

Chapter 4

REPORTS OF *SALMONELLA* IN ANIMAL FEEDINGSTUFFS

1) COMPOUND ANIMAL FEEDINGSTUFFS

In 1989, as part of its package of measures to control *Salmonella* in animals, particularly poultry, the Department, with the co-operation of the feedingstuffs industry, introduced a number of voluntary Codes of Practice for the hygienic production, storage, handling and transport of animal feedingstuffs (Defra 1989). The Codes contain measures for the testing of animal feedingstuffs for *Salmonella*, and the adoption of the Codes by all the major animal feedingstuff companies in Great Britain has resulted in a large volume of testing being undertaken each year. Laboratories which are authorised to test for *Salmonella* under the Poultry Breeding Flocks and Hatcheries Order, 1993, (superseded by Poultry Breeding Flocks and Hatcheries Order 2007 on March 7th 2007) and the Animal By-Products Regulations 2005, are required to report to Defra the number of tests performed under these Orders and the number positive for *Salmonella*. Under the Zoonoses Order 1989 all laboratories are required to report the isolation of *Salmonella* from animal feedingstuffs.

This chapter contains details on the results of that testing including the number of samples of various categories of feedingstuffs tested for *Salmonella*, the number of samples that proved positive and the contamination rate (Table 68 gives the overall isolation rate of *Salmonella* in comparison with 2005). There was an increase in the number of tests carried out – 35520 in 2006, 33171 in 2005. A 1.1% isolation rate is indicated for 2006 as apposed to 1.5% in 2005.

Isolations of *Salmonella* serovars of Public Health Significance (SOPHS) are given in Tables 69 and 70. SOPHS as defined by the EC are represented by the serotypes *S. Typhimurium*, *S. Enteritidis*, *S. Virchow*, *S. Infantis* and *S. Hadar*. Table 69 indicates a reduction in the number of SOPHS isolations from 22 in 2005 to 17 in 2006.

Tables 71, 72 and 73 show the isolated serotypes from compound ruminant, pig and poultry feed respectively.

Table 74 gives the serotypes isolated from feedingstuff ingredients. The wide range of serotypes is a reflection of the large variety of sample types tested. The most frequently isolated serotypes in 2006 were *S. Mbandaka* from rape (18 isolations), *S. Rissen* from rape (34 isolations) and *S. Montevideo* from unspecified feedingstuffs (9 isolations).

2) PROCESSED ANIMAL PROTEIN

Processed animal protein is subject to statutory testing schemes at the point of production or importation and voluntary testing is also undertaken, mainly by feed mills receiving the material, where typically higher rates of contamination are found.

The feeding of mammalian meat and bone meal (MBM) to all farmed livestock was made illegal from 4 April 1996 and this resulted in much of it being disposed of by burial or incineration. As such, it no longer fell within the definition of “processed animal protein” as defined in the Processed Animal Protein Order 1989 (replaced by the Animal By-Products Order, 1999) and producers were no longer under a legal obligation to test products for *Salmonella* on each day they were consigned from their premises. However, official quarterly testing of products has continued under the Animal By-Products Order 1992, and since under the Animal By-Products Order 1999. The Animal By Products Regulations 2003 came into force in July 2003 and have since been replaced by the Animal By Products Regulations 2005.

From 1 August 2001, under the Processed Animal Protein Regulations 2001, and now continued under the TSE Regulations 2002, the feeding of processed animal protein to animals kept, fattened or bred for the production of food is prohibited, with some exceptions including non-ruminant gelatin used for coating feed additives, animal-derived dicalcium phosphate and hydrolysed protein produced under certain conditions when fed to non-ruminants; fishmeal produced under certain conditions may be fed to farmed animals other than ruminants. Table 76 details the results obtained from the statutory official testing of domestic processed animal protein.

The number of batches of domestically produced processed animal protein tested in 2006 was 242, a decrease from 2005's 287 – see Table 75. A further decrease in the isolation rate (1.65%) from 2.8% in 2005 and 4.6% in 2004.

Figures 46 and 47 show trends in contamination rates for domestically produced and imported animal protein.

The decrease in the isolation rate in imported processed animal protein over the past ten years shown in Figure 47 and Table 77 (zero isolation rate in 2006) may be, in part, a reflection of the country of origin changing trend over the last few years.

Tables 76 and 78 show the serovars reported from testing of domestically produced and imported animal protein respectively.

