

Chapter 4

REPORTS OF *SALMONELLA* IN PIGS

Figures from the Agricultural Census indicate that by June 2013 the total GB pig herd had reached around 4.4 million, which represents an 8.5% increase relative to June 2012 and brings the herd size back up to the level observed five years ago (Figure 4.1). The number of fattening pigs in GB increased by 16.6% to reach just under 4.2 million animals. In contrast, the breeding pig herd size fell by 1.4% to 473,873 animals.

BPEX's Zoonoses National Control Programme (ZNCP) for pigs aims to control and reduce the risk of *Salmonella* in pig meat to the consumer by targeting action at every stage of the meat production chain. There has been no national scheme for monitoring *Salmonella* levels on pig farms in GB since the meat juice ELISA testing was suspended in 2012. However, a multi-agency study was carried out between January and May 2013 to investigate the prevalence of a number of microorganisms in UK slaughter pigs, including *Salmonella*. The study was designed to be comparable, wherever possible, with the UK baseline survey of *Salmonella* in slaughter pigs undertaken in 2006/7. Samples were collected from more than 600 pigs at fourteen abattoirs with the highest throughput of pigs.

Levels of *Salmonella* carriage in the caecum were found to be significantly higher than in 2006/7 (30.5% vs. 21.9%) whereas significantly fewer carcass swabs tested positive (9.6% vs. 15.1%); roughly a quarter (24.0%) of the rectal swabs collected in the study also tested positive but these were not taken in the 2006/7 survey so it is not possible to compare results for those. Monophasic *Salmonella* 4,[5],12:i:- and *S. Typhimurium* accounted for roughly half of the *Salmonella* isolates recovered in the survey, whilst *S. Derby* and *S. Bovismorbificans* together accounted for roughly a quarter of isolates (Figure 4.2). These were the most common serovars in all three of the sample types (Figure 4.3). The prevalence of both *Salmonella* 4,[5],12:i:- and *S. Bovismorbificans* had increased substantially since 2006/7 whereas *S. Derby* and *S. Typhimurium* had both decreased. Further information regarding the survey is available on the AHVLA website¹. As discussed in the Introduction, data from research projects and surveys are always excluded from the tables and figures in the species chapters of this publication, so all testing carried out as part of the UK baseline study has been excluded from Tables 4.1 – 4.2 and Figures 4.4 – 4.9. When comparing the results from the survey with the

¹ <http://www.defra.gov.uk/ahvla-en/science/bact-food-safety/2013-pig-abattoir-study/>

routine surveillance data presented in this chapter, it is important to consider the differences in study population e.g. the baseline study included pigs from the whole of the UK whereas the surveillance data only covers GB.

During 2013, there were a total of 3,688 pig submissions to AHVLA/SRUC, which is broadly comparable with the number received in 2012 (3,489 submissions; 5.7% increase). This followed a substantial decline from 5,685 submissions in 2011. A third of the submissions received during 2013 were for diagnostic purposes.

In total, there were 127 isolations of *Salmonella* from pigs during 2013 (Table 4.1). This is roughly a third fewer than in both 2012 (186 isolations) and 2011 (193 isolations), and is the lowest number of isolations ever recorded from pigs. As usual, most (89.0%) of the isolations were from diagnostic submissions. Together, the 127 reports represented 4.5% of all *Salmonella* isolations from statutory species in 2013 compared with 6.4% in 2012 and 7.4% in 2011.

Salmonella Typhimurium and S. 4,5,12:i:- remained the most commonly isolated serovars in 2013. Over the past decade there has been a general decline in *Salmonella* Typhimurium isolations from pigs. This trend continued in 2013, with only half as many isolations (42 isolations; 33.1% of all porcine *Salmonella* isolations) as in both 2012 (90 isolations; 48.4% of all porcine *Salmonella* isolations) and 2011 (85 isolations; 44.0% of all porcine *Salmonella* isolations) (Figures 4.4 and 4.5).

In contrast, reports of the two monophasic variants declined only marginally and they were therefore responsible for a greater proportion of pig *Salmonella* isolations than in the preceding year. S. 4,5,12:i:- accounted for 24.4% of all pig *Salmonella* isolations during 2013 compared to 18.8% in 2012 whilst S. 4,12:i:- accounted for 18.9% of all pig *Salmonella* isolations compared to 15.1% in 2012.

As observed in previous years, definitive phage type (DT) 193 was most commonly found in the isolations involving S. 4,5,12:i:- (71.0% of all isolations) and S. 4,12:i:- (75.0% of all isolations) (Figures 4.8 and 4.9). There was also one isolation of *Salmonella* 4,5,12:i:- U323, which had only previously been recorded in British pigs through project work undertaken in 2012.

For S. Typhimurium, there was a sharp decline in isolations of DT193 (8 vs. 27 isolations during 2012) (Table 4.2, Figures 4.6 and 4.7). Therefore, U288 was the most commonly identified phage type despite a continuing year-on-year declining trend since 2009. There were eight

isolations of *S. Typhimurium* U302, which declined between 2006 and 2009 but has since shown an increasing trend again. There was only a single isolation of *S. Typhimurium* DT120 compared with between nine and fourteen isolations annually between 2009 and 2012. There was also a single isolation of *S. Typhimurium* DT32, which was first reported in pigs in 2010.

