SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE VETERINARY MEDICINAL PRODUCT

Zermex 20 mg/ml LA Solution for Injection for Sheep

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each ml contains:

Active substance
Moxidectin 20 mg

Excipients
Benzyl alcohol (E1519) 70 mg
Butylhydroxytoluene ≤ 0.12 mg

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Solution for injection
Clear yellow liquid.

4. CLINICAL PARTICULARS

4.1 Target Species

Sheep.

4.2 Indications for use, specifying the target species

Sheep above 15 kg bodyweight.

Treatment and prevention of mixed infections of gastro-intestinal nematodes, respiratory nematodes and certain arthropod parasites in sheep.

Moxidectin is indicated for treatment of infections caused by moxidectin sensitive strains of:

Gastro-intestinal nematodes:
Haemonchus contortus (adults and L3)
Ostertagia (Teladorsagia) circumcincta (adults and L3, including inhibited larvae)
Trichostrongylus axei (adults)
Trichostrongylus colubriformis (adults and L3)
Nematodirus spathiger (adults)
Cooperia curticei (macmasteri) (adults)
Cooperia punctata (adults)
Oesophagostomum columbianum (L3)
Chabertia ovina (adults)
Respiratory tract nematodes
Dictyocaulus filaria (adults)

Larvae of Diptera
Oestrus ovis: L1, L2, L3

Mange mites
Psoroptes ovis

Trials have shown that moxidectin is effective against certain strains of

Haemonchus contortus, *Teladorsagia circumcincta* and *Trichostrongylus* spp. resistant to benzimidazoles.

The product has a persistent action and protects sheep against infection or re-infection with the following parasites for the period indicated:

Species	**Days**
Ostertagia (Teladorsagia) circumcincta	97
Haemonchus contortus	111
Trichostrongylus colubriformis	44
Psoroptes ovis	60

Persistent efficacy periods have not been established for parasite species other than those included in the list above. Therefore, re-infection of animals on pasture contaminated by parasites other than these remains possible before the 44 day minimum persistency period demonstrated for specific species.

4.3 Contraindications

Do not use in sheep less than 15 kg bodyweight.

Do not inject the product by intravascular route. Intravascular injection may result in ataxia, paralysis, convulsions, collapse and death. See item “Special precautions for use in animals”

Do not use in cases of hypersensitivity to the active substance or to any excipients.

4.4 Special warnings for each target species

Unnecessary use of antiparasitics or use deviating from the instructions given in the SPC may increase the resistance selection pressure and lead to reduced efficacy. The decision to use the product should be based on confirmation of the parasitic species and burden, or of the risk of infestation based on its epidemiological features, for each individual herd.

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 bodyweight, 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 macrocyclic lactones has been reported in *Teladorsagia* in sheep in a number of countries. In 2008, throughout Europe, moxidectin resistance is very rare; it has been reported in a single case involving a levamisole-, benzimidazole and ivermectin-resistant strain of *Teladorsagia circumcincta*. Therefore the use of moxidectin should be based on local (regional, farm) epidemiological information about susceptibility of nematodes, local history of treatments and recommendations on how to use the product under sustainable conditions to limit further selection for resistance to anthelmintics. These precautions are especially important when moxidectin is being used to control resistant strains.

Psoroptes ovis is an extremely contagious external parasite of sheep and cattle. To ensure complete control, great care must be taken to avoid re-infestation, as mites may be viable for up to 15 days off the animal. It is important that all animals which have been in contact with infected ones are treated with an appropriate product. Contact between treated, infected and untreated herds must be avoided until at least seven days after treatment.

Resistance to moxidectin has been reported in *Psoroptes ovis* scab mites in sheep and in cattle. Cases of side-resistance with other macrocyclic lactones (ivermectin and doramectin) have been reported as well. The use of this product should take into account local information about susceptibility of the target parasites, where available.

4.5 Special precautions for use

Special precautions for use in animals

This product has been formulated specifically for subcutaneous injection in the base of the ear of sheep and must not be given by any other route of administration or to any other species. In order to prevent abscesses a strict aseptic technique is recommended.

Special precautions to be taken by the person administering the veterinary medicinal product to animals

Avoid direct contact with skin and eyes.
Wash hands after use.
Do not smoke, drink or eat while handling the product.
Take care to avoid self-injection. If this occurs, it is unlikely that any product related symptoms will be observed. In case of accidental self injection, seek medical advice immediately and show the package leaflet or the label to the physician. Advice to Medical Practitioners in case of accidental self injection: Treat symptomatically.

Other precautions regarding impact on the environment

Moxidectin fulfils the criteria for a (very) persistent, bioaccumulative and toxic (PBT) substance; therefore, exposure of the environment to moxidectin must be limited to the extent possible. Treatments should be administered only when necessary and should

be based on faecal egg counts or evaluation of the risk of infestation at the animal and/or herd level.

