

TICK-BORNE DISEASE VACCINES: ?? FREQUENTLY ASKED QUESTIONS ??

The deep frozen blood vaccines that are available against redwater, anaplasmosis (tick-borne gallsickness) and heartwater, have been used to effectively control these tick-borne diseases for many years. Over time, numerous questions on their appropriate use have arisen. This document lists the major concerns experienced by producers and provides guidelines on the correct use of these vaccines.

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? * WHICH ANIMALS ARE AT RISK TO TICK-BORNE DISEASES

Animals older than 9 months of age with no prior exposure to infected vector ticks are most at risk to tick-borne diseases

Animals older than 9 months of age with no prior exposure to infected vector ticks are most at risk to severe clinical disease and death due to tick-borne diseases. Such animals have not developed immunity and will react when infected. Mature animals, when infected for the first time, are prone to develop more severe symptoms which may result in high mortalities if left untreated.

Animals intended for relocation from non-endemic to endemic disease areas should be regarded as susceptible and at high risk to tick-borne diseases. Similarly, animals that are managed under strict, intensive tick control will have had little or no exposure to infected ticks and are at risk should tick infestation occur in the new area.

Animals up to the age of 3 months, if born from immune dams, have immunity to disease conferred by cholostral intake. Young animals (calves up to the age of 9 months in the case of redwater and anaplasmosis; calves younger than 6 weeks and kids and lambs for the first week after birth in the case of heartwater), normally possess a non-specific resistance to tick-borne diseases and, if infected, generally show mild symptoms only.

? * HOW DO I DETERMINE FOR WHICH TICK-BORNE DISEASE I SHOULD VACCINATE

Accurate diagnoses (by blood smear examination or antibody determination) of which disease organisms are prevalent will determine which vaccine to use

Vaccines are available for African and Asiatic redwater, Anaplasmosis and Heartwater. The degree of exposure to these disease organisms in a herd may be determined by serological tests of serum samples (detection of specific antibodies against the respective infections) of a number of animals representative of the herd. Specific organisms may also be diagnosed in sick or dead animals by microscopic examination of blood smears or in brain smears in the case of heartwater (ehrlichiosis) and Asiatic redwater. Results of these tests would indicate which of the diseases pose a problem and require vaccination. A decision based on the tick vectors' prevalence, or the desire to move animals from a disease-free area to known disease risk areas, would also determine the choice of vaccination (e.g. moving animals from the Northern Cape to the coastal Eastern Cape would indicate Heartwater and also Asiatic redwater vaccination if intensive tick control is not practised at their destination). In many instances a decision may be made upon consultation with the local veterinarian, Onderstepoort or a knowledgeable local farmer.

? * HOW DO I DETERMINE WHETHER TO VACCINATE AGAINST AFRICAN OR ASIATIC BABESIOSIS (REDWATER)

Bloodsmear or serological diagnosis may be used to determine which form of babesiosis (redwater) is prevalent and requires vaccination

The ideal would be to determine microscopically from blood smears (low levels of parasites may be difficult to detect) or serologically (antibody detection) from serum samples which of the organisms are present in the herd. Should both be present it is advisable to vaccinate against both African and Asiatic babesiosis. Less ideally, the decision could be based on identification of the tick species infesting the cattle - should only *Rhipicephalus (Boophilus) decoloratus* be present, this would indicate vaccination with the African form of babesiosis. However, if both blue tick species (*R. (B) decoloratus* and *Rhipicephalus (Boophilus) microplus*) occur, both vaccines should be used. Clinical signs may also help in the differential diagnosis between the two diseases, however, blood smear examination is recommended to make an accurate diagnosis. Consultation with the local veterinarian, Onderstepoort or a knowledgeable local farmer may also be of value in determining which disease is problematic in your area.

? * WHAT IS THE DIFFERENCE BETWEEN THE AFRICAN AND ASIATIC FORMS OF BABESIOSIS (REDWATER)

Diagnosis of the parasite by microscopic bloodsmear examination is more accurate than relying on disease symptoms

The African form of babesiosis (redwater) is caused by the organism *Babesia bigemina* that is transmitted by both the one-host blue tick species present in South Africa, *Rhipicephalus (Boophilus) decoloratus* and *Rhipicephalus (Boophilus) microplus*. The Asiatic form, *Babesia bovis*, is transmitted only by *R. (B) microplus*. *R. (B) decoloratus* is more widespread than *R. (B) microplus* which prefers high rainfall areas and as a result the Asiatic form of redwater is limited. Major differences between the 2 forms are as follows:-

