

19 June 2023

***Salmonella* control programme – results for 2021: declining trend for *Salmonella* Enteritidis and *Salmonella* Typhimurium in laying hens has not continued**

As part of the EU-wide programme to combat *Salmonella*, the member states compile an annual report on the proportion of *Salmonella*-positive flocks in breeding poultry (*Gallus gallus*), laying hens, broilers and breeding and fattening turkeys. For the national report, the German federal states have forwarded the results of their investigations to the responsible federal authorities for evaluation since 2007. This data is used to compile the annual report on the control programme by the German Federal Institute for Risk Assessment (BfR).

Evaluation of the data for 2021 shows no consistent trend or prevalence of *Salmonella* for all animal species and production types considered in the report, compared to the previous year. Regarding the control-relevant *Salmonella* types (serovars), the control objectives were achieved for all poultry groups considered, except for breeding turkeys. According to the requirements of community law, *Salmonella* serovars relevant for control should be detectable in a maximum of 1 % or 2 % (laying hens) of the flocks examined.

1 Legal foundation for reporting

Article 9 (1) of Directive 2003/99/EC provides that the data on the assessment of national control programmes according to Regulation (EC) No. 2160/2003 is published annually in the report on trends and sources of zoonoses, zoonotic pathogen and antibiotic resistance.

2 Results

In the summarising evaluations, each flock is only shown once, even if it has been checked (“sampled”) several times in accordance with the specifications. The flocks examined overall, *Salmonella*-positive flocks and the proportion of positive flocks are listed in the tables of the examined animal species and production types, both in total and separately for the different examination reasons.

2.1 *Salmonella* control programme in breeding poultry (*Gallus gallus*)

According to Regulation (EU) No. 200/2010, a total of 882 breeding hen flocks were examined in total for all examination reasons (at the instigation of the food business operator and/or as part of official control) during the laying phase (Table 1). The detection rates for *Salmonella* spp. (sum of all serovars) and for the five control-relevant serovars (Top 5¹) from 2007 to 2021 are summarised in Figure 1.

Salmonella was detected in 42 flocks (4.8 %) in 2021 (Table 1). One of the five control-relevant serovars was found in one positive flock (0.1 %) (2020: four flocks, 0.4 %). *S. Enteritidis* was detected in this flock. In the previous year, *S. Enteritidis* had been detected in three flocks and *S. Typhimurium* in one flock. The serovars *S. Hadar* and *S. Virchow* were not discovered in 2021, as in previous years. The serovar *S. Infantis* was last detected in 2017. For 2020, the proportion of breeding hen flocks with positive detection of *Salmonella* was 1.5 %. This shows that in 2021, the increasing trend clearly continued, whereby this increase did not concern control-relevant serovars.

¹ Top 5: *S. Enteritidis*, *S. Typhimurium* (including the monophasic variants), *S. Infantis*, *S. Hadar*, *S. Virchow*

Table 1: Examination of breeding poultry (*Gallus gallus*) according to Regulation (EU) No. 200/2010 in 2021

	Number of flocks examined	<i>Salmonella</i>		<i>S. Enteritidis</i>		<i>S. Typhimurium</i>		Top 5*	
		positive	%	positive	%	positive	%	positive	%
All breeds, total									
Sampling (total)	882	42	4.8	1	0.1	0	0	1	0.1
Of which: Sampling instigated by food business operator	882	41	4.6	0	0	0	0	0	0
Of which: Sampling in connection with official control	872	2	0.2	1	0.1	0	0	1	0.1
Of which laying hen parent-breeding									
Sampling (total)	74	0	0	0	0	0	0	0	0
Of which: Sampling instigated by food business operator	74	0	0	0	0	0	0	0	0
Of which: Sampling in connection with official control	72	0	0	0	0	0	0	0	0
Of which broiler parent-breeding									
Sampling (total)	648	42	6.5	1	0.2	0	0	1	0.2
Of which: Sampling instigated by food business operator	648	41	6.3	0	0	0	0	0	0
Of which: Sampling in connection with official control	645	2	0.3	1	0.2	0	0	1	0.2

* *S. Enteritidis*, *S. Typhimurium* incl. monophasic variant, *S. Hadar*, *S. Infantis* and *S. Virchow*