Salmonella 4,[5],12:i:- has been increasingly reported in both pig populations and human salmonellosis cases in many European countries over the last decade. Prior to January 2012, presumptive human *Salmonella* Typhimurium isolates were usually only phage typed (and not also serotyped), so it was not possible to differentiate the monophasic variants from *S. Typhimurium*. Since full serotyping of all *Salmonella* isolates was instituted by Public Health England, many *Salmonella* isolates have been identified as the monophasic serovars rather than being only classified as *S. Typhimurium* of particular phage type. Several reported cases of *Salmonella* 4,[5],12:i:- in humans in the last few years have been traced back to hog roasts.

The other serovars recovered from pigs during 2013 occurred at a much lower frequency. *S. Derby* remained the fourth most common serovar recovered from pigs. Isolations of this serovar have been relatively stable over the last five years, with a total of nine isolations during 2013 (7.1% of all *Salmonella* isolations) compared to between eight and thirteen isolations per year (4.3-6.7% of all *Salmonella* isolations) between 2009 and 2012.

Contrary to the findings of the pig abattoir study, *S. Bovismorbificans* remained relatively rare amongst routine submissions, with only two isolations in 2013 and a maximum of six isolations per year since 2009.

There were single isolations of both *S. Ealing* and *S. Gloucester*, neither of which had previously been reported in pigs in GB. There was also one isolation of *S. Agona*, which was last reported from pigs in GB in 2006.

There were no isolations of *S. Enteritidis*. This serovar has not been reported from pigs in GB since 2008. *S. Enteritidis* was also not found in the pig abattoir study, but has occasionally been found in research investigations.

There were no reports of *Salmonella* from pigs of non-GB origin during 2013.

Figure 4.1: Pig population and number of holdings with pigs in GB 2004 - 2013

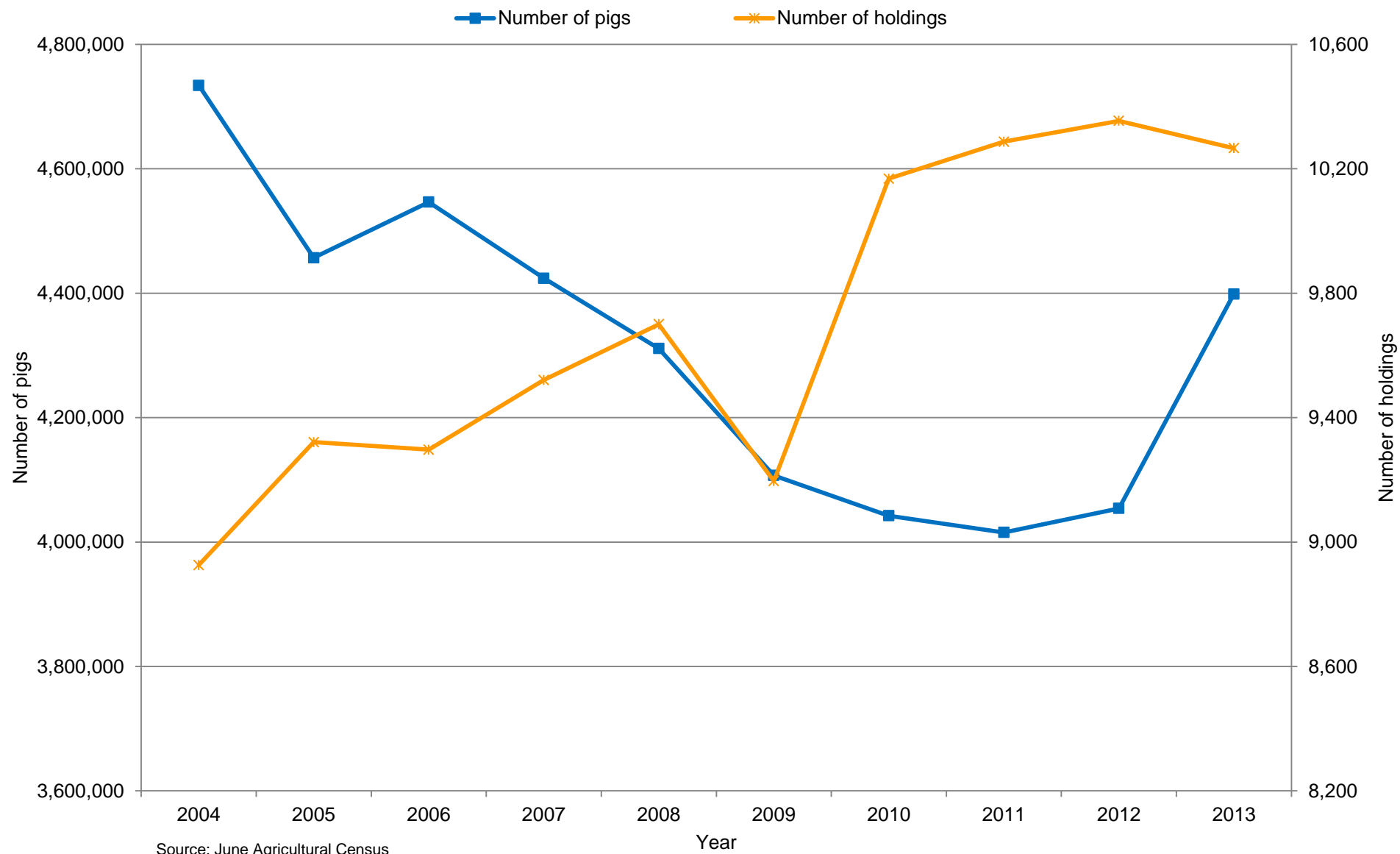
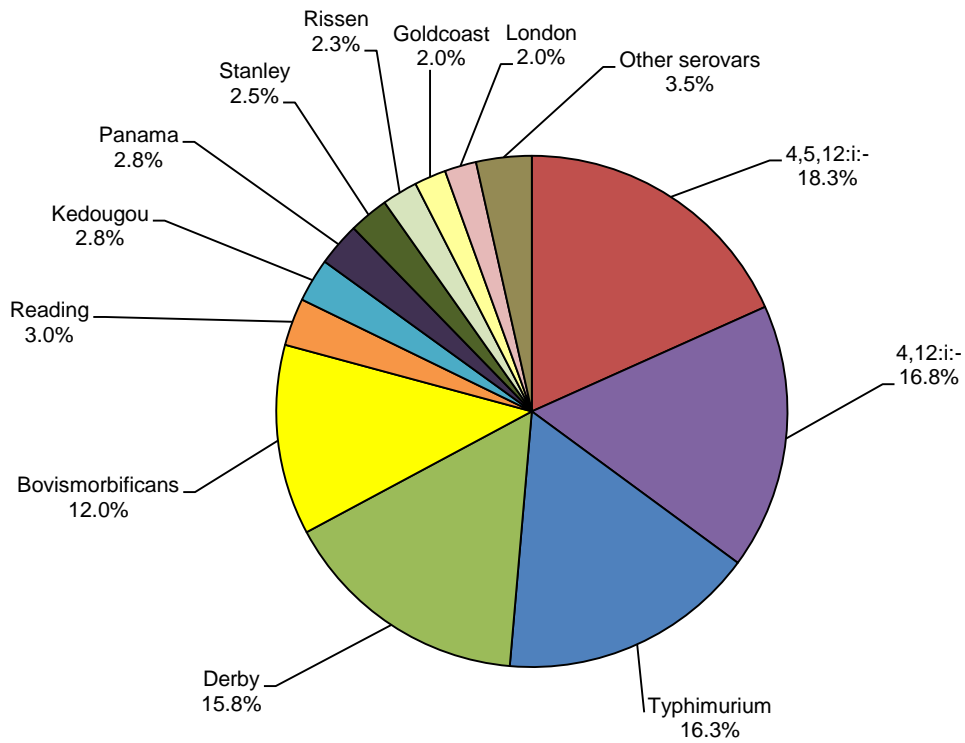


