Together raising more lambs

The Flockmaster’s Guide to Abortion and Vaccination

A practical guide to improving the performance of your flock through the control of infectious causes of barrenness, abortion and weak lambs

Click here to insert your dot stamp

References
3. Ian Pritchard, SAC, personal communication.
4. MSD Animal Health’s FlockCheck and Barren EweCheck 2014 schemes.

Use medicines responsibly. For more information visit www.noah.co.uk/responsible

Toxovax® contains Toxoplasma gondii. Enzovax® contains Chlamydia abortus strain 1B. Only available from your veterinary surgeon from whom advice should be sought. Legal category POM-V. For further detailed information regarding side effects, precautions, warnings and contra-indications please refer to the datasheet located at www.noahcompendium.co.uk Registered trademark. Toxovax® and Enzovax® are the property of Intervet International B.V. or affiliated companies or licensors and are protected by copyrights, trademark and other intellectual property laws. Copyright © 2016 Intervet International B.V. All rights reserved.
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INTRODUCTION

Lambing percentage is one of the key measures in determining flock health and performance: a small improvement can increase income.

Many of the lambs lost are the victims of infectious diseases that are preventable.

The most significant infections causing abortion in sheep have been identified and can be controlled using cost-effective practical solutions.

This booklet explains the important facts about the two most common diseases, including their prevalence, tips on diagnosis and how to cope with an acute outbreak. Most importantly, it shows how a sensible approach to their control can achieve long-term financial benefits.

CLOSING THE GAP BETWEEN SCANNING AND REARING PERCENTAGE

Most lowland flocks could achieve a lambing percentage of over 180%. All flocks should be looking to reduce abortions to less than 2% and the barren rate to less than 5%.

A straightforward way to maximise productivity is to reduce lamb losses.

### System standards

<table>
<thead>
<tr>
<th></th>
<th>Lowland</th>
<th>Upland</th>
<th>Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Ewes tupped</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>B Lambs scanned</td>
<td>195</td>
<td>175</td>
<td>116</td>
</tr>
<tr>
<td>C Lambing percentage</td>
<td>183</td>
<td>166</td>
<td>112</td>
</tr>
<tr>
<td>D Lambs turned out</td>
<td>172</td>
<td>156</td>
<td>104</td>
</tr>
<tr>
<td>E Rearing percentage</td>
<td>168</td>
<td>151</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Better Returns Programme, AHDB Beef & Lamb 2015

WHY AREN’T YOU GETTING MORE LAMBS?

Undiagnosed infectious abortion agents within a flock can have a significant impact on the number of barren ewes, ewe mortality and lambs born alive and strong.

There are a number of forms of abortion, and obtaining an accurate diagnosis is important, so consult your vet at the very first sign of any abortion.

The essence of Project LAMB is a proactive approach to sustaining a healthy flock. It is an initiative designed to:

- help produce healthy lambs
- close the gap between scanning % and lambs reared
- focus on flock well-being
- reduce time and resources needed to treat sick sheep
- meet the demands of both the consumer and the food chain

Talk to your sheep health advisor to find out more.
The cause of the losses is often an infection in the ewe during pregnancy which may be responsible for the barren ewe seen at scanning and not just the more obvious abortions.

Anecdotally, as well as weak and sickly lambs that die soon after birth, barren ewes and abortion rates between 5% and 10% are often tolerated. However, anything above 2% is likely to be due to an infectious cause and should be investigated.

Furthermore, those flocks with barren and abortion rates of 2% and less need to consider toxoplasmosis and enzootic abortion as continuing threats which could potentially strike the flock in any year subsequently without the necessary protection.

According to the 2016 and 2017 diagnostic results from the MSD Animal Health FlockCheck scheme, on average over 80% of submitted blood samples tested positive for toxoplasmosis and more than 62% were positive for enzootic abortion (EAE). Around 50% of samples were positive for both.

Even this evidence does not tell the whole story about the risk posed by toxoplasmosis to the national flock because it represents only part of the national flock in Great Britain.

