SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE VETERINARY MEDICINAL PRODUCT

Ivermectin Virbac 10 mg/ml Solution for Injection

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Active substances
Ivermectin…….. 10 mg/ml

For full list of excipients, see section 6.1

3. PHARMACEUTICAL FORM

Solution for injection.
Clear pale-yellow non-aqueous sterile solution.

4. CLINICAL PARTICULARS

4.1 Target species

Cattle, swine and sheep.

4.2 Indications for use, specifying the target species

CATTLE
The product is indicated for the treatment and control of the following species of gastro-intestinal roundworms, lungoworms, eyeworms, warbles, mites and lice.

Gastro-intestinal roundworms (adult and fourth-stage larvae):
Ostertagia ostertagi (including inhibited *O.ostertagi)*
Ostertagia lyrata
Haemonchus placei
Trichostrongylus axei
Trichostrongylus colubriformis
Cooperia oncophora Cooperia punctata
Cooperia pectinata
Bunostomum phlebotomum
Oesophagostomum radiatum
Strongyloides papillosus (adult)
Nematodirus helvatianus (adult)
Nematodirus spathiger (adult)
Trichuris spp. (adult)

Lungworms (adult and fourth-stage larvae):
Dictyocaulus viviparus

Eyeworms (adult):
Thelazia spp.

Warbles (parasitic stages):
Hypoderma bovis
Hypoderma lineatum

Mange mites:
Psoroptes bovis
Sarcoptes scabei var. bovis

Sucking lice:
Linognathus vituli
Haematopinus eurysternus
Solenopotes capillatus

The product may also be used as an aid in the control of the biting louse *Damalinia bovis* and the mange mite *Chorioptes bovis*, but complete elimination may not occur.

SWINE
The product is indicated for the treatment and control of the following species of gastro-intestinal roundworms, lungworms, mites and lice.

Internal parasites

Gastro-intestinal roundworms (adult and fourth-stage larvae):
Ascaris suum
Oesophagostomum spp.
Hyostrongylus rubidus
Strongyloides ransomi (adults and somatic larval stages)

Lungworms:
Metastrongylus spp. (adults)

External parasites

Mites:
Sarcoptes scabei var. suis

Lice:
Haematopinus suis

The product may also be used as an aid in the control of adult whipworm (*Trichuris suis*).

SHEEP
The product is indicated for the treatment and control of the following species of gastro-intestinal roundworms, lungworms, nasal bots and mites.

Gastro-intestinal roundworms (adult and fourth-stage larvae):
Ostertagia circumcincta (including inhibited *O. circumcincta*)
O. trifurcata
Haemonchus contortus (including inhibited *H. contortus*)
Trichostrongylus axei (adult)
Trichostrongylus colubriformis
Trichostrongylus vitrinus (adult)
Cooperia curticei
Oesophagostomum columbianum
Oesophagostomum venulosum (adult)
Nematodirus filicollis
Chabertia ovina
Trichuris ovis (adult)

Lungworms:
Dictyocaulus filaria (adult and fourth-stage larvae)
Protostrongylus rufescens (adult)

Nasal bots:
Oestrus ovis (immature stage)

Mange mites:
Psoroptes ovis (adult and immature stage)

For the treatment and control of sheep scab *Psoroptes ovis*, two injections with a seven-day interval are required to treat clinical signs of scab and to eliminate mites.
Benzimidazole-resistant strains of *Haemonchus contortus* and *Ostertagia circumcincta* are also controlled.

4.3 Contraindications

Do not use by the intravenous or intramuscular route.
Not for use in species other than cattle, swine and sheep as severe adverse reactions including fatalities in dogs may occur.
In sheep, treatment of psoroptic mange (sheep scab) with one injection is not recommended because, although a clinical improvement may be seen, elimination of all mites may not occur.

4.4 Special warnings for each target species

Sheep scab (*Psoroptes ovis*) is an extremely-contagious external parasite of sheep. Following treatment of infected sheep, great care must be taken to avoid reinfestation, as mites may be viable for up to 15 days off the sheep. It is important to ensure all sheep which have been in contact with infected sheep are treated. Contact between treated, infected and non-treated, non-

infected flocks must be avoided until at least 7 days after the last treatment. Adequate vaccination of sheep against clostridial infections is strongly recommended. Care should be taken to avoid the following practices because they increase the risk of development of resistance and could ultimately result in ineffective therapy:

- Too frequent and repeated use of anthelmintics from the same class, over an extended period of time.
- Underdosing, which may be due to underestimation of body weight, misadministration of the product, or lack of calibration of the dosing device (if any).

Suspected clinical cases of resistance to anthelmintics should be further investigated using appropriate tests (e.g. Faecal Egg Count Reduction test). Where the results of the test(s) strongly suggest resistance to a particular anthelmintic, an anthelmintic belonging to another pharmacological class and having a different mode of action should be used.
Resistance to ivermectin (an avermectin) has been reported in *Teladorsagia* in sheep and goats within the EU. Resistance is common in *Haemonchus* in sheep outside the EU. It has been reported in *Cooperia oncophora* in cattle within the EU, in *Teladorsagia* in cattle in developed countries such as New Zealand and *Haemonchus* in cattle outside the EU. Therefore the use of this product should be based on local (regional, farm) epidemiological information about susceptibility of nematodes and recommendations on how to limit further selection for resistance to anthelmintics.