Figure 4.2: Most common serovars recovered in UK pig baseline study 2013*



* Includes all positive caecal content samples (n=189), rectal swabs (n=150) and carcass swabs (n=60). Some of these samples were taken from the same pig.

Figure 4.3: Most common serovars recovered from each sample type in UK pig baseline study 2013

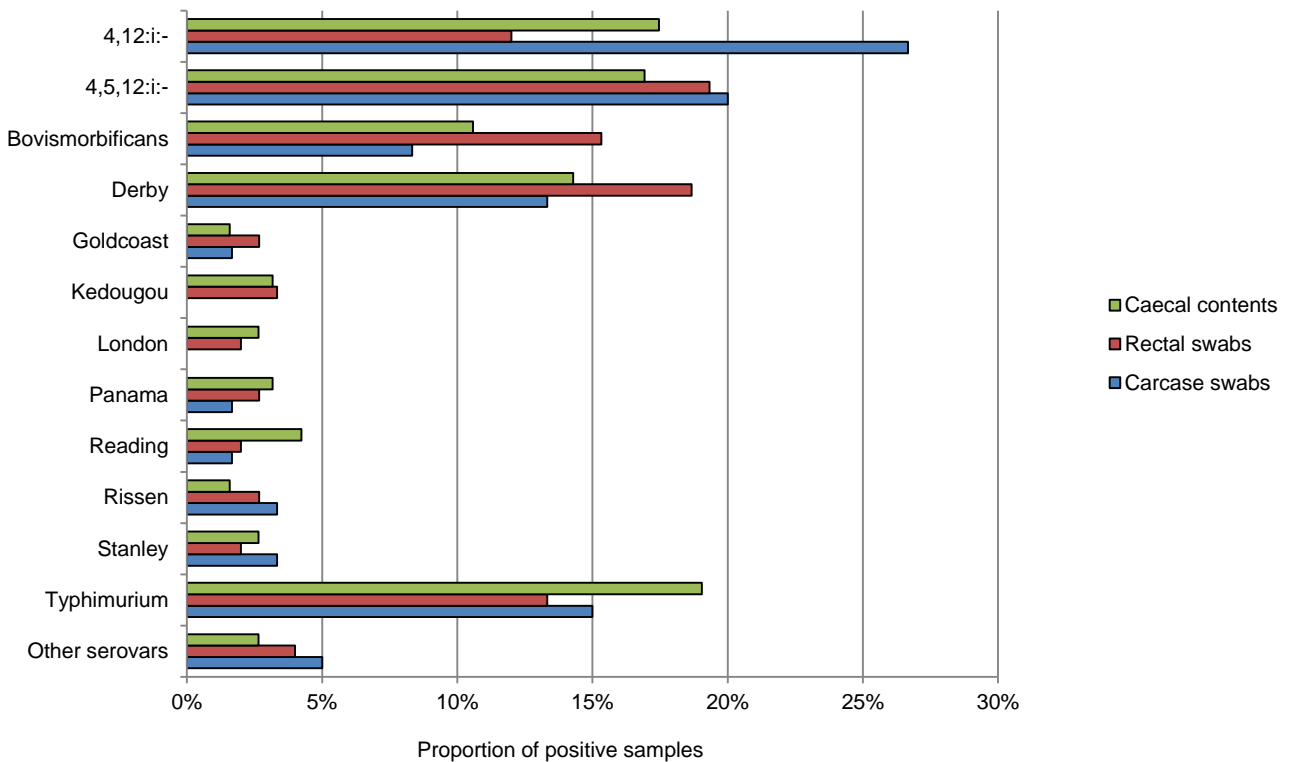


Table 4.1: Isolations and incidents of *Salmonella* in pigs on all premises in Great Britain

<i>Salmonella</i> subspecies	2009		2010		2011		2012		2013	
	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents
ENTERICA ENTERICA										
Agona	-	-	-	-	-	-	-	-	1	1
Anatum	1	1	1	1	-	-	-	-	-	-
Bardo	-	-	1	1	-	-	-	-	-	-
Bareilly	-	-	-	-	1	1	-	-	-	-
Bovismorbificans	3	3	3	3	6	6	6	6	2	2
Choleraesuis var K.*	1	1	-	-	-	-	-	-	-	-
Derby	11	8	13	11	13	13	8	8	9	7
Ealing	-	-	-	-	-	-	-	-	1	1
Gloucester	-	-	-	-	-	-	-	-	1	1
Goldcoast	1	1	1	1	2	2	1	1	-	-
Infantis	-	-	1	1	-	-	1	1	-	-
Kedougou	6	6	3	3	5	4	4	3	5	3
Kimuenza	1	1	-	-	-	-	-	-	-	-
Kottbus	-	-	-	-	-	-	1	1	-	-
London	3	3	3	2	4	4	3	3	2	2
Newport	1	1	2	2	4	4	1	1	-	-
Orion	1	1	-	-	-	-	-	-	-	-
Panama	1	1	1	1	4	4	5	5	1	1
Reading	4	4	4	3	3	3	-	-	5	4
Rissen	8	7	-	-	3	3	-	-	1	1
Saintpaul	-	-	-	-	-	-	1	1	-	-
Stanley	2	1	-	-	-	-	-	-	-	-
Typhimurium	146	129	120	99	85	77	90	81	42	40
4,5,12:i:-	13	11	34	30	40	40	35	35	31	29
4,12:i:-	1	1	13	13	22	20	28	27	24	24
UNSPECIFIED										
untypable strains	-	-	1	1	-	-	2	2	2	2
rough strains	-	-	1	1	1	1	-	-	-	-
TOTAL	204	180	202	173	193	182	186	175	127	118

