

## 1. NAME OF THE VETERINARY MEDICINAL PRODUCT

Enroxil 50 mg/ml solution for injection for calves, pigs and dogs

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each ml contains:

### Active substance:

Enrofloxacin 50 mg

### Excipients:

Qualitative composition of excipients and other constituents	Quantitative composition if that information is essential for proper administration of the veterinary medicinal product
n-butyl alcohol	30 mg
Potassium hydroxide	
Water for injections	

Clear yellow solution practically free from particles.

## 3. CLINICAL INFORMATION

### 3.1 Target species

Cattle (calves), pigs and dogs.

### 3.2 Indications for use for each target species

Calves:

Treatment of infections of the respiratory tract caused by enrofloxacin susceptible strains of *Pasteurella multocida*, *Mannheimia haemolytica* and *Mycoplasma* spp.

Treatment of infections of the alimentary tract caused by enrofloxacin susceptible strains of *Escherichia coli*.

Treatment of septicaemia caused by enrofloxacin susceptible strains of *Escherichia coli*.

Treatment of acute mycoplasma-associated arthritis due to enrofloxacin susceptible strains of *Mycoplasma bovis*.

Pigs:

Treatment of infections of the respiratory tract caused by enrofloxacin susceptible strains of *Pasteurella multocida*, *Mycoplasma* spp. and *Actinobacillus pleuropneumoniae*.

Treatment of infections of the alimentary tract caused by enrofloxacin susceptible strains of *Escherichia coli*.

Treatment of septicaemia caused by enrofloxacin susceptible strains of *Escherichia coli*

Dogs:

Treatment of infections of the alimentary, respiratory and urogenital tracts (including prostatitis, adjunctive antibiotic therapy for pyometra), skin and wound infections, otitis (externa/media) caused by enrofloxacin susceptible strains of *Staphylococcus* spp., *Escherichia coli*, *Pasteurella* spp., *Klebsiella* spp., *Bordetella* spp., *Pseudomonas* spp. and *Proteus* spp.

### 3.3 Contraindications

Do not use for prophylaxis.

Do not use in case of resistance against quinolones.

Do not use in case of disturbances in growth of cartilages and/or during injury of locomotory system particularly on functionally loaded joints or due to body weight loaded joints.

Do not use in young dogs during their growth, i.e. in small breeds of dogs less than 8 months of age, in big breeds of dogs less than 12 months of age, in giant breeds of dogs less than 18 months of age, as articular cartilage may be affected during the period of growth.

Do not use in growing horses because of possible deleterious damage on articular cartilage.

Do not use in animals that are epileptic or suffer from seizures since enrofloxacin may cause CNS stimulation.

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

### **3.4 Special warnings**

None.

### **3.5 Special precautions for use**

#### Special precautions for safe use in the target species:

Official and local antimicrobial policies should be taken into account when the veterinary medicinal product is used.

Fluoroquinolones should be reserved for the treatment of clinical conditions which have responded poorly, or are expected to respond poorly, to other classes of antimicrobials.

Whenever possible fluoroquinolones should only be used based on susceptibility testing.

Use of the veterinary medicinal product including use deviating from the instructions given in the SPC may increase the prevalence of bacteria resistant to enrofloxacin and may decrease the effectiveness of treatment with all fluoroquinolones due to the potential for cross-resistance.

Treatment should not be repeated if an allergic reaction occurs.

Enrofloxacin is partially excreted through the kidney. In the case of the kidney's functional failure slower excretion should be taken into account. Special caution should be taken when using enrofloxacin in animals with impaired renal function.

Degenerative changes of articular cartilage were observed in calves treated orally with 30 mg enrofloxacin/kg bw during 14 days.

The use of enrofloxacin in growing lambs at the recommended dose for 15 days caused histological changes in the articular cartilage, not associated with clinical signs.

Do not re-inject into the same injection site.

The cap may be safely punctured up to 40 times. When treating groups of animals, use a draw-off needle.

Only the 50 ml vial should be used to treat dogs and small piglets.

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

People with known hypersensitivity to fluoroquinolones should avoid any contact with the veterinary medicinal product.

Avoid skin and eye contact. Wash any splashes from skin or eyes immediately with water.

Wash hands after use. Do not eat, drink or smoke whilst handling the veterinary medicinal product.

Care should be taken to avoid accidental self-injection. In case of accidental self-injection, seek medical advice immediately and show the package leaflet or the label to the physician.

#### Special precautions for the protection of the environment:

Not applicable.

#### Other precautions:

In countries where feeding of fallen stock to scavenger bird populations is permitted as a conservation measure (see Commission Decision 2003/322/EC), the possible risk to hatching success should be considered before feeding carcasses of livestock recently treated with this veterinary medicinal product.

### 3.6 Adverse events

Calves:

Very rare ( $<1$ animal / 10,000 animals treated, including isolated reports):	Digestive tract disorders (e.g., diarrhoea) <sup>1</sup> Injection site reaction <sup>2</sup>
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<sup>1</sup> Generally mild and transient.