	AFRICAN FORM	ASIATIC FORM
Organism	<i>Babesia bigemina</i>	<i>Babesia bovis</i>
Vector/s	One-host Blue ticks - 2 species <i>R. (B) decoloratus</i> <i>R. (B) microplus</i>	One-host Blue tick - 1 species <i>R. (B) microplus</i>
Distribution	Wide distribution. Areas with rainfall >280mm/ annum - absent from the northern reaches of the Western Cape, Northern Cape, western Free State, higher Drakensberg & Lesotho	Limited distribution. Higher rainfall areas - present in parts of North West, Eastern Cape, Kwazulu-Natal, Venda & eastern parts of Mpumalanga
Clinical signs	Fever (>40°C) rapidly followed by sudden and severe anaemia (pale mucous membranes), icterus and sudden death. Light - dark red discolouration of urine often present earlier and more consistently. Cerebral involvement - nervous symptoms- not present. Non-fatal cases – recovery usually rapid.	Fever (>40°C) usually present for several days before onset of other signs – inappetance, depression and weakness, anaemia and icterus. Diarrhoea common. Discolouration of urine often present but not as early and less consistently. Cerebral involvement - nervous symptoms – often seen in advanced cases – usually fatal. Non-fatal cases – recovery may take several weeks.
Post-mortem symptoms	Severe haemolysis – pale carcass, watery blood, haemoglobinuria. Less severe haemorrhaging of internal organs. Splenomegaly less marked. Pulmonary oedema common.	Intense congestion of most organs and tissues. Haemoglobinuria often present. Severe haemorrhaging of internal organs. Splenomegaly marked. Pulmonary oedema uncommon.
Vaccine	Frozen African redwater	Frozen Asiatic redwater

? * WHAT IS THE BEST AGE TO ADMINISTER THE TICK-BORNE DISEASE VACCINES

Vaccinate young animals and the treatment of vaccine reactions should be unnecessary!

Redwater	- calves – 3 to 9 months of age
Anaplasmosis	- calves – 3 to 9 months of age
Heartwater	- calves – 4 to 6 weeks of age - lambs and kids – first week of life

Young animals possess a non-specific immunity to tick-borne diseases.

This immunity to severe clinical disease allows for safe vaccination against redwater and anaplasmosis in calves, from 3 - 9 months of age.

In the case of heartwater, this non-specific immunity is of shorter duration and administration of the vaccine is advised in calves from 4 - 6 weeks of age and in lambs and kids within the first week of their lives.

Animals may, however, be vaccinated at any age provided the directions are followed regarding vaccination procedures including the monitoring of vaccine reactions and treatment, the latter especially in older animals. *Babesia* strains used in the vaccines have been successfully attenuated to prevent severe reactions.

The vaccination of pregnant animals is generally NOT advised since fever that could result from vaccine reactions, may cause abortions.

? * AT WHAT DOSAGES AND BY WHICH ROUTE SHOULD TBD
VACCINES BE ADMINISTERED

Always check the accompanying vaccine pamphlet for dosage instructions as these may change from time to time!!

**Babesiosis (Redwater) - African and Asiatic: 1ml intramuscularly -
irrespective of animal size or age**

**Anaplasmosis (tick-borne gallsickness): 1ml intramuscularly -
irrespective of animal size or age**

Heartwater (Ehrlichiosis): 3ml intravenously - irrespective of animal size or age.

**? * WHICH TBD VACCINES MAY NOT BE ADMINISTERED TOGETHER
AND WHY NOT**

**African and Asiatic Redwater and Anaplasmosis
vaccines may be administered together**

Heartwater vaccine must be administered separately

Both the African and Asiatic redwater vaccines and the Anaplasmosis (tick-borne gallsickness) vaccine may be administered at the same time BUT NOT WITH heartwater vaccine.

The blood vaccines cause the respective diseases in animals, which may require appropriate differential treatment to prevent clinical symptoms, but at specific times in order to allow sufficient immunity to develop.

Both anaplasmosis and heartwater require tetracycline treatment of vaccine reactions and it is not possible to differentially treat for heartwater (which develops within a shorter period) without detrimentally affecting the development of anaplasmosis immunity.

The incubation periods of heartwater and babesiosis are similar; therefore the onset of fever signalling the onset of vaccine reactions could be from either of the two infections. Appropriate treatments of vaccine reactions are tetracycline for heartwater and diminazene for babesiosis and, should the wrong treatment be given, the animal may die.

