When there’s stress, use ZACTRAN® (gamithromycin).

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When there's stress, use ZACTRAN® (gamithromycin).

BRO is waiting for an opportunity. Some respiratory disease B. riboflavus commonly known as bronchitis, is a serious condition that can take a toll on your ability to feed and drink and prematurely bring your ration to a standstill. If the weather does not improve, it can be a factor that drives animal performance, feed efficiency, and overall production. 

A potent combination of 6 factors makes ZACTRAN® the smart choice.

1. Pathogen Susceptibility
   BRO often requires the ideal bronchitis environment, causing a host of respiratory pathogens, including respiratory bovine rhinovirus, bovine viral diarrhea virus, Mycoplasma, and Pasteurella to thrive. ZACTRAN® is highly efficacious against these pathogens, leading to improved health and performance.

2. Speed to Action is Important
   With ZACTRAN®, you get fast results. A single dose can help reduce stress, improve feed conversion, and enhance health and performance.

3. Gets to the Site of Infection
   The unique extended release (ER) formulation of ZACTRAN takes the energy out of respiratory bovine rhinovirus (RB-RV), successfully treating the most common cause of respiratory infection in cows.

4. Staying Power in a Single Dose
   The unique extended release (ER) formulation of ZACTRAN® delivers extended protection for 7 days (96 hours, 5.2 days), providing enduring protection from stress.

5. Safety and Ease of Use
   ZACTRAN® is safe and easy to use. It can be administered orally or parenterally, and no withdrawal period is required, allowing your animals to return to their daily activities as soon as possible.

6. Save You Money
   By improving health, feed conversion, and overall performance, ZACTRAN® helps you save money by reducing treatment costs and increasing productivity.

Featured Testimonial

John Do - Review

"Great result, thanks! My cattle are feeling better already."
References


Make ZACTRAN your choice for BRD treatment and control.

Why ZACTRAN is the smart choice
ZACTRAN is a broad-spectrum combination product that activates pathways of both the innate and adaptive immune systems. The multiple antimicrobial agents in ZACTRAN work synergistically to attack the pathogen, resulting in a treatment that is more effective than single-agent products. ZACTRAN is indicated for the treatment and control of respiratory infections caused by bacteria such as Mannheimia haemolytica, Pasteurella multocida, and Histophilus somni.

Rapid absorption for rapid results
- 80% percent bioavailable following subcutaneous BRD injection.
- Rapid onset/peak and concurrent dosing throughout the range.
- Reaches levels above MRLs within 1 hour.
- Complete elimination from tissues within 7 days.

ZACTRAN compares favorably to DRAXIN® (tilixin-trimethoprim), EXCEDE® (ceftiofur crystalline-free acid) and ZUPREVO® (tilikidin) for control of BRD.

Indications
- ZACTRAN is indicated for the treatment of BRD associated with Mannheimia haemolytica, Pasteurella multocida, Histophilus somni, and Mycoplasma bovis.
- ZACTRAN is indicated for the control of respiratory diseases in beef and dairy cattle caused by Mannheimia haemolytica, Pasteurella multocida, Histophilus somni, and Mycoplasma bovis associated with mycoplasma and mycosis.

Easy and Economical
- ZACTRAN is cost-effective for treatment or control of BRD in research or practical settings, with a one-time treatment.
- ZACTRAN offers a low-dose, low-volume,1 mL/220 lb, and a minimum administration of 1 mL/500 lb, or 1 mL/1000 lb for severe infections.
- ZACTRAN is available only by prescription.

The ZACTRAN Advantage
Do not calculate to compare costs with your current treatment.

Comparison of Zactran® (adenosine nucleotides) and Zuprevo® (tilikidin) for the control of bovine respiratory disease.

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Important Safety Information: See precautions, warnings, and contraindications in the package insert. ZACTRAN is for use in cattle only. Do not treat cattle within 24 hours of slaughter. Adverse effects observed in trials did not result in clinical signs. Do not use product in pregnant or nursing cattle.
References

3 ZACTRAN product label.


5 Data on file at Merial.


8 Data on file at Merial.


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Brad Haun - Kansas

Animals should be appropriately restrained to achieve the proper route of administration. Use static equipment. Inject under the skin in front of the shoulder (see illustration).

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Cattle First
Brad Haun – Kansas

Featured Testimonial

Dairy Calf Health Practices Impact Production Capabilities

On today’s dairies, capitalize on herd health begins at birth. New calves are young and full of potential, but they are also naïve and can be extremely susceptible to diseases like bovine respiratory disease (BRD) and scours if proper care isn’t taken early on.

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Knowing and Managing BRD Risk in Your Herd

Bovine respiratory disease (BRD) occurs when environmental and other stressors weaken a calf's immune system. Knowing the history of your cattle is one important aspect of determining a calf's risk for BRD. Producers also should consider the distance the cattle traveled, weather conditions and vaccination records.

Dr. Richard Linhart, professional services veterinarian, Boehringer Ingelheim, discusses more ways to determine BRD risk in your beef herd and effective preventive management practices.

BOVINE RESPIRATORY DISEASE
MANAGING BRD RISK IN YOUR HERD

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How BRD Impacts Dairy Calves

When just-weaned dairy calves are congregrated and under stress, they're susceptible to bovine respiratory disease (BRD). If not caught early, BRD can lead to increased services per conception during the breeding process, delaying a heifer's introduction into the milk stream and reducing a producer's bottom line.

