

# An overview of implementation of the programme for *Salmonella* control in *Gallus gallus* and *Meleagris gallopavo* flocks in 2014

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## Abstract

The mandatory programme to control *Salmonella* covers all *Gallus gallus* and *Meleagris gallopavo* flocks. The infection rate in flocks of breeders and future breeders of the species *Gallus gallus* rose in 2014 as compared to 2013. The infection rate for *Salmonella* Enteritidis and Typhimurium in units for laying hens producing eggs for human consumption also rose sharply. In turkey sector breeder units, the number of cases of infection remained stable. And last, the number of broiler chickens and fattening turkeys in which *Salmonella* Enteritidis and *Salmonella* Typhimurium were detected rose slightly. When looking at all the sectors except breeder turkeys, this rise was mainly due to increased presence of *Salmonella* Enteritidis. Overall control programme costs rose in proportion with the rise in the number of cases.

## Keywords

*Salmonella*, Epidemiological surveillance, Health rules, *Gallus gallus*, *Meleagris gallopavo*

## Résumé

**Bilan d'exécution du programme de lutte contre *Salmonella* dans les troupeaux des espèces *Gallus gallus* et *Meleagris gallopavo* en 2014**

Le programme de lutte obligatoire contre les salmonelles concerne tous les troupeaux de *Gallus gallus* et de *Meleagris gallopavo*. Le taux d'infection dans les troupeaux de futurs reproducteurs et reproducteurs de l'espèce *Gallus gallus* a augmenté en 2014, comparé à 2013. Le taux d'infection vis-à-vis de *Salmonella* Enteritidis et Typhimurium à l'étage poulespondeuses d'œufs de consommation a également fortement augmenté. À l'étage reproducteur de la filière dinde, le nombre de cas d'infection est resté stable. Enfin, le nombre de troupeaux de poulets de chair et de dindes d'engraissement, dans lesquels *Salmonella* Enteritidis et *Salmonella* Typhimurium ont été détectées, a légèrement augmenté. Pour l'ensemble des filières hors dindes de reproduction, l'augmentation est largement due à la présence accrue de *Salmonella* Enteritidis. Le coût global du programme de lutte est en augmentation, en proportion avec l'augmentation du nombre de cas.

## Mots-clés

*Salmonella*, épidémiologie, police sanitaire, *Gallus gallus*, *Meleagris gallopavo*

The presentation of the annual review aims to estimate prevalence in *Gallus* in the broiler and layer sectors, and in turkeys, in the different breeding and production levels. With regard to the objectives set by the European regulations for each of these compartments, apart from pre-adult periods, these prevalences are analysed over time. The changes observed can then be compared with different parameters.

## Testing programme

In 2014, 83,459 flocks were tested (Table 1), of which 1.2% were primary breeder flocks, 4.8% multiplier flocks, 8.7% table egg-layer flocks and 85.3% turkey or chicken meat-producing flocks.

At the primary breeding level, *Gallus gallus* broilers accounted for 78.6% of the tested flocks, *Gallus gallus* layers, 9.8% and turkeys, 11.6%. At the multiplier level, *Gallus gallus* broiler flocks accounted for 65.6% of the tested flocks, *Gallus gallus* layer flocks, 5.7% and turkey flocks, 28.9%.

The positive cases involving Category 1 *Salmonella* health hazards for all *Gallus gallus* and *Meleagris gallopavo* sectors are given in Table 2.

### Turkey breeder flocks

In 2014, the prevalence was 0.41% in turkey breeder flocks, which is much lower than the European target of 1% set by Regulation (EU) No 1190/2012. Since 2010, the prevalence rate has been consistently low, oscillating between 0 and 0.42%, which is equivalent to between zero and three cases per year.

As in previous years, serotype Typhimurium (both *sensu stricto* and its variants) was present in this sector (two cases out of three).

### *Gallus gallus* breeder flocks (multiplier level of the broiler and layer sectors)

No cases were identified in the breeding level of the table-egg laying sector.