A total of 872 flocks of breeding hens were examined as part of **official control** (2020: 881). *Salmonella* was detected in two flocks (0.2 %) in 2021 (Table 1). This constitutes a decline of the *Salmonella* rate compared to the previous year (2020: six flocks, 0.7 %). One control-

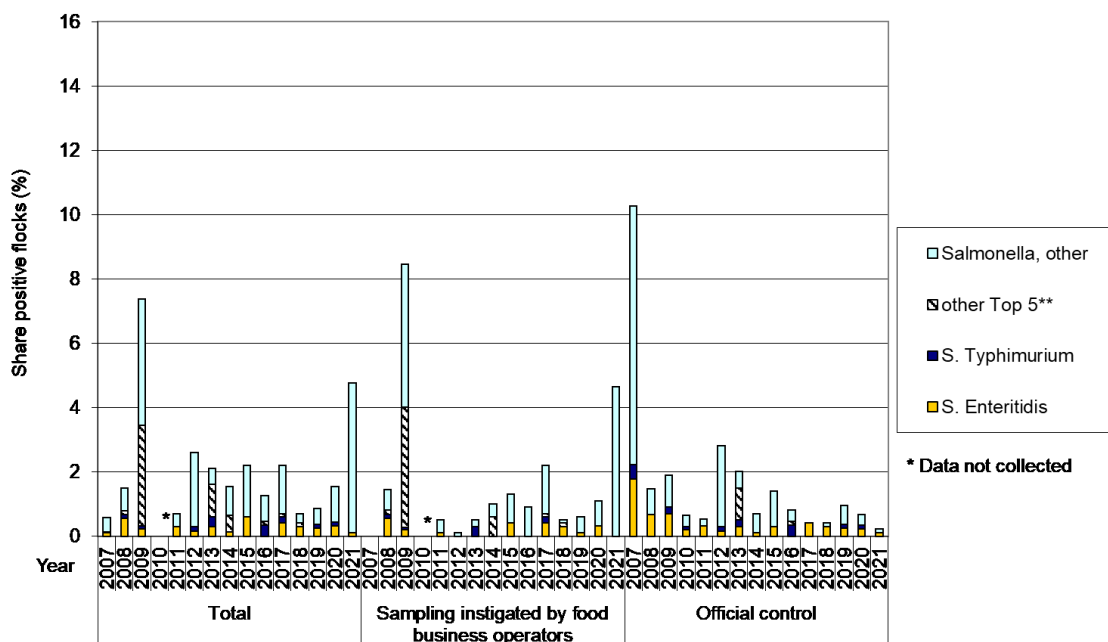
relevant serovar was discovered during the official monitoring in one flock (0.1 %; 2020: three flocks, 0.3 %). It was *S. Enteritidis*.

A total of 3 great-grandparent and 157 grandparent flocks were examined in 2021. *Salmonella* was not detected in any of these flocks. In the previous year, *Salmonella* was found in two grandparent flocks, but no control-relevant serovars. From 2016 to 2019 no great-grandparents and grandparent flocks were found to have *Salmonella*. In contrast, *S. Enteritidis* or *S. Typhimurium* had been reported occasionally between 2013 to 2015.

More precise classification with regard to the production type (egg production line, meat production line) was made for all parent flocks (Table 1). *Salmonella* was not detected in any of the 74 parent flocks in the egg production line (laying hen-parent breeding) but it was in 42 of the 648 parent flocks in the meat production line (broiler-parent breeding 6.5 %). The control-relevant serovar *S. Enteritidis* was detected in one broiler breeder parent flock (0.2 %).

In 2020, *Salmonella* was detected in one parent flock of laying breeders (1.1 %) and 11 flocks of broiler breeders (1.7 %). In 2021, the situation for parent flocks in egg production is more favourable than in the previous year since no *Salmonella* detection was reported. At 6.5 % in 2021, the *Salmonella* detection rate for parent flocks of broiler breeders is significantly above the value of the previous year (2020) at 1.7 %, and even exceeded the range of previous years.