Like other macrocyclic lactones, moxidectin has the potential to adversely affect non-target organisms:

- Faeces containing moxidectin excreted onto pasture by treated animals may temporarily reduce the abundance of dung feeding organisms. Following treatment of sheep with the product, levels of moxidectin that are potentially toxic to dung fly species may be excreted over a period of more than 4 weeks and may decrease dung fly abundance during that period. It has been established in laboratory tests that moxidectin may temporarily affect dung beetle reproduction; however, studies with incurred residues indicate no long-term effects. Nevertheless, in case of repeated treatments with moxidectin (as with products of the same anthelmintic class) it is advisable not to treat animals every time on the same pasture to allow dung fauna populations to recover.

- Moxidectin is inherently toxic to aquatic organisms including fish. The product should be used only according to the label instructions. Based on the excretion profile of moxidectin when administered as the injectable formulation to sheep, treated animals should not have access to watercourses during the first 11 days after treatment.

4.6 Adverse reactions (frequency and seriousness)

Swelling and inflammation may be found at the injection site in some animals. The swelling generally disappears within 7 days of treatment and generally resolves without any medical treatment.
In rare cases, adverse reactions such as transitory salivation, depression, drowsiness and ataxia might occur. No particular treatment is required; these symptoms usually disappear within 24 to 48 hours. There is no specific antidote.
Very rarely neurological disorders such as collapse, convulsion, and paralysis might occur. Severe reactions may be fatal.

The frequency of adverse reactions is defined using the following convention:
very common (more than 1 in 10 animals treated displaying adverse reaction(s))
common (more than 1 but less than 10 animals in 100 animals treated)
uncommon (more than 1 but less than 10 animals in 1,000 animals treated)
rare (more than 1 but less than 10 animals in 10,000 animals treated)
very rare (less than 1 animal in 10,000 animals treated, including isolated reports).

4.7 Use during pregnancy, lactation or lay

Can be used during pregnancy. However, note 4.11. Withdrawal periods.

4.8 Interactions with other medicinal products and other forms of interaction

The effects of GABA agonists are increased by moxidectin.

4.9 Amounts to be administered and administration route

Dosage is 0.5 ml/10 kg bodyweight to give 1 mg moxidectin/ kg bodyweight. The 50ml vial stoppers must not be broached more than 10 times. Use automatic syringe equipment for the 200 ml and 500ml vials.

Use the following table as a guide:

		Number of doses per pack		
Weight of sheep kg	Dose ml	50 ml	200 ml	500 ml
20	1.0	50	200	500
30	1.5	33	133	333
40	2.0	25	100	250
50	2.5	20	80	200
60	3.0	17	67	167
70	3.5	14	57	143
80	4.0	13	50	125
90	4.5	11	44	111
100	5.0	10	40	100

Underdosing could result in ineffective use and may favour resistance development. To ensure administration of a correct dose, bodyweight should be determined as accurately as possible; accuracy of the dosing device should be checked. If animals are to be treated collectively rather than individually, they should be grouped according to their bodyweight and dosed accordingly, in order to avoid under- or overdosing.

The injection should be administered as a single subcutaneous injection at the base of the ear using an 18 gauge, 25 mm hypodermic needle. With the animal's head under control, the formulation should be administered about 2 cm caudal from the anterior (rostral) edge of the pinna at the base of the ear. The skin at the base of the selected ear should be pinched and the product injected into the subcutaneous tissue. Following subcutaneous administration, the needle should be withdrawn from the skin as pressure is applied with the thumb at the point of insertion for several seconds. If leakage occurs then pressure should be applied for several additional seconds.

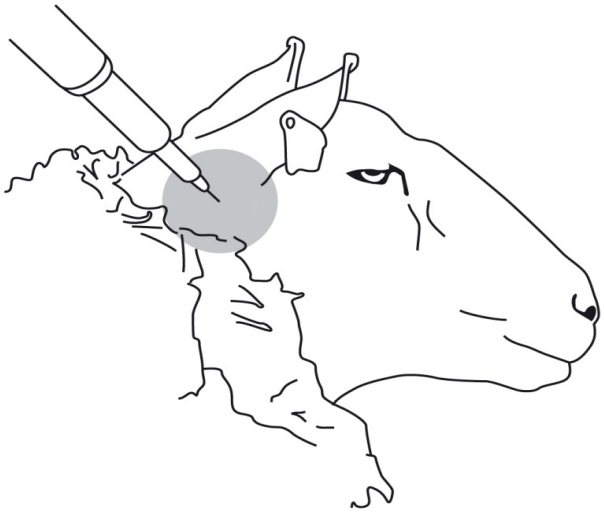

Diagram: Ear injection procedure

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

Signs of overdoses have not been seen at 3 and 5 times the recommended dose. However, if they do occur they should be consistent with the mode of action of moxidectin and would be manifested as transient salivation, depression, drowsiness

and ataxia 24 to 36 hours post-treatment. The signs would usually disappear within 36 to 72 hours without treatment. There is no specific antidote.