In fact almost 100% of GB flocks have been shown to have been exposed to toxoplasmosis, which means that every breeding sheep is at risk.
### SUMMARY OF THE MAIN INFECTIONS

<table>
<thead>
<tr>
<th></th>
<th><strong>TOXOPLASMOSIS</strong></th>
<th><strong>ENZOOTIC ABORTION (EAE)</strong></th>
<th><strong>CAMPYLOBACTERIOSIS</strong></th>
<th><strong>SALMONELLOSIS</strong></th>
<th><strong>LISTERIOSIS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAUSE</strong></td>
<td>Coccidial-type parasite – <em>Toxoplasma gondii</em></td>
<td>Bacterial-type organism – <em>Chlamydophila abortus</em></td>
<td>Bacteria – <em>Campylobacter</em></td>
<td>Bacteria – <em>Salmonella</em> of various strains</td>
<td>Bacteria – <em>Listeria monocytogenes / ivanovii</em></td>
</tr>
<tr>
<td><strong>SOURCES OF INFECTION</strong></td>
<td>Hay, straw, cereal, concentrates, pastures (contaminated with cat faeces)</td>
<td>Aborted placenta / lamb</td>
<td>Carrier sheep</td>
<td>Carrier sheep</td>
<td>Infected stock</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Contaminated foodstuffs</td>
<td>Soil</td>
</tr>
<tr>
<td><strong>APPEARANCE OF ABORTION</strong></td>
<td>Fresh lambs</td>
<td>Fresh lambs</td>
<td>Nothing specific</td>
<td>Nothing specific</td>
<td>Nothing specific</td>
</tr>
<tr>
<td></td>
<td>Mummified lambs</td>
<td>Mummified lambs</td>
<td>Ewe OK</td>
<td>Ewe may be ill</td>
<td>Ewe OK (may get nervous form of the disease in same flock)</td>
</tr>
<tr>
<td></td>
<td>Leathery or white spot placenta</td>
<td>Thickened placenta</td>
<td>Nothing specific</td>
<td>Nothing specific</td>
<td>Nothing specific</td>
</tr>
<tr>
<td></td>
<td>Ewe OK</td>
<td>Ewe OK</td>
<td>Ewe OK</td>
<td>Ewe OK</td>
<td>Ewe OK</td>
</tr>
<tr>
<td><strong>TREATMENT</strong></td>
<td>In-feed coccidiostat (only prevents abortions whilst fed daily)</td>
<td>Antibiotics (seek veterinary advice; only partially effective during that season)</td>
<td>Antibiotics generally not effective</td>
<td>Antibiotic</td>
<td>Nothing effective</td>
</tr>
<tr>
<td><strong>CONTROL</strong></td>
<td>Keep aborted ewes, Vaccination, Medicated feed, Neuter any farm cats</td>
<td>Cull aborted ewes, Vaccination</td>
<td>Keep aborted ewes, but mix with non-pregnant replacements to allow ewes to develop immunity</td>
<td>Keep aborted ewes</td>
<td>Keep aborted ewes</td>
</tr>
</tbody>
</table>

Unfortunately, there are no licensed vaccines in the UK for the other diseases commonly found to cause abortion in sheep. Talk to your vet to ensure that you have an accurate diagnosis, together with a plan to address the problem.

Hygiene and husbandry become very important in reducing the spread of the disease.
TOXOPLASMOSIS

WHERE DOES IT COME FROM?
The source of the eggs is most commonly contamination of the environment by cat faeces: in barns, feed stores, bedding, manure or pasture. A single cat dropping can contain enough eggs to infect more than 100 ewes. Eggs can survive on-farm for well over a year. *Toxoplasma* eggs are then eaten by ewes in feed, forage or on pasture. *Toxoplasma* is not commonly passed from sheep to sheep.

WHOSE FLOCK IS AT RISK?
Almost 100% of flocks have been shown to have been exposed to toxoplasmosis¹. This ubiquitous parasite is a serious risk to all flocks in the UK. It is in the environment and it only takes one brief visit from a cat to significantly contaminate the farm or pasture.

WHAT EFFECT DOES IT HAVE?
- Losses both during and after pregnancy
- Barrenness
- Reabsorptions
- Mummified foetuses
- Abortions
- Stillbirths
- Weakly lambs

CAN I CONTROL IT THROUGH MANAGEMENT?
The only way to effectively avoid toxoplasmosis is through vaccination. Feeding a coccidiostat can be of benefit but, as toxoplasmosis can strike at any time, in-feed medication needs to be administered throughout the last two-thirds of pregnancy, and can therefore be financially prohibitive and difficult to dose correctly for individuals.