**Table 68: Animal feedingstuffs and ingredients contamination rates
(Tests being performed under the Animal By-Products Regulations 2005 and
Defra Codes of Practice) 2005 - 2006**

Product	2005			2006		
	No of tests	No of tests positive	Percent positive	No of tests	No of tests positive	Percent positive
Processed animal protein at a GB protein processing premises	4896	116	3.2	7205	148	2.1
GB and imported processed animal protein arriving for feedingstuffs use	803	28	2.4	576	10	1.7
Oilseed meals and products for feedingstuffs use	8776	185	1.8	9393	155	1.7
Non-oilseed meal vegetable products	7839	106	1.2	7506	22	0.3
Ruminant concentrates	1959	6	0.3	1898	10	0.5
Pig extrusions	1325	5	0.3	1258	3	0.2
Pig and poultry meals	2639	32	1.0	3114	19	0.6
Poultry extrusions	4236	15	0.3	3640	14	0.4
Protein concentrate	340	8	1.6	374	5	1.3
Minerals/other	358	1	0.3	556	1	0.2
Total	33171	502	1.5	35520	387	1.1

Table 69: *Salmonella* of public health significance in animal feedingstuffs 2005 - 2006

<i>Salmonella</i>	Type of material - 2005			Type of material - 2006			
	Finished feeds	Vegetable material	Misc.	Finished feeds	Animal protein	Vegetable material	Misc.
Enteritidis PT4	-	-	2	-	-	-	-
Enteritidis untyped	-	-	-	-	-	1	-
Hadar PT4	-	1	-	-	1	-	-
Hadar untyped	-	-	-	1	-	-	-
Infantis	1	-	2	1	-	4	-
Typhimurium DT56	-	-	1	-	-	-	-
Typhimurium DT85	1	-	-	-	-	-	2
Typhimurium DT99	-	-	1	-	-	-	-
Typhimurium DT104	1	-	-	-	-	4	2
Typhimurium DT170b	-	-	1	-	-	-	-
Typhimurium DT193	1	-	-	-	-	-	-
Typhimurium DT193a	-	-	1	-	-	-	-
Typhimurium U288	-	-	2	-	-	-	-
Typhimurium U310	-	-	1	-	-	-	-
Typhimurium RDNC	-	1	-	-	-	-	-
Typhimurium UNTY	-	-	1	-	-	-	-
Typhimurium untyped	-	1	2	-	-	-	-
Virchow PT8	-	-	1	-	-	-	-
Virchow untyped	-	-	-	-	-	1	-
Total	4	3	15	2	1	10	4

Table 70: Isolations of *Salmonella* of public health importance from products monitored under the Defra Codes of Practice, 2006

<i>Salmonella</i>	Feedingstuff	Number
Enteritidis untyped	cocoa	1
Hadar PT4	Fishmeal	1
Hadar untyped	ruminant compound feed	1
Infantis	chicken compound feed	1
Infantis	soya	4
Typhimurium DT85	unspecified ingredient	2
Typhimurium DT104	barley	3
Typhimurium DT104	soya	1
Typhimurium DT104	unspecified ingredient	2
Virchow untyped	rape	1
Total		17

Table 71: The serotypes of *Salmonella* isolated from compound ruminant feed in 2006, compared with the previous year

<i>Salmonella</i> serotype	Isolations 2005	<i>Salmonella</i> serotype	Isolations 2006
Agona	1	Agama	2
Binza	1	Stanleyville	2
Carno	1	Hadar	1
Mbandaka	1	Hull	1
Montevideo	1	Montevideo	1
Typhimurium	1	9,46:-:-	1
Yoruba	1		
30:-:-ENX	1		

Table 72: The serotypes of *Salmonella* isolated from compound pig feed in 2006, compared with the previous year

<i>Salmonella</i> serotype	Isolations 2005	<i>Salmonella</i> serotype	Isolations 2006
Senftenberg	5	Agona	2
Kedougou	4	Anatum	1
Yoruba	2	Rissen	1
Agona	1	Tennessee	1
Livingstone	1		
Rissen	1		
Tennessee	1		
Typhimurium	1		
6,7:-:-	1		
6,7:z10:-	1		

Table 73: The top 3 serotypes of *Salmonella* isolated from compound poultry feed in 2006, compared with the previous year

