# *Salmonella*

**Infection costs Irish Dairy Farmers €112 per cow, per year[1] ***

**Can you afford**
**not to vaccinate with Bovivac S?**

MSD
Animal Health

# Salmonellosis is a significant cattle disease in Ireland

**Herds vaccinated for *Salmonella* recorded superior profits to unvaccinated positive herds to a value of €11,800 based on 100 cow herd [1]**

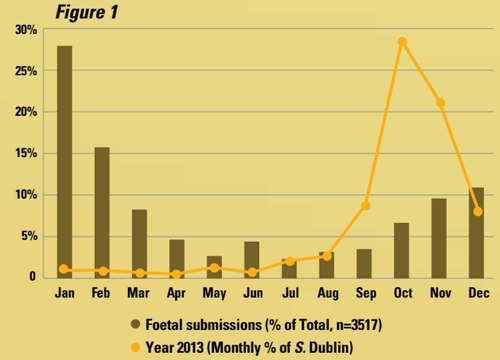
## *Salmonella* infection: know the signs

| Young stock | Older stock |
|---|---|
| Septicaemia | Abortion |
| Scour outbreaks | Reduced milk yield |
| Joint infections | *Salmonella* contaminated milk |
| Navel ill | Enteritis |
| Pneumonia | Metritis |
| Enteritis / Chronic diarrhoea | Pneumonia |
| Terminal dry gangrene | Chronic carrier animals |
| High calf mortality | Death |

**Incidence of *Salmonella* infection in Irish herds:**

- The majority of *Salmonella* infections in Irish cattle are caused by one of the following serotypes: *Salmonella typhimurium* or *Salmonella dublin*.
- In a study, over a ten year period in Cork Regional Veterinary Laboratory (RVL), *S. typhimurium* accounted for 11% of *Salmonella* isolates and *S. dublin* accounted for 85% of isolates.[3]
- Exposure of Irish dairy herds to *Salmonella* is very common, with 49% of bulk milk tanks testing positive for *Salmonella* antibodies.[1]
- Abortion in the absence of any other visible sign is associated with *S. dublin* which can result in significant losses in a herd.[1]
- **Figure 1** shows the monthly relative frequency of *Salmonella dublin* isolates from foetal bacterial cultures in both AFBI and DAFM laboratories (line graph), compared to the monthly relative frequency of foetal submissions (bar graph) during 2013. Salmonella dublin isolates peak in October-November, while the higher frequency of foetal submission occurs in January - February.

***Figure 1***




*Anon, All-island Animal Disease Surveillance Report 2013

## Salmonellosis in cows...so how does it enter a herd?

***Salmonella* infection enters a herd through:**

- **Replacement stock** - Recovered cases after an outbreak can often act as carriers of the bacteria for a very long time. These animals can appear healthy but shed bacteria in times of stress, infecting other animals that they are in contact with. This is the most common source of infection for *S. dublin*.
- **Physical contact-based spread** - *Salmonella* can be brought into a herd via farm visitors, birds, rodents, pigs, chickens and vehicles.
- **Animal to animal spread** - Nose to nose contact between animals on neighbouring farms.
- **Slurry** - *S. dublin* is known to persist in slurry for up to one month and can survive in soil for up to one year. Grazing animals are susceptible to infection when grazing pasture which was previously treated with contaminated slurry.
- **Feedstuffs / water** - Water courses infected by neighbouring stock can act as a source of infection. Feedstuffs can act as a source of *Salmonella* infection in the event of infected rodents / wild birds contaminating the feed.

Abortion is the most common clinical sign associated with *S. dublin*. [2]

In 2013, 5.8 % of bovine abortion submissions to AFBI and DAFM laboratories were attributable to *S. dublin*.

A clearly defined peak in *Salmonella* abortions was evident in October and November. [2]

*S. dublin* related scour or septicaemia, account for a further 20 to 60 confirmed *Salmonella* outbreaks per year in the Munster area alone. [3]

## Zoonotic Disease

*Salmonella* infection not only causes disease in animals; it is also a major threat to human health. *S. typhimurium* affects a wide range of host species and is the second most common type of *Salmonella* to cause disease in humans. *S. dublin* in contrast is a rare cause of zoonotic disease. However, when people do contract *S. dublin*, the fatality rate is high.