4.5 Special precautions for use

i. Special precautions for use in animals

As this product does not contain any antimicrobial preservative, swab septum before removing each does.
Use sterile needle and syringe.
When using the 200-ml, 500-ml and 1000-ml pack sizes, use only automatic syringe equipment.

ii. Special precautions for the person administering the veterinary medicinal product to animals

Do not smoke, eat or drink whilst handling the product. Wash hands after use. Take care to avoid self-administration: the product may cause irritation and/or pain at the site of injection.

4.6 Adverse reactions (frequency and seriousness)

Studies have shown a wide safety margin and, at the recommended dosage, no adverse effect on breeding performance were observed.
At therapeutic doses, ivermectin has no adverse effect on cattle, swine or sheep since it does not readily penetrate their central nervous systems.
Transitory discomfort has occasionally been observed in some cattle, pigs

and sheep following subcutaneous administration.
A low incidence of soft-tissue swelling at the injection site has been observed in those species. These reactions have disappeared without treatment.

4.7 Use during pregnancy, lactation or lay

The product can be administered to ewes at any stage of pregnancy or lactation. It can be used in breeding ewes and rams and will not affect fertility.

4.8 Interaction with other medicinal products and other forms of interaction

None known.

4.9 Amounts to be administered and administration route

The injection may be given with any standard automatic or single-dose or hypodermic syringe. Use of 17-gauge ½-inch needle is suggested. Replace with a fresh sterile needle after every 10 to 12 animals. Injection of wet or dirty animals is not recommended. If using a single-dose or hypodermic syringe, use a separate sterile needle to withdraw the product from the pack.

To ensure administration of a correct dose, body weight should be determined as accurately as possible; accuracy of the dosing device should be checked.

CATTLE
To be given only by subcutaneous injection at the recommended dosage level of
2 mg of ivermectin per 10 kilogram of bodyweight (equivalent to 1 ml per 50 kg of bodyweight) under the loose skin in front of or behind the shoulder.
Each ml contains 10 mg of ivermectin

Dosage schedule for cattle

Bodyweight (kg)	Dose Volume (ml)
Up to 50	1.0
51 – 100	2.0
101 – 150	3.0
151 – 200	4.0
201 – 250	5.0
251 – 300	6.0
301 – 350	7.0
351 – 400	8.0
401 – 450	9.0
451 – 500	10.0
501 – 550	11.0
551 - 600	12.0

SWINE

Injection at the recommended dosage level of 3 mg of ivermectin per 10 kg of bodyweight (equivalent to 1 ml per 33 kg of bodyweight).

Dosage schedule for swine

Bodyweight (kg)	Dose Volume (ml)
Up to 16	0.5
17 – 33	1.0
34 – 50	1.5
51 – 66	2.0
67 – 99	3.0
100 – 133	4.0
134 – 166	5.0
167 - 200	6.0

Over 200 kg of bodyweight, give 1.0 ml per 33 kg of bodyweight.
Inject subcutaneously in the neck in pigs.
In young pigs, especially those below 16 kg for which less than 0.5 ml of the product is indicated, dosing accurately is important. The use of a syringe that can accurately deliver as little as 0.1 ml is recommended.

SHEEP

To be given only by subcutaneous injection using aseptic precautions at the recommended dosage level of 200 mcg of ivermectin per kilogram of bodyweight (equivalent to 0.5 ml per 25 kg of bodyweight) in the neck.
For the treatment and control of *Psoroptes ovis* (sheep scab), two injections with a seven-day interval are required to treat clinical signs of scab and to eliminate living mites.

Dosage schedule for sheep

Bodyweight (kg)	Dose Volume (ml)
Up to 5	0.1
5.1 – 10	0.2
10.1 – 15	0.3
15.1 – 25	0.5
25.1 – 50	1.0
50.1 – 75	1.5
75.1 - 100	2.0

For sheep weighing over 100 kg, calculate the dose at the rate of 0.5 ml per 25 kg. When treating sheep of less than 16 kg, seek veterinary advice regarding the use of 1-ml disposable syringes graduated in increments of 0.1 ml. For the treatment of individual sheep, a syringe not exceeding 2.0 ml and calibrated in increments of
0.1 ml should be used.

General precautions
To be given by subcutaneous injection.
This product does not contain an antimicrobial preservative. Swab septum before removing each dose.

4.10 Overdose (symptoms, emergency procedures, antidotes), if necessary

Cattle
Single doses of 4 mg of ivermectin per kg (20 x the use level) given subcutaneously resulted in ataxia and depression.

Swine
A dose of 30 mg of ivermectin per kg (100 x the recommended dose of 0.3 mg per kg) injected subcutaneously to pigs caused lethargy, ataxia, bilateral mydriasis, intermittent tremors, labored breathing and lateral recumbency.