Dr. David Festa, professional services veterinarian, Boehringer Ingelheim, explains how BRD occurs and what you can do to protect your herd and your bottom line:

![Respiratory Disease on the Dairy](image)

**KEEPING HEARTS HEALTHY AND PRODUCTIVE**

(BOV-1343-ANTIB0618)

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![ZACTRAN - Brad Haan - Kansas](image)

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Cattle-Handling Tips

Good handling facilities are an integral part of performing the working procedures and health measures required in a preconditioning program.

It's all in keeping with an old industry saying, "You can tell the quality of a cattle processor by watching the way the producer's animals react to handling." Animals that are introduced gently to handling procedures may avoid becoming stressed when worked. 1

That can translate into dollars, because stress reduces an animal's ability to fight disease and gain weight. 2,3 Stress also increases deaths and interrupts normal rumen function. 4

Another often-overlooked advantage of reducing stress on livestock is the fact that it makes them easier to work, thereby reducing stress on the handler. 1,5

Livestock move and react more predictably when they are calm and feel secure. Large moving or flapping objects can also make animals more difficult to handle, as can excessive yelling or bellowing while handling and herding cattle. 1,5

Important note: Don't use electric prods or plastic paddle sticks; a small flag on the end of a stick can perform the same job.

A curved working shy takes advantage of an animal's natural instinct to turn away from potential danger or unpleasant sights and sounds. 1,6 Also, because cattle naturally move forward mostly when following each other, use see-through (rather than solid) blocking gates in a chute. 1,6

In the end, good facilities and use of a little good old-fashioned "row some" knowing how cattle was the world will streamline any livestock handling operation.

Guidelines for Success:

1. Cattle can be moved quietly by using their natural flight arcs. To move them forward, move toward their rear past the shoulder - their point of balance. To stop or back them up in the chute, move forward past their point of balance - ahead of the shoulder.
2. Handling facilities should have curved chutes and next crowding areas.
3. Use wide, curved lanes heading up to crowding areas.
4. Use three or more sorting pens in front of the squeeze chute.
5. Never fill a crowding gate more than three-quarters full; cattle read move to move around.
6. Cattle should easily go up in the chute. If not, it could be because the animals are seeing something that's distracting them.
7. Cover the sides of the squeeze chute, especially the back three-quarters, to limit the animal's side vision.
8. Ideally, producers should use electric prods. Instead, utilize wave olives with plastic streamers or a small flag on the end.
9. Keep the processing area clean.
10. Reduce stress on the animal. This reduces animal injuries and sickness, as well as potential for employee injuries. The end result is an increase in overall working efficiency. 5,6

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Brenda Hans – Kansai

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Dairy Calf Health Practices Impact Production Causality

On today's farms, exploiting a farm's health begins at birth. New calves are young and full of potential, but they are also naïve and can be extremely susceptible to diseases like bovine respiratory disease (BRD) and enteric if farmer care isn't taken early on.

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When just weaned dairy calves are crowded and stressed, they're susceptible to bovine respiratory disease (BRD). If not caught early, READ MORE>

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Dairy Calf Health Practices Impact Production Capabilities

On today’s dairy farm, health begins at birth. New calves are young and full of potential, but they are also naïve and can be extremely susceptible to diseases like bovine respiratory disease (BRD) and scour if proper care isn’t taken early on.

BRD, a serious condition for dairy operations, can occur when environmental and other stressors weaken the calf’s immune system. BRD is the leading cause of death in weaned calves and the second most common cause in pre-weaned calves. Even those that recover from the disease can experience lasting negative effects on their growth, fertility and milk production. Culling BRD early is often the key to minimizing damage.

When is a calf most vulnerable to BRD?

“The good news is, we usually aren’t going to see a lot of respiratory disease in calves less than a few weeks old. Respiratory disease is more of an issue in slightly older calves or around pre- and post-weaning. If they have been raised on a well-farmed, then BRD can be a concern during transportation back to the dairy,” said Dr. Mark van der Lip, professional services veterinarian for Boehringer Ingelheim.

However, Dr. van der Lip said it is essential for producers to take early steps to help give a calf the best start possible. The most important thing is to quickly remove the newborn from the mother and away from any pathogens in the birthing pen. And then get colostrum into its as soon as possible to get its internal antibodies to fight off any pathogens.

“Colostrum and early colostrum absorption is critical for building protection,” Dr. van der Lip said. “Some calf ranches are now tracking the immunoglobulin levels in calves to see what their level of passive absorption. This can help track disease and mortality rates from individual farms and see which farms are doing a good job of successfully raising calves.”

Vaccinations and treatments for respiratory disease

Calves are normally shipped to the calf ranches 4 to 8 weeks after birth. “If the calf the ranch receives them, this calves will be processed, put in individual hutches and started on a feeding program. They may also receive their first vaccinations during this transition,” Dr. van der Lip said. Calves are typically kept in separate hutches for the first 4 to 6 weeks so they can develop before they are weaned and co-ringed.

He warned that the weaning and co-ringing process can be stressful time for the calves, and this is when producers may see more disease. Signs of BRD include a reduced appetite, coughing, nasal discharge, depression, eye discharge, droopy ear or head tilt and fever. Once a calf is displaying one or more signs of disease it is time for the caretaker to evaluate whether or not it needs an antibiotic.

“Sometimes, even with the best health plans in place, calves that are under stress can get sick,” he added. When this happens, Dr. van der Lip recommends that producers work with their veterinarian to develop a BRD treatment plan that includes rapid diagnoses and the judicious use of antibiotics.

“This means using an effective, fast-acting and long-lasting antibiotic. If disease is detected, early detection of disease is always important and when we have well-trained workers that can detect respiratory disease quickly, we can begin effective and early treatment.”