## Diagnosis

- Isolation of *Salmonella* from infected material: culture of the bacteria either from an aborted foetus or from the faeces of a diarrhoeic animal.
- Blood sampling: blood samples from suspect animals in the herd may be submitted for serology. Paired serology demonstrating a rise in titre can be very useful for diagnosing *Salmonella*.
- Bulk milk tank analysis for *Salmonella* antibodies can provide information on the disease status of the herd particularly if tested regularly.
- Bulk milk analysis for Salmonella antigen by PCR analysis is also possible to aid in the detection of shedding

## Prevention

*'Salmonella dublin is one of the easiest diseases to introduce into a herd and one of the most difficult to eradicate once it is present'.* [3]

**Know the disease status of the herd**

**Susceptible** | **Infected**

**Susceptible Herds:**

- Contact between farm visitors, vehicles and livestock should be kept to a minimum
- Provide disinfection points and clothing at entry points to the farm
- Maintain stock and disease-proof boundary fencing
- Use piped mains water instead of natural water sources
- Control vermin and prevent access of wildlife to feed and bedding
- Maintain a closed herd or purchase only from herds of known disease status
- Quarantine recently introduced stock, including animals returning from a mart or show
- Consider vaccination with Bovivac S in at-risk herds

**Herds with no history of *Salmonella* infection may be at risk of serious losses due to low levels of herd immunity if their biosecurity fails.**

**Infected Herds:**

- Segregate and treat clinical cases in a dedicated isolation facility on farm
- Avoid spreading contaminated slurry on grazing land
- Strict personal hygiene and never consume unpasteurised milk to protect human health
- Vaccination with Bovivac S and boost annually ahead of the risk period
- Vaccination boosters should not be allowed to lapse in chronically infected herds due to the likely presence of subclinical carrier cows in these herds

## Recent trial work with Bovivac S

- A study[1] conducted in the Teagasc, Animal and Grassland, Research and Innovation Centre, found that *Salmonella* carriers in a herd of 100 dairy cows can cost over €11,000* making it very important to control with vaccination. The presence of *Salmonella* on Irish dairy farms was found to reduce overall farm profitability on an annual basis. Vaccination for *Salmonella* was found to be economically justified and a recommendation was made to implement vaccination on all Irish dairy farms to protect human and animal health.
- Data analysed from the Cork RVL, over a ten year period, indicated that vaccination with Bovivac S significantly reduces the risk of a *S. dublin* abortion. The recommendations in this study were that the vaccine is best given ahead of the period of risk, approximately one month prior to drying off.[4] However, the vaccine is not licenced for the control of *Salmonella*-induced abortions.

## Expansion Risk

Keeping a dairy herd free of disease is challenging at the best of times. However, during an expansion phase, the risk to the health of a herd increases dramatically. This is particularly true when expanding the herd involves the purchase of new stock, increased farm fragmentation (including contract heifer rearing), a change in labour structure and the introduction of new management systems. Purchase of livestock has been shown to significantly increase the risk of introduction of *Salmonella* spp. into a herd.[5]

## SUMMARY OF DATASHEET – BOVIVAC S

**PRESENTATION**

An opaque fluid vaccine containing inactivated cells of *S. dublin* (1 x $10^9$ cells/ml) and *S. typhimurium* (1 x $10^9$ cells/ml). The vaccine contains aluminium hydroxide as an adjuvant and thiomersal as a preservative.

**USES**

For the active immunisation of cattle in order to induce serological and colostral antibody production against S. *dublin* and *S. typhimurium* infections and in the face of an outbreak to reduce *S. typhimurium* infections when used under field conditions as part of an overall herd management programme. Bovivac S may also contribute to reducing *S. typhimurium* contamination of the environment.

**DOSAGE AND ADMINISTRATION**

Dose: Adult cattle, 5ml – calves up to 6 months of age, 2ml. Administration is by subcutaneous injection, preferably in the loose skin on the side of the neck, observing aseptic precautions.

**Primary Vaccination Schedule:** Where diagnosis of salmonellosis caused by *S. dublin* and/or *S. typhimurium* has been confirmed, all at-risk adult cattle, including lactating cows, dry cows, heifers, barren cows and in-contact bulls (but excluding any with overt clinical signs of salmonellosis), should receive two 5ml injections separated by an interval of 21 days.