Figure 1: Proportion of flocks of breeding poultry (*Gallus gallus*) from 2007 to 2021, in which *Salmonella* was detected, separated by examination reason and year (** other Top 5 = *S. Hadar*, *S. Infantis*, *S. Virchow*)



Within the examination of breeding poultry (*Gallus gallus*) during rearing, results were reported for a total of 179 flocks examined. Most of the samples were taken at the

operators' instigation. In 2021, as in the previous year, *Salmonella* was not detected in any flock. In 2017, *Salmonella* was detected in a total of five flocks, two of which were *S. Typhimurium* and one of which was *S. Infantis*. In the years prior to 2017, *Salmonella* was not detected in any parent flock during the rearing phase either.

2.2 *Salmonella* control programme in laying hens

A total of 7,070 flocks were examined in accordance with Regulation (EU) No. 517/2011 in 2021. *Salmonella* was detected in 73 flocks (1.0 %) (Table 2). This situation corresponded to the previous year's value (2020: 1.0 %). In 48 flocks of laying hens (0.7 %) (in 2020: 40 flocks, 0.6 %) *S. Enteritidis* or *S. Typhimurium* were detected in the laying phase. *S. Enteritidis* was found in 37 flocks (0.5 %; in 2020: 0.4 %) and *S. Typhimurium* in 11 (0.2 %; in 2020: 0.2 %) of the flocks examined. It is clear that in 2021, *Salmonella* detection was comparable to the previous year, although the detection of *S. Enteritidis* and *S. Typhimurium* has increased slightly again. In 2020, a declining trend was observed for *Salmonella* overall and the control-relevant serovars.

Table 2: Examination of laying hens (*Gallus gallus*) according to Regulation (EC) No. 517/2011 in 2021

	Number of flocks examined	<i>Salmonella</i>		<i>S. Enteritidis</i>		<i>S. Typhimurium</i>		<i>S. Enteritidis / S. Typhimurium</i>	
		positive	%	positive	%	positive	%	positive	%
Sampling (total)	7,070	73	1.0	37	0.5	11	0.2	48	0.7
Of which: Sampling instigated by food business operator	6,864	32	0.5	9	0.1	7	0.1	16	0.2
Of which: Sampling in connection with official control	3,321	49	1.5	32	1.0	4	0.1	36	1.1
Of which: Routine sampling in connection with official control	3,264	32	1.4	19	0.6	3	0.1	22	0.7
Of which: Suspected cases and follow-up investigations in connection with official control	57	17	29.8	13	22.8	1	1.8	14	24.6

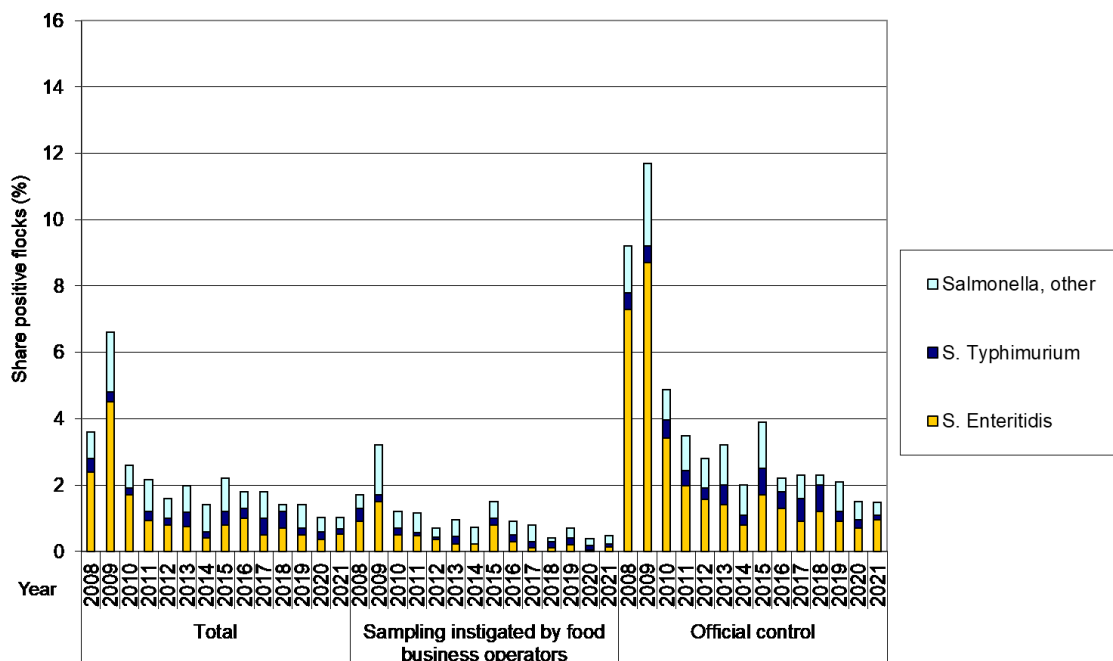
In 2021, *Salmonella* spp. was identified in the laying phase in 49 of the 3,321 laying hen flocks (1.5 %) by **official control**. *S. Enteritidis* or *S. Typhimurium* were found in 36 flocks (1.1 %). 32 flocks (1.0 %) exhibited *S. Enteritidis* and 4 flocks (0.1 %) *S. Typhimurium*. In 2020, as part of official control, *Salmonella* spp. was also identified in 1.5 % of laying hen flocks and *S. Enteritidis* or *S. Typhimurium* was found in 1.0 % of the flocks. Therefore, for the overall *Salmonella* detection rate and for the detection rate of the control-relevant serovars as part of the official monitoring, no difference can be observed compared to the previous year, although there was a shift towards *S. Enteritidis*.

