
Like the rest of agriculture, cattle producers have adopted efficiency and quality improving technology to meet consumer demands for a safe, wholesome, and affordable food supply.

Cattle Treated with LONGRANGE® (eprinomectin) Extended-Release Injection Had a Distinct Advantage in ADG Compared to Cattle Treated with the Competitors' Dewormers

Merial Large Animal Veterinary Services

Economically, one of the best things that you can do for your cattle herd is to deworm. In fact, of all the animal health practices used for increasing production, treating cattle for parasites gives the greatest economic return of up to \$201 per head.¹

The results of this practice may not always be very apparent to your eyes, but incorporating a strategic deworming protocol as part of a herd health program can have a significant impact on your bottom line. Over time, parasites take a toll on reproduction, weight gain and body condition. In an industry measured by pounds that translate into dollars, deworming is a must.

In November 2012, Merial introduced a prescription product, LONGRANGE, that is the first extended-release injectable cattle dewormer that provides cattle producers season-long persistent parasite control for up to 100 to 150 days in a single subcutaneous dose.^{2,3} Instead of treating cattle multiple times during the grazing season with conventional dewormers, LONGRANGE provides cattle producers a new way to think about parasite control. This means less labor for producers and less stress and shrink for the cattle.

During the 2013 grazing season, single-sourced herds of commercial cattle were divided onto like pastures based on stocking density and gender. 15,205 steer and heifer stocker calves, ranging in average weight of 352 to 786 pounds, from multiple locations across the United States were studied on 12 operations representing a cross-section of grazing environments and pastures to determine the effect on average daily gain (ADG) of pens of cattle subjected to a single dose of LONGRANGE compared to several other common deworming practices. Calves were on pasture in 9 states including: Colorado, Iowa, Idaho, North Dakota, Nebraska, Oregon, Texas, Virginia and Wisconsin.

In most locations cattle were assigned to treatment non-systematically by "gate cut", whereby large numbers of animals were assigned to a specific treatment by virtue of presentation to the animal handling area. On some sites, animals were randomly assigned to treatment by coin flip.

Calves treated with LONGRANGE received a dose of 1.0 mg/kg (1 mL/110 lbs bodyweight) by subcutaneous injection.

IMPORTANT SAFETY INFORMATION: Do not treat within 48 days of slaughter. Not for use in female dairy cattle 20 months of age or older, including dry dairy cows, or in veal calves. Post-injection site damage (e.g. granulomas, necrosis) can occur. These reactions have disappeared without treatment.



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Animals were observed for health regularly per local practice. At each location animals in Treatment Group 1 and Treatment Group 2 were maintained on separate but similar pastures with similar stocking rates. There were 8,014 calves assigned to Treatment Group 1 and 7,191 calves assigned to Treatment Group 2. Days on pasture ranged from 37 to 154 for Treatment Group 1 calves; and 52 to 154 for Treatment Group 2 calves. In many locations calves were provided supplemental feed in addition to free access to pasture.

Trt. ¹ Group	Drug	Dose	Route	Trt. Day	Pens per Trt.	Total Number Animals
1	LONGRANGE	1 mL/110 lbs.	SC ²	0	18	8,014
2a	Injectable	Per local practice	SC	0	9	1,168
2b	Pour-on	Per local practice	Topical	0	2	624
2c	Combination	Per local practice	According to product	0	7	5,399

¹Trt. = Treatment

²SC = Subcutaneous

After treatment on Day 0, each treatment group was placed on similar but separate pastures as designated by the cooperator. The forage type of these pastures varied depending on site. Some were seeded with native oats and naturally reseeded ryegrass. Some were native pastures representative of the area of the country where the study was conducted. Other pastures were irrigated to provide more available forage. While the pastures varied from site to site, the matched groups grazed on the same pasture type at individual sites. The animals stayed on these respective pastures for the duration of the study.

