

SALMONELLA IN LIVESTOCK PRODUCTION IN GB 2002

INTRODUCTION

This publication presents data on *Salmonella* reports from livestock species in Great Britain (England, Wales and Scotland) collected and collated by the Department for Environment, Food and Rural Affairs (Defra) during 2002 and also provides data from previous years for comparative purposes. The data in the first four chapters cover the reason for sampling and place of sampling, reports of *Salmonella* in livestock with separate sections for the main species covered, reports of *Salmonella* in livestock products and reports of *Salmonella* in animal feedingstuffs. The fifth chapter covers the antimicrobial sensitivity of *Salmonella* (England and Wales only).

Since 1993 the date of a *Salmonella* incident has been recorded as the date it was reported to an Officer of the Minister. Under the present system any *Salmonella* reports that are confirmed or identified after the publication of the annual report will be incorporated into the revised tables that appear in the following year's publication. This may cause the number of incidents and/or isolations to differ from that previously given for a particular year. The most recent version of the report should therefore always be used when comparing incidents from year to year.

Revisions in the way that data have been compiled and presented since 1993 mean that, with the exception of the tables on *Salmonella* in animal feedingstuffs, data in this report cannot be compared directly with information published prior to 1993. However, since the basic method of data collection is unchanged, the data analysis programme used to compile the report prior to 1993 has been retained, and tables can be produced, on request, in the old format to allow comparisons to be made between years from 1985 for the major *Salmonella* serotypes in each animal species. A more detailed comparison can be generated, if required, for any *Salmonella* serotype, phage type (in the case of *S. Enteritidis*, *S. Hadar*, *S. Pullorum*, *S. Thompson* and *S. Virchow*) or definitive phage type (in the case of *S. Typhimurium*). Requests for such data should be made to the Centre for Epidemiology and Risk Analysis (CERA), Veterinary Laboratories Agency, Weybridge who will be happy to assist with requests (s.a.kidd@vla.defra.gsi.gov.uk).

Care should be taken when comparing data from one year to another as an increase or decrease in the number of incidents and isolations does not necessarily indicate a similar change in prevalence. This is

because the total number of samples examined and their distribution are not known.

STATUTORY ASPECTS OF *SALMONELLA* CONTROL IN GREAT BRITAIN

On 1 March 1989 the Zoonoses Order 1975 was revoked and replaced by the Zoonoses Order 1989. The 1989 Order added horses, deer and pigeons to the range of species from which *Salmonella* isolations are subject to reporting¹. Under the 1989 Order the responsibility for reporting the isolation of a *Salmonella* was placed on the laboratory carrying out the examination or in the case of examinations elsewhere, the person carrying out the examination. In practice, reports of *Salmonella* isolations must be made to the Senior Veterinary Investigation Officer at one of the Regional Laboratories of the Veterinary Laboratories Agency or to a Divisional Veterinary Manager in Scotland. If so required, the Department must be provided with a culture of the organism.

The requirement to test poultry for *Salmonella* on a regular basis under the Poultry Laying Flocks (Testing and Registration etc.) Order 1989 and the Poultry Breeding Flocks & Hatcheries (Registration and Testing) Order 1989, increased the number of examinations carried out from 1989 onwards. These two Orders were revoked in 1993 with the implementation of the Poultry Breeding Flocks and Hatcheries Order 1993, which brought *Salmonella* control measures in poultry into line with the European Union Directive 92/117/EEC, with the result that the level of monitoring in some poultry sectors altered. This needs to be borne in mind when examining long term data for poultry. This Order only applies to chickens in its requirement for regular monitoring of breeding flocks and hatcheries using methods laid down in the Order.

DEFINITION OF AN INCIDENT AND ISOLATION

In contrast to *Salmonella* in humans, many isolations of *Salmonella* from livestock are not associated with clinical disease, or occur on farm premises in which *Salmonella* has been isolated from a group of animals rather than an individual. Since 1993 reports of *Salmonella* from livestock have been separated into isolations and incidents. "Isolations" comprise individual reports of *Salmonella* made from samples and reported to Officers of the Minister. "Incidents" afford a truer picture of the amount of *Salmonella* in the animal population as they do not include repeat isolations of a serotype that may result from

¹ *Salmonella* isolations from the following species must be reported to an Officer of the Minister: cattle, sheep, goats, pigs, rabbits, horses, deer, domestic fowl (chickens), turkeys, ducks, geese, guinea fowl, pheasants, partridges, pigeons and quail.

a number of samplings during the course of an investigation, or monitoring activities on a particular premises. Isolations and incidents are defined in the following way:

An isolation is defined as a single report of a *Salmonella*. Multiple isolations of the same serovar from a group of animals sampled on the same occasion will count as a single isolation.

An incident comprises the first isolation and all subsequent isolations of the same serotype or serotype and phage/definitive type combination of a particular *Salmonella* from an animal, group of animals or their environment on a single premises, within a defined time period (usually 30 days).

The first such report of any particular serotype or serotype and phage/definitive type combination of *Salmonella* from a particular animal, group of animals or their environment will therefore be recorded as one incident and one isolation. Further reports of the same *Salmonella* from the same group during the incident investigation will be recorded as further isolations, but not as further incidents unless the isolation is from an epidemiologically distinct group of animals. Examples of this would include a distinct group of the same species on a separate part of the same premises. Reports of a different serotype or phage/definitive type of *Salmonella* from the same animals will be recorded as a new incident. Thus two reports of *S. Typhimurium*, one of DT104 and another of DT193, from the same group of animals would count as one incident and one isolation of *S. Typhimurium* DT104 and one incident and one isolation of *S. Typhimurium* DT193, whilst two reports of *S. Typhimurium* DT12 from the same group of animals would count as one incident but two isolations.