4.11 Withdrawal period(s)

Meat and offal: 104 days.

Milk: Not permitted for use in dairy sheep, at any stage of life.

The withdrawal period is based solely on a single injection at the base of the ear.

5. PHARMACOLOGICAL PROPERTIES

Pharmacotherapeutic group: antiparasitic product, endectocide

ATCvet Code QP54AB02, moxidectin

5.1 Pharmacodynamic properties

Moxidectin is an endectocide active against a wide range of internal and external parasites and is a second generation macrocyclic lactone of the milbemycin family. Moxidectin interacts with GABA receptors and chloride channels. The net effect is to open the chloride channels on the postsynaptic junction to allow the inflow of chloride ions and induce an irreversible resting state. This results in flaccid paralysis and eventual death of parasites exposed to the drug.

The product has a persistent activity against the second instar larvae of *Oestrus Ovis* (L2 Larvae only) up to 80 days after treatment.
However, re-infestation with 1st instar larvae is not prevented and clinical signs arising from such re-infestation may be observed during this period.

5.2 Pharmacokinetic particulars

Moxidectin is absorbed following subcutaneous injection with maximum blood concentrations (C_{max} 24 ng/ml) being achieved 4 to 7 days post injection. Mean AUC_{last} is 411 ng.d/ml. The drug is distributed throughout the body tissues but due to its lipophilicity it is concentrated mainly in the fat. The depletion half life in fat is 30 - 34 days.

Moxidectin undergoes biotransformation by hydroxylation in the body. The only significant route of excretion is the faeces.

5.3 Environmental properties

Moxidectin fulfils the criteria for a (very) persistent, bioaccumulative and toxic (PBT) substance. In particular, in acute and chronic toxicity studies with algae, crustaceans and fish, moxidectin showed toxicity to these organisms, yielding the following endpoints:

Organism		EC50	NOEC
Algae	*S. capricornutum*	>86.9 µg/l	86.9 µg/l
Crustaceans (Water fleas)	*Daphnia magna* (acute)	0.0302 µg/l	0.011 µg/l
	Daphnia magna (reproduction)	0.0031 µg/l	0.010 µg/l

Fish	*O. mykiss*	0.160 µg/l	Not determined
	L. macrochirus	0.620 µg/l	0.52 µg/l
	P. promelas (early life stages)	Not applicable	0.0032 µg/l
	Cyprinus carpio	0.11 µg/l	Not determined

EC_{50}: the concentration which results in 50% of the test species individuals being adversely affected, i.e. both mortality and sub-lethal effects.
NOEC: the concentration in the study at which no effects are observed.

This implies that when allowing moxidectin to enter water bodies, this may have a severe and lasting impact on aquatic life. To mitigate this risk, all precautions for use and disposal must be adhered to.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Benzyl Alcohol (E1519)
Sorbitan Oleate
Propylene glycol dicaprylocaprate
Butylhydroxytoluene

6.2 Major incompatibilities

In the absence of compatibility studies, this veterinary medicinal product must not be mixed with other veterinary medicinal products.

6.3 Shelf life

Shelf life of the veterinary medicinal product as packaged for sale: 3 years.
Shelf life after first opening the immediate packaging: 28 days.

6.4 Special precautions for storage

Do not store above 25°C. Keep the container in the outer carton in order to protect from light.

6.5 Nature and composition of immediate packaging

Natural high density polyethylene vials with Flurotec coated chlorinated butyl rubber stoppers and aluminium flip off seals (50 ml) or aluminium seals (200 ml, 500ml).

Each vial is supplied in a carton.

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

Any unused veterinary medicinal product or waste material derived from such veterinary medicinal products should be disposed of in accordance with local requirements. Do not contaminate watercourses with the product. Extremely dangerous for fish and aquatic organisms.

7. MARKETING AUTHORISATION HOLDER

Zoetis Belgium S.A.
2nd Floor, Building 10
Cherrywood Business Park
Loughlinstown
Dublin 18
D18 T3Y1
Ireland

8. MARKETING AUTHORISATION NUMBER

Vm 60021/3036

9. DATE OF FIRST AUTHORISATION

07 December 2009

10. DATE OF REVISION OF THE TEXT

September 2025

Gavin Hall
Approved: 13 October 2025