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TRANSMISSION OF *TOXOPLASMA GONDII* BETWEEN CATS AND SHEEP

1. Reservoir of infection maintained in rodent population by transmission from generation to generation

2. Rodents and birds infected with *Toxoplasma* cysts

3. Young cat eats infected rats, birds, mice

4. *Toxoplasma* cysts passed in cat faeces onto pasture, feed, bedding etc. surviving up to two years

5. Ewe eats contaminated feed / pasture and becomes infected

6. Ewe aborts or gives birth to weakly lambs

Cat becomes immune and normally poses no further threat

1. Transmission of *Toxoplasma gondii* was first reported in 1908.
2. Conversion of *Toxoplasma gondii* to *Toxoplasma cati* was not possible until 1936.
3. The importance of cats in the transmission of *Toxoplasma gondii* was not recognized until 1982.
ENZOOTIC ABORTION (EAE)

WHAT CAUSES IT?
Enzootic abortion is caused by a bacteria-type organism called *Chlamydophila abortus*. The disease is also a zoonosis: it can cause abortion in women, and flu-like symptoms in both children and adults. Considerable care should therefore be taken when handling sheep during and after lambing.

WHERE DOES IT COME FROM?
• The disease usually arrives on farm when infected replacements are bought in.
• Wildlife can also be implicated by carrying infected placentae from one farm to another.
• The organisms are passed from ewe to ewe in infected afterbirth, on new lambs and in vaginal discharges for up to two weeks post-lambing.
• Lambs can also be born already infected from mothers carrying the disease.

THE MAJOR PROBLEM WITH EAE: LATENCY
• When a ewe aborts she sheds large numbers of the EAE organism.
• These can infect any ewe or lamb that comes into contact with them – BUT signs of EAE will not necessarily show in newly infected animals during that same lambing season and there is no test to identify them.
• The organism remains dormant in the body until the next lambing.
• In infected lambs it can be longer, e.g. in shearlings two years after infection.
• Approximately three weeks before the next lambing the placenta becomes inflamed and abortion occurs.

WHOSE FLOCK IS AT RISK?
• Anyone who buys in replacements from a source that isn’t known to be EAE-free.
• Unvaccinated flocks.
• Outdoor lambing flocks.
• Hefted sheep.

WHAT EFFECT DOES IT HAVE?
At its most obvious, EAE can cause devastating abortion storms, often affecting approximately 25% of ewes. This happens when the disease attacks a flock containing many susceptible, previously uninfected sheep. However, if a large proportion of the flock is already infected it will cause ongoing losses of around 5% a year.

CAN I CONTROL IT THROUGH MANAGEMENT?
Once your flock has the disease, it is very unlikely that it will ever disappear completely due to latency. Tests can only identify an infected ewe after she has aborted and spread the disease still further. Even a closed flock with good bio-security is vulnerable to material brought on-farm by scavengers; and of course, these are the flocks that are most at risk of a devastating abortion storm.

Only a vaccination programme can control its effects.

ENZOOTIC ABORTION OF EWES – SPREAD OF INFECTION

1. Clean susceptible ewes
2. Inhale or ingest chlamydiae from aborted ‘fresh’ lambs and placenta, uterine discharge and contaminated bedding
3. Chlamydiae lie dormant
4. 90-100 days into pregnancy, chlamydiae invade and damage placenta
5. Abortion usually occurs in the last two weeks of pregnancy
6. Weakly lambs infected with chlamydiae

- Clean susceptible sheep
- Infected sheep and placenta
- Latently infected sheep
**IF THE DIAGNOSIS IS TOXOPLASMOSIS**

Unfortunately, little can be done this season. Consult your veterinary surgeon for advice on whether medication would benefit your flock. The aborted ewe need not be isolated as the disease cannot spread from her to other ewes.

**TOXOPLASMOSIS CONTROL**

Whole flock vaccination with Toxovax is recommended and cost-effective. Then vaccinate all replacements as they enter the flock.

Immunity can be boosted by natural challenge, so often ewes may only need one vaccination in their lifetime. For advice on boosters, contact your veterinary surgeon.

Unlike EAE, toxoplasmosis cannot be passed from sheep to sheep. Older ewes are more likely to have been previously exposed to the disease and therefore will possess some immunity. Hence vaccinating the younger animals in the flock must be the first priority, although for maximum disease control whole flock vaccination is the gold standard.