Babesiosis and anaplasmosis may, however, be vaccinated at the same time because the incubation period of babesiosis is much shorter than that of anaplasmosis. If the babesiosis reaction requires treatment it will not interfere with the anaplasmosis reaction which will follow.

? * IS IT NECESSARY TO TREAT ANIMALS AFTER VACCINATION
? * WHAT PERCENTAGE OF VACCINATED ANIMALS WILL SHOW REACTIONS

All vaccinated animals may be expected to show reactions. Ideally, vaccinated animals should be temperatured daily. Those that do show typical fever reactions (40°C+) must be treated.

The redwater (babesiosis) vaccine contains live attenuated *Babesia* parasites and vaccinated animals may show varying degrees of clinical reactions 1 - 3 weeks after inoculation. Young calves (less than 9 months old) do not show clinical signs. Older animals, being more susceptible, react mildly. However, it should be expected that any or all of the vaccinates could react to the vaccine. Appropriate treatment of these animals is necessary to prevent clinical disease while ensuring the development of protective immunity.

The anaplasmosis vaccine contains live *A. centrale* parasites. Clinical signs of anaplasmosis may appear 4-6 weeks after inoculation. Young calves (less than 9 months old) show immunity to clinical disease. Older animals are more susceptible and could show clinical signs but seldom elevated body temperatures. It is highly recommended that good supervision be maintained during the period in which vaccine reactions may occur.

The heartwater vaccine contains live heartwater organisms (*Ehrlichia ruminantium*) and vaccinated susceptible animals will develop variable degrees of heartwater (from day 12 - 30 in cattle and 8 - 21 in sheep and goats after inoculation), which may or may not require appropriate treatment. Resistant or partially immune animals may not show any fever reaction and do not require any treatment. Animals that do show typical febrile reactions require specific treatment. Calves vaccinated before the age of 4-6 weeks usually show no clinical signs but will nevertheless develop immunity. Although young calves generally do not require any treatment, approximately 10-20% of calves may show a temperature reaction (fever), and a few of these may even develop clinical signs and therefore require treatment. The immunity that develops in these calves is usually of shorter duration and it is important that they be exposed to infected ticks within 3 months after vaccination. New-born lambs and kids must be vaccinated within the first week of their lives and should be kept under daily observation for at least one month after vaccination so that they may be treated should clinical signs develop.

The following should also be considered:

Certain breeds are more resistant to these diseases than others.

Stressed animals, e.g. high producing dairy cows, could show more severe vaccine reactions.

Many animals are vaccinated which are already immune and will therefore show no reaction to the vaccines.

Do not treat vaccine reactions with drugs/dosages that will sterilize the infection.

- ? * HOW LONG DOES IMMUNITY TAKE TO DEVELOP
? * HOW LONG DOES IMMUNITY LAST AFTER
VACCINATION

After inoculation, immunity develops within:-

- * 8 weeks - Anaplasmosis
- * 4-6 weeks - Babesiosis
- * 4-6 weeks - Heartwater

Strict tick control should be practiced during the interim period before immunity has developed

Immunity in a successfully vaccinated animal takes 8 weeks to develop in the case of Anaplasmosis (tick-borne gallsickness) and 4-6 weeks in the case of Babesiosis (African and Asiatic Redwater) and Heartwater (Ehrlichiosis). Intensive tick control is advised during this period after inoculation.

In all cases, once successfully vaccinated, animals remain carriers of the parasites for varying periods and will develop complete and long-lasting immunity to the disease where they come into contact with infected ticks. Relaxed tick control is thus advisable once immunity has been attained in a herd. In the absence of infected ticks, some older animals may lose their immunity, especially in the case of African redwater but this does not seem to be of major importance in the practical field situation.

? * CAN PREGNANT ANIMALS BE VACCINATED

THE VACCINATION OF PREGNANT ANIMALS IS NOT ADVISED

The vaccination of pregnant animals is NOT advised since the vaccines contain live organisms that may invoke a clinical reaction in some animals, including high fever, which may cause pregnant animals to abort. It is best to apply strict tick control on susceptible pregnant animals until they have given birth, before they are vaccinated.

? * WHAT TICK CONTROL SHOULD BE APPLIED DURING VACCINATION

Strict tick control should be applied after inoculation -

- * Babesiosis - for 4 weeks after
- * Heartwater - for 4 weeks after
- * Anaplasmosis - for 8 weeks after

Strict, intensive tick control should be applied for at least 4 weeks following babesiosis or heartwater inoculation and for at least 8 weeks in the case of anaplasmosis to enable the animals to develop immunity before they are exposed to natural tick infestation. If strict tick control is not applied, animals may become infected before sufficient immunity has developed and may consequently not be protected against the disease.

