SALMONELLA SPECIES ISOLATED FROM ANIMALS AND BIRDS IN QUEENSLAND DURING THE PERIOD 1951-1960

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SUMMARY

During the period 1951-1960, 654 salmonella strains containing 45 species were isolated from tissues and fluids of animal origin submitted for examination to the Animal Research Institute, Yeerongpilly, Queensland. Salmonellas were isolated from fowls (133 isolations), ducks (16), goose (1), canaries (6), turkeys (4), pigs (239), cattle (206), sheep (29), horses (9), goats (2), dogs (3), cat (1), guinea pigs (2), mouse (1), and kangaroo (1).

***S. typhi murium* was the species most frequently isolated, representing 28·7 per cent. of avian, 52·4 per cent. of bovine, 48·3 per cent. of ovine and 14·2 per cent. of porcine strains.**

No distinct trend in the numbers of salmonellas isolated each year was apparent for the 10-year period.

I. INTRODUCTION

Since 1946 details have been collected of all outbreaks of salmonellosis diagnosed at the Animal Research Institute, Yeerongpilly. Details of the isolations of Salmonella to the end of 1950 have been published (Simmons and Sutherland 1950; Simmons 1951). This paper extends the account of the species of salmonellas isolated since that date to the end of December 1960.

II. METHODS

Specimens were submitted to this Institute by officers of the Queensland Department of Agriculture and Stock, private veterinary surgeons and farmers. These specimens were either organs, Pasteur pipettes of organs, faeces, or live or dead animals which were autopsied at the Institute. Where more than one animal or bird in a single batch of specimens yielded the same Salmonella species it was recorded as a single isolation. The specimens were mainly from birds, cattle, pigs and sheep.

The methods used for the isolation of salmonellas from pathological specimens were essentially the same as those described previously (Simmons and Sutherland 1950). This involved the use of MacConkey agar, and the selective media, Difco SS agar and tetrathionate broth. The tetrathionate broth cultures were plated onto SS agar after 24 and sometimes 48 hours' incubation at 37°C.

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Colonies suspected to be those of Salmonella were identified as such if they were Gram-negative bacilli which did not ferment lactose or sucrose, produce indole, or hydrolyse urea, but produced acid and gas in glucose, maltose and mannitol (*S. pullorum* does not always produce acid in maltose, and produces a

TABLE 1

SALMONELLAS ISOLATED FROM BIRDS

Group	Species	No. of Isolations*				
		Fowl	Duck	Goose	Canary	Turkey
B	*S. bredeney*	2				
	S. derby	11				
	S. saint paul	2				
	S. san diego	2				
	S. typhi murium	29	11	1	4	1
C	*S. bareilly*	4				
	S. bonariensis	1				
	S. bovis morbificans	7			1	
	S. braenderup	1				
	S. cholerae suis var. *kunzendorf*	2				
	S. glostrup	1				
	S. kottbus	1				
	S. muenchen	5				
	S. newport	1				
	S. oranienburg	2				
	S. potsdam	1				
D	*S. pullorum*	16				
E	*S. anatum*	13	3			
	S. give	1				1
	S. lexington	3				
	S. london	1	1			
	S. meleagridis	6				
	S. new brunswick	1				
	S. newington					1
	S. orion	2				1
	S. taksony	1				
	S. zanzibar	1	1			
G	*S. worthington*	4				
I	*S. salford*	1				
Other	*S. adelaide*	2				
	S. waycross	2				
	Untyped	7			1	
	Total	133	16	1	6	4

* A single isolation is recorded when one or more cultures of the same species are isolated from one batch of specimens. When two or more species are isolated from one batch, each is recorded as one isolation.

small amount of gas) and agglutinated with polyvalent or group Salmonella antisera. If any characteristic, either biochemical or serological, was doubtful, tests described by Cowan (1957) were used. *S. pullorum* was identified on colonial morphology, the biochemical characteristics given above, and agglutination with group D antiserum.

After generic identification the cultures, except for those of *S. pullorum,* were forwarded to Dr. N. Atkinson (University of Adelaide) or to Dr. K. Anderson (Institute of Medical and Veterinary Science, Adelaide) for species identification.

III. RESULTS

Tables 1 (birds), 2 (pigs), 3 (cattle) and 4 (other animals) give details of the Salmonella species isolated. From all sources, 654 salmonellas were isolated. Of there 160 were isolated from birds, 239 from pigs, 206 from cattle and 48 from other animals.

TABLE 2

SALMONELLAS ISOLATED FROM PIGS

Group	Species	No. of Isolations*
B	*S. brandenburg*	1
	S. bredeney	1
	S. derby	6
	S. essen	1
	S. saint paul	2
	S. san diego	3
	S. typhi murium	34
C	*S. bareilly*	1
	S. bovis morbificans	7
	S. braenderup	1
	S. cholerae suis	11
	S. cholerae suis var. *kunzendorf*	151
	S. oranienburg	2
	S. potsdam	2
E	*S. anatum*	4
	S. bolton	1
	S. lexington	1
	S. london	1
	S. newington	2
	S. orion	1
G	*S. worthington*	1
	Untyped	5
	Total	239

* A single isolation is recorded when one or more cultures of the same species are isolated from one batch of specimens. When two or more species are isolated from one batch, each is recorded as one isolation

Of the 45 species identified, 31 were isolated from birds, 21 from pigs, 24 from cattle and 20 from other specimens.