* Choleraesuis var Kunzendorf

Figure 4.4: Isolations of the most common serovars in pigs in GB 2009 - 2013

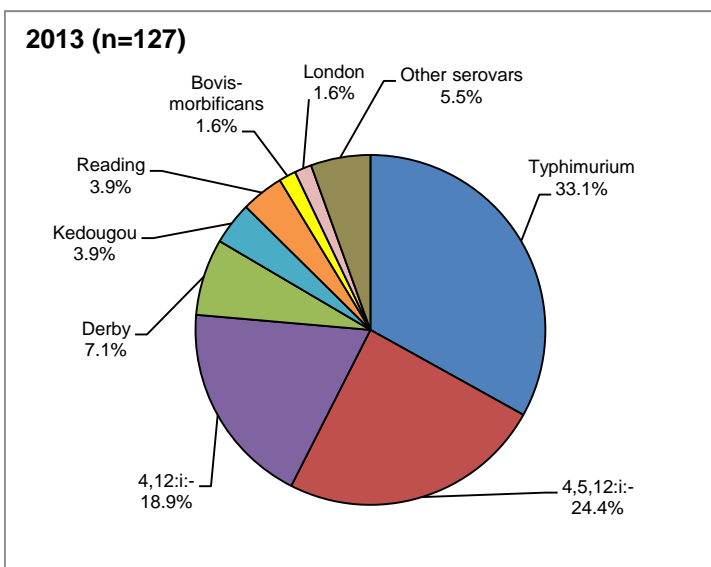
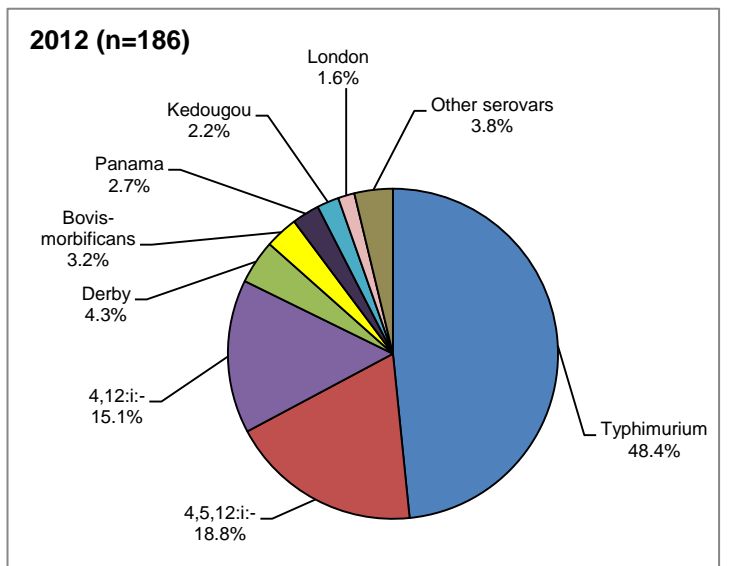
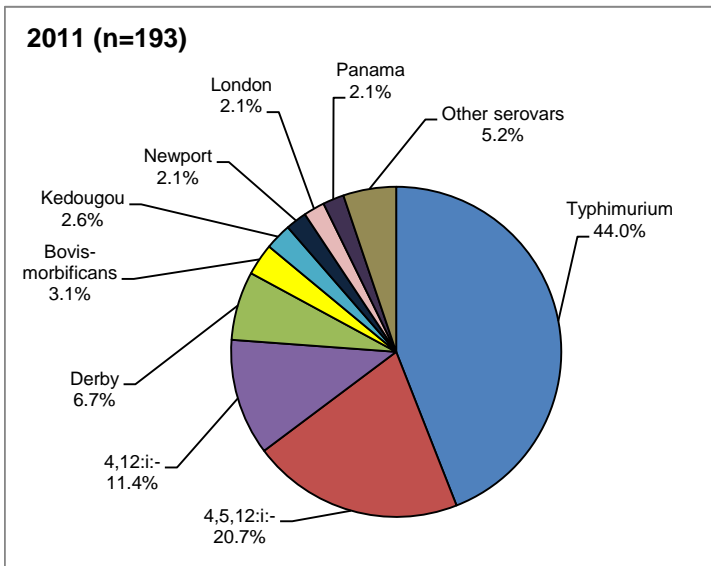
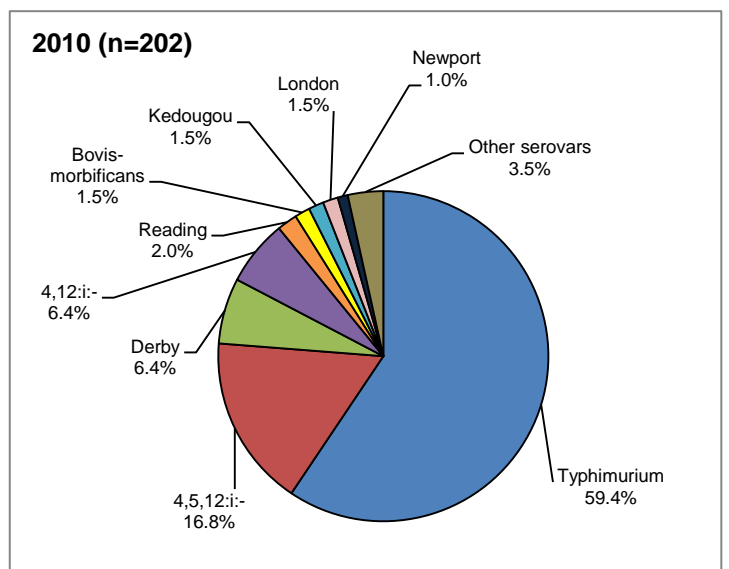
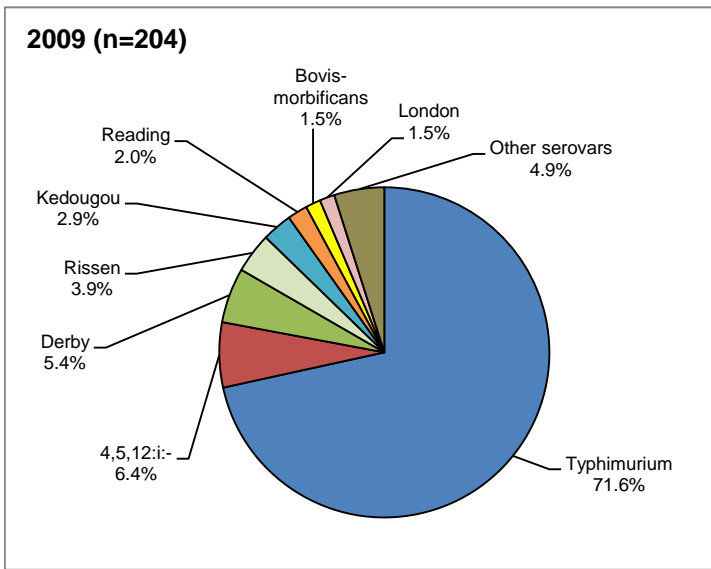


Figure 4.5: S. Derby, S. Enteritidis, S. Typhimurium and monophasic variant S. Typhimurium as a proportion of all isolations in pigs in Great Britain 1993 - 2013