Supplemental feeding was provided on some sites as dictated by local practice or weather conditions. Examples of supplemental feed included a ground feed consisting of 40% Brewers dried grain, 30% Recycled Bakery Products, and 30% Recycled Candy Products. Other supplemental feed was made available depending on site, although specific ration content was unavailable. These rations were fed to supplement pasture with the intent of optimizing gain on pasture. Both groups on a site were fed the same amount per day per head.

Data Analysis

All analyses and calculations were performed using SAS Version 9.3. Statistical significance was declared at a two-sided *P*-value of 0.05.

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For one ranch (Site 1), all the steers were assigned to one treatment group and all the heifers to the other; this location was deleted from the analysis due to the inherent difference in weight gain between the sexes. For another ranch (Site 17), the data were deemed unreliable due to the non-reporting of details of cattle in/out; thus the ranch was deleted from the analysis. Following these deletions, 16 replicates remained in the data set.

Average daily gain (ADG) was calculated for each pasture group by subtracting average weight in (total weight in divided by number in) from average weight out (total weight out divided by number out) and dividing by days on pasture and rounding to the nearest 0.01 pound.

ADG was analyzed using randomized-block ANOVA in Proc GLM. Least squares means were calculated by SAS. In addition to analysis of the whole data set, ADG was analyzed separately for steers and heifers; for beef and dairy (Holstein) breed types; and for the three types of local practices (injection, pour-on products, and combination regimens).

Results

For the evaluable data set (16 replicates from 8 states) the cattle treated with LONGRANGE had significantly ($P < 0.01$) higher ADG than cattle treated with competitor products; the difference in ADG was 0.28 lbs./day.

For beef-type cattle, the cattle treated with LONGRANGE had significantly ($P < 0.01$) higher ADG than the cattle treated with competitor products; the difference was 0.30 lbs./day. The difference for Holstein cattle was not quite statistically significant ($P = 0.0510$) but the cattle treated with LONGRANGE gained 0.27 lbs. more per day than those treated with competitor products.

For both heifers and steers, the cattle treated with LONGRANGE had significantly ($P < 0.01$) higher ADG than those treated with competitor products. The difference was 0.22 lbs./day for the heifers and 0.31 lbs./day for the steers.

Cattle treated with LONGRANGE had significantly ($P < 0.01$) higher ADG than the cattle treated with DECTOMAX® (doramectin) or ivermectin injection or a combination of products. The difference in ADG between calves treated with LONGRANGE and those receiving injectable products was 0.24 lbs./day. The difference between calves treated with LONGRANGE and those receiving combination including SAFE-GUARD® (fenbendazole) plus CYDECTIN® (moxidectin) injection was 0.30 lbs./day ($P = 0.0002$). For those treated with a pour-on product vs. LONGRANGE, the difference in ADG was not statistically significant ($P > 0.10$), but the numerical difference was in favor of LONGRANGE at 0.40 lbs./day.

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Table 1. Summary of average daily gain (lbs./day) for cattle treated with LONGRANGE or competitor products (number of replicates)

Data subset	LONGRANGE	Competitor	Difference	P-value
All (16)	2.07 ^B	1.79	0.28	<0.0001
Breed type				
Beef (12)	2.08 ^B	1.78	0.30	<0.0001
Holstein (4)	2.06	1.79	0.27	0.0510
Sex				
Heifers (4)	1.88 ^B	1.66	0.22	0.0034
Steers (12)	2.14 ^B	1.83	0.31	<0.0001
Competitor product(s)				
DECTOMAX/ Ivermectin Injection (7)	1.93 ^B	1.69	0.24	0.0026
Pour-on (2)	2.33	1.93	0.40	>0.10
Combination (7)	2.14 ^B	1.84	0.30	0.0002

^BSignificantly different from competitor group ($P < 0.01$)

For one ranch (Site 1), all the steers were assigned to one treatment group and all the heifers to the other; this location was deleted from the analysis due to the inherent difference in weight gain between the sexes. For another ranch (Site 17), the data were deemed unreliable due to the non-reporting of details of cattle in/out; thus the ranch was deleted from the analysis. Following these deletions, 16 replicates remained in the data set.

