Summary of Product Characteristics

1 NAME OF THE VETERINARY MEDICINAL PRODUCT

Duotech Oral Suspension for Sheep

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Active substances:
Oxfendazole 25 mg/ml
Closantel (as Closantel Sodium Dihydrate) 50 mg/ml
For a full list of excipients, see Section 6.1.

3 PHARMACEUTICAL FORM

An off white oral suspension.

4 CLINICAL PARTICULARS

4.1 Target Species

Sheep.

4.2 Indications for use, specifying the target species

For the treatment and control of mature and developing immature gastrointestinal roundworms, lungworms, tapeworms and fluke over 6 weeks in sheep and lambs. It is ovicidal against nematode eggs and delays egg laying in trematodes (fluke).
Oxfendazole is effective against all the economically important gastrointestinal roundworms of sheep including inhibited and arrested larvae of *Ostertagia* spp, it is effective against benzimidazole susceptible *Haemonchus* spp and *Ostertagia* spp.
Closantel is effective against mature and immature fluke over 6 weeks (*Fasciola hepatica*), haematophagous nematodes (*Haemonchus contortus* including benzimidazole resistant strains, *Chabertia ovina* and *Gaigeric pachyscelis*) and larval stages of some arthropods including *oestrus ovis* (sheep nasal bot fly larvae).
In known fluke areas, parasitic infestations will generally be mixed involving nematodes, trematodes and occasionally cestodes. Treatment with the oxfendazole/closantel combination will be of particular benefit in reducing parasite burden in such areas.
Duotech is recommended for the treatment and control of the following:
Gastrointestinal roundworms: *Ostertagia* spp, *Trichostrongylus axei*, *Nematodirus* (including *N. battus*), *Cooperia* spp, intestinal *Trichostrongylus, Oesophagostomum* spp, *Chabertia* spp, *Haemonchus* spp, inhibited, immature and adult stages of *H. contortus* (Barber Pole Worm) including benzimidazole resistant strains.

Lungworms: *Dictyocaulus viviparus*
Tapeworms: *Moniezia* spp;
Flukes: chronic and sub-acute fascioliasis due to *Fasciola hepatica*;
Sheep nasal fly: *Oestrus ovis*.
Duotech is effective against inhibited/arrested larvae of *Haemonchus* spp, *Ostertagia* spp and *Nematodirus* spp.

4.3 Contraindications

Do not exceed the stated dose.
Do not use in animals with known hypersensitivity to the active ingredients.

4.4 Special warnings for each target species

None known.

4.5 Special precautions for use

Special precautions for use in animals:
To be administered by the oral route only.
The bodyweight should be assessed as accurately as possible before calculating the dosage.
As with any husbandry procedure, care should be taken when handling the animals especially when inserting the dosing gun nozzle into the animal's mouth.
Unnecessary use of force should not be used as this may cause damage to the mouth and pharyngeal region.

Special precautions to be taken by the person administering the veterinary medicinal product to animals:
Direct contact with the skin should be kept to a minimum.
Suitable protective clothing, including impervious rubber gloves should be worn.
In case of accidental ingestion, consult your doctor immediately.
Wash hands after use.

4.6 Adverse reactions (frequency and seriousness)

None known.

4.7 Use during pregnancy, lactation or lay

Duotech can be used at any time during pregnancy.
See section 4.11.

4.8 Interaction with other medicinal products and other forms of interactions

None known.

4.9 Amounts to be administered and administration route

Duotech is an oral suspension containing 2.5% w/v oxfendazole and 5.0% w/v closantel.

The dosage rate is 5 mg oxfendazole and 10 mg closantel per kg bodyweight.

The suspension must be thoroughly shaken before administration to ensure even dispersal of the active ingredients.

The following table gives an indication of dosing requirements. Clean, properly calibrated drenching equipment must be used.

Bodyweight (kg)	**Dose**
Up to 7.5	1 ml
7.5 to 15	2 ml
16 to 20	4 ml
21 to 25	5 ml
26 to 30	6 ml
31 to 40	8 ml
41 to 50	10 ml
51 to 60	12 ml
61 to 70	14 ml
71 to 80	16 ml

Dosing Schedule:
Gastrointestinal roundworms: ewes should be treated prior to lambing, approximately 6 weeks after lambing and prior to tupping to reduce pasture contamination by infested ewes, lambs must be dosed at four weekly intervals during periods of risk.
Treatment with Duotech is effective in control of benzimidazole resistant strains of *Haemonchus contortus*.
For treatment of liver fluke, all sheep grazing infested pastures should be dosed at regular intervals between September and March. As closantel delays egg laying for up to 13 weeks, treatment at 10-12 week intervals throughout the period of risk is recommended.
The spring treatment using a single dose will lead to a reduction in pasture contamination during Summer and Autumn.
Sheep brought in from fluke areas should be dosed prior to joining the flock.