**Table 1.** Number of flocks tested and number of birds covered by the programme in 2014

Sector and stage	Number of flocks tested	Total number of animals covered by the programme
<b><i>Meleagris gallopavo</i> - breeding level</b>		
Pre-adult primary breeder	57	154,014
Adult primary breeder	59	111,215
Pre-adult multiplier	493	2,175,116
Adult multiplier	670	1,796,940
<b><i>Gallus gallus</i> - broiler sector - breeding level</b>		
Pre-adult primary breeder	410	2,896,240
Adult primary breeder	374	2,024,088
Pre-adult multiplier	1,199	11,804,155
Adult multiplier	1,442	13,022,702
<b><i>Gallus gallus</i> - layer sector - breeding level</b>		
Pre-adult primary breeder	45	368,100
Adult primary breeder	53	535,936
Pre-adult multiplier	93	1,232,994
Adult multiplier	135	1,488,645
<b><i>Gallus gallus</i> - layer sector - production level</b>		
Pre-adult table egg layers (pullets)	2,387	57,288,000
Adult table egg layers	4,928	76,093,248
<b><i>Gallus gallus</i> and <i>Meleagris gallopavo</i> - production level</b>		
Meat production (broilers and fattening turkeys)	71,414	830,901,890
<b>Total</b>	<b>83,759</b>	<b>1,001,893,283</b>

### Objectives of the surveillance programme

The ultimate purpose of *Salmonella* surveillance in poultry flocks is to prevent the occurrence of food-borne diseases. For this, the overall objective of the surveillance is to detect the presence of any infection by *Salmonella* in the targeted poultry sectors for the purpose of enabling appropriate control measures to be established. *Salmonella* bacteria are generally transmitted vertically through the different levels of the breeding scheme; surveillance therefore involve not only poultry raised for food production (eggs, meat), but also poultry reared for breeding purposes. The specific objectives of the surveillance programme are as follows:

- to detect, control and eradicate infections by Category 1 health hazard *Salmonella* serotypes, as defined by Decree No 2012-845 of 30 June 2012, with the aim of reducing their prevalence and the risk that they present to public health,
- to assess the progress made in light of the obtained results,
- to monitor the emergence of any *Salmonella* serotypes.

### The population monitored

For *Salmonella* serotypes classified as Category 1 health hazards, French regulations include the following variants in their definition of *Salmonella* Typhimurium: 1,4,[5],12,i-, 1,4,[5],12,-:1,2 and 1,4,[5],12,-:: (Table 1)

**Table 1.** Poultry populations monitored with regard to *Salmonella*

	<i>Salmonella</i> Enteritidis	<i>Salmonella</i> Hadar	<i>Salmonella</i> Infantis	<i>Salmonella</i> Typhimurium	<i>Salmonella</i> Virchow
Breeder flocks <i>Gallus gallus</i>	x	x	x	x	x
Breeder flocks <i>Meleagris gallopavo</i>	x			x	
Layer flocks <i>Gallus gallus</i>	x			x	
Broiler flocks <i>Gallus gallus</i> et <i>Meleagris gallopavo</i>	x			x	

Surveillance covers flocks of *Gallus gallus* (hens and chickens) and *Meleagris gallopavo* (turkeys), irrespective of their level in the poultry breeding scheme, their geographic location or their epidemiological situation (Table 1), with the exception of small flocks (less than 250 birds).

### Surveillance procedures

Samples are taken by a mandated veterinarian, by a technician designated and trained in veterinary sampling techniques by a mandated veterinarian, or by DDecPP/DAAF staff technicians:

- In poultry farms and hatcheries, the minimum frequencies and the basic sampling programme are set by European regulations; French regulations voluntarily extended these regulations;
- For other *Salmonella* serotypes (Category 2 health hazards): epidemiological surveillance based on a systematic sampling programme carried out before moving or culling any poultry flock.

It should be noted that since 2013, all farms with more than 250 adult breeding turkeys have been subject to official controls, whereas previously the European regulations only required sampling of 10%.