For these species, no antidote has been identified; however, symptomatic therapy may be beneficial

4.11 Withdrawal period

Cattle must not be treated within 49 days of slaughter for human consumption.
Do not use in cattle producing milk for human consumption.
Do not use in non-lactating cows including pregnant heifers within 60 days of calving.

Swine must not be treated within 28 days of slaughter for human consumption.

Sheep must not be treated within 42 days of slaughter for human consumption.
Do not use in sheep producing milk for human consumption.

5. PHARMACOLOGICAL PROPERTIES

Pharmaco-therapeutic group: endectocide

ATCvet Code: QP54AA01

5.1 Pharmacodynamic properties

Ivermectin is a broad-spectrum endectocide of the avermectin family.
Ivermectin is isolated after purification and hydrogenation of the avermectin-family compounds which are obtained from the fermentation of the soil organism *Streptomyces avermitillis*.
Ivermectin is a macrocyclic-lactone derivative which has a broad and potent antiparasitic activity against nematodes and arthropods. It acts by inhibiting nerve impulses. Ivermectin binds selectively and with high affinity to

glutamate-gated chloride-ion channels which occur in invertebrate nerve and muscle cells. This leads to an increase in the permeability of the cell membrane to chloride ions with hyperpolarization of the nerve or muscle cell, resulting in paralysis and death of the relevant parasites. Compunds of this class may also interact with other ligand-gated chloride channels, such as those gated by the neurotransmitter gamma-aminobutyric acid (GABA). The margin of safety for compounds of this class is attributable to the fact that mammals do not have glutamate-gated chloride channels. The macrocyclic lactones have a low affinity for other mammalian ligand-gated chloride channels and they do not readily cross the blood-brain barrier.

5.2 Pharmacokinetic particulars

The biological half-life afforded by an injectable formulation of ivermectin is significantly longer than the intrinsic half-life of the drug (intravenous bolus). Slower absorption associated with the parenteral route (subcutaneous injection) compared to the oral administration has been attributed to precipitation of the drug at the injection site.
The low solubility of ivermectin in water, its formulation in non-aqueous preparation and its deposition in the subcutaneous tissue favour a slow absorption from the sire of injection, which may account for its prolonged residence in the bloodstream.

In cattle
Following a subcutaneous administration of the recommended dosage (1 ml for
50 kg of bodyweight), the elimination half-life is obtained after 15 hours with a plasma peak achieved after 50 hours. The concentrations progressively decrease with an elimination half-life of 128 hours. Studies have shown that the liver is the target tissue with the highest residue levels recovered. All other tissues showed lower residues: fat > kidney > muscle. The injection site had residues shortly after treatment but, by day 28, the average residues were negligible. After administration of tritium-labelled ivermectin, faeces collected during the first 7 days after dosing contained almost all the dosed radioactivity. Only about 1 % - 2 % of the dosed radioactivity was excreted in the urine. About 40 % - 50 % of the excreted radioactivity was present as unaltered drug.

In swine
Following a subcutaneous administration of the recommended dosage (1 ml per
33 kg of bodyweight), the ivermectin plasma peak is observed after 1.5 days with 13.71 ng/ml. The concentration then remains stable for 4 days (concentrations over Cmax/2) before decreasing with an elimination half-life of 1 day. Studies have shown that liver is the target tissue. Following an injection of 0.4 mg/kg, no liver residues
(< 2ppb) were found at 28 days *post* dose. After administration of tritium-labelled ivermectin, faeces collected during the first 7 days after dosing contained only about 36 % of the dosed radioactivity. Less than 1 % of the

dosed radioactivity was found in the urine. About 40 % of the excreted radioactivity was unaltered drug.

In sheep
Following a subcutaneous administration of the recommended dosage (0.5 ml for
25 kg of bodyweight), the ivermectin plasma peak is observed after 1.68 days with 31.48 ng/ml. The elimination half-life corresponds to 1.69 days.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Glycerol Formal

6.2 Major incompatibilities

None known

6.3 Shelf life

Shelf life of the veterinary medicinal product as packaged for sale: 3 years
Shelf life after opening the immediate packaging: 6 months.

6.4 Special precautions for storage

Do not store above 30 °C.
Following withdrawal of the first dose, use the product within 6 months.
Dispose of unused material.
Avoid introduction of contamination.
Protect from light.
Keep vial in outer carton

6.5 Nature and composition of immediate packaging

200, 500 and 1000 ml colourless low-density polyethylene vial with chlorobutyl/rubber closure with plastics overcap secured with an aluminium collar.

Not all pack sizes may be marketed.

6.6 Special precautions for the disposal of unused veterinary medicinal product or waste materials derived from the use of such products, if appropriate

Any unused product or waste material should be disposed of in accordance with national requirements.
EXTREMELY DANGEROUS TO FISH AND AQUATIC LIFE. Do not contaminate ponds, waterways or ditches with the product or used container.

7. MARKETING AUTHORISATION HOLDER

VIRBAC
1ère avenue 2065m LID
06516 Carros
France

8. MARKETING AUTHORISATION NUMBER

Vm 05653/4203

9. DATE OF FIRST AUTORISATION

30 December 2004

10. DATE OF REVISION OF THE TEXT

April 2024

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