<i>Salmonella</i> serotype	Isolations 2005	<i>Salmonella</i> serotype	Isolations 2006
Kedougou	6	Ohio	5
Livingstone	4	Rissen	3
Ohio	4	Agona	2
Agona	2	Senftenberg	2
Rissen	2		
Tennessee	2		

Table 74: The serotypes of *Salmonella* in feedingstuff ingredients 2006, compared with the previous year

Feedingstuff	<i>Salmonella</i> serotype	Isolations 2005	Isolations 2006
Barley	Arizonae (unspecified)	1	0
	Typhimurium	0	3
Cocoa	Agama	0	1
	Amager	1	0
	Babelsberg	1	0
	Enteritidis	0	1
	Ibadan	2	3
	Kibusi	1	0
	Lille	1	0
	Malaysia	1	0
	Malstatt	1	0
	Maritzburg	2	0
	Okatie	0	1
	Soerenga	1	0
	Somone	1	0
	Teltow	2	0
	Utah	1	0
	Vinohrady	2	0
	16:-:-	1	0
	28:-:-	1	0
	28:i:-	1	0
	3:1:-y:-	0	1
	4:z:-	0	1
	4:-:1,5	0	1
	4,12:-:-	1	0
6,7:-:-	0	1	
Linseed	Mbandaka	1	0
	Senftenberg	1	0
	Tennessee	1	0
Palm Kernel	Agona	2	0
	Emek	0	1
	Havana	1	0
	Rissen	0	1
	Ruiru	1	0
	Senftenberg	0	1
	Tennessee	1	1
	3,19:-:-	1	0
Rape	Agama	2	0
	Agona	1	1
	Binza	0	1
	Cubana	0	1
	Give	1	0
	Havana	0	7
	Livingstone	0	2
	Mbandaka	14	18

Table 74 (continued): The serotypes of *Salmonella* in feedingstuff ingredients 2006, compared with the previous year

Feedingstuff	<i>Salmonella</i> serotype	Isolations 2005	Isolations 2006
	Montevideo	0	4
	Ohio	0	1
	Oranienburg	1	0
	Orion	0	1
	Rissen	75	34
	Senftenberg	3	1
	Stanleyville	0	1
	Tennessee	6	1
	Umbilo	0	1
	Virchow	0	1
	4:b:-	5	0
	4,12:-:-	0	1
	6,7:-:-	1	0
Rice Bran	Anatum	1	0
	Cubana	1	0
	Mbandaka	1	0
	Typhimurium	1	0
Soya	Adelaide	0	1
	Agama	2	0
	Agona	6	5
	Alachua	1	0
	Bredeney	0	1
	Cerro	0	1
	Corvallis	1	1
	Cubana	2	0
	Derby	0	1
	Dublin	0	1
	Ealing	1	0
	Give	0	1
	Havana	2	2
	Infantis	0	4
	Jerusalem	1	0
	Kottbus	0	1
	Lexington	0	1
	Livingstone	2	1
	Mbandaka	5	2
	Meleagridis	1	1
	Montevideo	0	1
	Orion	1	1
	Poona	1	0
	Rissen	0	1
	Schwarzengrund	0	3
	Senftenberg	17	3
	Soerenga	1	0
	Sundsvall	0	1
	Tennessee	2	1
	Typhimurium	0	1

Table 74 (continued): The serotypes of *Salmonella* in feedingstuff ingredients 2006, compared with the previous year

Feedingstuff	<i>Salmonella</i> serotype	Isolations 2005	Isolations 2006
	Yoruba	11	2
	16:-:l,w	1	0
	3,10:rough:-	1	0
	3,19:-:-	3	0
	3,19:i:-	1	0
	3,19:rough:-	1	1
	4:b:-	1	0
	6,7:-:l,w	1	0
	9:12:-:-	1	0
	9,46:-:-	0	1
Sunflower	Give	0	3
	Havana	1	0
	Lexington	0	1
	Senftenberg	4	5
	Tennessee	0	1
	6,7:z10:-	1	0
Wheat	Agama	1	0
	Berta	1	0
	Hadar	1	0
	Kedougou	2	0
	Nagoya	1	0
	Typhimurium	2	0
Fishmeal	Agona	0	1
	Anatum	1	0
	Cerro	1	1
	Give	2	0
	Fresno	0	1
	Hadar	0	1
	Havana	1	2
	Indiana	1	0
	Mbandaka	1	0
	Montevideo	2	1
	Oslo	1	0
	Rissen	1	0
	Tennessee	0	3
	3,19:rough:-	0	1
	6,7:-:-	0	2
	8,20:z4,z23:-	0	1
Other	Abony	0	1
	Agama	2	4
	Agona	7	3
	Ajiobo	0	1
	Anatum	26	6
	Bovis morbificans	1	0
	Cannstatt	0	1