**IF THE DIAGNOSIS IS EAE**

- Keep aborted ewes separate from the rest of the flock, especially any future replacements
- Do not foster lambs onto aborted ewes
- Ask your vet about antibiotic injections for EAE. It won’t stop the outbreak completely, nor will it prevent other ewes from being infected and aborting next year, but it can reduce the number of abortions in the current season
- Look to future control with Enzovax

**EAE CONTROL**

Vaccination with Enzovax will effectively control EAE within your flock.

As you can’t identify latently infected ewes, any ewe may pose a threat of infection to another. It is best to vaccinate the entire flock in the first year. Thereafter, vaccinate all replacements, regardless of source. Generally, only one vaccination is needed for the lifetime of the ewe. Re-vaccination is recommended every 3-4 years depending on farm management practices and conditions.

In any infected flock, a proportion of ewes will already be latently infected. Some of these ewes may still abort at the first lambing, because the infection is established in the ewe’s womb, but vaccination has been shown to reduce the number of abortions in these ewes.

**INFECTION VERSUS PROTECTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Unvaccinated flock</th>
<th>‘Enzovaxed’ flock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Susceptible</td>
<td>Protected</td>
</tr>
<tr>
<td>Year 2</td>
<td>Susceptible</td>
<td>Protected</td>
</tr>
<tr>
<td>Year 3</td>
<td>Susceptible</td>
<td>Protected</td>
</tr>
</tbody>
</table>
The devastating impact of \textit{Toxoplasma} or enzootic abortions will have been experienced by many. Abortion storms are caused when EAE affects a largely clean, uninfected flock which is unvaccinated. The effects of \textit{Toxoplasma} on vulnerable flocks are often insidious and therefore harder to identify. However, abortion storms can occur in a naïve flock.

**These effects can be minimised by the following steps:**

- If any abortion occurs, act fast (it may be the beginning of an enzootic abortion storm). The earlier you determine the cause and treat other ewes, the more lambs may be saved.
- Isolate and mark the affected ewe.
- Contact your vet.
- Collect freshly aborted lambs and placentae if present; put in separate, clean bags and take to your local APHA Investigation Centre / SAC Disease Surveillance Centre. Two or three will allow you to identify most of the possible infectious causes.
- If aborted material is not available, ask your vet to take blood samples for \textit{Toxoplasma} and EAE. These samples must be taken within 4 months of the abortion to gain relevant results. Note that you cannot blood test for some of the less common causes. Ask your vet about MSD Animal Health’s FlockCheck.
- Be careful when handling problem ewes and aborted material, and always wash your hands afterwards. Pregnant women and children are particularly at risk if infected.
- Dispose of aborted material carefully and appropriately.
- MSD Animal Health provides complimentary blood testing for both EAE and toxoplasmosis through the FlockCheck scheme.

\textbf{VACCINATION – THE BENEFITS}

The costs of lowered productivity are so great that vaccination is a cost-effective route to the control of these diseases. Many farmers see benefits where they didn’t realise there was a problem, having healthier and more viable lambs born.

\textbf{ACTION IN THE FACE OF AN OUTBREAK}

For further advice about toxoplasmosis or EAE and the vaccines available to assist in their control, please contact your veterinary surgeon. Additionally, contact MSD Animal Health’s product support team on 01908 685685.

[webpage link: www.msd-animal-health.co.uk/sheep/sheep-pom-v-vaccines.aspx]
CONTRA-INDICATIONS, WARNINGS, ETC.

Do not vaccinate pregnant animals. Do not vaccinate animals less than 4 weeks before mating. Do not vaccinate animals which are being treated with antibiotics, particularly tetracyclines.

SPECIAL WARNINGS FOR EACH TARGET SPECIES

Chlamydia abortus is only one of the causes of abortion in sheep. If the abortion rate remains unchanged in flocks which have been vaccinated, Toxovax is recommended that veterinary advice is sought. The epidemiology of abortion due to Chlamydia abortus in ewes involves a long incubation period. Ewes that abort in any lambing season have usually been infected at the previous lambing. Field trial data indicate that vaccinating incubating ewes will reduce the incidence of abortion, but a proportion can still go on to abort. Care should be taken in handling such abortions as susceptible humans may be at risk of infection. A good immune response is reliant on the reaction of an immunogenic agent and a fully competent immune system. Immunogenicity of the vaccine antigen will be reduced by poor storage or inappropriate administration. Immuno-competence of the animal may be compromised by a variety of factors including poor health, nutritional status, genetic factors, concurrent drug therapy and stress. Only healthy animals should be vaccinated.