### Health control measures (for Category 1 health hazard *Salmonella* serotypes)

Control measures remain unchanged since 2009; they were extended to turkey flocks in 2010.

- Suspicions are based on any positive result from samples taken in the environment of a poultry flock. The suspected flock is then placed under a prefectural monitoring order (APMS) that imposes restrictions on the sale of poultry from these flocks. The DDecPP/DAAF orders a series of official samples to confirm or disprove infection. Suspicion is disconfirmed if two successive series of samples test negative; infection is confirmed if one of the samples tests positive. However, for broilers and fattening turkeys, no systematic confirmatory tests have been performed since the abolition of confirmatory sampling on

muscles by the Ministerial Order of 24 April 2013; the APMS issued after a first positive test is sufficient for health control measures to be implemented.

- Confirmation: In the event of a confirmed infection, the poultry farm is declared infected by the prefecture (APDI) and health control measures vary with production type. In all cases, cleaning and disinfection operations must precede repopulation with a new batch.
  - > For breeders or pullets (future table egg-laying hens), mandatory preventive elimination of poultry and waste;
  - > For table egg-laying hens, preventive elimination is strongly encouraged by offering compensation to the farm operator, but is not mandatory; however, eggs from an infected flock can only be sold to the food-processing industry where they undergo heat treatment;
  - > The cleaning and disinfection operations are of utmost importance; the effectiveness of these operations must be officially validated before repopulation, and compensation is contingent upon this inspection.

For broilers, the new Ministerial Order of 24 April 2013 included the following amendments:

- > confirmatory sampling is limited to special cases that will be described in detail in a forthcoming ministerial memorandum, in case of risk of spread to layer or breeder holdings,
- > if confirmatory samples are also positive (i.e. APDI declaration), the entire flock can be culled shortly thereafter (depending on the risk of contamination for exposed holdings),
- > implementation of Regulations (EU) No 200/2012 (regarding broilers) and No 1190/2012 (regarding fattening turkeys) extending the validity of test results to 6 weeks before culling for long fattening periods (i.e. 81 days for broilers, 100 days for turkeys) or in organic poultry production.

The strains isolated for testing are held at the ANSES Ploufragan-Plouzané Laboratory, the National Reference Laboratory (NRL) for *Salmonella*. This strain collection can be used for retrospective typing studies or antimicrobial resistance profiles.

## Regulatory References

European Regulation (EC) No 2160/2003 lays down the general framework for controlling *Salmonella* infections in the poultry sector in Member States (MSs). Specific regulations for implementing EU legislation define the prevalence targets and the details of the testing programme (sampling protocol, duties of the farm operators and competent authorities, laboratory analyses):

- Regulation (EU) No 200/2010 for adult breeding flocks of *Gallus gallus*,
- Regulation (EU) No 517/2011 for laying hens of *Gallus gallus*,
- Regulation (EU) No 200/2012 for flocks of broilers,
- Regulation (EU) No 1190/2012 for fattening and breeding flocks of turkeys.

The French national control programme was progressively aligned with European regulations as it was being developed:

- Ministerial Orders of 26 February 2008 regarding flocks of *Gallus gallus* breeding hens and table egg-laying hens,
- Ministerial Order of 4 December 2009 as amended regarding breeding turkeys;
- Ministerial Order of 24 April 2013 as amended regarding broilers and fattening turkeys.