<sup>2</sup> May persist up to 14 days.

Pigs:

Very rare ( $<1$ animal / 10,000 animals treated, including isolated reports):	Digestive tract disorders (e.g., diarrhoea) <sup>1</sup>
Undetermined frequency (cannot be estimated from the available data):	Injection site inflammation <sup>2</sup>

<sup>1</sup> Generally mild and transient.

<sup>2</sup> May persist up to 28 days.

Dogs:

Very rare ( $<1$ animal / 10,000 animals treated, including isolated reports):	Digestive tract disorders (e.g., diarrhoea) <sup>1</sup>
Undetermined frequency (cannot be estimated from the available data):	Injection site reaction (e. g. oedema) <sup>2</sup>

<sup>1</sup> Generally mild and transient.

<sup>2</sup> Moderate and transient.

Reporting adverse events is important. It allows continuous safety monitoring of a veterinary medicinal product. Reports should be sent, preferably via a veterinarian, to either the marketing authorisation holder or its local representative or the national competent authority via the national reporting system. See the package leaflet for respective contact details.

### 3.7 Use during pregnancy, lactation or lay

Pregnancy and lactation:

Laboratory studies in rats and rabbits have not produced any evidence of teratogenic effects but have shown evidence of foetotoxic effects at maternotoxic doses.

The safety of the veterinary medicinal product has not been established during pregnancy and lactation. Use only according to the benefit-risk assessment by the responsible veterinarian.

### **3.8 Interaction with other medicinal products and other forms of interaction**

Do not use enrofloxacin concomitantly with antimicrobial substances acting antagonistically to quinolones (e. g. macrolides, tetracyclines or phenicols).

Do not use concurrently with theophylline as the elimination of theophylline may be delayed.

Care should be taken during the concomitant use of flunixin and enrofloxacin in dogs to avoid adverse drug reactions. The decrease in drug clearances as a result of co-administration of flunixin and enrofloxacin indicates that these substances interact during the elimination phase. Thus, in dogs, the co-administration of enrofloxacin and flunixin increased the AUC and the elimination half-life of flunixin and increased the elimination half-life and reduced the  $C_{max}$  of enrofloxacin.

### **3.9 Administration routes and dosage**

Intravenous (calves), subcutaneous (calves, dogs) or intramuscular (pigs) use.

Repeated injections should be made at different injection sites.

To ensure a correct dosage, body weight should be determined as accurately as possible.

Calves:

5 mg of enrofloxacin/kg bw, corresponding to 1 ml/10 kg bw, once daily for 3-5 days.

Acute mycoplasma-associated arthritis due to enrofloxacin susceptible strains of *Mycoplasma bovis*: 5 mg of enrofloxacin/kg bw, corresponding to 1 ml/10 kg bw, once daily for 5 days.

The veterinary medicinal product can be administered by slow intravenous or subcutaneous administration.

Not more than 10 ml should be administered at one subcutaneous injection.

Pigs:

2.5 mg of enrofloxacin/kg bw, corresponding to 0.5 ml/10 kg bw, once daily by intramuscular injection for 3 days.

Alimentary tract infection or septicaemia caused by *Escherichia coli*: 5 mg of enrofloxacin/kg bw, corresponding to 1 ml/10 kg bw, once daily by intramuscular injection for 3 days.

In pigs, the injection should be made in the neck at the ear base.

Not more than 3 ml should be administered at one intramuscular injection site.

Dogs:

5 mg of enrofloxacin/kg bw, corresponding to 1 ml/10 kg bw, daily by subcutaneous injection for up to 5 days.

Treatment may be initiated with injectable veterinary medicinal product and maintained with enrofloxacin tablets. Duration of treatment should be based on the duration of treatment approved for the appropriate indication in the SPC of the tablet veterinary medicinal product.

If there is no clinical improvement within two to three days, further susceptibility testing and possibly a change in antimicrobial therapy should be considered.

Do not exceed the recommended dose.

Normal sterile precautions should be taken.

### **3.10 Symptoms of overdose (and where applicable, emergency procedures and antidotes)**

In cases of accidental overdoses digestive tract disorders (e.g. vomiting, diarrhoea) and neurological disorders may occur.

In pigs, no adverse effects were reported after the administration of 5 times the recommended dose.

In dogs and cattle, overdose has not been documented.

In accidental overdose there is no antidote and treatment should be symptomatic.

### **3.11 Special restrictions for use and special conditions for use, including restrictions on the use of antimicrobial and antiparasitic veterinary medicinal products in order to limit the risk of development of resistance**

Not applicable.

### **3.12 Withdrawal periods**

#### Calves

Intravenous use:

Meat and offal: 5 days.

Subcutaneous use:

Meat and offal: 12 days.

Not authorised for use in animals producing milk for human consumption.

#### Pigs

Meat and offal: 13 days.