Operator warnings

Toxovax should not be handled by pregnant women, or women of child-bearing age as the vaccine may interfere with normal foetal development.

Toxovax should not be handled by persons who are immunodeficient (e.g. AIDS sufferers, persons undergoing chemotherapy or taking immunosuppressive drugs). Operators should wear gloves when handling the vaccine. Living tachyzoites can cause disease in man. Care should be taken to avoid self-injection and to avoid vaccine getting into the mouth or the eyes. In the case of self-injection, immediate medical advice should be sought and the doctor should be informed that self-injection with a living tachyzoite Toxoplasma vaccine has occurred. Pyrimethamine is the current recognised treatment for Toxoplasmosis in humans.

Withdrawal period

Meat and offal: 42 days

FOR ANIMAL TREATMENT ONLY. KEEP OUT OF REACH AND SIGHT OF CHILDREN.

PHARMACEUTICAL PRECAUTIONS

Store and transport refrigerated (2°C - 8°C). Protect from light. Do not freeze.

After dilution the vaccine should be kept cool and away from light and used as soon as possible (within 2 hours). Ideally only dilute one vaccine vial at a time.

Administration

Dose: 2 ml by intramuscular injection.

Administration dose

Animals should be given a single dose at least 3 weeks prior to mating. Ewe lambs, where it is intended to breed from them, may be vaccinated from 5 months of age. Sheep lambs and older ewes should be vaccinated during the 4 month period prior to mating.

RE-VACCINATION

After 2 years, a single dose at least 3 weeks prior to mating.

PRESENTATION

Enzovax contains Chlamydia abortus strain 1B. Solvent: Unisolve is supplied with the vaccine.

USES

For the active immunisation of susceptible breeding female sheep to reduce the effects of infection by Chlamydia abortus. Vaccination studies have demonstrated that protection against Enzovax Abortion and excretion of Chlamydia abortus post-challenge is undiminished for at least three years post-vaccination with Enzovax. Field studies in experimentally infected flocks maintaining a policy of vaccinating incoming ewes with Enzovax indicate that Enzovax abortion levels remain very low in ewes vaccinated 4 years previously.

CONTRA-INDICATIONS, WARNINGS, ETC.

Do not vaccinate pregnant animals. Do not vaccinate animals less than 4 weeks before mating. Do not vaccinate animals which are being treated with antibiotics, particularly tetracyclines.

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Chlamydia abortus is only one of the causes of abortion in sheep. If the abortion rate remains unchanged in flocks which have been vaccinated, Toxovax is recommended that veterinary advice is sought. The epidemiology of abortion due to Chlamydia abortus in ewes involves a long incubation period. Ewes that abort in any lambing season have usually been infected at the previous lambing. Field trial data indicate that vaccinating incubating ewes will reduce the incidence of abortion, but a proportion can still go on to abort. Care should be taken in handling such abortions as susceptible humans may be at risk of infection. A good immune response is reliant on the reaction of an immunogenic agent and a fully competent immune system. Immunogenicity of the vaccine antigen will be reduced by poor storage or inappropriate administration. Immuno-competence of the animal may be compromised by a variety of factors including poor health, nutritional status, genetic factors, concurrent drug therapy and stress.

SPECIAL PRECAUTIONS FOR USE

Enzovax should not be handled by pregnant women or women of child-bearing age as the vaccine may cause abortion.

Enzovax should not be handled by persons who are immunodeficient (e.g. AIDS sufferers, persons undergoing chemotherapy or taking immunosuppressive drugs). If in any doubt, you should consult your GP. Operators should wear gloves when handling the vaccine. Care should be taken to avoid self-injection. If this occurs, immediate medical advice should be sought and the doctor informed that self-injection with a living chlamydial vaccine has occurred. Tetracycline therapy is the current recognised treatment for infection with Chlamydia abortus in humans.

INTERACTIONS

Safety and efficacy data are available which demonstrate that this vaccine can be administered the same day but not mixed with Toxovax. However, it should be given at separate sites. No information is available on the safety and efficacy of this vaccine when used with any other veterinary medicinal product except the product mentioned above. A decision to use this vaccine before or after any other veterinary medicinal product therefore needs to be made on a case by case basis.