**Table 2.** Number of flocks infected with regulated *Salmonella* strains in France in 2014

Sector	Stage	SE	SE associated with ST	ST	ST i:-variant	ST -:1,2 variant	ST -:variant	SH	SV	SI	TOTAL
Turkey breeder	Pre-adult primary breeder							NA	NA	NA	0
	Adult primary breeder							NA	NA	NA	0
	Pre-adult multiplier				1			NA	NA	NA	1
	Adult multiplier	1		1	1			NA	NA	NA	3
<i>Gallus gallus</i> breeders - broiler sector	Pre-adult primary breeder										0
	Adult primary breeder										0
	Pre-adult multiplier	2		0				1	1	0	4
	Adult multiplier	5		5				0	0	1	11
<i>Gallus gallus</i> breeders - layer sector	Pre-adult primary breeder										0
	Adult primary breeder										0
	Pre-adult multiplier										0
	Adult multiplier										0
	Pre-adult table egg layer (pullet)	2		2	5	1		NA	NA	NA	10
	Table egg layer	37	1	16	3	0		NA	NA	NA	57
Broiler and fattening turkey	Meat production	135		265	57	8	24	NA	NA	NA	489
<b>TOTAL</b>		<b>182</b>	<b>1</b>	<b>289</b>	<b>67</b>	<b>9</b>	<b>24</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>575</b>

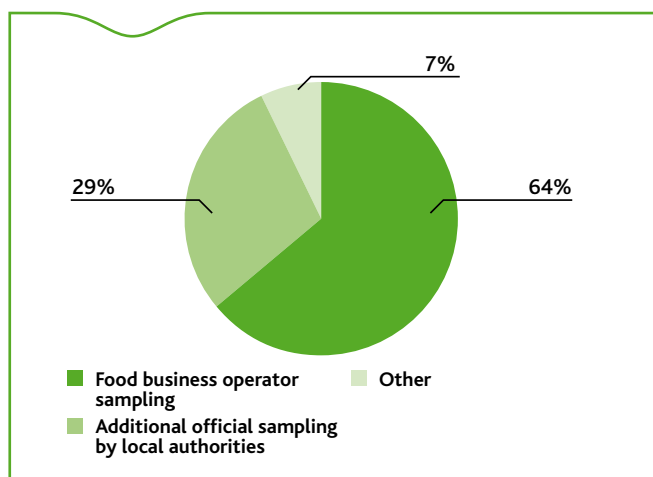
Caption: SE: *Salmonella* Enteritidis, SH: *Salmonella* Hadar, SI: *Salmonella* Infantis, ST: *Salmonella* Typhimurium, SV: *Salmonella* Virchow, NA: Not applicable

Since 2011, serotype Enteritidis had been absent or had a low presence in both sectors, broiler and layer.

In 2014, it reappeared in the broiler sector with two cases (out of four) at the pre-adult stage and five cases (out of 11) at the adult stage.

Regarding the remaining cases in the broiler sector, five flocks tested positive for Typhimurium. The other three positive flocks relate to serotypes Hadar and Virchow in pre-adult, and Infantis in the adult stage.

The overall infection rate, for all breeding and production levels, was 0.23% for pre-adult breeders (0.36% in 2013) and 0.55% for adult breeders (0.11% in 2013), which is lower than the European target of 1% for adult breeders as set by Regulation (EU) No 200/2010. Due to the cases detected in the broiler sector at the adult stage, the total number of positive flocks has therefore increased significantly at the multiplier level compared to 2013 (Chasset *et al.*, 2014).



**Figure 1.** Detection of suspected cases of infection with *Salmonella* Enteritidis and *Salmonella* Typhimurium at the table egg-layer level in 2014

### Laying hen flocks

At the production level in the French layer sector, European Regulation (EU) No 517/2011 targets a 10% reduction in the prevalence of *Salmonella* Enteritidis and *Salmonella* Typhimurium every year, or a stable rate of less than 2%. The targeted percentage of reduction in prevalence was set on the basis of an EU-wide baseline survey in 2005 (8% observed in France).

In 2014, as has been the case since 2010 (Chasset *et al.*, 2014), the targeted prevalence rate of less than 2% in layer flocks was met, with a value of 1.16% compared with 1.42% in 2012, and 0.58% in 2013 (Table 2). Thus, in 2014, a renewed increase in the number of cases was observed compared with 2013. This increase is mainly due to a significant number of flocks testing positive for the serotype Enteritidis, representing two-thirds of positive cases in this year. In pullets (future egg-laying hens), ten cases were detected, double the number for 2013.