The detection rates for laying hen flocks during the laying phase from 2008 to 2021 for *Salmonella* spp. (sum of all serovars), as well as for the serovars *S. Enteritidis* and *S. Typhimurium* are summarised in Figure 2 according to the different examination reasons.

For 2021, official controls were performed in 57 cases due either to a suspicion or as follow-up investigations. *Salmonella* spp. was identified in 17 of these flocks (Table 2).

When laying hens were examined during rearing, detection of *Salmonella* was reported in one of the total 1,062 flocks examined (0.09 %). The flock tested positive for the control-relevant serovar *S. Enteritidis*. In 2020, positive detection was reported in eleven flocks (1.1%), six of which were control-relevant serovars. Therefore, the situation has significantly improved.

Figure 2: Proportion of laying hen flocks during the laying phase from 2008 to 2021, in which *Salmonella* was detected according to examination reason and year



2.3 *Salmonella* control programme in broilers

A total of 25,929 flocks were examined. *Salmonella* was detected in 254 flocks (1.0 %) (Table 3). In contrast in 2020, 2.9 % of the flocks examined tested positive for *Salmonella* spp. Serovars *S. Enteritidis* or *S. Typhimurium* were found in six flocks (0.02 %) in 2021 (2020: 36 flocks, 0.14 %). One flock (0.004 %) was positive for *S. Enteritidis* and five flocks (0.02 %) for *S. Typhimurium*. *S. Enteritidis* (24 flocks, 0.09 %) and *S. Typhimurium* (12 flocks, 0.05 %) were also detected in 2020 (Figure 3). Therefore, the situation in 2021 is significantly more favourable on the whole. The frequent detection of *S. Infantis* has also not continued at the previous year's scale. While in 2020 this serovar was reported in 237 flocks, in 2021 this was the case in only 47 flocks.

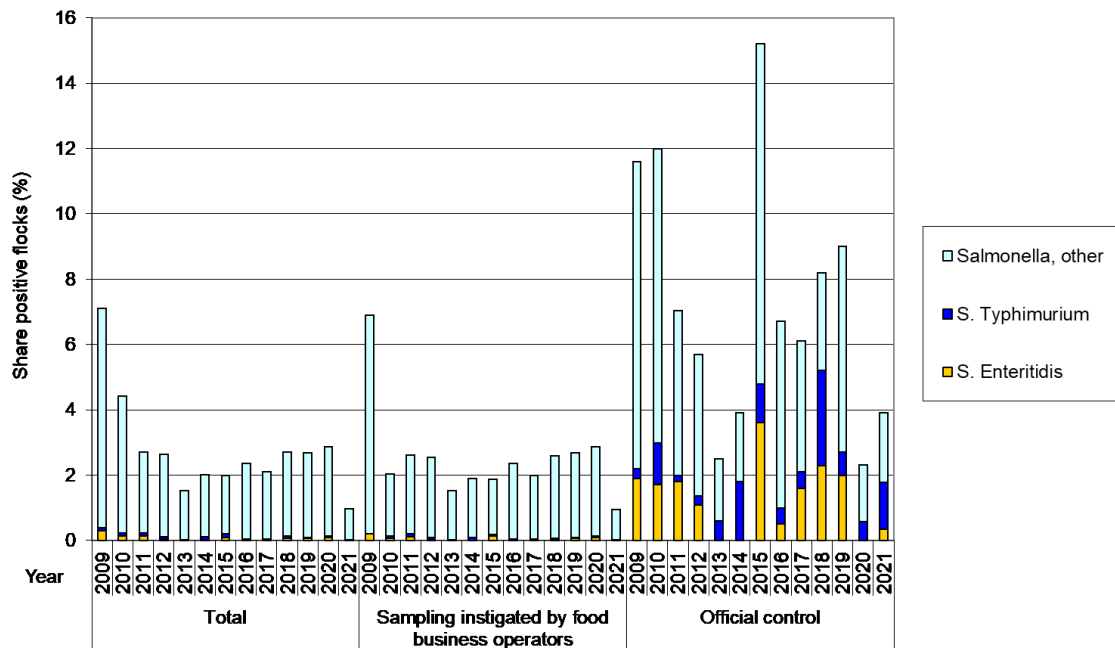
If we consider the detection rates in the context of self-monitoring and official testing separately, differences can be seen (Figure 3).