? * HOW DO I TREAT REDWATER VACCINE REACTIONS

? * CAN REDWATER VACCINE REACTIONS BE BLOCK TREATED

Vaccine reactions in susceptible animals can be expected 5 -21 days after inoculation.

Severely reacting animals (persistent high fever, signs of anaemia) should be treated with any babesiacide that will not sterilize the infection.

Block treatment of vaccine reactions is NOT advised

The vaccine contains live attenuated *Babesia* parasites and vaccinated animals may develop varying degrees of babesiosis 1 - 3 weeks after vaccination. Young calves up to 9 months show a non-specific resistance to the disease and seldom develop clinical symptoms. Older animals are more likely to develop disease symptoms.

- *Monitoring vaccine reactions:* It is recommended that daily monitoring of rectal temperatures (early morning) be done of vaccinated animals during the period in which vaccine reactions may occur (i.e. day 5 to 21 after inoculation). Animals which develop severe reactions (i.e. high fever, depression, poor appetite, urine discolouration and anaemia characterized by pale mucous membranes) should be treated as soon as possible with a babesiacide that will not sterilize the infection. Strictly adhere to the manufacturer's directions for drug use, particularly with regard to the dosage, route of administration and withdrawal periods for meat or milk, where these products are intended for human consumption. It is also recommended that specific treatment with drugs, as far as possible, be accompanied by good nursing and supportive treatment. A veterinarian should preferably be consulted with regard to specific and supportive treatment.

When the vaccine is used for the first time in a herd, all animals should be vaccinated. Thereafter, only new arrivals (calves and animals bought in from outside) need to be vaccinated. Immunity to babesiosis usually develops within 4-6 weeks after administration of the vaccine.

Block treatment is NOT advised mainly due to the variable vaccine reaction time experienced after inoculation.

? * **HOW DO I TREAT ANAPLASMOSIS VACCINE REACTIONS**

If any, vaccine reactions can be expected from the 4th to the 6th week after inoculation. Older animals may develop clinical signs which include elevated body temperature, severe anaemia (pale mucous membranes), inappetance, constipation, rumen stasis and jaundice.

Animals showing severe vaccine reactions should be treated with a single administration of a long-acting tetracycline
OR 2 to 3 treatments at 24-hour intervals with a short-acting tetracycline

Young calves show the highest resistance to disease and seldom develop clinical signs. Older animals are more susceptible. Thus, it is recommended that good supervision be maintained over vaccinated animals during the period in which vaccine reactions may occur (i.e. the 4th to 6th week after vaccination). Animals which develop clinical signs (such as fever, poor appetite, decreased milk production, constipation, anaemia and jaundice) should be treated as soon as possible after symptoms are observed. Any of the various injectable tetracycline antibiotics (short- or long-acting preparations) are recommended. A single treatment with a long-acting tetracycline is usually sufficient to control the vaccine reactions. When using an ordinary (short-acting) tetracycline preparation, dependant on the severity of the symptoms, 2 to 3 treatments given at 24-hour intervals are recommended. Strictly adhere to the manufacturer's directions for drug use, particularly with regard to the dosage, route of administration and withdrawal periods for meat or milk, where these products are intended for human consumption.

? * **CAN ANAPLASMOSIS VACCINE REACTIONS BE
BLOCK TREATED**

Block treatment is NOT recommended

**Treat only those animals showing a definite
fever reaction (40°C+)**

Animals vaccinated with the anaplasmosis vaccine may develop variable degrees of anaplasmosis. Reacting animals may or may not show a fever 4-6 weeks after inoculation. This extremely variable reaction-time complicates the effective block treatment of a group of animals that have been vaccinated. Treatment with tetracycline antibiotics, especially when given too early may adversely affect the immune response and degree of immunity attained. Block treatment of anaplasmosis vaccine reactions is thus not advised.

? * HOW DO I CONTROL HEARTWATER VACCINE REACTIONS

- *The conventional method:* Vaccinated animals should be temperatured daily. After inoculation, the heartwater reaction may be expected from day 12-30 in cattle and from day 8 - 21 in sheep and goats.
- Treatment with a tetracycline antibiotic should be applied after the body temperature reaches ($>40^{\circ}\text{C}$). Repeat the treatment after 24 hours if the temperature is still elevated above normal.
- The variable reaction-time encountered with different animals, breeds and individuals, complicates block treatment. Block treatment in large groups of animals, to prevent severe vaccine reactions, is commonly used by farmers

Since the vaccine contains live heartwater organisms, susceptible animals will develop symptoms, which may or may not require treatment.