The rate of unconfirmed results in laying hens was similar to that of 2013, at approximately 50%.

For the table egg-layer production level in 2014, the distribution of suspected cases of infection with *Salmonella* Enteritidis and *Salmonella* Typhimurium is shown in Figure 1. Two-thirds of the suspected cases were detected through mandatory screening carried out by poultry farm operators.

The number of screening operations performed by operators was on average six times higher than those carried out by the State services. Nevertheless, as can be seen in Figure 1, the operators only detected twice as many cases of *Salmonella* as the State services. Screening carried out by the State services is therefore three times more effective than that carried out by the professionals.

### Flocks of broiler chickens and fattening turkeys

The results obtained in 2014 (489 cases) were higher compared to 2013 (455 cases) and represent a net increase compared to 2012 (364 cases). However, they remain within the European target set by Regulations (EU) No 200/2012 and (EU) No 1190/2012 for the end of 2012: i.e. less than 1%. With 19% of the national share of broiler flocks testing positive, Reunion Island contributes, as in the previous year, to this increase with regard to serotype ST. With 38 cases in 2014,

**Table 3.** Changes in prevalence since 2007 and comparison with the European targets since 2010 for all the poultry sectors involved in the control programme for *Salmonella*

Sector	Stage	2007	2008	2009	European target	2010	2011	2012	2013	2014
<b><i>Meleagris gallopavo</i> - breeding level</b>	Pre-adult breeder	NA	NA	NA	NA	0.22%	0.70%	0.36%	0.00%	0.18%
	Adult breeder	NA	NA	NA	1.00%	0.00%	0.30%	0.11%	0.42%	0.41%
<b><i>Gallus gallus</i> - breeding level</b>	Pre-adult breeder	0.57%	0.45%	0.26%	NA	0.00%	0.07%	0.47%	0.36%	0.23%
	Adult breeder	0.69%	0.54%	0.26%	1.00%	0.47%	0.30%	0.13%	0.11%	0.55%
<b><i>Gallus gallus</i> - Table egg production level</b>	Pullet	0.66%	0.48%	0.54%	NA	0.13%	0.15%	0.10%	0.16%	0.38%
	Layer	3.85%	3.16%	2.56%	2.00%	1.62%	1.45%	1.42%	0.58%	1.16%
<b>Broiler and fattening turkey</b>	Meat production	NA	NA	0.52%	1.00%	0.49%	0.54%	0.50%	0.58%	0.64%

**Table 4.** Changes in prevalence for breeder flocks of *Gallus gallus* in the broiler and table egg-layer sectors since 2004 (expressed as a %)

Breeding level	Stage	SE												ST including its variants											
		04	05	06	07	08	09	10	11	12	13	14	04	05	06	07	08	09	10	11	12	13	14		
<b><i>Gallus gallus</i> breeders - layer sector</b>																									
Primary breeders	pre-adult	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	adult	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Multipliers	pre-adult	0	0	0	0	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.44	0		
	adult	0	0	0	0.88	0	0	0.77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
<b><i>Gallus gallus</i> breeders - broiler sector</b>																									
Primary breeders	pre-adult	0	0	0	1.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.66	0	0			
	adult	0	0	1.4	0	0	1.7	0	0	0	0	0	0	0	0	0	0	0	0.52	0.71	0	0			
Multipliers	pre-adult	0	0	0.1	0.12	0.6	0.2	0	0	0	0.09	0.17	0	0	0.1	0.2	0	0	0	0.47	0.09	0			
	adult	0.2	0.6	0.2	0.33	0.1	0.1	0.3	0	0	0.08	0.35	0.1	0.1	0.1	0	0.6	0	0.23	0.3	0.05	0.08	0.35		

