

Chapter 2

REPORTS OF *SALMONELLA* IN LIVESTOCK AND HUMANS

This chapter provides information on *Salmonella* isolated from livestock from samples taken on all premises, including farms, hatcheries, veterinary surgeries, zoos, slaughterhouses and human food premises. An overview of the number of incidents and isolations of *Salmonella* reported in farm animal species is given at Tables 8 & 9 and Figures 1 to 8. Poultry refer to reports from chickens, turkeys, ducks, geese and game birds.

For comparison purposes, data have been reproduced here on the number of laboratory reports of human isolations of *Salmonella* reported in England and Wales to the Health Protection Agency (HPA) Centre for Infections (Cfi) and in Scotland to Health Protection Scotland (HPS) (Tables 5 - 7). Clinical microbiology laboratories voluntarily report data and there are a number of factors that influence these reports. These are discussed in the Zoonoses Report UK 2007 (Defra 2008, in press).

Table 5 ranks the most common *Salmonella* serovars isolated from livestock in Great Britain in 2007 against the most common serovars isolated from human cases of salmonellosis in Great Britain. Tables 6 and 7 provide a similar comparison for phage types of *S. Typhimurium* and *S. Enteritidis* in livestock and humans. Apart from *Salmonella Typhimurium* and *Salmonella Enteritidis* the other serovars associated with human cases are reported relatively rarely from British livestock. The total number of isolation reports to the HPA from human cases of salmonellosis decreased by 2.6% in 2007 compared with 2006.

For several years tables have been produced comparing the relative frequency of *Salmonella* serovars in each animal species over the last five years. These data should be considered alongside absolute numbers of reports, as the relative proportions may remain similar despite a change in number of reports, in which case we conclude that the change in number of reports is likely to be constant across serovars. Similarly, if there is a change in serovar relativity, it is only by examining changes in absolute numbers that we can ascertain the size of any increase or decrease. For example, in 2007 the total number of *Salmonella* incident reports decreased by 24.8% compared with 2006 and decreased by 39.3% compared with 2005. However, this was not consistent across serovars. Compared with 2006, reports of *S. Typhimurium* decreased by 47.2%, reports of *S. Virchow* decreased from 10 to 3 and reports of *S. Kedougou*, *S. Livingstone* and *S. Dublin* decreased by 14.3%, 49.2% and 21.5% respectively. The number of incidents of *S. Agona*, *S. Ohio*, *S. Saint Paul* and *S.*

Thompson also decreased compared with 2006 (23 to seven, 45 to 14, 12 to one and 16 to one, respectively). There were increases in the number of reports of *S. Anatum* (18.9%) and *S. Enteritidis* (57.1%) and reports of *S. Mbandaka* more than doubled, from 35 to 79; there was therefore a change in the distribution of reports between these serovars. *S. Dublin* was in 2007, for the ninth successive year, the serovar most commonly isolated from livestock and was responsible for 24.3% of reports, a similar level to 2006 (23.3%). *S. Typhimurium* was again the second most common serovar (14.6%), *S. Indiana* the third (9.0%), *S. enterica diarizonae* subspecies the fourth (7.5%) and *S. Mbandaka* the fifth (4.5%). The increase in the number of incidents of *S. Mbandaka* in 2007 was due to increases in reports from cattle (29 reports in 2007, compared with six in 2006) and ducks (36 reports in 2007 compared with 18 in 2006).

Some serovars of *Salmonella* can infect a wide variety of host groups, for example, *S. Typhimurium*. Others tend to be associated with a particular animal group, for example, *S. Enteritidis* and poultry, *S. Dublin* and cattle and *S. enterica diarizonae* subspecies and sheep. Thus the serovar distribution reflects the group distribution of reports. In 2007, 35.9% of reports were from poultry, 35.3% from cattle, 10.0% from sheep and 8.5% from pigs (see Table 1). There were 62 reports of *Salmonella* from horses in 2007 (compared with 51 in 2006), one report from goats, two reports from deer, and no reports from rabbits.

Changes in the number of incidents have to be treated with caution in view of the inherent biases associated with the data collection.

Tables 8 & 9 and Figure 1 show that in 2007 the total number of incidents of *Salmonella* reported fell by 573 (24.8%) compared with 2006 and by 1126 (39.3%) compared with 2005.

The relative frequency of reports of *S. Enteritidis* in 2007 was 3.2%, compared with 1.6% in 2006. There were 36 reports of *S. Enteritidis* in chickens, 10 in ducks, two in pheasants, five in cattle, two in sheep, five in horses and seven in non-statutory species (two in dogs, two from environmental samples, and single reports from cats, guinea pigs and hedgehogs).

The frequency of reports of *S. Typhimurium* (STM) fell to 14.6% of all reports in 2007. The relative frequency of *S. Typhimurium* in chickens was similar in 2007 (3.1%) to that in 2006 (3.3%), was increased in pigs and reduced in cattle, sheep, turkeys, ducks and game birds. The frequency of *S. Typhimurium* DT104 reports in cattle fell to 43.9% of all STM reports in 2007 compared with 68.5% in 2006.

The number of incidents of *S. Dublin* reported in cattle decreased by 22.6% in 2007 due to falls in reports from both adult cattle (22.5%) and calves (31.5%). However, the proportion of incidents of *S. Dublin* in cattle increased slightly (to 59.0% of total reports in cattle) in 2007 compared with 2006 (57.5% of total reports in cattle) and this serovar was again the most common reported in cattle.

Reports of *S. enterica* subspecies *diarizonae* (almost entirely from sheep) decreased by 16.6% compared with 2006 (Table 8) and for the eighth year running *S. enterica* subspecies *diarizonae* 61:k:1,5,(7) and variants were most common serovars isolated from sheep (66.0%).

The three most common serovars reported from humans in 2007 were *S. Enteritidis* (52.8% of all reports), *S. Typhimurium* (13.4% of all reports) and *S. Virchow* (3.3% of all reports). By contrast the most common serovars reported from livestock during this period were *S. Dublin* (24.3% of all reports), *S. Typhimurium* (14.6% of reports) and *S. Indiana* (9.0% of reports). There were very few reports of *S. Virchow* from livestock, which accounted for 0.2% of all reports in 2007.

The most frequently reported definitive types of *S. Typhimurium* in humans during 2007 were DT104, RDNC and DT193 (11.7%, 9.9% and 8.8% of all *S. Typhimurium* reports respectively) and the most common phage types of *S. Enteritidis* reported from humans were PT4 and PT8 (26.0% and 19.8% of all *S. Enteritidis* reports respectively).

