

# TECHNICAL BRIEF

## BOSS®

## INJECTION

### MULTI-ACTIVE INJECTION FOR CATTLE

**Active Ingredients:** Eprinomectin (7mg/ml), Ivermectin (7mg/ml) and Levamisole phosphate (223mg/ml)

#### Where's the beef!

The need for combination anthelmintics is well established and indeed it is likely that in future these will be the default choice for effective parasite control.

While there are a number of effective oral combination products available, until now there has been a complete absence of broad spectrum combination injectable formulations capable of delivering efficacy against both internal and external parasites.

#### The BOSS® Solution

BOSS® Injection, is a new (patent pending) combination injection for cattle containing levamisole phosphate and a CO-MECTIN™ blend of eprinomectin and ivermectin.

Selecting this particular blend of active ingredients was based on two guiding principles:

Combining one or more macrocyclic lactone active ingredients with levamisole offers the best choice for delivering superior internal parasite control

Selection of an appropriate macrocyclic lactone component should not result in the sacrifice of either internal or external parasite efficacy

Of the available macrocyclic lactone active ingredients:

Abamectin has a low margin of safety when used in injectable form.

Ivermectin is a very potent external parasiticide and available at low cost

Eprinomectin is a very potent and preferred internal parasiticide but lacks potency against external parasites when used in injectable form

Moxidectin and doramectin are extremely costly materials



Based on this analysis, a CO-MECTIN™ blend of ivermectin and eprinomectin with levamisole can be seen to offer the greatest potential for high potency against both internal and external parasites at reasonable manufacturing cost.

It can also be hypothesised that by reducing weaknesses in the efficacy spectrum a CO-MECTIN™ blend might also have the effect of slowing down the speed at which resistance might develop to the macrocyclic lactone class for certain parasites.

### The truth, it wasn't that easy

Putting a few active ingredients together might appear easy. The truth; it wasn't. Careful optimisation of formulation excipients has not only resulted in a highly potent parasiticide but has also helped reduce the potential for injection site reactions.

Because it is designed to clear so rapidly, the pharmacokinetics of BOSS® Injection are quite different from oil based formulations. While such products typically deliver low but gradually declining drug levels BOSS® Injection gives rapid and high peak blood levels without an associated long decline. This means that the product is ideally suited to a quarantine treatment and for helping slow the speed at which resistance may develop. Given this rapid absorption for best results it is advisable that if used as a routine treatment in younger animals the treatment interval should be reduced to 4-5 weeks.

### More beef with BOSS®

BOSS® Injection is the premier choice for treatment of young cattle. Clinical studies performed in New Zealand demonstrate that the product is highly effective against the common parasite species present on New Zealand farms. Efficacy levels of greater than 99% against all species were obtained in the total worm count studies undertaken with this product. This level of efficacy gives peace of mind for parasite control and helps to delay the onset of parasite resistance. The product is effective in the control of endectocide resistant *Cooperia* species and species resistant to benzimidazole drenches. BOSS® Injection is also highly effective in the control of sucking lice and lungworm.

BOSS® Injection was developed in New Zealand and all of the trial work performed to register the product was undertaken on New Zealand farms. The results from these studies are outlined above.

### Waikato Total Worm Count Efficacy Study:

Efficacy of BOSS® Injection against a natural infection of gastrointestinal parasites in cattle. Efficacy determined by total worm counts in comparison with untreated control animals.

**Table 1:** Arithmetic mean worm counts and % efficacy of BOSS® Injection compared with an untreated control group.

| Worm Spp                | Control | BOSS Injection | % Efficacy |
|-------------------------|---------|----------------|------------|
| <i>T. axei</i>          | 192     | 0              | 100%       |
| <i>Ostertagia</i>       | 1533    | 0              | 100%       |
| <i>Nematodirus</i>      | 75      | 0              | 100%       |
| <i>Trichostrongylus</i> | 8       | 0              | 100%       |
| <i>Cooperia</i>         | 5108    | 0              | 100%       |

### Helensville Total Worm Count Efficacy Study:

Efficacy of BOSS® Injection against a natural infection of gastrointestinal parasites in cattle. Efficacy determined by total worm counts in comparison with untreated control animals.

**Table 2:** Arithmetic mean worm counts and % efficacy of BOSS® Injection compared with an untreated control group.

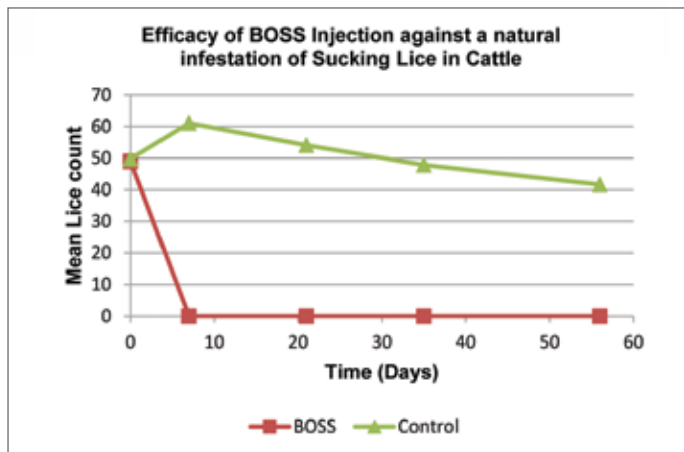
| Worm Spp                | Control | BOSS Injection | % Efficacy |
|-------------------------|---------|----------------|------------|
| <i>T. axei</i>          | 867     | 1.9            | 99.7%      |
| <i>Ostertagia</i>       | 3950    | 1.9            | 99.9%      |
| <i>Nematodirus</i>      | 100     | 0              | 100%       |
| <i>Trichostrongylus</i> | 83      | 0              | 100%       |
| <i>Cooperia</i>         | 3875    | 0              | 100%       |
| <i>Haemonchus</i>       | 50      | 0              | 100%       |
| <i>Trichuris</i>        | 2       | 0              | 100%       |