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

Oxfendazole has been administered to lambs at a dose of up to 7.5 mg/kg with no adverse effects.
The lethal dose 50% for closantel in sheep has been calculated as being greater than 40 mg/kg. In case of 3-fold overdose animals may exhibit inappetance and be slightly depressed. Blindness, hypotonia and quadriplegia and death may occur from a 3-fold overdose. The product administered to sheep and lambs at up to 3 times the recommended dose has been shown to be well tolerated.

4.11 Withdrawal period(s)

Animals must not be slaughtered for human consumption during treatment.
Sheep may be slaughtered for human consumption only after 42 days from the last treatment.
Not authorised for use in ewes producing milk for human consumption including during the dry period. Do not use within 1 year prior to the first lambing in ewes intended to produce milk for human consumption.

5 PHARMACOLOGICAL or IMMUNOLOGICAL PROPERTIES

Pharmacotherapeutic group;
Oxfendazole: benzimidazoles and pro-benzimidazoles
Closantel: Salicylanilides

ATC Vet Code;
Oxfendazole: QP52AQC02
Closantel: QP52AG09

5.1 Pharmacodynamic properties

Oxfendazole belongs to a class of compounds, the benzimidazoles. The benzimidazoles possess anti-mitotic properties, related to their capacity to bind to tubulin leading to inhibition of formation of microtubules. This in turn leads to disruption of cell division. Eventually cell lysis and disintegration occur. Oxfendazole may concentrate preferentially in intestinal cells of parasites to exert its toxic effects principally at this site. Similar effects do not occur in host cells, possibly because of differential binding characteristics. The disruption of parasite metabolic processes and the effects of oxfendazole on enzymes of helminth parasites involves inhibition of glucose and sodium uptake, reduced muscle glycogen content, uncoupling of oxidative phosphorylation and inhibition of malate dehydrogenase and fumarate reductase.

Oxfendazole is a sulphoxide identical to the sulphoxide metabolite of fenbendazole, both are known to be anthelmintically active and metabolically interconvertible. Reduction of oxfendazole to fenbendazole occurs in the ruminal fluid while oxidation of fenbendazole to oxfendazole is carried out by hepatic microsomal enzymes in the liver. Much of fenbendazole's anthelmintic activity is attributed to oxfendazole, the latter being much more potent.

Closantel is a member of the salicylanilide class of anthelmintics. Salicylanilides are hydrogen (proton) ionophores (referred to as oxidative phosphorylase uncouplers).

The chemical structure of salicylanilides illustrate the possession of a detachable proton. This type of molecule is lipophilic and is known to shuttle protons across membranes, in particular the inner mitochondrial membrane. ATP production in the mitochondria is coupled to the proton gradient across the inner mitochondrial membrane. Oxidative phosphorylation is summarised as electrons from NADH or FADH being conveyed through a series of protein complexes on the inner mitochondrial membrane. The result of this process is protons being pumped out of the mitochondrial matrix producing a proton motive force due to the pH gradient and transmembrane electric potential. ATP is synthesised when the proton flows back into the mitochondrial matrix through an enzyme complex. This process of oxidative phosphorylation takes place in the host animal as well as in the parasitic helminths.

5.2 Pharmacokinetic particulars

After oral administration of the recommended dose of the product to sheep (5mg oxfendazole and 10mg closantel per kg bodyweight), the following parameters were observed:
Oxfendazole: Cmax 0.529 µg/ml; AUC 18.11 µg/ml.h; Tmax 15.43 hours; $T_{1/2}$ elimination 18 hours.
Closantel: Cmax 43.9 µg/ml; AUC 21350 µg/ml.h; Tmax 65.3 hours; $T_{1/2}$ elimination 273.8 hours.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Propylene Glycol
Sodium Lauryl Sulphate
Microcrystalline Cellulose
Carmellose Sodium
Hypromellose
Simethicone Emulsion
Citric Acid
Purified Water

6.2 Major incompatibilities

None known.

6.3 Shelf-life

Shelf life of the veterinary medicinal product as packaged for sale: 18 months.

6.4 Special precautions for storage

Do not store above 25ºC.
Protect from light.

6.5 Nature and composition of immediate packaging

White low density polyeythlene back packs of 1 L, 2.5 L, 2 x 2.5, 5 L, 2 x 5 L and 10 L.

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

Unused product or waste material should be disposed of in accordance with current practice for pharmaceutical waste under national waste disposal regulations.

Do not contaminate ponds, waterways or ditches with the product or used container.

7 MARKETING AUTHORISATION HOLDER

Norbrook Laboratories (Ireland) Limited
Rossmore Industrial Estate
Monaghan
Ireland

8 MARKETING AUTHORISATION NUMBER(S)

VPA22664/057/001

9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation: 04 May 2001
Date of last renewal: 04 May 2006

10 DATE OF REVISION OF THE TEXT

Decemeber 2018