**Table 5.** Impact of health control measures on production in 2014

Sector and stage	Number of flocks positive for Category 1 health hazard <i>Salmonella</i> in 2014	Number of flocks slaughtered or culled	Number of animals slaughtered or culled	Number of destroyed or heat-treated eggs
<b><i>Meleagris gallopavo</i> - breeding level</b>				
Pre-adult primary breeder	0	0	0	NA
Adult primary breeder	0	0	0	0
Pre-adult multiplier	1	1	4,964	NA
Adult multiplier	3	3	12,182	94,900
<b><i>Gallus gallus</i> - broiler sector - breeding level</b>				
Pre-adult primary breeder	0	0	0	NA
Adult primary breeder	0	0	0	0
Pre-adult multiplier	4	4	46,912	NA
Adult multiplier	11	11	78,658	614,740
<b><i>Gallus gallus</i> - layer sector - breeding level</b>				
Pre-adult primary breeder	0	0	0	NA
Adult primary breeder	0	0	0	0
Pre-adult multiplier	0	0	0	NA
Adult multiplier	0	0	0	0
<b><i>Gallus gallus</i> - layer sector - production level</b>				
Pre-adult table egg layers (pullets)	10	10	201,940	NA
Adult table egg layers	57	56	417,151	6,698,648
<b><i>Gallus gallus</i> - broiler sector and <i>Meleagris gallopavo</i> - production level</b>				
Meat production (broilers and fattening turkeys)	489	489	3,856,589	NA
<b>TOTAL</b>	<b>575</b>	<b>574</b>	<b>4,618,396</b>	<b>7,408,288</b>

or almost 8% of the total, compared to 15 cases in 2013, the Drôme is the second *département* making a significant contribution to this increase in prevalence.

Variants of *Salmonella* serotype Typhimurium were present in flocks of broiler chickens and fattening turkeys, particularly the monophasic variant 1,4,[5],12,i:-. For the first time, the variant 1,4,[5],12,-:- was frequent, with 24 cases (Table 2).

## Changes in prevalence

A favourable change in prevalence has been observed since control programmes for *Salmonella* were set up in the various poultry sectors, with the exception of the broiler sector (Table 3). However, this year prevalence was significantly higher than in the previous year for all the sectors. Regarding breeder turkeys, the number of annual cases remains low, because the number of flocks and thus the number tested is itself low.

European regulations set targets for prevalence, as mentioned above, for each sector, which are then only calculated on adults for the regulated *Salmonella*, including the 1,4,[5],12,i:-, variant and to the exclusion of other variants. European targets have thus always been met in France in all four poultry sectors.

Regarding breeder flocks, detailed results for the breeding and multiplier levels are given for the layer and broiler sectors (Table 4). It appears that the layer sector, with a few exceptions, most often has zero annual prevalence, whereas the broiler sector, with a higher frequency and number of infections, must be monitored carefully, given the significant increase in 2014.

## Control measures

Application of health control measures in breeders and layer hens continued to have a significant impact in 2014, with the elimination of 87 flocks (including 57 layer flocks), 761,807 birds and the destruction or heat treatment of around seven million table eggs (Table 5). It should be noted that positive broiler poultry flocks are slaughtered at the end of their fattening period, with nevertheless specific measures at the slaughterhouse, such as slaughter at the end of the line, and removal of offal for appropriate heat treatment. They are therefore not included in the numbers of flocks destroyed for health reasons.

## Changes in the costs of control measures and official analyses

The budget for the control programme for *Salmonella* allotted by the French government to health measures continually decreased until 2012 in line with the fall in the number of infected flocks. However, in 2013, and even more so in 2014, expenditure on the control programme increased, due to the rise in the number of cases (Figure 2). Costs cover the confirmatory analyses and the analyses undertaken upon inspection of cleaning and disinfection operations, financial compensation for animals slaughtered or culled following an administrative order, the destruction or heat treatment of eggs, cleaning and disinfection operations, involvement of mandated veterinarians and various other fees related to the control programme. Compensation accounts for the majority of expenditure and its annual amount varies greatly depending on the type, age and size of the contaminated flocks.