References:

BNX-1226-AVB9418

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Preventing BRD Outbreaks in Your Herd

Detection of and treatment for bovine respiratory disease (BRD) requires intensive labor and comes with a hefty price tag. In fact, it is estimated that BRD can cost the industry between $500 million and $900 million each year. And on top of the monetary stress, BRD also impacts producers emotionally.

Dr. Richard Linhart, professional services veterinarian, Boehringer Ingelheim, discusses the impacts of BRD and practices you can implement for successful prevention and treatment.

BOVINE RESPIRATORY DISEASE
PREVENTING BRD OUTBREAKS

[Video]

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See how retreatment costs, herd performance and death loss can have an impact on your bottom line. Follow the prompts to enter the current herd information, or choose to prepopulate with current test data.

<table>
<thead>
<tr>
<th>Number of Steers</th>
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<tbody>
<tr>
<td>Steer Weight (lbs.)</td>
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<tr>
<td>Zactran Bottle Size</td>
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<td>Price per Zactran Bottle</td>
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<td>Other Product</td>
<td>DRAXXIN</td>
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<td>Price per Bottle</td>
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<table>
<thead>
<tr>
<th>Steer Weight (lbs.)</th>
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<tbody>
<tr>
<td>750</td>
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</table>

Choose:
- 100ML
- 250ML
- 500ML
Other Product

- CHOOSE
- LA 200
- BIOMYCIN
- NAXCEL
- NUFLOR
- MICOTIL
- BAYTRIL
- DRAXXIN
- EXCEDE
- ADSPEC
Other Product Bottle Size

- 50ML
- 100ML
- 250ML
- 500ML
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See how retreatment costs, herd performance and death loss can have an impact on your bottom line. Follow the prompts to enter the current herd information, or choose to prepopulate with current test data.

### 2 of 4

**Morbidity %**

| 22.9 |

**Deads (Number of Head)**

| 44.31 |

- **Use Test Data**
- **Your Own Data**

**1st treatment response %**

| 75 |

**2nd treatment response %**

| 60 |

**3rd treatment response %**

| 50 |

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See how re-treatment costs, herd performance and death loss can have an impact on your bottom line. Follow the prompts to enter the current herd information, or choose to pre-populate with current test data.

### 3 of 4

<table>
<thead>
<tr>
<th>Cattle Purchase Price, lb.</th>
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<tr>
<td>Vaccination ($ per head)</td>
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<td>Wormer ($ per head)</td>
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<td>Yardage/Day ($ per head)</td>
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<tr>
<td>Interest Rate</td>
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</tbody>
</table>

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## 4 of 4

<table>
<thead>
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<th>Out weight</th>
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</thead>
<tbody>
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<tr>
<td>Shrink weight, lb.</td>
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<tr>
<td>Average daily gain</td>
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<td>Feed efficiency</td>
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<td>Reimplant ($ per head)</td>
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<tr>
<td>Fat Cattle Price ($ per pound)</td>
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</tbody>
</table>

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## Your Current Product

<table>
<thead>
<tr>
<th></th>
<th>Your Current Product</th>
<th>Zactran® by Meriel (gamithromycin)</th>
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<tbody>
<tr>
<td><strong>Total Cost</strong></td>
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<td>$1329.77</td>
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<tr>
<td><strong>Morbidity</strong> and Mortality cost per head</td>
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<tr>
<td><strong>Break-even</strong></td>
<td>$1.75</td>
<td>$1.73</td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td>$50,468.51</td>
<td>$50,468.51</td>
</tr>
<tr>
<td><strong>Net Profit per head</strong></td>
<td>$-435.92</td>
<td>$-423.53</td>
</tr>
<tr>
<td><strong>Net Profit</strong></td>
<td>$-24,276.30</td>
<td>$-23,586.30</td>
</tr>
</tbody>
</table>

**Zactran® will save you $690.00 per year.**

---

**Important Safety Information:** For use in cattle only. Do not treat cattle within 35 days of slaughter. Because a discard time in milk has not been established, do not use in female dairy cattle 20 months of age or older, or in calves to be processed for veal. The effects of Zactran on bovine reproductive performance, pregnancy and lactation have not been determined.

---

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Stay up to date with the latest cattle health tips and news.

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**Role**

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**Privacy Policy**
### Pricing Calculator

Select Products and enter Cattle Weight, Bottle Size and Price per bottle to determine cost/head comparison.

**PRODUCT:**  
- ZACTRAN® (gamithromycin)  
- ADVOCIN™ (danofoxacin mesylate)  
- BAYTRIL® (enrofloxacin)  
- DRAXIN® (telithromycin)  
- ENROFLOX® (enrofloxacin)  
- ENROFLOX® (enrofloxacin)  
- EXCEDE® (ceftiofur crystalline free acid)  
- EXCEDE® RTU (ceftiofur hydrochloride)  
- MICOTYL® (tiamulin injection)  
- NAXCEL® (ceftiofur sodium)  
- NORFENICOL® (florfenicol)  
- NUFLOX® (florfenicol)  
- NUFLOX GOLD® (florfenicol)  
- RESFLOX GOLD® (florfenicol and flunixin meglumine)  
- ZUPREVO™ (buthionine)