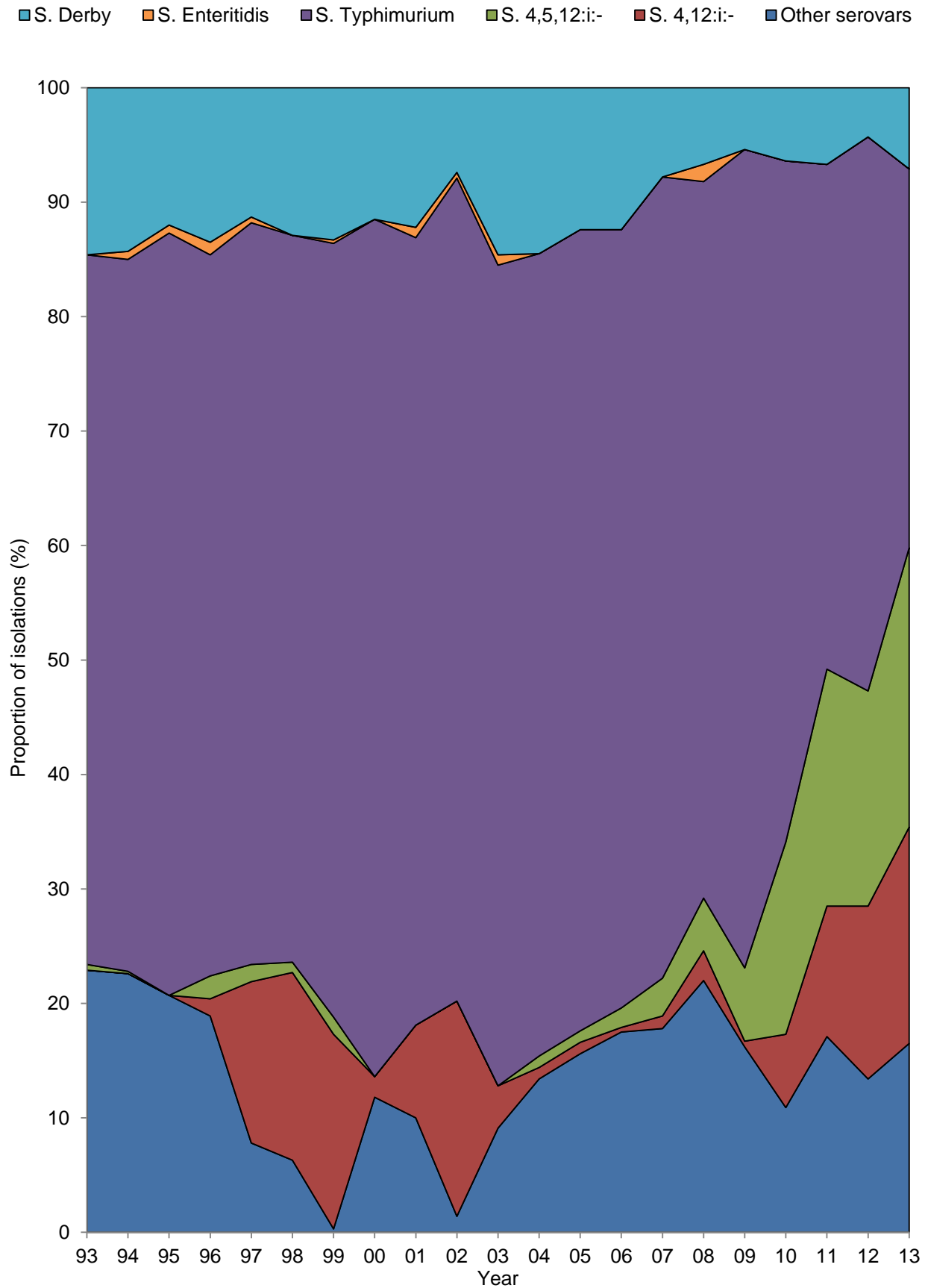


Table 4.2: Isolations and incidents of *S. Typhimurium* in pigs on all premises in Great Britain

Phage Types	2009		2010		2011		2012		2013	
	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents	Isolations	Incidents
1	1	1	-	-	-	-	-	-	-	-
8	1	1	-	-	-	-	-	-	-	-
12	4	3	-	-	-	-	-	-	-	-
30	1	1	-	-	-	-	-	-	-	-
32	-	-	2	2	1	1	-	-	1	1
41	1	1	-	-	-	-	-	-	-	-
104	6	6	3	2	1	1	5	5	1	1
104b	1	1	-	-	3	3	4	4	-	-
120	9	8	14	13	11	11	9	9	1	1
193	34	33	35	31	17	17	27	27	8	8
193a	1	1	-	-	-	-	-	-	-	-
194	-	-	-	-	1	1	-	-	-	-
208	2	2	-	-	2	2	-	-	-	-
U288	61	54	39	36	32	29	23	23	17	16
U302	-	-	1	1	6	6	6	6	8	7
U308	-	-	3	2	1	1	-	-	-	-
U310	7	5	-	-	-	-	-	-	-	-
U311	1	1	-	-	-	-	-	-	-	-
U323	-	-	-	-	-	-	1	1	-	-
RDNC	2	-	6	-	-	-	-	-	-	-
UNTY	12	11	12	12	5	5	6	6	6	6
untyped	2	-	5	-	5	-	9	-	-	-
TOTAL	146	129	120	99	85	77	90	81	42	40

Figure 4.6: Isolations of *Salmonella* Typhimurium phage types in pigs in Great Britain 2009 - 2013