The overall cost of the official analyses is stable with a budget of approximately €450,000 per year, with the same number of analyses and the cost of the analyses increasing only moderately.

For all the sums spent by the French government, there is a European 50% co-funding scheme for the compensation of slaughtered or culled animals and destroyed eggs and for official analyses. For 2014, the upper limit granted to France was reached (€1,360,000).

## Discussion

The mandatory *Salmonella* control programme that covers all *Gallus gallus* and *Meleagris gallopavo* flocks was assessed by the EU's Food and Veterinary Office (FVO) during an audit conducted from 19 to 29 November 2013. The FVO particularly focused on compliance with the quality and frequency of screening, the control of the competent authority over screening carried out by the professionals, and the levels of sampling required for the official screening.

The report concluded that the programme is implemented correctly throughout the whole of France. However, it made a series of recommendations. It can be consulted on the internet ([http://ec.europa.eu/food/fvo/audit\\_reports/details.cfm?rep\\_id=3280](http://ec.europa.eu/food/fvo/audit_reports/details.cfm?rep_id=3280)).

Overall, the results from 2014 were less favourable than those of 2013 (Chasset *et al.*, 2013).

The national control programme for *Salmonella* implemented since 1998 in *Gallus gallus* breeder flocks and layer flocks, since extended to broiler and turkey flocks, provides satisfactory results and the overall cost of the programme had been decreasing gradually, before increasing again from 2013, on a like-for-like basis.

For the *Gallus gallus* breeding level, the infection rate rose in 2014. Although the number of positive flocks at this level is still relatively low (around 15 per year, with APMSs or suspicions nevertheless totalling 44 cases), the public health and economic consequences of these infections are potentially high. In the layer sector at the production level, the number of infections also increased in 2014. At the breeding level in the turkey sector, the number of cases of infection has remained stable. As noted for *Gallus gallus* breeder flocks, the public health and economic consequences of these infections are potentially high. In the broiler sector, the infection rate increased slightly, with *Salmonella* Enteritidis being especially implicated.

Implementing biosafety measures to avoid introducing and spreading pathogens in poultry farms, particularly in holdings with breeders or laying hens that for the most part have adopted a disease control charter, have continued to prove useful in the control programme for *Salmonella* in *Gallus gallus* and turkey flocks. Meanwhile, given the increase in prevalence, greater vigilance is needed

The number of infections increased significantly in 2014, in large part due to the increase in the serotype *Salmonella* Enteritidis, all sectors combined. Some of the detected cases that tested positive for *Salmonella* Enteritidis in broiler flocks could be due to vertical contamination: two large broiler hatcheries were contaminated by this serotype in 2014, as a result of trade (exchanges between hatcheries, often within the EU) in hatching eggs.

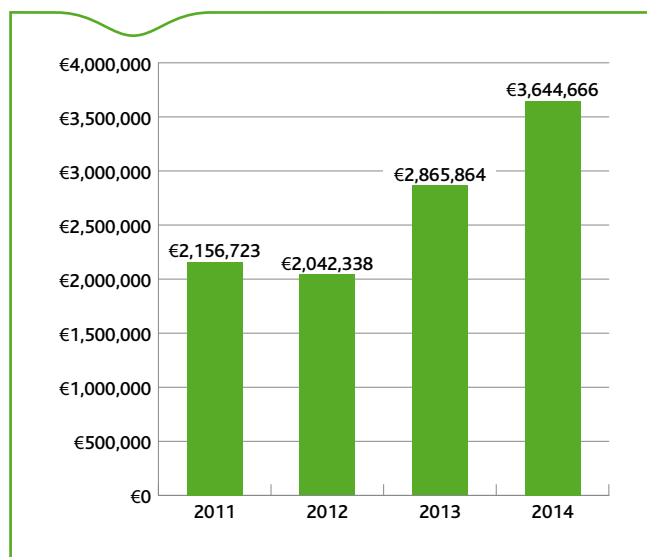


Figure 2. Annual government funds spent for the control programme for *Salmonella* in poultry holdings from 2011 to 2014

The results for 2015 will help determine whether the increase in recorded cases in 2014 was transient or a trend. In any event, a good level of surveillance needs to be ensured, along with the effectiveness of the control programme.