If we only consider **officially** examined flocks, 11 (3.9 %) of the 282 examined flocks were found to be positive for *Salmonella*. A control-relevant serovar was detected in five (1.8 %) flocks. One flock (0.4 %) tested positive for *S. Enteritidis* and four flocks (1.4 %) for *S. Typhimurium*. Compared to the previous year, the detection rate for *Salmonella* overall and for control-relevant serovars as part of the official investigation in 2021 has again increased (3.9 % vs. 2.3 % in 2020).

Table 3: Examination of broilers (*Gallus gallus*) according to Regulation (EC) No. 200/2012 in 2021

	Number of flocks examined	<i>Salmonella</i>		<i>S. Enteritidis</i>		<i>S. Typhimurium</i>		<i>S. Enteritidis / S. Typhimurium</i>	
		positive	%	positive	%	positive	%	positive	%
Sampling (total)	25,929	254	1.0	1	0.004	5	0.02	6	0.02
Of which: Sampling instigated by food business operator	25,929	248	1.0	0	0	3	0.01	3	0.01
Of which: Sampling in connection with official control	282	11	3.9	1	0.4	4	1.4	5	1.8

Figure 3: Proportion of broiler flocks from 2009 to 2021, in which *Salmonella* was detected according to examination reason and year



2.4 *Salmonella* control programme for breeding turkeys

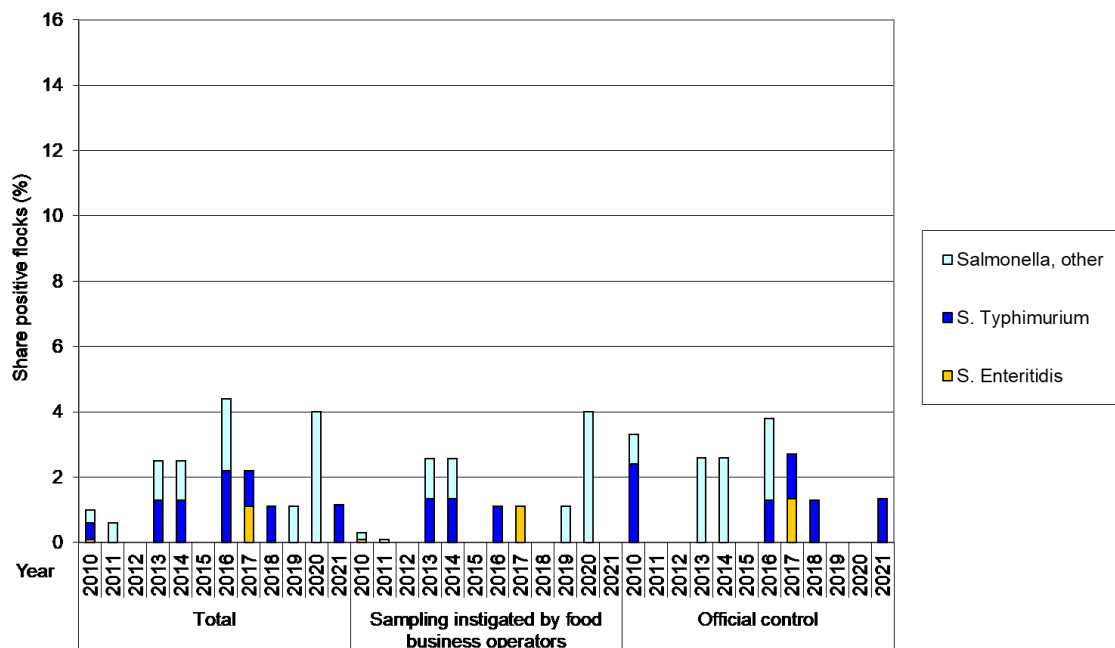
In total, examinations of 86 breeding turkey flocks were reported. Of these flocks, one flock (1.2 %) was positive for *Salmonella* in 2021 (Table 4). The control-relevant serovar *S. Typhimurium* was detected in this flock. This positive flock was identified in the course of official control. In 2020, four positive flocks (4.1 %) were reported as part of farm controls, but in none of the cases did it concern a control-relevant serovar (Figure 4).