Table 74 (continued): The serotypes of *Salmonella* in feedingstuff ingredients 2006, compared with the previous year

Feedingstuff	<i>Salmonella</i> serotype	Isolations 2005	Isolations 2006
	Corvallis	1	0
	Cubana	1	0
	Derby	4	2
	Dublin	1	0
	Ealing	1	0
	Enteritidis	2	0
	Give	0	1
	Hartford	1	0
	Havana	0	1
	Indiana	1	0
	Isangi	0	1
	Kedougou	2	2
	Kingston	1	0
	Livingstone	6	0
	Malstatt	0	1
	Mbandaka	3	0
	Meleagridis	1	1
	Montevideo	3	3
	Orion	1	0
	Paratyphi B var Java	1	0
	Reading	1	0
	Rissen	2	0
	Schwarzengrund	3	1
	Senftenberg	1	5
	Tennessee	12	4
	Typhimurium	6	0
	Virchow	1	0
	Yoruba	3	0
	Untyped	4	0
	3,19:rough:-	0	1
Mill environment	Agama	8	2
	Indiana	1	0
	Kedougou	0	1
	Kottbus	0	1
	Mbandaka	3	0
	Senftenberg	1	0
	4,12:-:1,5	1	0
	4,12:d:-	0	1
Unspecified	Agama	4	1
	Agona	14	1
	Anatum	2	0
	Bredeney	1	0
	Butantan	0	1
	Corvallis	0	2
	Derby	3	0
	Dublin	1	0
	Goldcoast	1	0
	Indiana	2	0

Table 74 (continued): The serotypes of *Salmonella* in feedingstuff ingredients 2006, compared with the previous year

Feedingstuff	<i>Salmonella</i> serotype	Isolations 2005	Isolations 2006
	Infantis	1	0
	Havana	0	1
	Kedougou	2	0
	Kentucky	1	0
	Kingston	2	0
	Lexington	1	0
	Livingstone	1	0
	Lille	1	0
	Mbandaka	2	0
	Meleagridis	1	0
	Montevideo	8	9
	Ohio	2	1
	Oranienburg	1	0
	Oslo	1	1
	Rissen	4	0
	Schwarzengrund	0	1
	Senftenberg	4	0
	Stanleyville	0	1
	Tennessee	1	0
	Thompson	1	0
	Typhimurium	2	4
	Utah	0	1
	Wangata	1	0
	Welikade	1	0
	Yoruba	1	0
	Rough	1	0
	4,12:d:-	0	1

Table 75: Animal By-Products Regulations 2005 - domestic protein official testing - contamination rates in 2006 compared with the previous year

Sample Type	Batches Tested in 2005			Batches Tested in 2006		
	No	+ve	% +ve	No	+ve	% +ve
Blood meal	3	0	-	1	0	-
Bone meal	0	0	-	1	0	-
Feather meal	37	0	-	13	0	-
Poultry Offal Meal	30	2	6.7	13	0	-
Meat & Bone Meal	18	3	16.7	21	1	4.76
Greaves	8	0	-	10	0	-
Herring Meal	3	1	33.3	1	0	-
Other Fish Meal	12	0	-	7	1	14.29
White Fish Meal	5	0	-	9	0	-
Others	171	2	1.2	160	2	1.25
Unspecified	0	0	-	6	0	-
Total	287	8	2.8	242	4	1.65