Discussion

The difference in ADG was not statistically significant for Holstein cattle and those treated with a pour-on product. The lack of statistical significance was most likely due to the small number of replicates in these subsets, and would probably become significant with larger numbers of replicates. Although all comparisons were not statistically significant, it is apparent that pens of calves treated with LONGRANGE had an advantage in ADG regardless of geography, pasture type or days on pasture.

Because every producer's situation is unique, it is necessary to consult with your veterinarian to develop a strategic deworming protocol designed to meet the specific needs and conditions within your operation. Factors they will typically consider are the time of year when grazing season begins, age and category of the animals, and type of operation and grazing history of the pasture.

LONGRANGE is an extended-release injection available from veterinarians by prescription. Please follow all label indications and precautions prior to using this product in your herd.

References

1. Lawrence JD, Ibarburu MA. Economic analysis of pharmaceutical technologies in modern beef production in a bioeconomy era. 2009. Iowa State University. Available at <http://www2.econ.iastate.edu/faculty/lawrence/pharma%202007%20update.pdf> accessed June 10, 2014
2. LONGRANGE product label.
3. LONGRANGE FOI summary. Available at: http://thelongrangelook.com/pdf/LR_FOI_Summary.pdf Accessed November 11, 2013.

IMPORTANT SAFETY INFORMATION: Do not treat within 48 days of slaughter. Not for use in female dairy cattle 20 months of age or older, including dry dairy cows, or in veal calves. Post-injection site damage (e.g. granulomas, necrosis) can occur. These reactions have disappeared without treatment.

Table 2. Site Data

Site ID ¹	Ranch Location	Pasture ID	Treatment	Trt ² Group	In-Weight (lbs ³)	No. ⁴ Head (initial)	Days on Pasture	Out-Weight (lbs)	No. Head (final)	ADG ⁵	ADG Difference	Type/Gender
1	ID	1	LONGRANGE	1	387433	593	37	446010	593	2.67	0.82	Beef Steers
1	ID	2	DECTOMAX	2a	313863	514	52	364290	514	1.85		Beef Heifers
2	OR	1	LONGRANGE	1	273700	386	52	329305	386	2.77	0.52	Beef Steers
2	OR	2	Ivermectin PO ⁶	2b	339851	457	58	399438	457	2.25		Beef Steers
3	ID	1	LONGRANGE	1	705171	1028	104	901687	1028	1.84	0.29	Beef Steers
3	ID	2	DECTOMAX, SAFE-GUARD	2c	823658	1237	130	1071892	1237	1.55		Beef Steers
4	NE	1	LONGRANGE	1	180239	264	125	242211	264	1.87	0.27	Beef Heifers
4	NE	2	Ivermectin PO	2b	103540	167	145	142284	167	1.60		Beef Heifers
5	OR	1	LONGRANGE	1	279846	458	115	406614	458	2.41	0.24	Beef Heifers
5	OR	2	DECTOMAX+ SAFE-GUARD+ ivermectin PO, ivermectin PO	2c	288807	481	124	418152	481	2.17		Beef Heifers
6	OR	1	LONGRANGE	1	295828	480	113	439083	480	2.65	0.48	Beef Steers
6	OR	2	DECTOMAX+ SAFE-GUARD+ ivermectin PO, ivermectin PO	2c	692272	1575	90	998818	1575	2.17		Beef Steers

Note: For one ranch (Site 1), all the steers were assigned to one treatment group and all the heifers to the other; this location was deleted from the analysis due to the inherent difference in weight gain between the sexes.