Table 4: Examination of breeding turkeys according to Regulation (EC) No. 1190/2012 in 2021

	Number of flocks examined	<i>Salmonella</i>		<i>S. Enteritidis</i>		<i>S. Typhimurium</i>		<i>S. Enteritidis / S. Typhimurium</i>	
		positive	%	positive	%	positive	%	positive	%
Sampling (total)	86	1	1.2	0	0	1	1.2	1	1.2
Of which: Sampling instigated by food business operator	83	0	0	0	0	0	0	0	0
Of which: Sampling in connection with official control	74	1	1.4	0	0	1	1.4	1	1.4

Salmonella was found in one of the 32 flocks examined during the rearing period. No control-relevant serovars were detected. Four positive flocks were discovered in 2020. *S. Enteritidis* was last reported in a rearing flock in 2017.

Figure 4: Proportion of breeding turkey flocks from 2010 to 2021, in which *Salmonella* was detected according to examination reason and year



2.5 *Salmonella* control programme in fattening turkeys

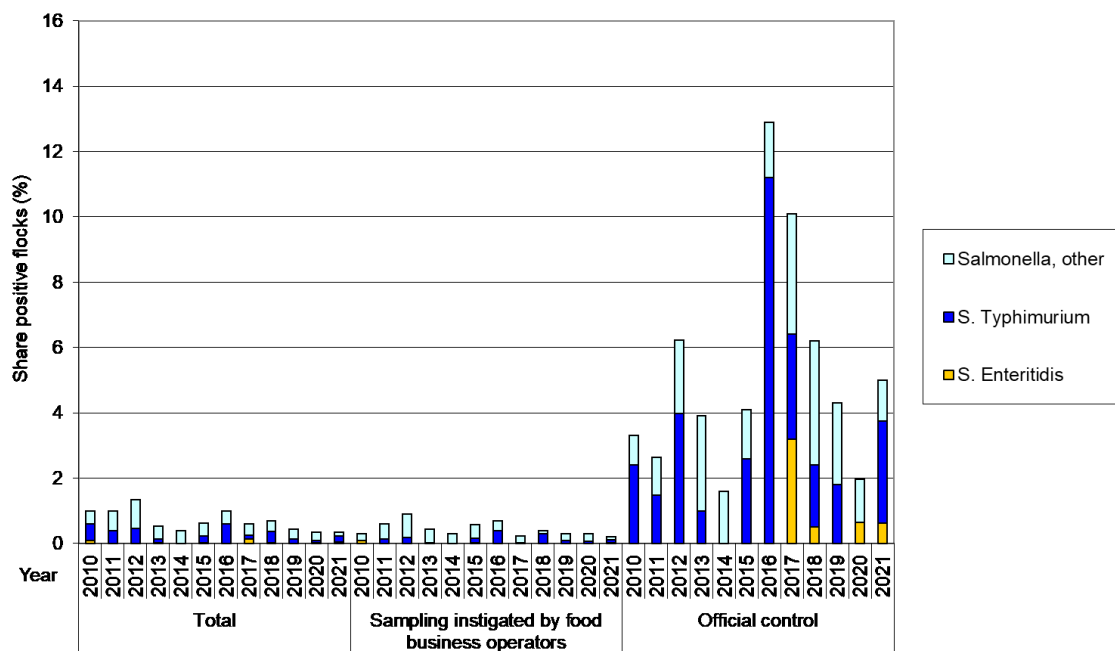
A total of 4,538 fattening turkey flocks were examined in accordance with Regulation (EU) No. 1190/2012 (Table 5). Of these flocks, 16 (0.4 %) were positive for *Salmonella* spp. In 2021, control-relevant serovars were detected in ten flocks. Two flocks contained *S. Enteritidis* (0.04 %) and eight flocks *S. Typhimurium* (0.2 %). In the previous year, 0.4 % of fattening turkey flocks examined also tested positive for *Salmonella*. As regards control-relevant serovars, only *S. Typhimurium* (3 flocks, 0.06 %) and *S. Enteritidis* (1 flock, 0.02 %) were detected in 2020 (Figure 5). Therefore, the detection rates for *Salmonella* overall are comparable, but control-relevant serovars in 2021 were at a higher level compared to the previous year.