As mentioned in more detail above for laying hens, suspicions were reported primarily from routine mandatory testing carried out by farm operators. However, for an equal number of food business operator sampling and official sampling, *Salmonella* has always been detected more frequently by competent authority inspectors. The effort to raise awareness among professional organisations should be pursued in order to increase the level of detection by farmers.

In addition, these results should be qualified, with the rate of unconfirmed results growing constantly since 2008. Since 2013, the rate of unconfirmed results for *Salmonella* cases has been of the order of 50% for suspicions in layer hen flocks, and even higher in breeder flocks (only one case in three confirmed).

The reasons for the constant increase in the rate of unconfirmed results need to be identified. They may have multiple origins, which can be complex to analyse. For this reason, a formal request has been made to ANSES. The fact that fewer and fewer cases are being confirmed may have the effect of maintaining a minimum level of contamination, or even maintaining the dynamics of contamination, which could explain the threshold effect or the possible resurgence of prevalence that is currently being observed.

When ANSES issues its opinion, a debate will be held on the scope of the criteria for confirmation. Initially, to follow up one of the recommendations of the FVO, confirmations will no longer be systematic, but will require a request to be made by the farmers.

Regarding Reunion Island, a specific plan of action is to be launched, including in certain specific cases the use of an attenuated live vaccine, to reduce the number of holdings contaminated following a resurgence of *Salmonella* Typhimurium. The ultimate objective is to reduce the prevalence of *Salmonella* Typhimurium, which remains high in this overseas *département*.

Regarding the Drôme, the *département* in mainland France concerned by high prevalence of *Salmonella* Enteritidis since the implementation of the control programmes, the action plan implemented since 2010 aimed at reducing these prevalences in both the layer and broiler sectors has not yielded the expected results, despite the efforts undertaken by the State services. A mission scheduled in 2015 is seeking to assess the implementation of the action plan, to adapt it if necessary by prioritising the actions to be taken according to the

priorities chosen and to verify compliance with the regulatory control measures for *Salmonella* and biosecurity.

It should not be forgotten that the ultimate objective of *Salmonella* surveillance in poultry flocks is to prevent the occurrence of foodborne illnesses (FBIs). Indeed, for the years 2009 to 2013, eggs, egg products and poultry meat were responsible for nearly 37% of all *Salmonella* FBIs, with *Salmonella* Typhimurium, Enteritidis and the monophasic variant 1,4,[5],12,i :- of Typhimurium accounting for more than 70% of the serotypes reported. Since 2012, this variant has been at the origin of more FBIs than serotype Enteritidis.

In the farms monitored, *Salmonella* Typhimurium variants represent one-quarter of the cases of *Salmonella* Typhimurium (*sensu lato*) infections. The variant 1,4,[5],12,i :- has been increasing constantly for the last few years, accounting for two-thirds of variants of Typhimurium. With nine cases, the variant 1,4,[5],12,-:1.2 has represented a non-negligible proportion of infections since 2013. Unlike in previous years, the non-motile variant 1,4,[5],12,-:- was present in 2014 with 24 cases in broiler poultry. Fully consistent with the development of *Salmonella* FBIs, the control measures are therefore justified in the first place for *Salmonella* Typhimurium, Enteritidis and the monophasic variant 1,4,[5],12,i:- of Typhimurium. For the other two variants, not included so far in the surveillance and control programmes at the European level, the trends should be monitored in the coming years.

The analyses carried out at the end of a flock production cycle before slaughter help to monitor all non-regulated *Salmonella* serotypes. The control programme, focused on regulated diseases, is thus also useful for monitoring non-regulated serotypes that, once emergent, can become high zoonotic risks, such as *Salmonella* Kentucky CIPR which shows multiple drug resistance (Guillon *et al.*, 2013).

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