	0	1	0	1	0

Table 3 Antibiotic resistance

Salmonella												
	A	S	T	C	Su	Tm	K	Na	Sp	G	Cp	Cf
S. Saintpaul	S	S	R	S	S	S	S	S	S	S	S	S
S. Para B bv Java Battersea	S	S	S	S	S	S	S	S	S	S	S	S
S. Para B bv Java 3b var	S	S	S	S	S	S	S	S	S	S	S	S
S. Hull	S	S	R	S	S	S	S	S	S	S	S	S

S= sensitive R=resistance

Antibiotics (μg/ml)
A = ampicillin (32)
S = streptomycin (5 and 25)
T = tetracycline (20)
C = chloramphenicol (10)
Su = sulphathiazole (550)
Tm = trimethoprim (50)
K = kanamycin (10)
Na = nalidixic acid (50)
Sp = spectinomycin (50)
G = gentamycin (2.5)
Cp = ciprofloxacin (0.06 and 2.0)
Cf = cefotaxime (1)

CONCLUSION

This short survey has highlighted a previously little understood source of *Salmonella* in the ACT. The *Salmonella* serotypes isolated are all recorded human pathogens. With nearly ten percent of tanks in the survey positive and levels of *Salmonella* as high as 1 per ml of tank water, there is a potential risk associated with the keeping of fish.

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