S. Typhimurium DT193 is a relatively common group of strains associated mainly with pigs and to a lesser extent cattle and other livestock. There were 39 isolations of *S. Typhimurium* U288 in humans (2.2% of total STM isolations) in 2007. In livestock, DT104 was the most common phage type of *S. Typhimurium* in both cattle (43.9%), sheep (76.9%) and poultry (46.4%), and U288 was the most common in pigs (53.0%). *S. Enteritidis* PT4 and PT8 are the most common *S. Enteritidis* phage types in poultry; in 2007 PT4 comprised 30.6% of total *S. Enteritidis* incidents in chickens and PT8 comprised 27.8% and 30.0% of total *S. Enteritidis* incidents in chickens and ducks respectively.

These trends and others are highlighted further in the relevant species sections.

Serotypes that have been reported in livestock for the first time in 2007 are *Salmonella* Adelaide and *S. Sinstorff* (both from cattle) and *S. Mons* from turkeys. Of these three serotypes, *S. Adelaide* has previously been reported from compound poultry feed in 2004 and soya in 2006. Other unusual serotypes reported in livestock during 2007 were *Salmonella* Newington which was reported (from adult cattle) for the first

time since 2001 and *S. Thomasville* was reported (from chickens) for the first time since 2001.

Perhaps the most important factor which may bias the number of *Salmonella* reports is the submission rate. This report presents numerator data but the denominator, in most cases, is unknown and may change over time. Most *Salmonella* incident reports from cattle, sheep and pigs result from the investigation of clinically diseased animals. Economic factors may exert a strong influence on diagnostic practices, such as whether a veterinary surgeon is consulted and whether samples are submitted for laboratory examination, and 2007 yet again saw a depressed livestock industry.

Diagnostic submissions to the Veterinary Laboratories Agency (VLA) and the Scottish Agricultural College (SAC) have declined in recent years. The total number of diagnostic submissions received in 2007 decreased by 18.6% compared with 2006. Additionally as most of the data from species other than poultry relate to clinical investigations, the prevalence of subclinical infection in these species of livestock is not usually known.

Changes in the denominator population for *Salmonella* reports from poultry, particularly chickens, turkeys and ducks, are difficult to assess and most sample submissions are associated with statutory or voluntary surveillance activities. Statutory monitoring of chicken breeding flocks for *Salmonella* detailed in the PBFHO 2007 has been supplemented by additional voluntary testing of many flocks in recent years. Turkey and duck breeding flocks undertake voluntary monitoring for *Salmonella* following protocols based on those defined in the PBFHO 2007 and there is also a substantial amount of voluntary monitoring in production flocks. Therefore, it is likely that there has been an increase in surveillance of poultry flocks for *Salmonella* over the five-year period. The assessment of submission rates in poultry is further complicated by the large proportion of *Salmonella* testing undertaken by private laboratories. More details on the changes in the intensity and the methods for *Salmonella* monitoring in the poultry sector are included in the Poultry Chapter of this publication.

Although trends in *Salmonella* reports can be compared with diagnostic submission rates to VLA/SAC it should be remembered that not all submissions will have been examined for *Salmonella*. Private laboratories also report the isolation of *Salmonella* and the total number of submissions to these laboratories is unknown.

Fig 1: Number of incident reports of *Salmonella* in livestock (2003 - 2007)

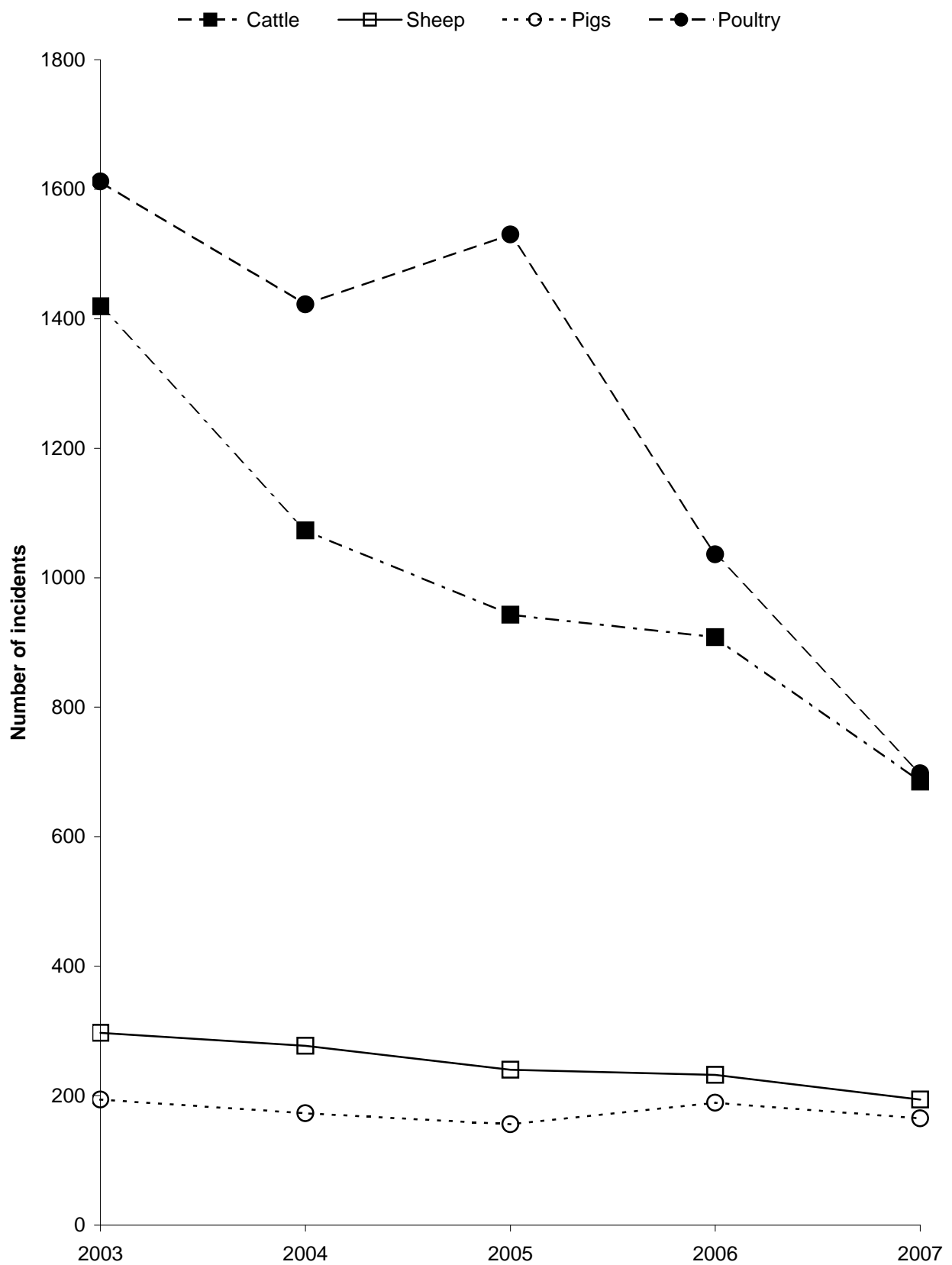


Table 5: Reports of the most common *Salmonella* serotypes in 2007 in livestock and humans in Great Britain