## **4. PHARMACOLOGICAL INFORMATION**

### **4.1 ATCvet code: QJ01MA90**

### **4.2 Pharmacodynamics**

#### Mode of action

Two enzymes essential in DNA replication and transcription, DNA gyrase and topoisomerase IV, have been identified as the molecular targets of fluoroquinolones. Target inhibition is caused by noncovalent binding of fluoroquinolone molecules to these enzymes. Replication forks and translational complexes cannot proceed beyond such enzyme-DNA-fluoroquinolone complexes, and inhibition of DNA and mRNA synthesis triggers events resulting in a rapid, drug concentration-dependent killing of pathogenic bacteria. The mode of action of enrofloxacin is bactericidal and bactericidal activity is concentration dependent.

#### Antibacterial spectrum

Enrofloxacin is active against many Gram-negative bacteria such as *Escherichia coli*, *Klebsiella* spp., *Actinobacillus pleuropneumoniae*, *Mannheimia haemolytica*, *Pasteurella* spp. (e.g. *Pasteurella multocida*), *Bordetella* spp., *Proteus* spp., *Pseudomonas* spp., against Gram-positive bacteria such as *Staphylococcus* spp. (e.g. *Staphylococcus aureus*) and against *Mycoplasma* spp. at the recommended therapeutic doses.

#### Types and mechanisms of resistance

Resistance to fluoroquinolones has been reported to arise from five sources, (i) point mutations in the genes encoding for DNA gyrase and/or topoisomerase IV leading to alterations of the respective enzyme, (ii) alterations of drug permeability in Gram-negative bacteria, (iii) efflux mechanisms, (iv) plasmid mediated resistance and (v) gyrase protecting proteins. All mechanisms lead to a reduced susceptibility of the bacteria to fluoroquinolones. Cross-resistance within the fluoroquinolone class of antimicrobials is common.

### **4.3 Pharmacokinetics**

Enrofloxacin is rapidly absorbed after parenteral injection. Bioavailability is high (approximately 100% in pig and cattle) with a low to moderate plasma protein binding (approximately 20 to 50%). Enrofloxacin is metabolized to the active substance ciprofloxacin at approximately 40 % in dogs and ruminants, less than 10 % in pigs.

Enrofloxacin and ciprofloxacin distribute well into all target tissues, e.g. lung, kidney, skin, and liver, reaching 2- to 3-fold higher concentrations than in plasma. Parent substance and active metabolite are cleared from the body via urine and faeces.

Accumulation in plasma does not occur following a treatment interval of 24 h.

In milk, most of drug activity consists on ciprofloxacin. Overall drug concentrations peak at 2 hours after treatment showing an approximately 3-fold higher total exposure over the 24 hours dosing interval compared to plasma.

	Dogs	Pigs	Pigs	Calves	Calves
Dose rate (mg/kg bw)	5	2.5	5	5	5
Route of administration	s.c.	i.m.	i.m.	i.v.	s.c.
T <sub>max</sub> (h)	0.5	2	2	/	1.2
C <sub>max</sub> (µg/ml)	1.8	0.7	1.6	/	0.73
AUC (µg·h/ml)	/	6.6	15.9	7.11	3.09
Terminal half-life (h)	/	13.12	8.10	/	2.34
Elimination half-life (h)	4.4	7.73	7.73	2.2	/
F (%)	/	95.6	/	/	/

## **5. PHARMACEUTICAL PARTICULARS**

### **5.1 Major incompatibilities**

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

### **5.2 Shelf life**

Shelf life of the veterinary medicinal product as packaged for sale: 5 years.

Shelf life after first opening the immediate packaging: 28 days.

### **5.3 Special precautions for storage**

Do not store above 25 °C.

Keep the bottle in the outer carton.

### **5.4 Nature and composition of immediate packaging**

Cardboard box with 1 amber Type I glass bottle of 50 or 100 ml with a grey bromobutyl rubber stopper and aluminium cap.

Cardboard box with 1 amber Type II glass bottle of 50 or 100 ml with a grey bromobutyl rubber stopper and aluminium cap.

Not all pack sizes may be marketed.

### **5.5 Special precautions for the disposal of unused veterinary medicinal products or waste materials derived from the use of such products**

Medicines should not be disposed of via wastewater or household waste.

Use take-back schemes for the disposal of any unused veterinary medicinal product or waste materials derived thereof in accordance with local requirements and with any national collection systems applicable to the veterinary medicinal product concerned.

## **6. NAME OF THE MARKETING AUTHORISATION HOLDER**

KRKA, d.d., Novo mesto

**7. MARKETING AUTHORISATION NUMBER(S)**

VPA10774/002/002

**8. DATE OF FIRST AUTHORISATION**

10/07/2009

**9. DATE OF THE LAST REVISION OF THE SUMMARY OF THE PRODUCT CHARACTERISTICS**

02/02/2024

**10. CLASSIFICATION OF VETERINARY MEDICINAL PRODUCTS**

Veterinary medicinal product subject to prescription.

Detailed information on this veterinary medicinal product is available in the [Union Product Database](https://medicines.health.europa.eu/veterinary) (<https://medicines.health.europa.eu/veterinary>).