**CATTLE WEIGHT:**  
- lbs.  
- lbs.

**DOSSING SIZE (ML):**  
- 0.00 mL  
- 0 mL

**BOTTLE SIZE:**  
- Choose  
- Choose

**PRICE PER BOTTLE:**  
- $  
- $

Email Address Required:  
- Email Address  
- The email address is required

Calculate

### Dosing Chart

<table>
<thead>
<tr>
<th>Product</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZACTRAN® (gamithromycin)</td>
<td>1 cc/25 kg</td>
</tr>
<tr>
<td>ADVOCIN™ (danofoxacin mesylate)</td>
<td>1 cc/30 kg</td>
</tr>
<tr>
<td>BAYTRIL® (enrofloxacin)</td>
<td>1 cc/8.4 kg, 1 cc/13 kg</td>
</tr>
<tr>
<td>DRAXIN® (telithromycin)</td>
<td>1 cc/40 kg</td>
</tr>
<tr>
<td>ENROFLOX® (enrofloxacin)</td>
<td>1 cc/8.25 kg</td>
</tr>
<tr>
<td>ENROFLOX® (enrofloxacin)</td>
<td>1 cc/13 kg</td>
</tr>
<tr>
<td>EXCEDE® (ceftiofur crystalline free acid)</td>
<td>1 cc/30 kg</td>
</tr>
<tr>
<td>EXCEDE® RTU (ceftiofur hydrochloride)</td>
<td>1 cc/22.5 kg</td>
</tr>
<tr>
<td>MICOTYL® (tiamulin injection)</td>
<td>1 cc/15 kg, 1 cc/23 kg, 1 cc/30 kg</td>
</tr>
<tr>
<td>NAXCEL® (ceftiofur sodium)</td>
<td>1 cc/22.5 kg</td>
</tr>
<tr>
<td>NORFENICOL® (florfenicol)</td>
<td>1 cc/7.5 kg</td>
</tr>
<tr>
<td>NUFLOX® (florfenicol)</td>
<td>1 cc/7.5 kg</td>
</tr>
<tr>
<td>NUFLOX GOLD® (florfenicol)</td>
<td>1 cc/7.5 kg</td>
</tr>
<tr>
<td>RESFLOX GOLD® (florfenicol and flunixin meglumine)</td>
<td>1 cc/7.5 kg</td>
</tr>
<tr>
<td>ZUPREVO™ (buthionine)</td>
<td>1 cc/45.5 kg</td>
</tr>
</tbody>
</table>

**Ready to Purchase?**

Contact your veterinarian or animal health supplier.

### Downloads

- Dosing Guide
- Product Label
- ROI Calculator
- Technical Content

---

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---

**Cattle First.** Merck is now part of Merck KGaA. Zactran is a registered trademark of Merck, ©2018. This is a Veterinary Information website.

**Click here for full prescribing information.**

REFERENCES | Privacy Policy | Terms of Use
CHOOSE

50 ML
100 ML
250 ML
500 ML
1 GRAM
4 GRAM
CONTRAINDICATIONS
As with all drugs, the use of ZACTRAN is contraindicated in animals previously found to be hypersensitive to this drug.

WARNING:
FOR USE IN CATTLE ONLY.
NOT FOR USE IN HUMANS.
KEEP THIS AND ALL DRUGS OUT OF REACH OF CHILDREN.
NOT FOR USE IN CHICKENS OR TURKEYS.

The material safety data sheet (MSDS) contains more detailed occupational safety information. To report adverse effects, obtain an MSDS or for assistance, contact Merial at 1-888-637-4271.

RESIDUE WARNINGS:
Do not treat cattle within 35 days of slaughter. Because a discard time in milk has not been established, do not use in female dairy cattle 20 months of age or older. A withdrawal period has not been established for this product in pre-nu-maturing calves. Do not use in calves to be processed for veal.

PRECAUTIONS
The effects of ZACTRAN on bovine reproductive performance, pregnancy, and lactation have not been determined. Subcutaneous injection of ZACTRAN may cause a transient local tissue reaction in some cattle that may result in trim loss of edible tissues at slaughter.

ADVERSE REACTIONS
Transient animal discomfort and mild to moderate injection site swelling may be seen in cattle treated with ZACTRAN.

CLINICAL PHARMACOLOGY
The macrolide antimicrobials as a class are weak bases and as such concentrate in some cells (such as pulmonary leukocytes). Prolonged exposure of extracellular pulmonary pathogens to macrolides appears to reflect the slow release of drug from its intracellular reservoir to the site of action, the pulmonary epithelial lining fluid (ELF). It is the ELF that is relevant to the successful treatment and control of BRD. Gamithromycin is primarily bacteriostatic at therapeutic concentrations. However, in vitro bacteriostatic activity has been observed at concentrations of 10 µg/mL (Mueller-Hinton broth) and after exposure to the 6-hour and 24-hour plasma samples derived from cattle dosed at 6 mg gamithromycin/kg BW. Macrolides typically exhibit substantially higher concentrations in the alveolar macrophages and ELF as compared to concentrations observed in plasma. Gamithromycin concentrations in the ELF and ELF cells exceed the concentrations observed in the plasma. Postmortem gamithromycin concentrations in ELF exceed the MIC of M. haemolytica, H. somni and P. multocida through at least 72 hours after drug administration. Because M. haemolytica, P. multocida and H. somni are extracellular pathogens, drug concentrations in the ELF and ELF cells are considered to be clinically relevant. The postmortem area under the concentration-time curve (AUC) observed in lysed ELF cells (e.g., alveolar macrophages) are at least 100-times greater than that in the plasma. Although published studies suggest that inflammation can increase the release of drug from macrophages and neutrophils, these high concentrations in the alveolar macrophages should not be considered indicative of the magnitude or duration of response to the pathogens for which this product is indicated.