### Results:

Results from these studies demonstrate how effective BOSS® Injection is at controlling a gastrointestinal parasites burden. The product removed more than 99% of all parasites spp present in both studies. This makes BOSS® Injection a great option as a quarantine treatment.

### Waikato Lice Count Efficacy Study:

Efficacy of BOSS® Injection against a natural infection of lice in cattle. Efficacy determined by lice counts after treatment in comparison with untreated controls.



### Results:

Results from this lice efficacy studies demonstrate that BOSS® Injection is highly effective at controlling a natural infection of sucking lice in cattle. BOSS® Injection reduced lice numbers to non-detectable levels for 56 days post treatment. In two other biting lice studies BOSS® Injection was also very effective at reducing biting lice numbers with efficacy levels around 80% for the duration of the 56 day studies.

### Eprinomectin - More potent by Injection

Eprinomectin has become a preferred anthelmintic for use in cattle. In particular, it is used extensively in topical formulations for the treatment of lactating dairy cows.

Interestingly however, early development work with eprinomectin demonstrated that when used topically a dose rate of 500mcg/kg was required to eliminate the common mature and immature gastro-intestinal parasites of cattle, while only 56mcg/kg was required when it was administered subcutaneously (Shoop 2001).

Given this conclusion it can be seen that in addition to a full dose of levamisole phosphate (6.37mg/kg) and a full dose of ivermectin (200mcg/kg), BOSS Injection is also effectively delivering an eprinomectin dose 3.5x (200mcg/kg) the eprinomectin dose Shoop demonstrated was required to achieve efficacy via the injection route.

The fact that BOSS Injection combines eprinomectin with two other proven active ingredients helps provide assurance of best-in-class efficacy.

### Product Safety

A clinical safety study was undertaken to determine the safety of BOSS® Injection in the target species. In this study BOSS® Injection was administered to weaned calves (3-6 months of age) at 3x the recommended dose rate. Signs of levamisole toxicity were observed in one of the study animals. This is common with an overdose of levamisole so it is important that the correct dose is calculated with this product prior to administration. Avoid treating animals that are stressed and do not administer BOSS® Injection in conjunction with any organophosphate products. Avoid treatment of young calves, less than 3 months of age and calves that weigh less than 106kg.

### General Information

#### Dose Rate:

1ml/35kg

#### With-holding periods:

21 days meat, 35 days milk

#### Active ingredients:

7g/L Ivermectin, 7g/L Eprinomectin and 223g/L levamisole

#### Administration method:

Administer as a subcutaneous injection in the anterior of the neck.

#### Storage:

The product should be stored below 25°C.

#### Pack Sizes:

500ml pillow packs.

#### Dosage Table:

1ml/35kg body weight (0.2mg eprinomectin, 0.2mg ivermectin, 6.37mg levamisole phosphate / kg body weight) by subcutaneous injection.  
**Do Not** treat calves below 106 kg body weight.

| Bodyweight (kg) | Dose (mL) | 500mL treats |
|-----------------|-----------|--------------|
| 106-122         | 3.5       | 142          |
| 123-140         | 4.0       | 125          |
| 141-157         | 4.5       | 111          |
| 158-175         | 5.0       | 100          |
| 176-210         | 6.0       | 83           |
| 211-245         | 7.0       | 71           |
| 246-280         | 8.0       | 62           |
| 281-315         | 9.0       | 55           |
| 316-350         | 10.0      | 50           |

For cattle over 350kg dose at 1ml/35kg

### Some associated points to remember concerning product use

BOSS® Injection has a 3 month broached shelf life.

What does this mean?

Simply this means that upon first opening (penetrating the seal with a needle) the product should be used within 3 months. Unused product should be discarded after this time.

### Product Benefits

Dual macrocyclic lactone/levamisole active ingredients

Advanced CO-MECTIN™ formulation designed to deliver superior internal and external parasite control

Broad spectrum internal parasite activity – >99% effective against natural parasite infestations in NZ studies.

Effective against resistant species including endectocide resistant Cooperia

The only combination injection on the market that also controls external parasites (sucking lice)

More effective at delaying parasite resistance than single active products

Convenient injectable application, great for use if rain is pending

Developed for NZ conditions by a NZ owned company

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Alleva Animal Health Limited,  
15 Calman Place, Birkenhead, Auckland.

BOSS® Injection is registered pursuant to the ACVM act, No. A10830. See [www.foodsafety.govt.nz](http://www.foodsafety.govt.nz) for registration conditions.

Shoop W, Michael B, Egerton J, Mrozik H, Fisher M. 'Titration of subcutaneously administered eprinomectin against mature and immature nematodes in cattle' Journal of Parasitology, 2001 Dec;87(6):1466-9