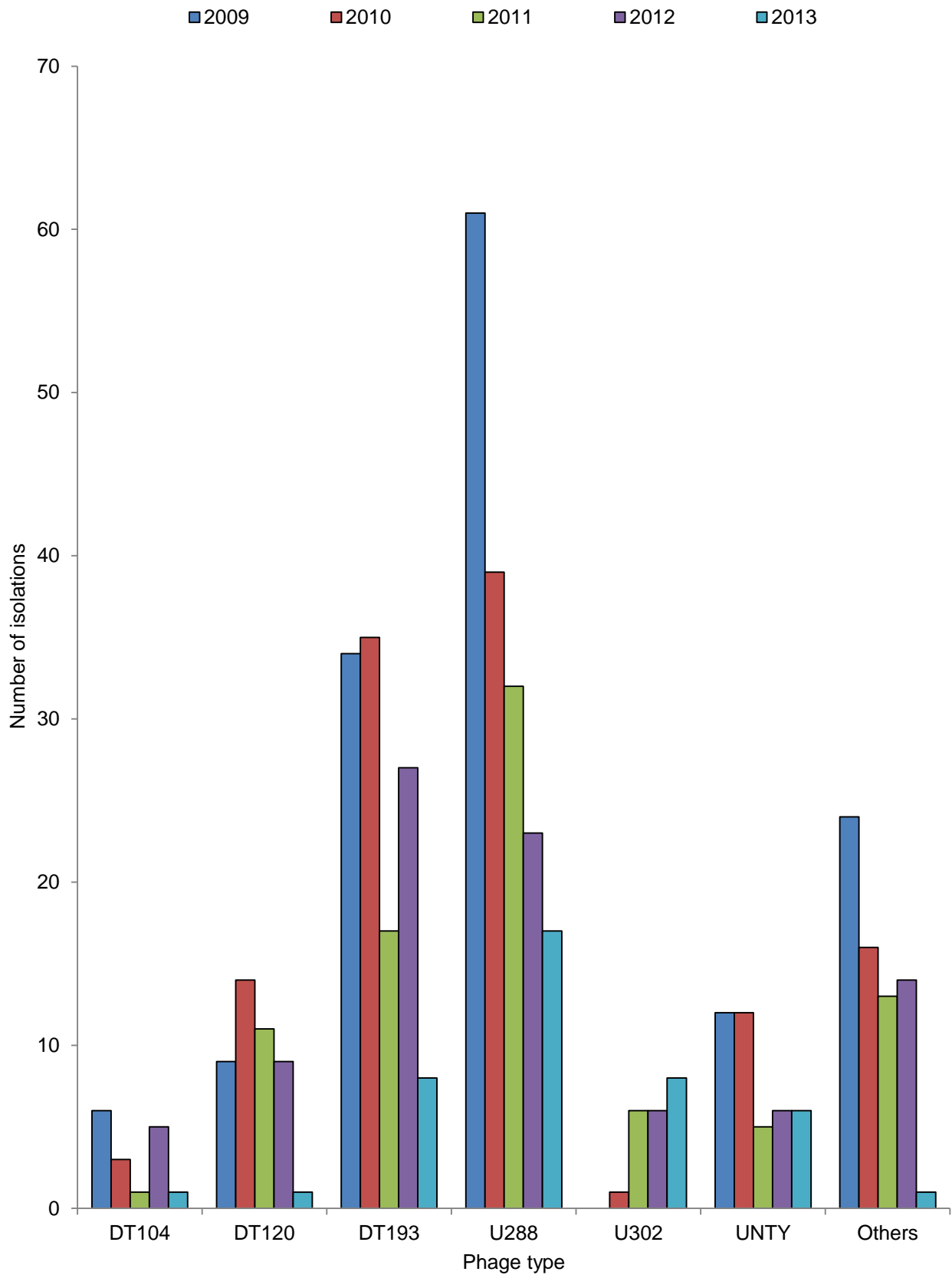


Figure 4.7: Top phage types of *S. Typhimurium* in pigs in GB 2009 - 2013

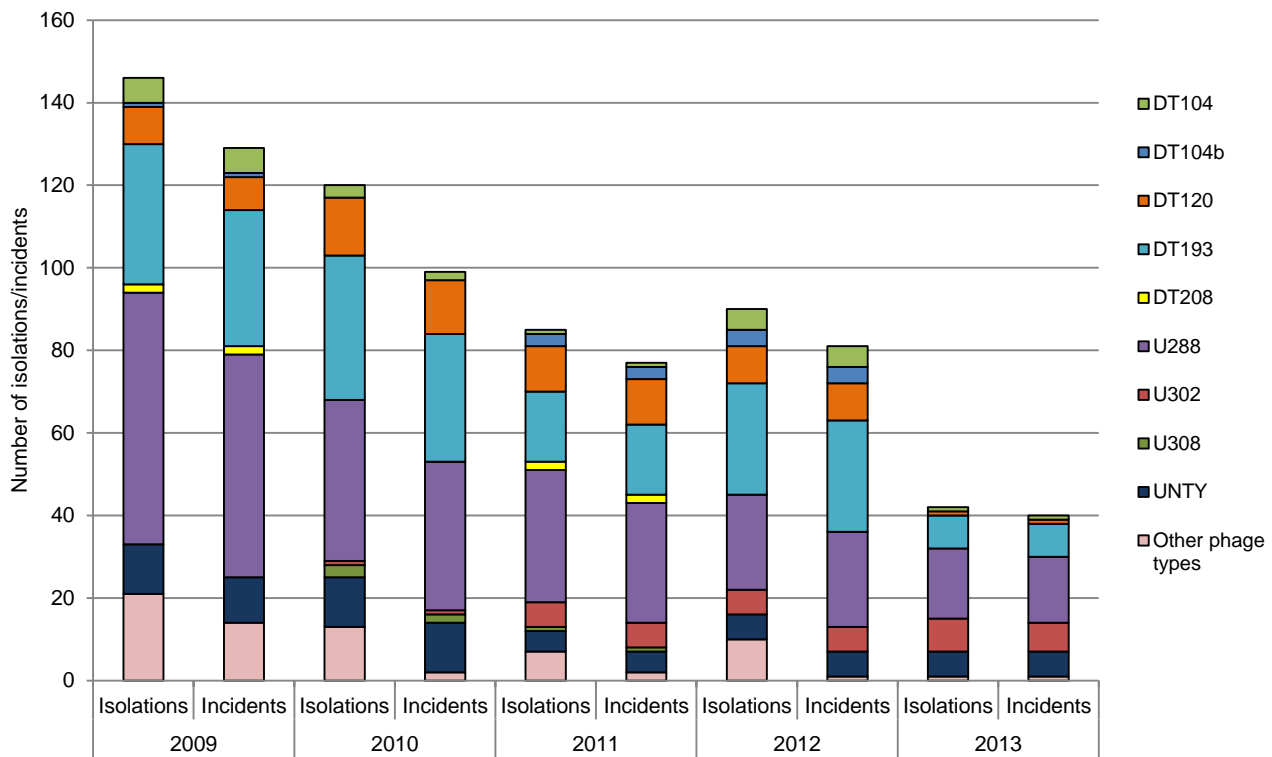


