Salmonella serovars of public health significance in GB livestock - A ten year review: 1995-2004

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INTRODUCTION

- Non-typhoidal *Salmonella* serovars can cause self-limiting illness characterised by diarrhoea, fever and abdominal pains, sometimes more severe disease.
- *Salmonella* Enteritidis, *S*. Typhimurium, *S*. Virchow, *S*. Hadar and *S*. Infantis, the most common *Salmonella* serovars involved in human salmonellosis in the European Union, have been designated by the European Commission as the '*Salmonella* Serovars of Public Health Significance' for which special monitoring and control programmes will be required [1].
- In Great Britain (GB) there is a statutory requirement to report *Salmonella* isolated from statutory animals, their environment or animal feeding stuffs to an Officer of the Minister under the Zoonoses Order 1989 [2]. Additional legislation supports a compulsory monitoring and control programme in chicken breeding flocks and hatcheries [3].
- This poster presents surveillance trends of *Salmonella* serovars of public health significance reported from livestock and animal feed in GB over a ten-year period (1995-2004). Distributions of serotypes and phage types as well as antimicrobial resistance patterns are summarised.

MATERIALS & METHODS

- Reports of *Salmonella* serovars of public health significance from livestock and animal feeding stuffs in GB (1995 to 2004) were reviewed.
- A total of 10,311 such reports were received at the VLA Regional Laboratories and the Scottish Animal Health Offices.
- *Salmonella* biochemical confirmation and serotyping by micro, tube and slide agglutination tests.
- Serovars were derived by reference to the Kauffmann-White Scheme.
- *Salmonella* Enteritidis, *S*. Hadar, *S*. Typhimurium and *S*. Virchow were phage typed according to the Health Protection Agency phage typing schemes [4], [5], [6], [7], [8].
- In vitro sensitivity testing against a panel of 16 antimicrobials (Table 1), with a disk diffusion technique on Oxoid "Isosensitest" agar using antibiotic disks [9].
- Data analysis using STATA (STATA Statistical Software Release 9.0; StataCorp).

Table 1: Antimicrobial agents tested

	Antimicrobial agent	Concentration (µg/ml)	Code
1.	Nalidixic acid	30	NA
2.	Tetracycline	10	T
3.	Neomycin	10	N
4.	Ampicillin	10	AM
5.	Furazolidone	15	FR
6a.	Cefuroxime (until 31/12/00)	30	CX
6b.	Ceftazidime (from 01/01/01)	30	CAZ
7.	Sulphamethoxazole/trimethoprim	25	TM
8.	Chloramphenicol	10	C
9.	Amikacin	30	AK
10.	Amoxicillin/clavulanic acid	30	AMC
11.	Gentamicin	10	CN
12.	Streptomycin	25	S
13a.	Sulphonamide compounds	500 (until 31.12.97)	SU
13b.	Sulphonamide compounds	300 (from 01.01.98)	SU
14a.	Cefoperazone (until 31.12.03)	30	CF
14b.	Cefotaxime (from 01.01.04)	30	CTX
15.	Apramycin	15	APR
16a.	Colistin (until 31.12.03)	25	CT
16b.	Ciprofloxacin (from 01.01.04)	1	CIP

RESULTS

Serotype & Phage Trends

- *Salmonella* Typhimurium DT104: predominant serovar of public health significance in cattle, sheep, turkeys, animal feed, and in pigs until 2002
- U288: predominant *S*. Typhimurium type in pigs since 2003
- PT4: predominant phage type of *S*. Enteritidis in all species
- PT9b: predominant phage type of *S*. Enteritidis in ducks since 1999
- *Salmonella* Hadar: predominant serovar of public health significance in ducks since 2002 (most common phage types: PT2 & PT22)
- *Salmonella* Infantis: occasional reports from livestock
- *Salmonella* Virchow: predominant serovar of public health significance in chickens since 2002 (most common phage type: PT2)
- *Salmonella* Typhimurium and *S*. Infantis: the most common *Salmonella* serovars of public health significance reported from animal feed, but in low levels, especially in recent years.

Table 2: *Salmonella* serovars of public health significance: reports from GB livestock (1995-2004)

Serotype	Total (n)	Origin
Enteritidis	1 ,251	cattle (118), sheep (11), goats (0), pigs (18), chickens (852), ducks (162), geese (9), turkeys (52), feed (29)
Hadar	344	cattle (13), sheep (0), goats (0), pigs (2), chickens (141), ducks (110), geese (1), turkeys (42), feed (35)
Infantis	233	cattle (32), sheep (2), goats (0), pigs (13), chickens (58), ducks (0), geese (0), turkeys (2), feed (126)
Typhimurium	7,913	cattle (4,382), sheep (401), goats (8), pigs (1,767), chickens (494), ducks (181), geese (13), turkeys (459), feed (208)
Virchow	570	cattle (33), sheep (0), goats (0), pigs (2), chickens (479), ducks (1), geese (0), turkeys (26), feed (29)
Total	10,311	cattle (4,578), sheep (414), goats (8), pigs (1,802), chickens (2,024), ducks (454), geese (23), turkeys (581), feed (427)

Antimicrobial Resistance Trends

- *Salmonella* serovars of public health significance which showed resistance to at least 4 unrelated antimicrobials:
  - *S*. Typhimurium isolates from all sources
  - *S*. Enteritidis isolates from ducks and chickens
  - *S*. Hadar from chickens, ducks, turkeys and animal feed
  - *S*. Infantis from chickens and pigs
  - *S*. Virchow from chickens, turkeys, cattle and pigs.
- The proportion of isolates of *S*. Typhimurium that are fully sensitive has in general increased in recent years
- The other *Salmonella* serovars of public health significance showed in general high levels of full sensitivity

CONCLUSIONS

- Decline of *Salmonella* Typhimurium DT104 epidemic in cattle
- Reports of *S*. Typhimurium have in general decreased from all sources in the study period
- Contrary to other species, U288 is the predominant type of *S*. Typhimurium reported from pigs since 2003
- Decline of *Salmonella* Enteritidis PT4 epidemic in domestic fowl
- Contrary to other species, DT8 is the predominant definitive phage type of *S*. Typhimurium reported from ducks
- Contrary to other species, PT9b is the predominant phage type of *S*. Enteritidis reported from ducks since 1999
- *Salmonella* serovars of public health significance are reported occasionally from animal feed
- Since 1996 the proportion of fully sensitive *S*. Typhimurium isolates has increased. This could be due to the decrease in occurrence of certain definitive types of *S*. Typhimurium in livestock especially DT104 (which generally shows the typical ACSSuT penta-valent resistance pattern
- No serovars were found to be resistant to cefotaxime or ceftazidime. This is an important finding, as 3rd generation cephalosporins are very important antimicrobials used for treatment of invasive salmonellosis in humans.

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