The recommended protocol includes taking rectal body temperatures of all vaccinates daily and recording the readings of individual animals that will give a clear indication when the febrile reaction starts. Reactions can be expected 8-21 days after inoculation in the case of small stock and 12-30 days in cattle. Animals should be treated with an appropriate drug on the second day after body temperature reaches 40°C or more, and repeated after 24 hours if the temperature has not returned to normal.

If the above recommendation is too labour intensive, i.e. large groups, select a representative batch of animals, record their temperatures and use that as a baseline to block all the vaccinates. This method incurs the risk that some animals may have then received treatment too early or too late with consequent failure to develop immunity.

Treatment is with a tetracycline antibiotic and full directions on the container should be followed.

The immunity to heartwater will have developed approximately six to eight weeks after inoculation. Maintenance of immunity is dependant on re-infection and will remain for life if animals are kept on heartwater-infected veld, If not re-infected, animals may become susceptible after a few months.

Calves vaccinated before the age of 4-6 weeks usually show no clinical signs but should nevertheless develop immunity. Although young calves generally do not require any treatment, approximately 10-20% of calves may show a temperature reaction (fever), and a few of these may even develop clinical signs and therefore require treatment. The immunity that thus develops in calves is usually of shorter duration and it is important that the calves be exposed to infected ticks within 2 months. Newborn lambs and kids must be vaccinated within the first week of their lives.

? * CAN HEARTWATER VACCINE REACTIONS BE BLOCK TREATED

- **Block method** - Inoculation of vaccine followed by treatment with tetracycline at the recommended dosage on a predetermined day depending on the type of animal vaccinated.

- σ Sheep and goats on Day 11
- σ Exotic cattle breeds and their crosses on Day 14
- σ Indigenous cattle breeds and their crosses on Day 17

This method is considered not to be without a risk of losing animals from severe vaccine reactions, especially if they are not closely observed post treatment for at least three to four weeks depending on the species and breed.

The block method: Here the vaccine is administered and followed by treatment with tetracycline at the recommended dosage rate (usually 10 mg/kg) on a pre-determined day, based on practical experience, without recording daily temperatures. The following predetermined days of treatment are suggested (the day of inoculation is considered to be Day 0):

- σ Sheep and goats on Day 11
- σ Exotic cattle breeds and their crosses on Day 14
- σ Indigenous cattle breeds and their crosses on Day 17

This method must be used with circumspection, because in exceptional cases individual animals may be more susceptible than the rest of the herd and may show clinical signs before they will receive treatment. This method is also useful when moving large numbers of animals from a heartwater-free area into an endemic area. Such animals should preferably be immunized on the farm of origin.

The following variables cannot be accommodated in this method:

Differences in vaccine batches.

Abuse of the cold chain handling of the vaccine.

Intravenous administration.

Age and animal breed susceptibility.

- ? * WHAT IS AN UNSTABLE / STABLE DISEASE SITUATION
- ? * MOVING ANIMALS FROM A NON-ENDEMIC TO AN ENDEMIC AREA
- ? * CONVERTING FROM INTENSIVE TO RELAXED TICK CONTROL

Vaccinate susceptible animals timeously before moving them to high-risk, tick-borne disease areas

Babesiosis	- @ least 6 weeks
Anaplasmosis	- @ least 8 weeks
Heartwater	- @ least 6 weeks

In areas where infected ticks occur in sufficient numbers, all animals should become infected with tick-borne disease organisms at a young age (endemic areas). Calves, lambs and kids should thus be 'naturally immunised' and consequently, no outbreaks of the disease should occur in such areas. A situation such as this, where no clinical cases of the tick-borne disease occur in an infected area (endemic area), is referred to as a *stable disease situation*. On the other hand, an *unstable disease situation* may arise within an endemic area when too few infected ticks occur, either as a result of strict, intensive tick control, or due to the influence of nature (e.g. droughts, i.e. the vectors are present in these areas but their prevalence is suppressed). Areas where the vectors (ticks) do not occur are referred to as non-endemic areas. Animals in non-endemic areas, therefore, have no experience of vector infestation or tick-borne disease infection and must be regarded as extremely susceptible to tick-borne diseases.