ZACTRAN administered subcutaneously in the neck of cattle at a single dosage of 6 mg/kg BW is rapidly and completely absorbed, with peak concentrations generally occurring within 1 hour after administration. Based upon plasma and lung homogenate data, the terminal half-life (t1/2) of gamithromycin is approximately 3 days. In vitro plasma protein binding studies show that 26% of the gamithromycin binds to plasma protein, resulting in free drug available for rapid and extensive distribution into body tissues. The free drug is rapidly cleared from the systemic circulation with a clearance rate of 732 mL/h/kg and a volume of distribution of 251 L/kg. Doze proportionality was established on AUC over a range of 3 mg/kg BW to 9 mg/kg BW. Biliary excretion of the unchanged drug is the major route of elimination.

MICROBIOLOGY
The minimum inhibitory concentrations (MICs) of gamithromycin were determined for BRD isolates obtained from calves enrolled in BRD treatment field studies in the U.S. in 2004 using methods recommended by the Clinical and Laboratory Standards Institute (CLSI). Isolates were obtained from pre-treatment nasopharyngeal swabs from each enrolled calf and from calves removed from the study due to BRD. The results are shown below in Table 1.

Table 1. Gamithromycin minimum inhibitory concentration (MIC) values* of indicated pathogens isolated from BRD treatment field studies in the U.S.

<table>
<thead>
<tr>
<th>Indicated Pathogen</th>
<th>Years of isolation</th>
<th>No. of isolates</th>
<th>MIC**, µg/mL</th>
<th>MIC**, µg/mL</th>
<th>MIC range</th>
<th>µg/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. haemolytica</td>
<td>2004</td>
<td>49</td>
<td>1</td>
<td>0.5 to 32</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>P. multocida</td>
<td>2004</td>
<td>70</td>
<td>0.5</td>
<td>1</td>
<td>3.12 to 32</td>
<td></td>
</tr>
<tr>
<td>H. somni</td>
<td>2005</td>
<td>52</td>
<td>0.5</td>
<td>0.5</td>
<td>0.25 to 1</td>
<td></td>
</tr>
</tbody>
</table>

* The correlation between in vitro susceptibility data and clinical effectiveness is unknown.

** The lowest MIC to encompass 50% and 90% of the most susceptible isolates, respectively.

EFFECTIVENESS
The effectiveness of ZACTRAN for the treatment of BRD associated with Mannheimia haemolytica, Pasteurella multocida and Histophilus somni was demonstrated in a field study conducted at four geographic locations in the United States. A total of 497 cattle exhibiting clinical signs of BRD were enrolled in the study. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10. The percentage of successes in cattle treated with ZACTRAN (58%) was statistically significantly higher (p<0.05) than the percentage of successes in the cattle treated with saline (19%). The effectiveness of ZACTRAN for the treatment of BRD associated with M. bovis was demonstrated independently at two U.S. study sites. A total of 502 cattle exhibiting clinical signs of BRD were enrolled in the studies. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. At each site, the percentage of successes in cattle treated with ZACTRAN on Day 10 was statistically significantly higher than the percentage of successes in the cattle treated with saline (74.4% vs. 24% (p<0.001), and 67.4% vs. 46.2% (p=0.002)). In addition, in the group of calves treated with gamithromycin that were confirmed positive for M. bovis (pre-treatment nasopharyngeal swabs), there were more calves at each site (45 of 57 calves, and 5 of 5 calves) classified as successes than as failures. The effectiveness of ZACTRAN for the control of respiratory disease in cattle at high risk of developing BRD associated with Mannheimia haemolytica and Pasteurola multoicida was demonstrated in two independent studies conducted in the United States. A total of 467 crossbred beef cattle at high risk of developing BRD were enrolled in the study. ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline was administered as a single subcutaneous injection within one day after arrival. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10 post-treatment. In each of the two studies, the percentage of successes in the cattle treated with ZACTRAN (86% and 78%) was statistically significantly higher (p<0.001 and p=0.001) to the percentage of successes in the cattle treated with saline (36% and 58%).

ANIMAL SAFETY
In a target animal safety study in healthy, six-month old beef cattle, ZACTRAN was administered by subcutaneous injection at 6, 18, and 30 mg/kg bodyweight (1, 3, and 5 times the labeled dose) on Day 0, 5, and 10 (3 times the labeled administration frequency). Injection site discomfort (neck twisting, attempts to scratch or lick the injection site, and pawing at the ground) was observed in cattle in the 18 mg/kg BW and 30 mg/kg BW groups at 10 minutes post-treatment following each injection. Mild to moderate injection site swelling and pathology changes consistent with inflammation were observed in the gamithromycin-treated groups. Other than injection site reactions, no clinically relevant treatment-related effects were observed.

STORAGE CONDITIONS
Store at or below 77°F (25°C) with excursions between 59-86°F (15-30°C). Use within 18 months of first puncture.

HOW SUPPLIED
ZACTRAN is available in three ready-to-use bottle sizes. The 100, 250 and 1000 mL bottles contain sufficient solution that will treat 10, 25 and 50 head of 550 lb (250 kg) cattle respectively.

Marketed by Merial 3239 Satellite Blvd., Duluth, GA 30096-4640 U.S.A. Made in Austria ©ZACTRAN is a registered trademark of Merial. ©2016 Merial. All rights reserved. REV. 01/2016
Comparison of Zactran® (gamithromycin) and Zuprevo™ (tildipirosin) for Metaphylaxis Treatment of Winter-Placed Feedlot Calves for Control of Bovine Respiratory Disease.

— The Bovine Practitioner Vol. 51, No 2

Summary
A randomized complete-block design trial was conducted in a commercial feedlot in Alberta, Canada, using winter-placed heifer calves (n = 4574; initial body weight 672 ± 43 pounds) to evaluate the efficacy of metaphylactic treatment with Zactran® (gamithromycin) and Zuprevo™ (tildipirosin) for control of bovine respiratory disease. There were no statistically significant differences (P > 0.05) in health or feedlot performance between calves treated with ZACTRAN and ZUPREVO from arrival to terminal weight sort, approximately 30 days before slaughter. However, using current drug prices, metaphylactic treatment with ZACTRAN had a net economic advantage of $3.24/head to those treated with ZUPREVO on arrival.