| Human cases | | | Cattle | | | Sheep | | | Pigs | | | Poultry | | |
|-----------------|----------------|------|-----------------|---------------|------|-----------------------------------|---------------|------|------------------|---------------|------|-----------------|---------------|------|
| Serotype | No. isolations | % | Serotype | No. incidents | % | Serotype | No. incidents | % | Serotype | No. incidents | % | Serotype | No. incidents | % |
| Enteritidis | 6893 | 52.8 | Dublin | 404 | 59.0 | <i>Enterica diarizonae</i> subssp | 128 | 66.0 | Typhimurium | 115 | 69.7 | Binza | 56 | 8.0 |
| Typhimurium | 1756 | 13.4 | Typhimurium | 98 | 14.3 | Dublin | 17 | 8.8 | Derby | 13 | 7.9 | Enteritidis | 48 | 6.9 |
| Virchow | 433 | 3.3 | Anatum | 38 | 5.5 | Montevideo | 16 | 8.2 | London | 6 | 3.6 | Mbandaka | 50 | 7.2 |
| Newport | 224 | 1.7 | Mbandaka | 29 | 4.2 | Typhimurium | 13 | 6.7 | Anatum | 4 | 2.4 | Kedougou | 42 | 6.0 |
| Schwarzengrund | 196 | 1.5 | Montevideo | 19 | 2.8 | Agama | 7 | 3.6 | Bovismorbificans | 4 | 2.4 | Derby | 40 | 5.7 |
| Java | 163 | 1.2 | Newport | 13 | 1.9 | Newport | 3 | 1.5 | Kedougou | 4 | 2.4 | Senftenberg | 36 | 5.2 |
| Braenderup | 156 | 1.2 | Agama | 10 | 1.5 | Durham | 2 | 1.0 | Reading | 3 | 1.8 | Livingstone | 32 | 4.6 |
| Infantis | 141 | 1.1 | Ohio | 7 | 1.0 | Enteritidis | 2 | 1.0 | | | | Kottbus | 31 | 4.4 |
| Stanley | 127 | 1.0 | Butantan | 5 | 0.7 | Stourbridge | 2 | 1.0 | | | | Hadar | 29 | 4.2 |
| Kentucky | 107 | 0.8 | Enteritidis | 5 | 0.7 | | | | | | | Typhimurium | 28 | 4.0 |
| | | | | | | | | | | | | | | |
| Other serotypes | 2861 | 21.9 | Other serotypes | 57 | 8.3 | Other serotypes | 4 | 2.1 | Other serotypes | 16 | 9.7 | Other serotypes | 306 | 43.8 |
| | | | | | | | | | | | | | | |
| Total | 13057 | | Total | 685 | | Total | 194 | | Total | 165 | | Total | 698 | |

* Reports to the Health Protection Agency and Health Protection Scotland, provisional data

Table 6: Reports of the most common *Salmonella* Typhimurium definitive types in 2007 in livestock and humans in Great Britain

| Human cases | | | Cattle | | | Sheep | | | Pigs | | | Poultry | | |
|-------------|----------------|------|-----------|---------------|------|-----------|---------------|------|-----------|---------------|------|-----------|---------------|------|
| DT | No. isolations | % | DT | No. incidents | % | DT | No. incidents | % | DT | No. incidents | % | DT | No. incidents | % |
| DT 104 | 206 | 11.7 | DT 104 | 43 | 43.9 | DT 104 | 10 | 76.9 | U288 | 62 | 53.9 | DT 104 | 13 | 46.4 |
| RDNC | 173 | 9.9 | DT 193 | 14 | 14.3 | DT 104b | 1 | 7.7 | DT 193 | 30 | 26.1 | DT 8 | 4 | 14.3 |
| DT 193 | 154 | 8.8 | U302 | 9 | 9.2 | DT 56 | 1 | 7.7 | U302 | 7 | 6.1 | UNTY | 3 | 10.7 |
| DT 120 | 145 | 8.3 | DT 104b | 6 | 6.1 | DT 193 | 1 | 7.7 | DT 104 | 6 | 5.2 | DT 99 | 2 | 7.1 |
| DT 8 | 64 | 3.6 | DT 135 | 5 | 5.1 | | | | | | | DT 193 | 2 | 7.4 |
| U313 | 64 | 3.6 | DT 2 | 3 | 3.1 | | | | | | | DT 195 | 2 | 7.1 |
| DT 2 | 53 | 3.0 | DT 12 | 3 | 3.1 | | | | | | | | | |
| DT 104b | 43 | 2.4 | DT 7 | 2 | 2.0 | | | | | | | | | |
| U288 | 39 | 2.2 | | | | | | | | | | | | |
| U311 | 37 | 2.1 | | | | | | | | | | | | |
| Other DTs | 778 | 44.3 | Other DTs | 13 | 13.3 | Other DTs | 0 | 0.0 | Other DTs | 10 | 8.7 | Other DTs | 2 | 7.1 |
| Total | 1756 | | Total | 98 | | Total | 13 | | Total | 115 | | Total | 28 | |

* Reports to Health Protection Agency and Health Protection Scotland, provisional data

Table 7: Reports of the most common *Salmonella* Enteritidis phage types in 2007 in livestock and humans in Great Britain

| Human cases* | | | Cattle | | | Sheep | | | Pigs | | | Poultry | | |
|--------------|----------------|------|-----------|---------------|------|-----------|---------------|------|-----------|---------------|-----|-----------|---------------|------|
| PT | No. isolations | % | PT | No. incidents | % | PT | No. incidents | % | PT | No. incidents | % | PT | No. incidents | % |
| PT 4 | 1794 | 26.0 | PT 13 | 2 | 40.0 | PT 13a | 1 | 50.0 | | | | PT 8 | 13 | 27.1 |
| PT 8 | 1365 | 19.8 | PT 8 | 1 | 20.0 | | | | | | | PT 4 | 11 | 22.9 |
| PT 1 | 854 | 12.4 | PT 11 | 1 | 20.0 | | | | | | | PT 1 | 5 | 10.4 |
| PT 14b | 516 | 7.5 | PT 14b | 1 | 20.0 | | | | | | | PT 35 | 4 | 8.3 |
| PT 21 | 422 | 6.1 | | | | | | | | | | PT 6 | 3 | 6.3 |
| PT 6 | 313 | 4.5 | | | | | | | | | | PT 9b | 3 | 6.3 |
| PT 12 | 311 | 4.5 | | | | | | | | | | PT 13a | 2 | 4.2 |
| PT 6a | 138 | 2.0 | | | | | | | | | | PT 23 | 2 | 4.2 |
| PT 1e | 71 | 1.0 | | | | | | | | | | PT 7 | 1 | 2.1 |
| PT 56 | 54 | 0.8 | | | | | | | | | | | | |
| Other PTs | 1055 | 15.3 | Other PTs | 0 | 0.0 | Other PTs | 1 | 50 | Other PTs | 0 | 0.0 | Other PTs | 4 | 8.3 |
| Total | 6893 | | Total | 5 | | Total | 2 | | Total | 0 | | Total | 48 | |