Site ID	Ranch Location	Pasture ID	Treatment	Trt Group	In-Weight (lbs)	No. Head (initial)	Days on Pasture	Out-Weight (lbs)	No. Head (final)	ADG	ADG Difference	Type/Gender
7	OR	1	LONGRANGE	1	270896	716	103	380003	716	1.48	0.19	Beef Steers
7	OR	2	Ivermectin PO + VALBAZEN® (albendazole)	2c	393089	977	65	475133	977	1.29		Beef Steers
8	TX	1	LONGRANGE	1	146155.8	322	154	222785.4	302	1.82	0.16	Beef Heifers
8	TX	2	DECTOMAX	2a	145472	320	154	214763.5	301	1.66		Beef Heifers
9	WI	1	LONGRANGE	1	3710	10	92	5480	10	1.92	0.23	Holstein Steers
9	WI	2	DECTOMAX	2a	3168	9	92	4572	9	1.69		Holstein Steers
10	WI	1	LONGRANGE	1	6756	12	92	9312	12	2.31	0.26	Holstein Steers
10	WI	2	DECTOMAX	2a	6182	11	92	8261	11	2.05		Holstein Steers
11	WI	1	LONGRANGE	1	7530	10	92	9190	10	1.80	0.50	Holstein Steers
11	WI	2	DECTOMAX	2a	6786	9	92	7866	9	1.30		Holstein Steers
12	WI	1	LONGRANGE	1	6123	13	92	8749	13	2.20	0.10	Holstein Steers
12	WI	2	DECTOMAX	2a	5652	12	92	7980	12	2.10		Holstein Steers
13	WI	1	LONGRANGE	1	20010	30	93	25740	30	2.05	0.25	Beef Steers
13	WI	2	DECTOMAX	2a	14454	22	93	18150	22	1.80		Beef Steers
14	VA	1	LONGRANGE	1	33660	51	143	50541	51	2.30	0.40	Beef Steers
14	VA	2	CYDECTIN Inj ⁷ +SAFE-GUARD	2c	35620	52	143	49868	52	1.90		Beef Steers

Site ID	Ranch Location	Pasture ID	Treatment	Trt Group	In-Weight (lbs)	No. Head (initial)	Days on Pasture	Out-Weight (lbs)	No. Head (final)	ADG	ADG Difference	Type/Gender
15	VA	1	LONGRANGE	1	48706	71	131	69722	71	2.26	0.27	Beef Steers
15	VA	2	CYDECTIN Inj +SAFE-GUARD	2c	42336	63	131	58779	63	1.99		Beef Steers
16	CO	1	LONGRANGE	1	732727	1019	124	978313	1008	2.03	0.22	Beef Steers
16	CO	2	Ivermectin + SAFEGUARD	2c	734439	1014	134	967948	1002	1.81		Beef Steers
17	ND	1	LONGRANGE	1	1967013	2521	95	1967013	2473	1.76	0.97	Beef Steers
17	ND	2	DECTOMAX	2a	189425	241	131	189425	241	0.79		Beef Steers
18	IA	1	LONGRANGE	1	18300	30	63	20940	30	1.40	0.19	Beef Heifers
18	IA	2	Ivermectin Inj	2a	18310	30	63	20580	30	1.21		Beef Heifers

¹ ID = identification, ² Trt = treatment, ³ lbs. = pounds, ⁴ No. = number, ⁵ ADG = average daily gain, ⁶ PO = Pour on, ⁷ Inj = injectable

Note: For ranch Site 17, the data were deemed unreliable due to the non-reporting of details of cattle in/out; thus the ranch was deleted from the analysis.



LONGRANGE®

(epinomectin)

Extended-Release Injectable Parasiticide
5% Sterile Solution
For the Treatment and Control of Internal and External Parasites of Cattle on Pasture with Persistent Effectiveness

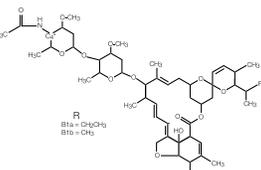
Not for use in female dairy cattle 20 months of age or older, including dry dairy cows. Not for use in calves to be processed for veal.
Not for use in breeding bulls, or in calves less than 3 months of age.
Not for use in cattle managed in feedlots or under intensive rotational grazing.

CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

DESCRIPTION

LONGRANGE® (epinomectin) is a ready-to-use, sterile injectable preparation containing epinomectin, a member of the macrocyclic lactone class of antiparasitics. Each mL of LONGRANGE contains 50 mg of epinomectin in a co-solvent system of N-methyl-2-pyrrolidone (30% v/v) and triacetin (qs), along with 50 mg of poly-lactide-co-glycolic-acid 75:25 (PLGA), a polymer that allows a slow release of epinomectin from the formulation, thereby maintaining a prolonged duration of product effectiveness. Butylated hydroxytoluene (0.2 mg/mL) acts as an antioxidant in the formulation.

The chemical name of epinomectin is 4"-deoxy-4"-epiacetylaminovermectin B₁. It is a semi-synthetic member of the avermectin family of compounds consisting of a mixture of two homologous components, B_{1a} and B_{1b}, which differ by a single methylene group at C₂₆.



Divide doses greater than 10 mL between two injection sites to reduce occasional discomfort or site reaction.

LONGRANGE is to be given subcutaneously only. Animals should be appropriately restrained to achieve the proper route of administration. Inject under the loose skin in front of the shoulder (see illustration) using a 16 or 18 gauge, ½ to ¾ inch needle.

Sanitize the injection site by applying a suitable disinfectant. Clean, properly disinfected needles should be used to reduce the potential for injection site infections.

50 mL bottle size: Use only polypropylene syringes. Not for use with polycarbonate syringe material. If syringe material is not known, contact the syringe manufacturer prior to use for identification. Do not use beyond 3 months after stopper has been punctured. Discard bottle after 15 stopper punctures.
250 mL and 500 mL bottle sizes: Use only automatic syringe equipment provided by Merial. To obtain compatible equipment, contact Merial at 1-888-637-4251 or your veterinarian. LONGRANGE should not be stored in automatic syringe equipment. Automatic syringe equipment should be thoroughly cleaned after each use. Discard bottle after one stopper puncture with draw-off spike. No special handling or protective clothing is necessary.

WARNINGS AND PRECAUTIONS

Withdrawal Periods and Residue Warnings

Animals intended for human consumption must not be slaughtered within 48 days of the last treatment.
This drug product is not approved for use in female dairy cattle 20 months of age or older, including dry dairy cows. Use in these cattle may cause drug residues in milk and/or in calves born to these cows. A withdrawal period has not been established for pre-ruminating calves. Do not use in calves to be processed for veal.

User Safety Warnings

Not for Use in Humans. Keep this and all drugs out of the reach of children. The material safety data sheet (MSDS) contains more detailed occupational safety information. To report adverse effects, to obtain an MSDS, or for assistance, contact Merial at 1-888-637-4251. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS, or <http://www.fda.gov/AnimalVeterinary>.

Animal Safety Warnings and Precautions

The product is likely to cause tissue damage at the site of injection, including possible granulomas and necrosis. These reactions have disappeared without treatment. Local tissue reaction may result in trim loss of edible tissue at slaughter. Observe cattle for injection site reactions. If injection site reactions are suspected, consult your veterinarian. This product is not for intravenous or intramuscular use. Protect product from light. LONGRANGE® (epinomectin) has been developed specifically for use in cattle only. This product should not be used in other animal species.