NB: This table excludes the results of private testing

**Fig 46: Contamination rate - domestic processed animal protein
(official and private testing - batches) 1997 - 2006**

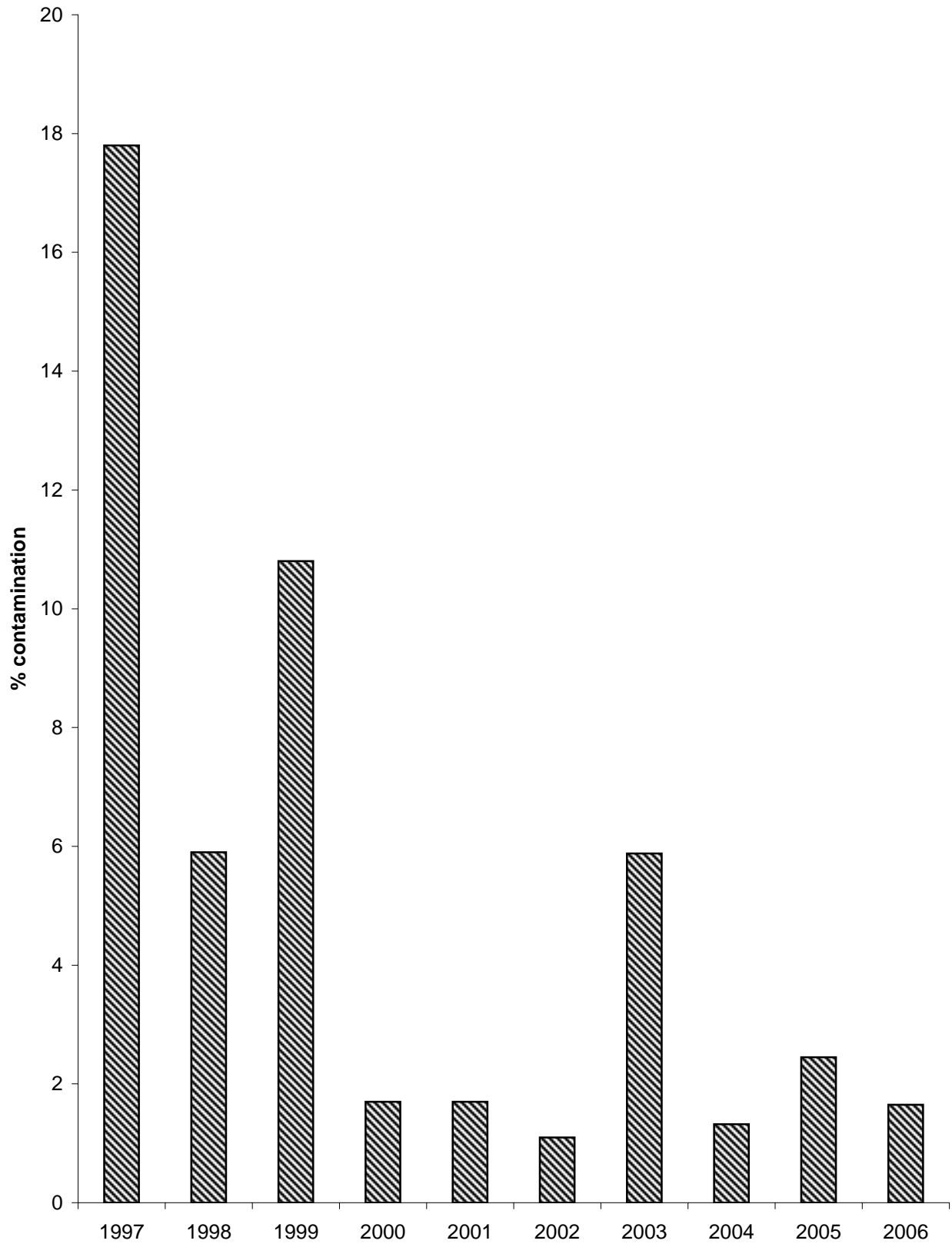


Table 76: Animal By-Products Regulations 2005 - serotypes isolated during 2006 from official and private testing of domestic protein, compared with previous year

<i>Salmonella</i> serotype	Isolations 2005	<i>Salmonella</i> serotype	Isolations 2006
Montevideo	7	Montevideo	4
Indiana	3		
Schwarzengrund	2		
Anatum	1		
Total isolations	13	Total isolations	4
No. of positive batches	8	No. of positive batches	4

Table 77: The Importation of Processed Animal Protein Order, 1981 - imported protein contamination rates in 2006, compared with the previous year

Sample Type	Batches Tested in 2005			Batches Tested in 2006		
	No	+ve	% +ve	No	+ve	% +ve
Meat & Bone Meal	4	1	25.0	1	0	-
Other Fish Meal	61	1	1.6	39	0	-
Others	5	0	-	4	0	-
Total	70	2	2.9	44	0	-