During the 1951-1960 period, *S. typhi murium* constituted 208 (31·8 per cent.) of the 654 strains isolated. Of the 160 salmonellas isolated from birds, 46 (28·7 per cent.) were *S. typhi murium*. Isolations from cattle and sheep were also largely *S. typhi murium,* being 108 (52·4 per cent.) of 206 and 14 (48·3 per cent.) of 29 respectively. *S. cholerae suis* var. *kunzendorf,* 151 strains and *S. cholerae suis,* 11 strains, represented 67·8 per cent. of the 239 porcine isolates and *S. typhi murium,* 34 strains, 14·2 per cent.

TABLE 3

SALMONELLAS ISOLATED FROM CATTLE

Group	Species	No. of Isolations*
B	*S. bredeney*	4
	S. chester	3
	S. derby	8
	S. saint paul	1
	S. san diego	1
	S. typhi murium	108
C	*S. bovis morbificans*	13
	S. irumu	1
	S. kottbus	1
	S. muenchen	7
	S. newport	11
	S. oranienburg	3
	S. potsdam	4
	S. thompson	1
E	*S. anatum*	14
	S. london	1
	S. meleagridis	3
	S. new brunswick	1
	S. newington	1
	S. orion	2
	S. zanzibar	1
F	*S. rubislaw*	1
Other	*S. adelaide*	3
	S. waycross	2
	Untyped	11
	Total	206

* A single isolation is recorded when one or more cultures of the same species are isolated from one batch of specimens. When two or more species are isolated from one batch, each is recorded as one isolation

TABLE 4

SALMONELLAS ISOLATED FROM OTHER ANIMALS

Group	Species	Number of Isolations*							
		Ovine	Equine	Caprine	Canine	Feline	Guinea Pig	Mouse	Kangaroo
B	*S. chester*	1			2				
	S. derby						1		
	S. reading		1						
	S. saint paul	1							
	S. san diego	2							
	S. typhi murium	14	2	1	1	1		1	
C	*S. bovis morbificans* ..	1					1		
	S. muenchen	1	1						
	S. newport		1						
	S. potsdam	1							
D	*S. enteritidis*		1						
E	*S. anatum*	1							
	S. london	1							
	S. meleagridis								1
	S. vejle			1					
F	*S. rubislaw*	1							
G	*S. cubana*		1						
I	*S. salford*	1							
Other	*S. adelaide*	2							
	S. brisbane	1							
	Untyped	1	2						
	Total	29	9	2	3	1	2	1	1

* A single isolation is recorded when one or more cultures of the same species are isolated from one batch of specimens. When two or more species are isolated from one batch, each is recorded as one isolation.

TABLE 5

ISOLATIONS OF SALMONELLAS FROM CATTLE, PIGS AND SHEEP FOR THE PERIOD 1951–1960

Year	Cattle		Pigs			Sheep		Total
	S. *typhi murium*	Other Salmonellas	S. *typhi murium*	S. *cholerae suis**	Other Salmonellas	S. *typhi murium*	Other Salmonellas	
1951	7	2	4	12	1	0	1	27
1952	7	1	2	8	1	1	0	20
1953	13	7	2	11	3	2	2	40
1954	18	22	5	8	4	4	2	63
1955	10	10	1	20	5	1	1	48
1956	6	5	9	29	4	2	6	61
1957	21	23	5	15	12	0	1	77
1958	4	12	2	17	5	4	0	44
1959	14	9	4	17	3	0	2	49
1960	8	7	0	25	5	0	0	45
Total ..	108	98	34	162	43	14	15	474

* Includes *S. chlorae suis* var. *kunzendorf*

IV. DISCUSSION

Twenty-two Salmonella species were reported previously for the period 1946-1950 (Simmons and Sutherland 1950; Simmons 1951), whereas over the period 1951-1960, 45 species were isolated. Species previously reported but not isolated during 1951-1960 were *S. oslo, S. orientalis, S. cambridge* and *S. champaign.*

Species not previously recorded at this Institute were *S. brandenburg, S. bredeney, S. essen, S. reading, S. saint paul, S. san diego, S. bonariensis, S. braenderup, S. irumu, S. oranienburg, S. thompson, S. enteritidis, S. bolton, S. new brunswick, S. orion, S. taksony, S. vejle, S. zanzibar, S. rubislaw, S. cubana, S. salford, S. adelaide, S. waycross, S. glostrup* and *S. brisbane* (28:z:enz$_{15}$).

The number of different species recovered from fowls was greater than from any other host. The relatively few *S. pullorum* strains isolated reflected the rarity of pullorum disease in chickens in Queensland, no doubt the result of an effective campaign to detect the carrier birds by using the stained antigen whole blood agglutination test.

Although two strains of *S. cholerae suis* var. *kunzendorf* were isolated from chickens, this species is remarkable for its specificity for pigs. On the other hand, *S. typhi murium* was isolated from most animal species and in fowls, ducks, sheep and cattle represented the major species. From Table 5 it would appear that there is no trend for either an increase or a decrease in the incidence of *S. typhi murium* or other salmonellas during the period.

Noteworthy is the absence of *S. gallinarum, S. dublin* and *S. abortus equi.*

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