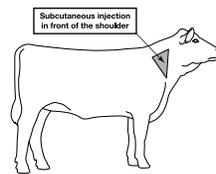
When to Treat Cattle with Grubs

LONGRANGE effectively controls all stages of cattle grubs. However, proper timing of treatment is important. For the most effective results, cattle should be treated as soon as possible after the end of the heel fly (warble fly) season. Destruction of *Hypoderma* larvae (cattle grubs) at the period when these grubs are in vital areas may cause undesirable host-parasite reactions, including the possibility of fatalities. Killing *Hypoderma lineatum* when it is in the tissue surrounding the esophagus (gullet) may cause salivation and bloat; killing *H. bovis* when it is in the vertebral canal may cause staggering or paralysis. These reactions are not specific to treatment with LONGRANGE, but can occur with any successful treatment of grubs. Cattle should be treated either before or after these stages of grub development. Consult your veterinarian concerning the proper time for treatment.

Environmental Hazards

Studies indicate that when epinomectin comes in contact with soil, it readily and tightly binds to the soil and becomes inactive over time. Free epinomectin may adversely affect fish and certain aquatic organisms. Do not contaminate water by direct application or by improper disposal of drug containers. Dispose of containers in an approved landfill or by incineration. As with other avermectins, epinomectin is excreted in the dung of treated animals and can inhibit the reproduction and growth of pest and beneficial insects that use dung as a source of food and for reproduction. The magnitude and duration of such effects are species and life-cycle specific. When used according to label directions, the product is not expected to have an adverse impact on populations of dung-dependent insects. Not for use in cattle managed in feedlots or under intensive rotational grazing because the environmental impact has not been evaluated for these scenarios.

Other Warnings: Underdosing and/or subtherapeutic concentrations of extended-release anthelmintic products may encourage the development of parasite resistance. It is recommended that parasite resistance be monitored following the use of any anthelmintic with the use of a fecal egg count reduction test program.

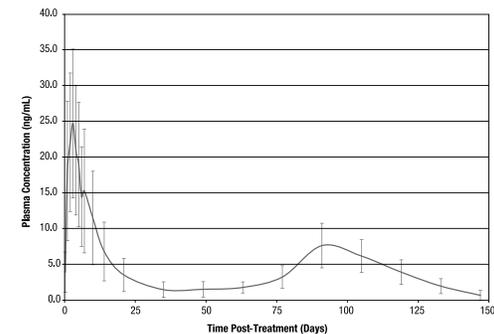


CLINICAL PHARMACOLOGY

Due to its unique formulation characteristics, when LONGRANGE is injected subcutaneously in the shoulder area of cattle, a polymeric PLGA matrix is formed. The biodegradable matrix solidifies in vivo to form an in situ forming gel, which allows a gradual release of epinomectin from the formulation. The rate-limiting step is diffusion of the drug through the gel matrix. Because of its mechanism of release, absorption characteristics can be highly dependent upon the injection technique used and the corresponding surface to volume ratio of the gel.

Clinical efficacy of avermectins and milbemycins is closely related to their pharmacokinetic behavior, and the time of parasite exposure to active drug concentrations is relevant to obtain optimal and persistent antiparasitic activity (Lanusse et al., 1997; Lifschitz et al., 1999; Lifschitz et al., 2004; Shoop et al., 1996). Lifschitz et al. (1999) indicated that plasma concentrations between 0.5 and 1 ng/mL would represent the minimal drug level required for optimal nematocidal activity, while others have suggested minimum levels of 1 to 2 ng/mL. Pharmacokinetic studies of LONGRANGE in cattle indicate that effective plasma levels remain for an extended period of time (at least 100 days).

Mean Epinomectin B_{1a} Plasma Concentration Versus Time Following a Single Subcutaneous Injection of LONGRANGE® at a Dose Rate of 1 mg Epinomectin per kg Body Weight in Beef Cattle (Arithmetic Mean ± Standard Deviation of the Mean, n=42)



Mode of Action

The macrocyclic lactones have a unique mode of action. Compounds of this class bind selectively and with high affinity to glutamate-gated chloride ion channels that are present 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 parasite. Compounds of this class may also interact in other ligand-gated chloride ion channels, such as those gated by the neurotransmitter gamma-aminobutyric acid (GABA).