Fig 47: Contamination rate: imported processed animal protein (batches tested) 1997 - 2006

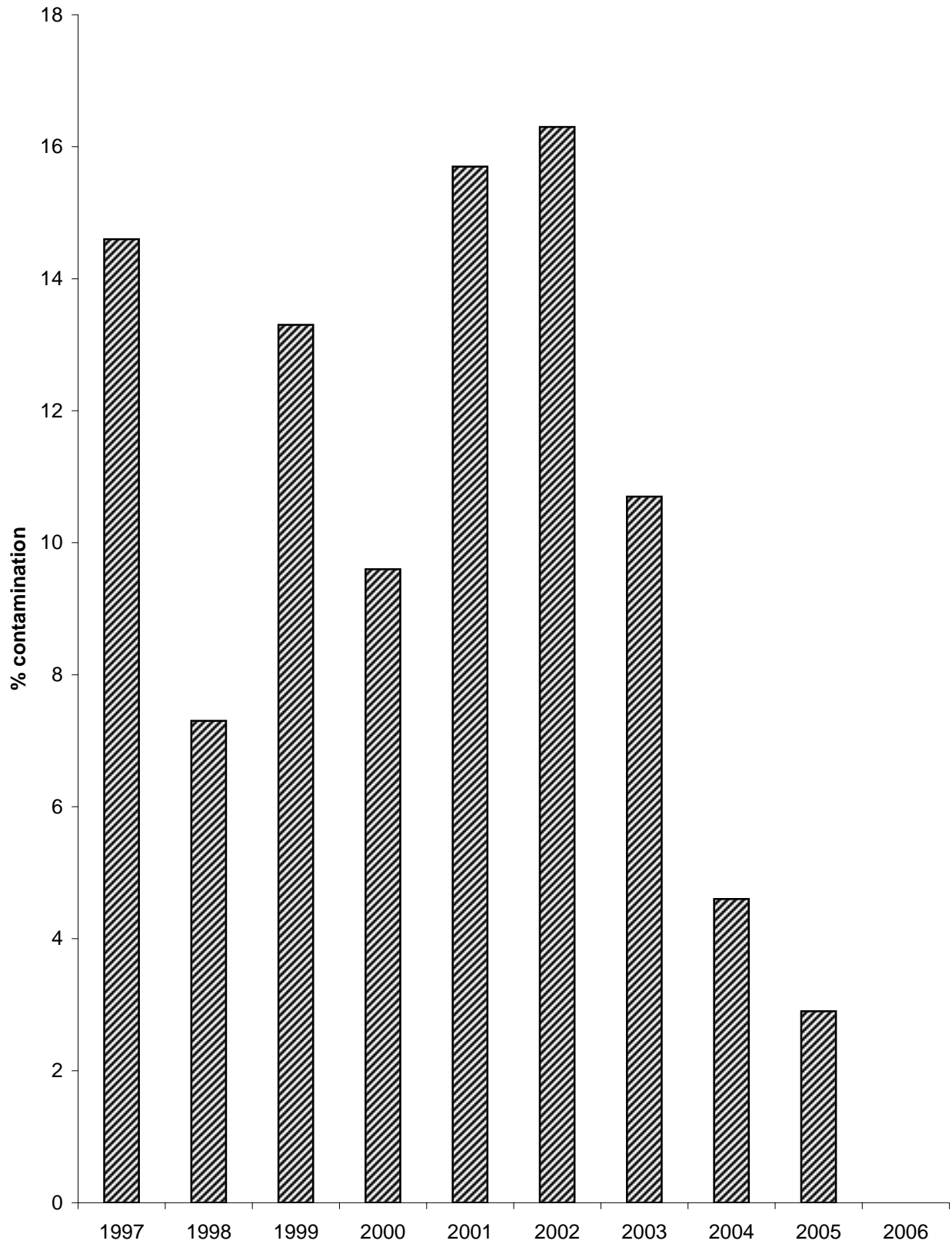


Table 78: The Importation of Processed Animal Protein Order, 1981 - serotypes isolated during 2006 from imported protein, compared with the previous year

<i>Salmonella</i> serotype	Isolations 2005	<i>Salmonella</i> serotype	Isolations 2006
Anatum	2		
Infantis	2		
6,7:-:-	2		
Agona	1		
Livingstone	1		
Total isolations	8	Total isolations	0
No. of positive batches	2	No. of positive batches	0