Movement of susceptible animals from non-endemic to endemic areas carries the risk that infection in the endemic areas could very well lead to clinical outbreaks of tick-borne disease. These animals should therefore be timeously vaccinated before being moved to such endemic areas. Babesiosis (redwater) and heartwater (Ehrlichiosis) immunity takes up to 6 weeks to develop fully after vaccination while Anaplasmosis (tick-borne gallsickness) immunity develops after 8 weeks. The appropriate vaccinations should therefore be performed well in advance of moving animals from non-endemic to endemic areas.

Similarly, if the intention is to convert from stringent, intensive to a more relaxed tick control strategy, appropriate vaccinations should be done and intensive control maintained until such time that sufficient immunity has developed in the animals (up to 8 weeks post vaccination).

? * HOW DO I OBTAIN THE VACCINES

The vaccines may be collected or ordered directly from Onderstepoort Biological Products, or ordered through your veterinarian, co-operative or on-line from www.obpvaccines.co.za

Contact Details

TEL:
+27- 12-522-1500

FAX:
+27-12-565-5260
or
+27-12-522-1591

EMAIL:

Enquiries:
lungie@obpvaccines.co.za

Domestic orders:
sesie@obpvaccines.co.za
nolwazi@obpvaccines.co.za

Export orders:
renah@obpvaccines.co.za
jacob@obpvaccines.co.za

POSTAL ADDRESS:
ONDERSTEPOORT BIOLOGICAL PRODUCTS
P/BAG X07
ONDERSTEPOORT
0110

The vaccines are stored at ultra low temperatures and dispatched deep frozen on dry ice. They must be kept on dry ice or in liquid nitrogen during transport and storage - an ordinary household freezer is not suitable. Do not accept damaged or leaking containers.

? * WHAT QUANTITIES ARE AVAILABLE

Frozen African redwater vaccine: Bottles of 5 (five) doses

Frozen Asiatic redwater vaccine: Bottles of 5 (five) doses

Frozen Anaplasmosis (tick-borne gallsickness) vaccine: Bottles of 5 (five) doses

Heartwater-infective Blood: Bottles of 3 (three) doses

The technique used to freeze the infected blood does not allow the bottling of more doses per bottle without adversely affecting the viability of the disease organisms.

? * WHAT DETERMINES THE PRICE OF TBD VACCINES
? * WHY IS TBD VACCINE SO EXPENSIVE

Except for the usual resources such as consumables, equipment and personnel necessary to produce high quality vaccines, the main determinant of the tick-borne diseases vaccines' expense is the use of live, healthy, and fully susceptible animals in their production. Cattle used for redwater and the anaplasmosis vaccines are born and reared under strict tick-free conditions at Onderstepoort. They are splenectomized and inoculated with infected blood from stock stored in liquid nitrogen. The donor animals are bled at the height of the parasitemia and the infected blood prepared to contain the required number of parasites per vaccine dose. Production of the Heartwater vaccine follows a similar procedure using intact sheep.

The maintenance of a quarantined animal breeding and housing facility, the necessary labour associated with animal upkeep, associated medication and especially their nutrition, is extremely expensive, which costs naturally have to be incorporated into the production costs of the vaccines, including that of quality control procedures. Despite extensive research on alternate production systems, including tissue culture techniques, which would obviate the use of animals, no satisfactory alternatives have as yet been found. Every effort is made to limit production costs

? * DO THE VACCINES REQUIRE SPECIAL HANDLING

Yes!

The vaccines are dispatched frozen and must be kept deep frozen until used.

Order sufficient dry ice. Thaw immediately prior to administration.

Follow administration instructions diligently to attain effective immunisation

All the tick-borne disease vaccines (Redwater, Anaplasmosis and Heartwater) are issued as frozen blood vaccines on dry ice and must be kept on dry ice or in liquid nitrogen during transport and storage. The vaccines must remain deep frozen until used. An ordinary household freezer is not suitable for storage of the vaccine. The vaccines must not be stored for longer than the expiry date printed on the bottle. Should vaccines be thawed on receipt, or when there is insufficient dry ice left in the container in contact with the vaccine bottles, they must be considered damaged.

The vaccines must be thawed in luke-warm water immediately prior to administration. Should any delay be experienced, such thawed vaccine may be kept on melting ice for a maximum of 30 minutes from the time of thawing. If vaccine is thawed on crushed or melting ice it may be administered for up to 4 hours from having been placed in the ice. Once thawed the vaccine cannot be refrozen. Do not thaw more than can be used within the time constraint.