* Reports to Health Protection Agency and Health Protection Scotland, provisional data

Table 8: *Salmonella* in cattle, sheep, pigs and poultry on all premises

| <i>Salmonella</i> Incidents (Isolations) | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | |
|---|------|---------|------|---------|------|---------|------|---------|------|---------|
| ENTERICA ENTERICA | | | | | | | | | | |
| Adelaide | - | (-) | - | (-) | - | (-) | - | (-) | 1 | (2) |
| Agama | 37 | (37) | 25 | (25) | 25 | (27) | 33 | (36) | 34 | (36) |
| Agona | 39 | (39) | 27 | (28) | 25 | (25) | 23 | (25) | 7 | (10) |
| Ajiobo | 2 | (2) | 6 | (6) | 1 | (1) | 1 | (1) | 3 | (3) |
| Anatum | 46 | (46) | 35 | (38) | 42 | (43) | 37 | (40) | 44 | (46) |
| Berta | - | (-) | - | (1) | - | (-) | 2 | (2) | 1 | (1) |
| Binza | 87 | (89) | 93 | (96) | 56 | (60) | 65 | (82) | 56 | (68) |
| Bovismorbificans | - | (-) | 1 | (1) | 3 | (4) | 5 | (8) | 5 | (5) |
| Bradford | - | (-) | 1 | (1) | - | (-) | - | (-) | - | (-) |
| Braenderup | 2 | (2) | 1 | (1) | - | (-) | 1 | (1) | - | (-) |
| Brandenburg | 15 | (18) | 20 | (23) | - | (-) | - | (-) | - | (-) |
| Bredeney | 18 | (18) | 3 | (3) | 1 | (1) | 5 | (5) | - | (-) |
| Butantan | - | (-) | - | (-) | - | (-) | 5 | (7) | 5 | (7) |
| Carno | 1 | (1) | - | (-) | 1 | (1) | - | (-) | 1 | (1) |
| Cerro | - | (-) | - | (-) | - | (-) | 3 | (6) | - | (-) |
| Choleraesuis | - | (-) | 1 | (1) | 1 | (1) | - | (-) | - | (-) |
| Coeln | - | (-) | - | (-) | 1 | (1) | 2 | (3) | - | (-) |
| Concord | - | (-) | - | (-) | - | (-) | 1 | (1) | - | (-) |
| Corvallis | 3 | (3) | 6 | (6) | 1 | (1) | - | (-) | - | (-) |
| Cubana | 1 | (1) | - | (-) | 1 | (1) | - | (-) | - | (-) |
| Derby | 88 | (95) | 61 | (64) | 88 | (93) | 68 | (93) | 55 | (69) |
| Dublin | 1145 | (1213) | 801 | (822) | 665 | (693) | 539 | (563) | 423 | (447) |
| Duesseldorf | - | (-) | - | (-) | 1 | (1) | - | (-) | 1 | (1) |
| Durham | 2 | (2) | 1 | (1) | 1 | (1) | 2 | (2) | 7 | (8) |
| Eboko | - | (-) | - | (-) | - | (-) | 1 | (1) | 1 | (1) |
| Enteritidis | 68 | (75) | 24 | (29) | 93 | (106) | 35 | (62) | 55 | (112) |
| Fischerkietz | - | (-) | 2 | (2) | - | (-) | - | (-) | - | (-) |
| Gallinarum | - | (-) | - | (-) | 5 | (9) | 5 | (14) | 6 | (18) |
| Give | 31 | (31) | 47 | (47) | 25 | (26) | 16 | (17) | 19 | (21) |
| Gloucester | - | (-) | - | (-) | 1 | (1) | - | (-) | - | (-) |
| Goldcoast | 22 | (22) | 9 | (11) | 11 | (11) | 9 | (9) | 3 | (4) |
| Hadar | 53 | (56) | 60 | (66) | 26 | (27) | 29 | (31) | 29 | (29) |
| Havana | 18 | (18) | 10 | (10) | 10 | (10) | 16 | (17) | 8 | (9) |
| Heidelberg | 3 | (3) | - | (-) | - | (-) | - | (-) | 1 | (1) |
| Idikan | 1 | (1) | 3 | (3) | 11 | (11) | 2 | (2) | - | (-) |
| Indiana | 170 | (176) | 137 | (170) | 213 | (224) | 160 | (226) | 156 | (197) |
| Infantis | 11 | (11) | 21 | (21) | 8 | (8) | 8 | (8) | - | (-) |
| Jangwani | - | (-) | - | (-) | 3 | (4) | - | (-) | - | (-) |