The margin of safety for compounds of this class is at least partially attributable to the fact that mammals do not have glutamate-gated chloride ion channels, and that the macrocyclic lactones have low affinity for other mammalian ligand-gated channels and do not readily cross the blood-brain barrier.

TARGET ANIMAL SAFETY

Clinical studies have demonstrated the wide margin of safety of LONGRANGE® (epinomectin). Overdosing at 3 to 5 times the recommended dose resulted in a statistically significant reduction in average weight gain when compared to the group tested at label dose. Treatment-related lesions observed in most cattle administered the product included swelling, hyperemia, or necrosis in the subcutaneous tissue of the skin. The administration of LONGRANGE at 3 times the recommended therapeutic dose had no adverse reproductive effects on beef cows at all stages of breeding or pregnancy or on their calves.

Not for use in bulls, as reproductive safety testing has not been conducted in males intended for breeding or actively breeding. Not for use in calves less than 3 months of age because safety testing has not been conducted in calves less than 3 months of age.

HOW SUPPLIED

LONGRANGE is available in three ready-to-use glass bottle sizes. The 50, 250, and 500 mL bottles contain sufficient solution to treat 10, 50, and 100 head of 550 lb (250 kg) cattle, respectively. The 250 and 500 mL bottles are supplied in a removable plastic protector.

STORAGE

Store at 77° F (25° C) with excursions between 59° and 86° F (15° and 30° C). Protect from light.

NADA #141-327, Approved by FDA

Made in Canada.

Manufactured for Merial Limited, Duluth, GA, USA.

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INDICATIONS FOR USE

LONGRANGE, when administered at the recommended dose volume of 1 mL per 110 lb (50 kg) body weight, is effective in the treatment and control of the following internal and external parasites of cattle:

Gastrointestinal Roundworms	Lungworms
<i>Cooperia oncophora</i> – Adults and L ₄	<i>Dictyoacaulus viviparus</i> – Adults
<i>Cooperia punctata</i> – Adults and L ₄	
<i>Cooperia surmabada</i> – Adults and L ₄	Grubs
<i>Haemonchus placei</i> – Adults	<i>Hypoderma bovis</i>
<i>Oesophagostomum radiatum</i> – Adults	
<i>Ostertagia lyrata</i> – Adults	Mites
<i>Ostertagia ostertagi</i> – Adults, L ₄ , and inhibited L ₄	<i>Sarcoptes scabiei</i> var. <i>bovis</i>
<i>Trichostrongylus axei</i> – Adults and L ₄	
<i>Trichostrongylus colubriformis</i> – Adults	

Persistent Activity

LONGRANGE has been proven to effectively protect cattle from reinfection with the following parasites for the indicated amounts of time following treatment:

Parasites	Durations of Persistent Effectiveness
Gastrointestinal Roundworms	
<i>Cooperia oncophora</i>	100 days
<i>Cooperia punctata</i>	100 days
<i>Haemonchus placei</i>	120 days
<i>Oesophagostomum radiatum</i>	120 days
<i>Ostertagia lyrata</i>	120 days
<i>Ostertagia ostertagi</i>	120 days
<i>Trichostrongylus axei</i>	100 days
Lungworms	
<i>Dictyoacaulus viviparus</i>	150 days

DOSAGE AND ADMINISTRATION

LONGRANGE® (epinomectin) should be given only by subcutaneous injection in front of the shoulder at the recommended dosage level of 1 mg epinomectin per kg body weight (1 mL per 110 lb body weight).

Each mL of LONGRANGE contains 50 mg of epinomectin, sufficient to treat 110 lb (50 kg) body weight.

Body Weight (lb)	Dose Volume (mL)
110	1
220	2
330	3
440	4
550	5
660	6
770	7
880	8
990	9
1100	10