Trial
Four thousand five hundred seventy-four auction market – sourced heifers averaging 672 pounds were shipped to the feed yard and processed on arrival as follows:

- Pyramid® 2 + Type 2 BVD
- Presponse® SQ
- Eight way clostridial + H. somnus
- Implanted and dewormed
- Received metaphylactic ZACTRAN or ZUPREVO
Results

Table 1. Comparison of gamithromycin and tildipirosin metaphylaxis on morbidity and mortality in winter-placed feedlot heifer calves at moderate risk of developing bovine respiratory disease (BRD).

<table>
<thead>
<tr>
<th>Health Variable</th>
<th>Experimental Group</th>
<th></th>
<th>RR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gamithromycin(^a)</td>
<td>Tildipirosin(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of pens</td>
<td>10</td>
<td>10</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>No. of animals</td>
<td>2,287</td>
<td>2,287</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>First BRD (UF+NF) treatment, %</td>
<td>5.6</td>
<td>4.7</td>
<td>1.2 (0.91–1.48)</td>
<td>0.23</td>
</tr>
<tr>
<td>First UF(^c) treatment, %</td>
<td>5.0</td>
<td>4.3</td>
<td>1.2 (0.88–1.49)</td>
<td>0.30</td>
</tr>
<tr>
<td>First NF(^d) treatment, %</td>
<td>0.56</td>
<td>0.44</td>
<td>1.3 (0.57–2.93)</td>
<td>0.53</td>
</tr>
<tr>
<td>First BRD (UF+NF) relapse, %</td>
<td>20.3</td>
<td>14.9</td>
<td>1.4 (0.79–2.60)</td>
<td>0.23</td>
</tr>
<tr>
<td>First UF relapse, %</td>
<td>22.9</td>
<td>15.6</td>
<td>1.5 (0.80–2.69)</td>
<td>0.22</td>
</tr>
<tr>
<td>First NF relapse, %</td>
<td>5.0</td>
<td>5.0</td>
<td>1.0 (0.06–15.3)</td>
<td>0.99</td>
</tr>
<tr>
<td>Second BRD (UF+NF) relapse, %</td>
<td>38.9</td>
<td>23.3</td>
<td>1.7 (0.32–1.67)</td>
<td>0.42</td>
</tr>
<tr>
<td>Second UF relapse, %</td>
<td>38.9</td>
<td>23.3</td>
<td>1.7 (0.32–1.67)</td>
<td>0.25</td>
</tr>
<tr>
<td>Second NF relapse, %</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Third BRD (UF+NF) relapse, %</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Third UF relapse, %</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Third NF relapse, %</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>First ART(^e) treatment, %</td>
<td>1.2</td>
<td>1.5</td>
<td>0.8 (0.48–1.31)</td>
<td>0.37</td>
</tr>
<tr>
<td>First ART relapse, %</td>
<td>4.0</td>
<td>7.0</td>
<td>0.6 (0.04–1.64)</td>
<td>0.57</td>
</tr>
<tr>
<td>Crude mortality, %</td>
<td>0.70</td>
<td>0.57</td>
<td>1.2 (0.59–2.53)</td>
<td>0.56</td>
</tr>
<tr>
<td>BRDHS(^f) mortality, %</td>
<td>0.26</td>
<td>0.26</td>
<td>1.0 (0.32–3.06)</td>
<td>0.99</td>
</tr>
<tr>
<td>Removals, %</td>
<td>0.87</td>
<td>0.66</td>
<td>1.3 (0.47–2.86)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

\(^a\) Zactran\(^®\), Merial Canada, Baie-D’Urfé, Quebec

\(^b\) Zuprevo\(^®\), Merck Animal Health, Intervet Canada Corp., Kirkland, Quebec

\(^c\) UF = undifferentiated fever

\(^d\) NF = no fever

\(^e\) ART = arthritis

\(^f\) BRDHS = bovine respiratory disease and Histophilus somni disease
Table 2. Comparison of gamithromycin versus tildipirosin metaphylaxis on feedlot performance of winter-placed feedlot heifer calves at moderate risk of developing bovine respiratory disease.

<table>
<thead>
<tr>
<th>Health Variable</th>
<th>Experimental Group</th>
<th>SEM</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. head/pen</td>
<td>229</td>
<td>229</td>
<td>3.75</td>
</tr>
<tr>
<td>Avg. arrival weight, lbs</td>
<td>672</td>
<td>671</td>
<td>2.13</td>
</tr>
<tr>
<td>Avg. terminal sort weight, lbs</td>
<td>1,247</td>
<td>1,248</td>
<td>4.38</td>
</tr>
<tr>
<td>Avg. weight gain, lbs</td>
<td>575</td>
<td>577</td>
<td>5.31</td>
</tr>
<tr>
<td>DOFj</td>
<td>186</td>
<td>186</td>
<td>0.00</td>
</tr>
<tr>
<td>DDMI,k lbs</td>
<td>21.5</td>
<td>21.6</td>
<td>0.06</td>
</tr>
<tr>
<td>ADG,l lbs/day</td>
<td>3.08</td>
<td>3.10</td>
<td>0.03</td>
</tr>
<tr>
<td>DMC,m lb/lb</td>
<td>6.99</td>
<td>6.97</td>
<td>0.08</td>
</tr>
</tbody>
</table>

g Zactran®, Merial Canada, Baie-D’Urfe, Quebec  
h Zuprevo™, Merck Animal Health, Intervet Canada Corp., Kirkland, Quebec  
i Sort weight = live body weight collected at approximately 30 days prior to slaughter  
j DOF = days-on-feed, from arrival to terminal weight sort  
k DDMI = daily dry matter intake, from arrival to terminal weight sort  
l ADG = average daily gain, from arrival to terminal weight sort  
m DMC = dry matter conversion, from arrival to terminal weight sort

Conclusions

No differences were noted between metaphylactic treatment with ZACTRAN versus ZUPREVO when comparing health (morbidity and mortality) or performance variables. ZACTRAN did have an economic advantage of $3.24/head (CA) or $2.53*/head (U.S.) in cost saving in this study.