Table 8: *Salmonella* in cattle, sheep, pigs and poultry on all premises

| <i>Salmonella</i> Incidents (Isolations) | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|------------|------------|------------|-----------|----------|
| ENTERICA ENTERICA | | | | | |
| Kedougou | 94 (96) | 94 (95) | 87 (89) | 56 (148) | 48 (74) |
| Kentucky | - (-) | 6 (6) | 2 (2) | 4 (4) | 6 (10) |
| Kiambu | - (-) | 1 (1) | - (-) | - (-) | - (-) |
| Kimuenza | 4 (4) | 1 (1) | - (-) | 2 (2) | 3 (4) |
| Kokomlemle | - (-) | - (-) | 1 (1) | - (-) | - (-) |
| Kottbus | 41 (42) | 38 (39) | 93 (96) | 52 (74) | 32 (46) |
| Larochelle | 1 (1) | 1 (1) | 1 (1) | - (-) | - (-) |
| Lexington | - (-) | 10 (10) | 3 (3) | - (-) | - (-) |
| Liverpool | 16 (27) | 39 (48) | 16 (17) | 2 (3) | - (-) |
| Livingstone | 192 (199) | 238 (248) | 175 (183) | 63 (79) | 32 (44) |
| London | 3 (3) | 8 (10) | 5 (5) | 7 (7) | 9 (10) |
| Manhattan | 1 (2) | - (-) | - (-) | - (-) | - (-) |
| Mbandaka | 43 (54) | 23 (26) | 24 (28) | 35 (45) | 79 (88) |
| Meleagridis | 2 (2) | 1 (1) | 3 (3) | - (-) | - (-) |
| Menston | 1 (1) | - (-) | 2 (2) | - (-) | - (-) |
| Mons | - (-) | - (-) | - (-) | - (-) | 1 (1) |
| Montevideo | 152 (156) | 65 (74) | 61 (66) | 55 (62) | 38 (41) |
| Nagoya | 2 (2) | - (-) | - (-) | 1 (1) | - (-) |
| Newington | - (-) | - (-) | - (-) | - (-) | 1 (1) |
| Newport | 48 (48) | 56 (59) | 52 (52) | 33 (38) | 25 (26) |
| Ohio | 32 (32) | 31 (31) | 27 (27) | 45 (45) | 14 (14) |
| Orion | 51 (51) | 42 (43) | 47 (48) | 40 (54) | 35 (42) |
| Oskarshamn | - (-) | - (-) | - (-) | 1 (1) | - (-) |
| Oslo | 6 (6) | 1 (1) | 1 (1) | - (-) | - (-) |
| Panama | - (-) | - (-) | - (-) | - (1) | - (-) |
| Paratyphi B | - (-) | - (-) | 1 (1) | - (-) | - (-) |
| Paratyphi B var java | 3 (3) | - (-) | - (-) | - (-) | - (-) |
| Poona | 1 (1) | 2 (2) | 1 (1) | - (-) | 4 (4) |
| Pullorum | 5 (5) | 3 (4) | - (1) | 1 (1) | - (1) |
| Reading | 7 (7) | 8 (8) | 12 (13) | 10 (10) | 3 (4) |
| Riggil | - (-) | - (-) | - (-) | 1 (1) | - (-) |
| Rissen | - (-) | 2 (2) | 5 (5) | 1 (1) | 1 (1) |
| Saint Paul | 3 (3) | 5 (5) | 28 (28) | 12 (14) | 1 (2) |
| Schwarzengrund | 2 (2) | 6 (6) | 1 (1) | 1 (1) | 2 (2) |
| Senftenberg | 70 (74) | 75 (80) | 139 (144) | 51 (87) | 37 (72) |
| Sinstorf | - (-) | - (-) | - (-) | - (-) | 1 (1) |
| Stanley | 1 (1) | 2 (2) | - (-) | 1 (1) | - (-) |
| Stourbridge | 3 (3) | 2 (2) | 3 (3) | 6 (6) | 2 (2) |
| Sundsvall | - (-) | - (-) | 1 (1) | - (-) | - (-) |
| Taksony | - (-) | - (-) | - (-) | 3 (3) | - (-) |
| Tennessee | 7 (7) | 2 (2) | 2 (2) | - (-) | - (-) |

Table 8: *Salmonella* in cattle, sheep, pigs and poultry on all premises

| <i>Salmonella</i> Incidents (Isolations) | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | |
|---|------|----------|------|----------|------|----------|------|----------|------|----------|
| ENTERICA ENTERICA | | | | | | | | | | |
| Thomasville | - | (-) | - | (-) | - | (-) | - | (-) | 1 | (1) |
| Thompson | 15 | (16) | 40 | (40) | 33 | (34) | 16 | (16) | 1 | (1) |
| Typhimurium | 398 | (433) | 347 | (378) | 405 | (447) | 481 | (589) | 254 | (279) |
| Uganda | - | (-) | - | (-) | 1 | (1) | - | (-) | - | (-) |
| Vejle | 4 | (4) | 8 | (8) | - | (-) | - | (-) | - | (-) |
| Virchow | 88 | (92) | 42 | (43) | 20 | (20) | 10 | (16) | 3 | (8) |
| Worthington | 1 | (1) | - | (-) | - | (-) | 1 | (1) | - | (-) |
| Yoruba | 1 | (1) | 1 | (1) | 2 | (2) | 1 | (1) | 2 | (2) |
| ENTERICA DIARIZONAE | | | | | | | | | | |
| 61:k:1,5 | 9 | (9) | 1 | (1) | 1 | (1) | 2 | (2) | 1 | (1) |
| 61:k:1,5,7 | 122 | (122) | 136 | (139) | 106 | (106) | 88 | (88) | 80 | (81) |
| 61:k:1,7 | - | (-) | - | (-) | 4 | (4) | - | (-) | - | (-) |
| 61:-:1,5 | 2 | (2) | - | (-) | - | (-) | 5 | (5) | 1 | (1) |
| 61:-:1,5,7 | 30 | (30) | 49 | (49) | 48 | (48) | 58 | (59) | 49 | (49) |
| 61:-:1,7 | 1 | (1) | - | (-) | - | (-) | 4 | (4) | - | (-) |
| UNSPECIFIED | | | | | | | | | | |
| untypeable | - | (2) | - | (-) | - | (-) | 1 | (1) | - | (-) |
| structure only | 170 | (228) | 121 | (166) | 116 | (184) | 78 | (132) | 46 | (62) |
| rough strain | 1 | (3) | 1 | (2) | 8 | (8) | 13 | (13) | 9 | (9) |
| no viable organisms | - | (5) | - | (2) | - | (1) | - | (3) | - | (-) |
| untyped | - | (-) | - | (-) | - | (-) | 1 | (1) | - | (-) |
| TOTAL | 3513 | (3753) | 2940 | (3119) | 2868 | (3084) | 2315 | (2889) | 1742 | (2081) |

Fig 2: Incidents of *Salmonella* serotypes in cattle, sheep, pigs & poultry in 2007

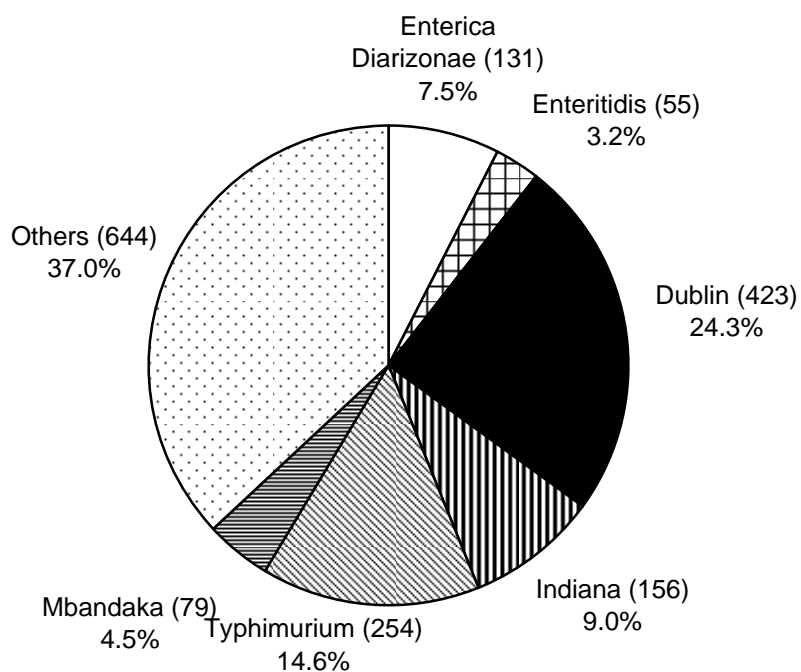


Table 9: Incidents of the top 5 *Salmonella* serotypes in cattle, sheep, pigs and poultry in 2007 as a % of all incidents compared to previous years

| Serotype | 2003 | 2004 | 2005 | 2006 | 2007 |
|--|------|------|------|------|------|
| S. Dublin % | 32.6 | 27.2 | 23.2 | 23.3 | 24.3 |
| S. Typhimurium % | 11.3 | 11.8 | 14.1 | 20.8 | 14.6 |
| S. Indiana % | 4.8 | 5.7 | 7.4 | 6.9 | 9.0 |
| S. <i>Enterica Diarizonae</i> subspecies % | 4.7 | 6.3 | 5.5 | 6.8 | 7.5 |
| S. Mbandaka % | 1.2 | 0.8 | 0.8 | 1.5 | 4.5 |
| Total no. incidents | 3513 | 2940 | 2868 | 2315 | 1742 |