For pregnant cows, this primary vaccination course can be given irrespective of the reproductive status. Any pregnant cows that have not calved within 8 weeks of the second dose of vaccine should receive a further 5ml dose of Bovivac S, 3-4 weeks pre-calving.

Healthy calves from approximately 3 weeks of age may also be given a primary vaccination course. Calves should be given two 2ml injections separated by an interval of 14 to 21 days.

Booster vaccination: All cattle vaccinated with the primary vaccination course of Bovivac S should receive a 5ml booster injection at least two weeks prior to each period of risk or at intervals of not more than 12 months thereafter. As part of an overall herd management programme, for pregnant cattle, it is advised that for each subsequent pregnancy, in order to maintain a sufficient level of active immunisation to reduce *S. dublin* and *S. typhimurium* infections under field conditions, a single booster dose of 5ml should be administered approximately 3-4 weeks before calving.

**CONTRA-INDICATIONS, WARNINGS, ETC.**

A small number of individuals may fail to respond to vaccination as a result of immunological incompetence or for some other reason.

In the face of an outbreak of disease, it is therefore important to avoid vaccination of animals which have overt clinical salmonellosis or intercurrent disease or which have a poor nutritional status. Such animals must be isolated and treated as appropriate and then vaccinated upon recovery.

Significant levels of immunity cannot be expected until two weeks after the second dose of the primary vaccination course.

All stock showing overt clinical signs of salmonellosis at the time of the initial vaccination programme should receive appropriate treatment and be fully vaccinated once they have recovered. Any unvaccinated stock must be managed separately to vaccinated stock, with no contact between the groups. Hygiene precautions must be instituted, where possible, to prevent transfer of infection from one group to another.

When vaccinating animals, stress should be avoided, particularly during pregnancy. The effect of Bovivac S administered around service / insemination has not been studied. Limited laboratory and field data suggest that vaccination with Bovivac S has no adverse effect on pregnancy and calving. No information is available on the effect of concurrent use of this vaccine with any other. It is therefore suggested that no other vaccine should be administered within 14 days before or after vaccination with the product.

Occasional hypersensitivity reactions may occur.

**Withdrawal Period:** Zero days

**PHARMACEUTICAL PRECAUTIONS**

Store at +2°C to +8°C. Protect from freezing. Use before the expiry date printed on the pack.

Once opened, use of the vaccine must be completed within 10 hours. Partially-used containers must be discarded at the end of each day's operations. Partly used and empty packs, syringes and needles must be disposed of in accordance with national requirements.

Keep out of reach of children. For animal treatment only.

Package Quantities: 50ml polyethylene multidose bottles.

Further Information: The efficacy of Bovivac S has been established in the field using the recommended programme of use.

Specific experimental data has not been generated to quantify the duration of immunity, the effectiveness of a single booster dose vaccination or the degree of protection from colostral antibodies.

Legal Category: ROI POM(E) NI POM-V.

**References:**


1 O' Doherty et al, 2015. Effect of exposure to *Neospora caninum*, *Salmonella*, and *Leptospira interrogans* serovar Hardjo on the economic performance of Irish dairy herds. *Journal of Dairy Science* 98: 2789–2800.

2 O'Leary 2014, Salmonella dublin in Irish cattle, *Veterinary Ireland Journal*. 4 (12), 642-643

3 Crilly 2004. The epidemiology of bovine salmonellosis in Cork and Kerry. Available at http://www.teagasc.ie/research/reports/dairyproduction/4992/eopr-4992.asp (Assessed July 2015).

4 Crilly and Power 2004. Field efficacy of vaccination in the control of bovine abortion. Available at: http://www.teagasc.ie/research/reports/dairyproduction/4992/hyper39vaccination.asp (Assessed July 2015).

5. Mee et al, 2012. Bioexclusion of diseases from dairy and beef farms: risks of introducing infectious agents and risk reduction strategies. *The Veterinary Journal;* 194:143-150.

* Anon (2014) DAFM/AFBI All-island Animal Disease Surveillance Report 2013. Figures are based on profit reduction in non vaccinated dairy herds testing positive for exposure to Salmonella at a milk price of €0.34/L.


# Bovivac® S

The only vaccine for Bovine Salmonellosis
(caused by *S. dublin* and *S. typhimurium*)

**See www.bovilis.ie for more information**

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**Use medicines responsibly**

Further information is available from your veterinary supplier, the product SPC, or
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