AMOUNTS TO BE ADMINISTERED AND ADMINISTRATION ROUTE

Reconstitution: The vaccine is reconstituted with Unisolve immediately prior to use, allowing 2 ml of solvent per dose. If using the vented transfer device push one end of the device through the centre of the vaccine vial using a firm, twisting action. Similarly, push the other end of the device through the Unisolve vial and transfer spike from the solvent vial and place into an administration kit including a vented transfer device and automatic syringe. If using disposable automatic syringes fitted with a guarded needle system according to the manufacturer’s instructions. It is vital that a vented draw off tube is used with this equipment. Regular checks should be made to ensure that the equipment is properly calibrated. Carefully attach the vial of reconstituted vaccine to the injection equipment and avoid creating aerosols during the priming process. It may be advisable to wear a visor while carrying out this operation.

Dilution

Protective gloves (impermeable rubber or plastic such as disposable medical gloves or surgical gloves (EU guidelines)) and goggles or a face visor should be worn when reconstituting the vaccine. If using the vented transfer device push one end of the device through the centre of the Unisolve vial using a firm, twisting action. Similarly, push the vented transfer vial onto the opposite end of the device taking care to ensure the spike penetrates the centre of the vial bung. The vaccine concentrate will drain into the diluent vial. Remove the empty vaccine vial and transfer spike from the diluent vial and place into an apparatus for injection device. Care should be taken to avoid self-injection and to avoid vaccine getting into the mouth or the eyes. In the case of self-injection, immediate medical advice should be sought and the doctor should be informed that self-injection with a living tachyzoite Toxoplasma vaccine has occurred. Pyrimethamine is the current recognised treatment for Toxoplasmosis in humans.

Withdrawal period

Meat and offal: 42 days

FOR ANIMAL TREATMENT ONLY. KEEP OUT OF REACH AND SIGHT OF CHILDREN.

PHARMACEUTICAL PRECAUTIONS

Major incompatibilities

Do not mix with any other veterinary medicinal product except the solvent, Unisolve.

Special precautions for storage

Store and transport refrigerated (2°C - 8°C). Do not freeze. Protect from light.

LEGAL CATEGORY

POM-V

PRESENTATION

Toxovax contains Toxoplasma gondii; strain 548. Unisolve is supplied as a diluent for dilution prior to use.

USES

For the active immunisation of susceptible breeding female sheep to reduce the effects of infection by Toxoplasma gondii; namely early embryonic death, barrenness and abortion. Vaccination with Toxovax is known to protect for at least two lambing seasons.

DOSAGE AND ADMINISTRATION

The vaccine is supplied as a liquid concentrate containing 20 or 50 doses. Immediately before use this is added to the diluent (Unisolve 40 or 100 ml, respectively), giving a dose volume of 2 ml.

Injection equipment

To minimise the risk of self-injection the vaccine should be administered using disposable automatic syringes fitted with the Stearimic guarded needle system according to the manufacturer’s instructions. An administration kit including a vented transfer device for vaccine reconstitution and disposable automatic syringes with the Stearimic guarded needle system is available from the company. It is vital that a vented draw off tube is used with this equipment. Regular checks should be made to ensure that the equipment is properly calibrated. Carefully attach the vial of reconstituted vaccine to the injection equipment and avoid creating aerosols during the priming process. It may be advisable to wear a visor while carrying out this operation.

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Protective gloves (impermeable rubber or plastic such as disposable medical gloves or surgical gloves (EU guidelines)) and goggles or a face visor should be worn when reconstituting the vaccine. If using the vented transfer device push one end of the device through the centre of the Unisolve vial using a firm, twisting action. Similarly, push the vented transfer vial onto the opposite end of the device taking care to ensure the spike penetrates the centre of the vial bung. The vaccine concentrate will drain into the diluent vial. Remove the empty vaccine vial and transfer spike from the diluent vial and place into an apparatus for injection device. Care should be taken to avoid self-injection and to avoid vaccine getting into the mouth or the eyes. In the case of self-injection, immediate medical advice should be sought and the doctor should be informed that self-injection with a living tachyzoite Toxoplasma vaccine has occurred. Pyrimethamine is the current recognised treatment for Toxoplasmosis in humans.

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