The concept of an "incident" is clearly inappropriate when referring to isolations from animal feedingstuffs or human foodstuffs of animal origin, so data for these are only reported in terms of isolations of *Salmonella*. With this in mind the tables reporting the reason for sampling and the place from which the sample originated have been divided to indicate the number of incidents for samples taken at premises other than slaughterhouses, and the number of isolations for samples taken at slaughterhouses or human food premises.

SEROTYPING AND PHAGE TYPING METHODS

Salmonella isolated from animals and feed is biochemically confirmed and serotyped by micro, tube and slide agglutination tests. Each culture is tested for the presence of somatic and flagella antigens by mixing with specific *Salmonella* antisera. Where homologous antiserum and antigen react, clumps of bacteria form as visible agglutination.

Serotypes are derived by reference to the Kauffmann White Scheme. *Salmonella* Typhimurium, *S. Enteritidis*, *S. Hadar*, *S. Thompson*, *S. Virchow* and *S. Pullorum* are phage typed according to the Central Public Health Laboratory phage typing schemes. Cultures are seeded onto special agar plates and a specific set of phages applied to the culture. After incubation the degree and pattern of lysis is read and a phage type or definitive type (for *S. Typhimurium*) attributed to the culture (Anderson and others 1977, Ward and others 1987).

Some phage types are 'related variants' although they are still reported as distinct types, eg. PTs 4 and 7 of *S. Enteritidis* and DT104, DT104b and U302 of *S. Typhimurium*.

NOMENCLATURE

The nomenclature used throughout this publication follows that devised by Le Minor and Popoff which divides the bacterial species *Salmonella enterica* into six subspecies: *enterica*, *salamae*, *arizonae*, *diarizonae*, *houtenae* and *indica*.

The method of naming serotypes of subspecies *enterica* differs from that used for the other five subspecies in that the familiar serotype names are assigned to subspecies *enterica* whilst the other subspecies are designated by antigenic structure.

For example, following this method the serotype originally referred to as *S. typhimurium* is now known as *S. enterica* subspecies *enterica* serotype Typhimurium which may be shortened to *S. Typhimurium* and the naming of serotypes of subspecies *diarizonae* is, for example, *S. enterica* subspecies *diarizonae* serovar 61:k:1,5,7 (or *S. 61:k:1,5,7*). For further details of this nomenclature see: Le Minor, L., Popoff, M.Y. (1987).

The serotype formally known as *Salmonella* Java has now been reclassified, on the basis of genetic similarity studies, as *S. Paratyphi B* variant (var.) Java. It is a group B *Salmonella* and has the same antigenic structure as *S. Paratyphi B* (O = 4, 12: H = b : 1.2). *S. Paratyphi B* var. Java and *S. Paratyphi B* are differentiated by the dextro-tartrate test, in which *S. Paratyphi B* var. Java produces a positive acid reaction, whereas *S. Paratyphi B* is negative.

FOOT AND MOUTH DISEASE OUTBREAK 2001

On 20 February 2001, Foot and Mouth Disease (FMD) caused by the O1 Pan Asia strain of virus was confirmed in Great Britain. A Controlled Area Order was imposed across the whole of the country on 23 February 2001, which prohibited the movement of livestock except under official control and banned livestock markets. During the subsequent epidemic 2,026 outbreaks were confirmed. The final confirmed outbreak was on 30 September 2001.

FMD was controlled by the slaughter of infected animals and animals that were judged to be dangerous contacts. More than three million sheep, 500,000 cattle and 140,000 pigs were killed, from more than nine thousand holdings. Approximately two million additional animals were slaughtered under the Livestock Welfare Disposal Scheme, bringing the total to more than 6 million animals. On the basis that no cases of FMD had occurred for three months and extensive statistically based serological surveys, every administrative area in Great Britain had achieved FMD free status by 14 January 2002 – three and a half months after the last outbreak was confirmed. The European Commission recognised Great Britain's FMD-free status through Commission Decision 2002/153/EC of 20 February 2002 which repealed requirements to provide FMD related certification for intra-community trade. Further information about the 2001 FMD epidemic can be found on the DEFRA website <http://defraweb/footandmouth>.

The FMD epidemic impacted upon surveillance for *Salmonella* in two distinct ways. Firstly, the outbreak caused significant disruption to normal farming practice with unpredictable consequences for the incidence of infection. Secondly, surveillance activities were constrained. VLA laboratories were unable to accept samples from infected areas and cattle, sheep or pig carcasses from any areas between late February 2001 and October 2001. Field visits were halted from late February 2001 but essential visits were later permitted providing strict Agency procedures were followed.

The peculiar circumstances of the FMD outbreak preclude any meaningful comparison of the *Salmonella* data for 2001 with other years. Therefore, these data have been visually highlighted in all tables and graphs that present information on an annual basis to emphasise the unusual nature of the 2001 data compared to other years.

Farms where all livestock were slaughtered due to FMD were able to re-stock during 2002. Livestock may have been purchased from multiple sources and these re-stocked herds would tend to contain a preponderance of younger animals. These factors may have altered the risk of *Salmonella* infection entering a herd and of the subsequent transmission of infection within the herd.