*Conversion rates as of 11/28/17.

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<table>
<thead>
<tr>
<th>Body Weight (lb.)</th>
<th>2mL per 110 lbs. Subcutaneous (SC) Dose Volume (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 lb.</td>
<td>2.0 mL</td>
</tr>
<tr>
<td>135 lb.</td>
<td>2.5 mL</td>
</tr>
<tr>
<td>165 lb.</td>
<td>3.0 mL</td>
</tr>
<tr>
<td>190 lb.</td>
<td>3.5 mL</td>
</tr>
<tr>
<td>220 lb.</td>
<td>4.0 mL</td>
</tr>
<tr>
<td>245 lb.</td>
<td>4.5 mL</td>
</tr>
<tr>
<td>275 lb.</td>
<td>5.0 mL</td>
</tr>
<tr>
<td>300 lb.</td>
<td>5.5 mL</td>
</tr>
<tr>
<td>330 lb.</td>
<td>6.0 mL</td>
</tr>
<tr>
<td>355 lb.</td>
<td>6.5 mL</td>
</tr>
<tr>
<td>385 lb.</td>
<td>7.0 mL</td>
</tr>
<tr>
<td>410 lb.</td>
<td>7.5 mL</td>
</tr>
<tr>
<td>440 lb.</td>
<td>8.0 mL</td>
</tr>
<tr>
<td>465 lb.</td>
<td>8.5 mL</td>
</tr>
<tr>
<td>495 lb.</td>
<td>9.0 mL</td>
</tr>
<tr>
<td>520 lb.</td>
<td>9.5 mL</td>
</tr>
<tr>
<td>550 lb.</td>
<td>10.0 mL</td>
</tr>
</tbody>
</table>

Administer up to 10 mL per injection site

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RESIDUE WARNINGS:

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Caution: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. READ ENTIRE BROCHURE CAREFULLY BEFORE USING THIS PRODUCT.

DESCRIPTION

ZACTRAN® Injection for Cattle is a ready to use sterile parenteral solution containing gamithromycin, a macrolide sub-class, 7-azalide antimicrobial. Each mL of ZACTRAN contains 150 mg of gamithromycin as the free base, 1 mg of monohydroraclo and 40 mg of sucinic acid in a glyceral formal vehicle. The chemical name of gamithromycin is 1-Oxa-7-azaspiro[4.5]decine-3(13)-one-13,15-cis-3-cis-3-heptenoic acid, 3,3-dimethyl-3-oxo-11-[3,3,4,6-tetradecyloxy]-[2R*,3S*,4R*,5S*,8R*,10R*,11R*,12S*,13S*,14R*] and the structure is shown below.

INDICATIONS

ZACTRAN is indicated for the treatment of bovine respiratory disease (BRD) associated with Mannheimia haemolytica, Pasteurella multocida, Histophilus somni and Mycoplasma bovis in beef and non-lactating dairy cattle. ZACTRAN is also indicated for the control of respiratory disease in beef and non-lactating dairy cattle at high risk of developing BRD associated with Mannheimia haemolytica and Pasteurella multocida.

DOSEAGE AND ADMINISTRATION

Administer ZACTRAN one time as a subcutaneous injection in the neck at 6 mg/kg (2 mL/110 lb) body weight (BW). If the total dose exceeds 10 mL, divide the dose so that no more than 10 mL is administered at each injection site.

Body Weight (lb) | Dose Volume (mL)
--- | ---
110 | 2
220 | 4
330 | 6
440 | 8
550 | 10
660 | 12
770 | 14
880 | 16
990 | 18
1100 | 20

Animals should be appropriately restrained to achieve the proper route of administration for sterile equipment. Inject under the skin in front of the shoulder (see illustration).

EFFECTIVENESS

The effectiveness of ZACTRAN for the treatment of BRD associated with Mannheimia haemolytica, Pasteurella multocida and Histophilus somni was demonstrated in a field study conducted at four geographic locations in the United States. A total of 497 cattle exhibiting clinical signs of BRD were enrolled in the study. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10. The percentage of successes in cattle treated with ZACTRAN (58%) was statistically significantly higher (p = 0.05) than the percentage of successes in cattle treated with saline (19%). The effectiveness of ZACTRAN for the treatment of BRD associated with M. bovis was demonstrated independently in two U.S. study sites. A total of 502 cattle exhibiting clinical signs of BRD were enrolled in the studies. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. Clinical success was defined as the absence of clinical signs of BRD for at least 72 hours after drug administration. The percentage of successes in cattle treated with ZACTRAN on Day 10 was statistically significantly higher than the percentage of successes in the cattle treated with saline (74.4% vs. 24% (p = 0.001) and 67.4% vs. 46.2% (p = 0.002)). In addition, in the group of calves treated with gamithromycin that were confirmed positive for M. bovis (pre-treatment nasopharyngeal swabs), there were more calves at each site (45 of 57 calves, and 5 of 5 calves) classified as successes than as failures.