Fig 3: Incidents of *Salmonella* serotypes in cattle, sheep, pigs & poultry (2003 - 2007)

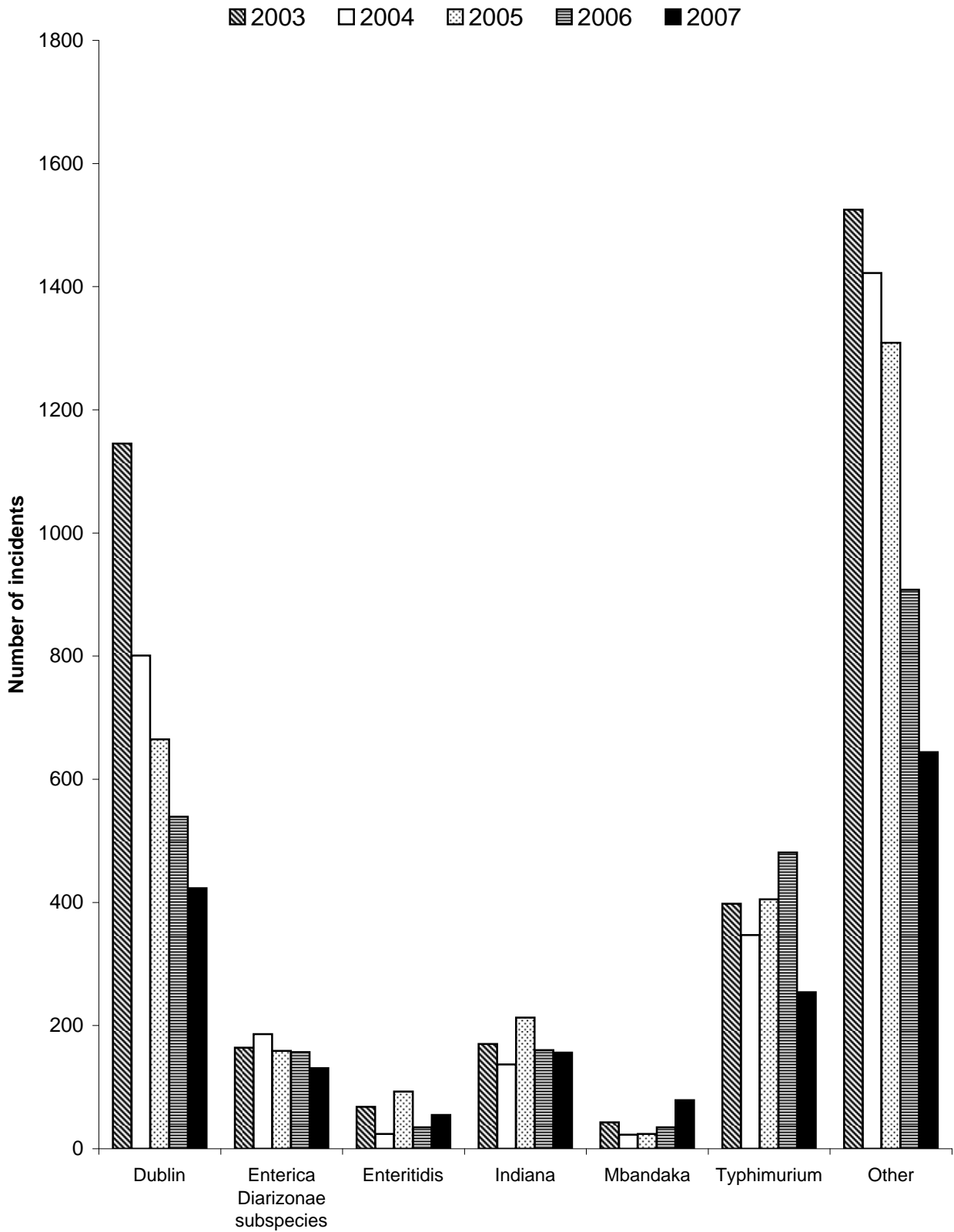


Fig 4: Number of incident reports of *Salmonella* Typhimurium in livestock (2003 - 2007)