Table 5: Examination of fattening turkeys according to Regulation (EU) No. 1190/2012 in 2021

	Number of flocks examined	<i>Salmonella</i>		<i>S. Enteritidis</i>		<i>S. Typhimurium</i>		<i>S. Enteritidis / S. Typhimurium</i>	
		positive	%	positive	%	positive	%	positive	%
Sampling (total)	4,538	16	0.4	2	0.04	8	0.2	10	0.2
Of which: Sampling instigated by food business operator	4,538	9	0.2	1	0.02	4	0.1	5	0.1
Of which: Sampling in connection with official control	160	8	5.0	1	0.6	5	3.1	6	3.8

A high proportion of positive flocks (5.0 %) was still reported in the **official** investigations, which exceeds the value from recent years (2020: 2.0 %, in 2019: 4.3 %).

Figure 5: Proportion of fattening turkey flocks from 2010 to 2021, in which *Salmonella* was detected according to examination reason and year



3 Summary

The results forwarded by the federal states as part of the control programmes according to Regulation (EC) No. 2160/2003 were summarised for reporting at the federal level. For 2021, they document no consistent trend or prevalence of *Salmonella* for all animal species and production types considered in the report, compared to the previous year.

The target values were achieved, with the exception of breeding turkeys (one flock positive). For breeding hen flocks, broilers and fattening turkeys, a prevalence of less than 1% for the control-relevant serovars was achieved, for laying hens the prevalence of 0.7 % was below the target value of 2 %. Due to the small number of breeding turkey flocks examined, the 1 % target value is exceeded by the single detection of *S. Typhimurium*.

However, the detection of *S. Enteritidis* and *S. Typhimurium* in various poultry flocks, especially in laying hens, broilers and fattening turkeys, must be critically monitored. *S. Enteritidis* and/or *S. Typhimurium* were reported across all animal species and production types in 2021. *S. Infantis* was again only detected in broilers, but not in breeding hen flocks. In broilers, this serovar is not one of the control-relevant serovars.

Salmonella was detected in 4.8 % of breeding hen flocks in 2021, 0.1 % of the flocks tested positive for a control-relevant serovar. Therefore, an increasing trend in the detection of *Salmonella* continues to be noticeable in breeding hens overall, which, however, does not affect the control-relevant serovars.

In flocks of laying hens, the *Salmonella* prevalence in 2021 is comparable to the previous year, but the detection of control-relevant serovars has increased slightly. This mainly concerned *S. Enteritidis*.

In broilers, the detection rate decreased again in 2021. The frequent detection of *S. Infantis* has also not continued at the previous year's scale. As in previous years, broilers dominated the non-control-relevant serovars in all studies.

In 2021, *Salmonella* was detected in a flock of breeding turkeys; it concerned *S. Typhimurium*.

In fattening turkey flocks, the favourable situation of the last few years with regard to *Salmonella* continued in 2021, although the proportion of control-relevant serovars increased to 0.2 %. The observed *Salmonella* prevalence was 0.4 %.

Further information on *Salmonella* is available on the BfR website

Salmonella topic page

https://www.bfr.bund.de/en/salmonella_and_their_importance_as_pathogens-10638.html

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