Figure 4.8: *Salmonella* 4,5,12:i:- phage types in pigs in GB 2009 - 2013

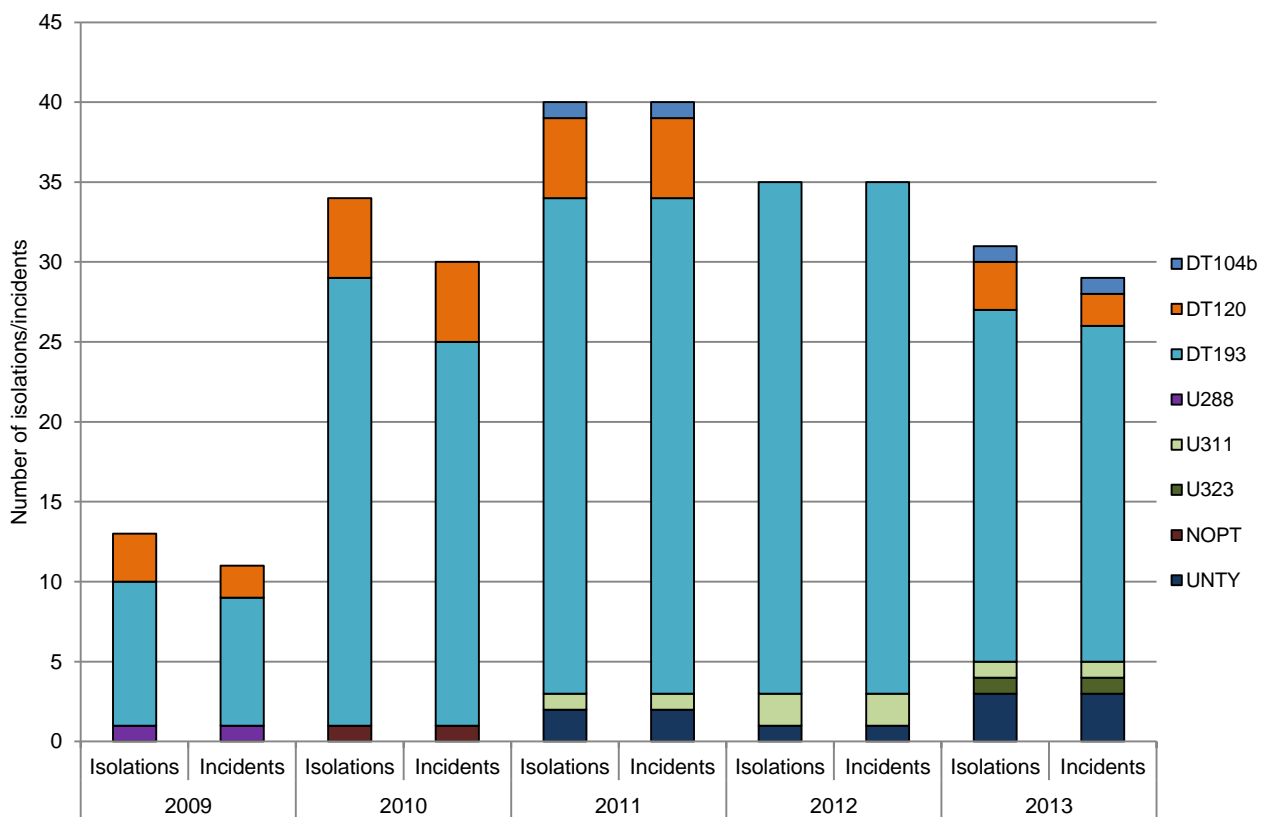


Figure 4.9: *Salmonella* 4,12:i- phage types in pigs in GB 2009 - 2013