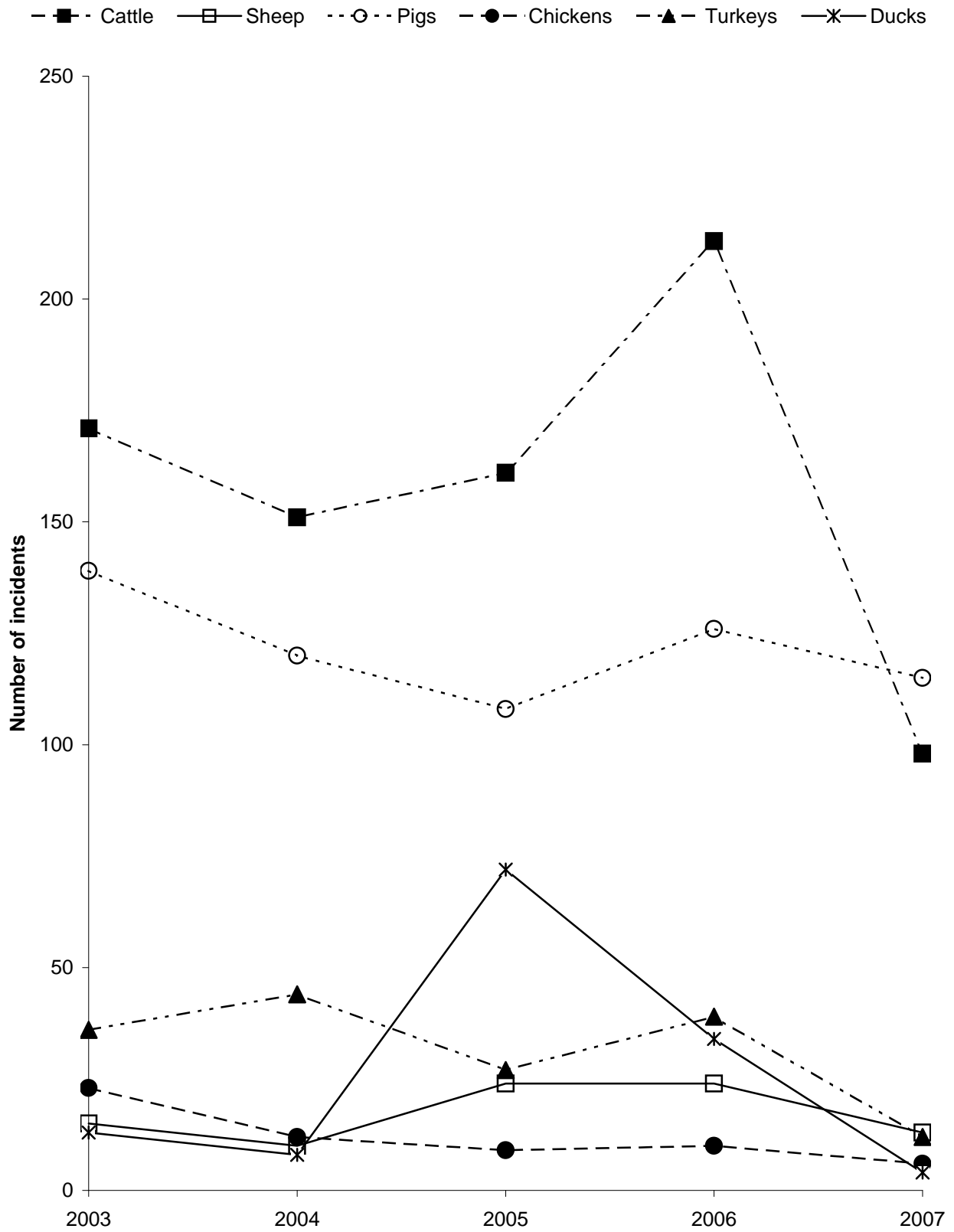


Fig 5: Number of incident reports of *Salmonella* Enteritidis in livestock (2003 - 2007)

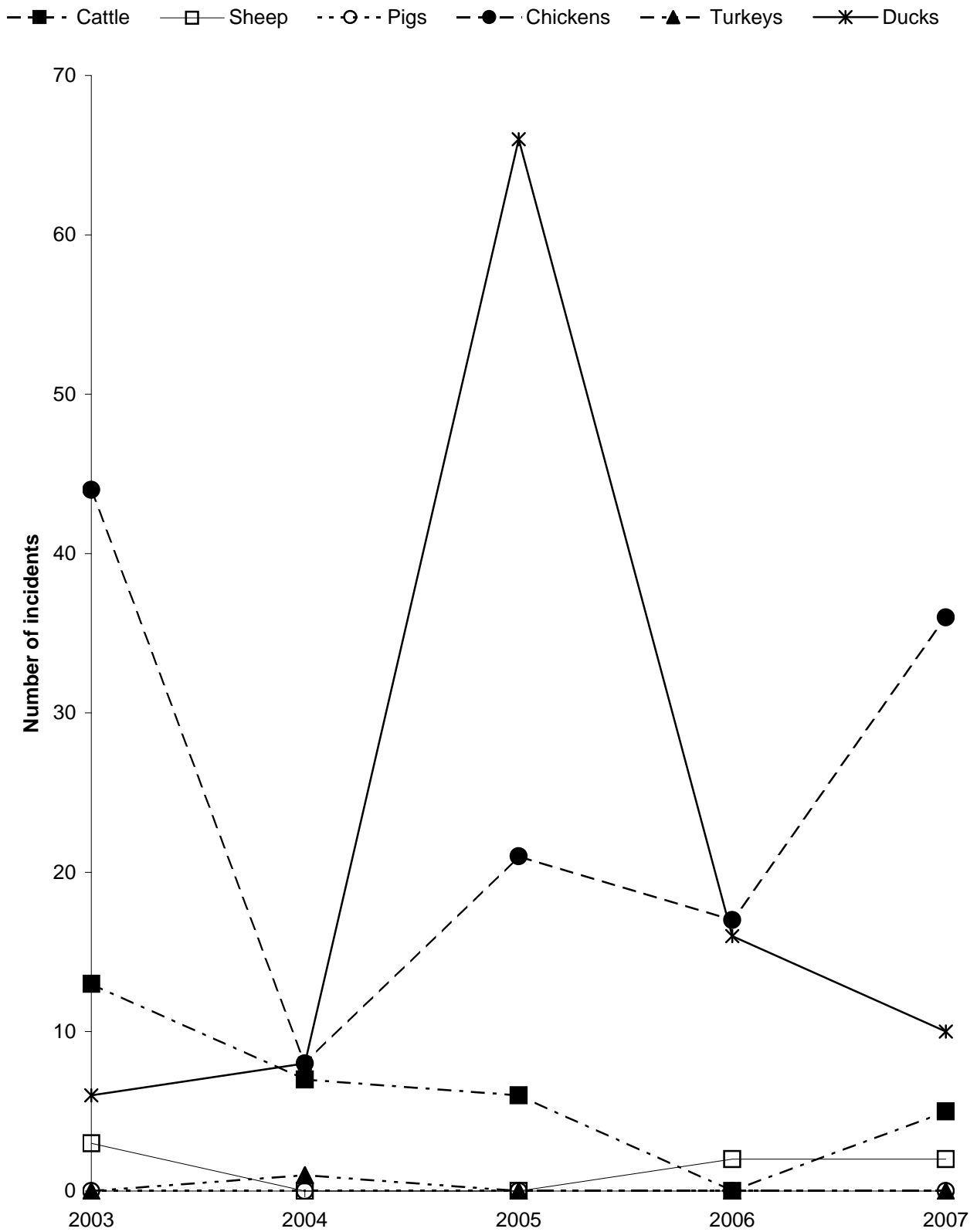


Fig 6: Number of incident reports of *Salmonella* Hadar in livestock (2003 - 2007)

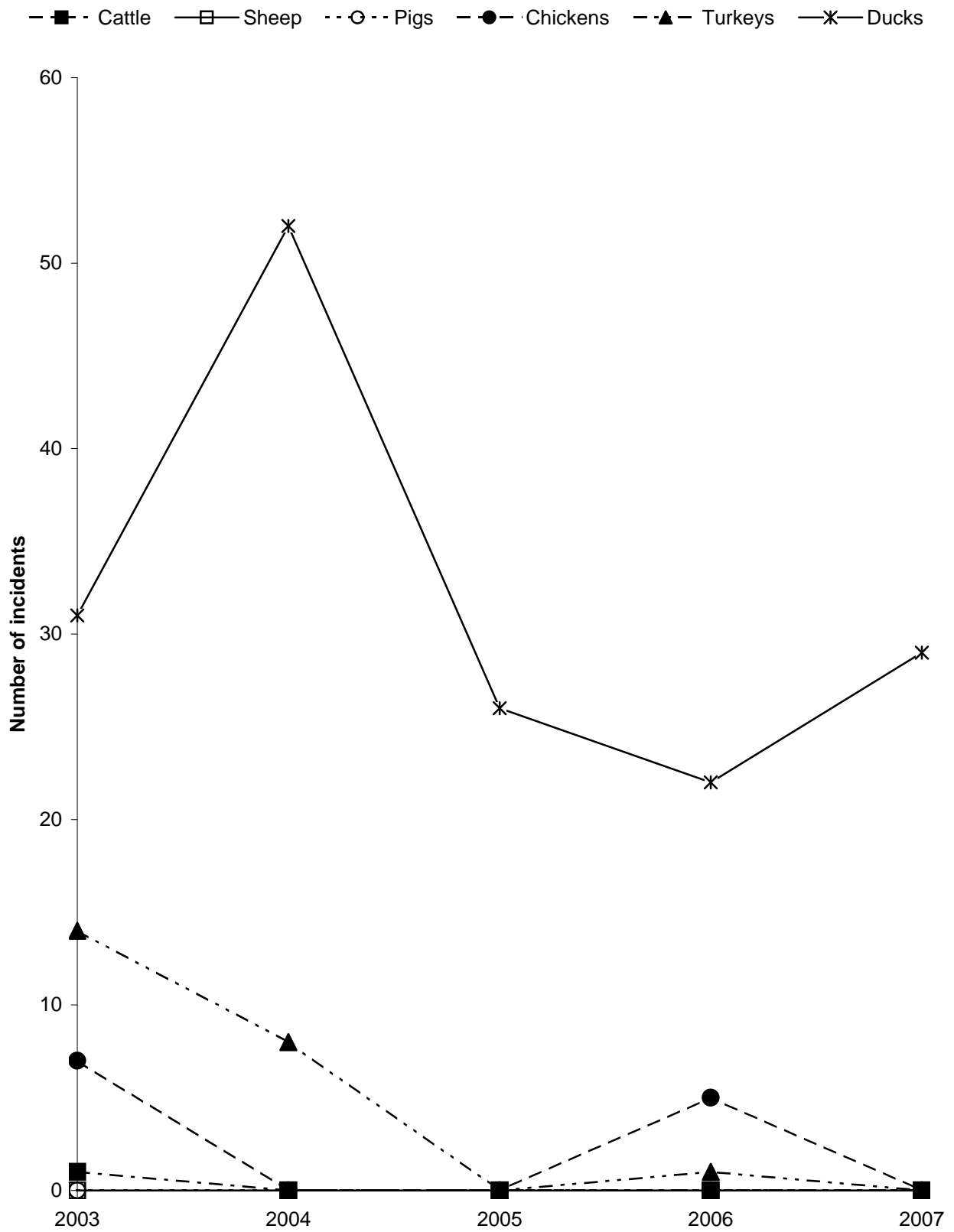


Fig 7: Number of incident reports of *Salmonella* Infantis in livestock (2003 - 2007)

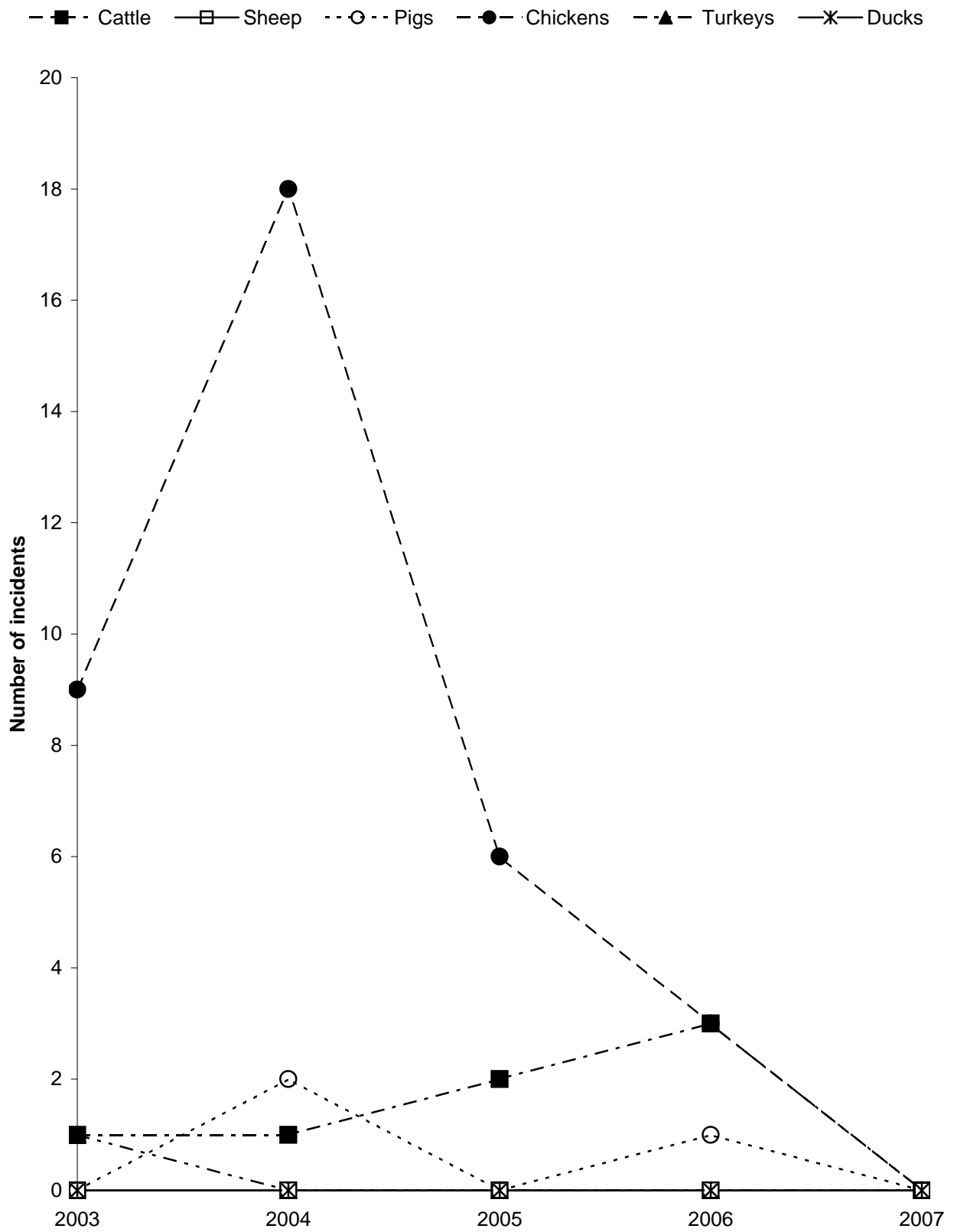


Fig 8: Number of incident reports of *Salmonella* Virchow in livestock (2003 - 2007)