The effectiveness of ZACTRAN for the control of respiratory disease in cattle at high risk of developing BRD associated with Mannheimia haemolytica and Pasteurella multocida was demonstrated in two independent studies conducted in the United States. A total of 467 crossbred beef cattle at high risk of developing BRD were enrolled in the study. ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline was administered as a single subcutaneous injection within one day after arrival. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10 post-treatment. In each of the two studies, the percentage of successes in the cattle treated with ZACTRAN (68%) and 78% was statistically significantly higher (p < 0.01) than the percentage of successes in the cattle treated with saline (36% and 58%).

ANIMAL SAFETY

In a target animal safety study in healthy, six-month-old beef cattle, ZACTRAN was administered by subcutaneous injection at 6, 18, and 30 mg/kg bodyweight (1, 3, and 5 times the labeled dose) on Day 0, 5, and 10 (3 times the labeled administration frequency). Injection site discomfort (neck twisting, attempts to scratch or lick the injection site, and pawing at the ground) was observed in calves in the 18 mg/kg BW and 30 mg/kg BW groups at 10 minutes post-treatment following each injection. Mild to moderate injection site swelling and pathology changes consistent with inflammation were observed in the gamithromycin-treated groups. Other than injection site reactions, no clinically relevant treatment-related effects were observed.

STORAGE CONDITIONS

Store at or below 77°F (25°C) with excursions between 59-86°F (15-30°C). Use within 18 months of first puncture.

HOW SUPPLIED

ZACTRAN is available in three ready-to-use bottle sizes. The 100, 250 and 500 mL bottles contain sufficient solution that will treat 10, 25 and 50 head of 550 lb (250 kg) cattle respectively.

Marketed by Merial 3239 Satellite Blvd., Duluth, Ga 30096-4640 U.S.A. Made in Austria ©ZACTRAN is a registered trademark of Merial. ©2016 Merial. All rights reserved.

REV. 01/2016
Información importante de seguridad: Para uso solo en ganado vacuno. No tratar al ganado dentro de los 35 días siguientes al sacrificio. Debido a que el tiempo de desecho en la leche no ha sido establecido, no utilizar en ganado lechero hembra de 20 meses de edad o más, o en terneros a ser procesados como carne de ternera de engorde. Los efectos de ZACTRAN durante el ciclo reproductivo, la preñez y la lactación en bovinos no han sido determinados. La inyección subcutánea puede causar una reacción transitoria del tejido local en algunos bovinos que puede provocar la pérdida de tejido comestible en el sacrificio. NO INDICADO PARA SU USO EN SERES HUMANOS. MANTENER FUERA DEL ALCANCE DE LOS NIÑOS.

Ahora Merial pertenece a Boehringer Ingelheim. Zactran es una marca registrada de Merial. ©2018 Boehringer Ingelheim Vetmedica, Inc. BOV-1705-ANTB0918

<table>
<thead>
<tr>
<th>Peso corporal (lb)</th>
<th>2 mL por 110 libras</th>
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<tbody>
<tr>
<td></td>
<td>Dosificación (ml)</td>
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<tr>
<td></td>
<td>Subcutánea (SC)</td>
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<tr>
<td>110 lb</td>
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<td>550 lb</td>
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Administrar hasta 10 mL por punto de inyección
CONTRAINDICACIONES
Al igual que con todos los medicamentos, el uso de ZACTRAN está contraindicado en animales que hayan tenido hipersensibilidad previa a este fármaco.

ADVERTENCIA:
Para uso solo en Ganado vacuno. No indicado para uso en Seres Humanos. Mantener este y todos los medicamentos fuera del alcance de los niños.

No debe utilizarse en pollos o ponedoras.

La ficha de datos de seguridad (essential safety data sheet, MSDS) contiene información más detallada sobre la seguridad ocupacional. Para informar efectos adversos, obtenga MSDS o reciba asistencia, comuníquese con Merial 1-888-676-4257.

ADVERTENCIAS DE RESIDUOS:
No tratar al ganado dentro de los 35 días siguientes al sacrificar. Debido a que el tiempo de descenso de los niveles de antibiótico en la leche no ha sido establecido, no utilizar en ganado lechero hasta 20 meses de edad o más. El periodo de retiro no se ha establecido para este producto en terneros pre-rumiantes. No utilizar en terneros para ser procesados como carne de ternera de engorde.

PRECAUCIONES
Los efectos de ZACTRAN durante el ciclo reproductivo, la parturición y la lactación en bovinos no han sido determinados. La inyección subcutánea de ZACTRAN puede causar una reacción transitoria del tejido local en algunos bovinos que puede provocar la pérdida de tejido comestible en el sacrificio.

REACciones ADVERSAS
Se puede observar mala tolerancia e inmunización leve a moderada en el punto de inyección en el ganado vacuno tratado con ZACTRAN.

INdICACIONES
ZACTRAN está indicado para el tratamiento de la enfermedad respiratoria bovina (bovine respiratory disease, BRD) asociada a Mannheimia haemolytica, Pasteurella multocida, Mycoplasma bovis y Mycoplasma mycoides. ZACTRAN está disponible en tres tamaños de frasco listo para usar. Use dentro de los 18 meses posteriores a la primera punción.

DOsIS Y ADMINISTRACIÓN
Administrar ZACTRAN en una única inyección subcutánea en el pescuezo en una dosis de 6 mg/kg de BW (2 ml/100 lb de peso corporal) (body weight, BW) a los 10 ml/10 de inyección.

Los animales deben ser sujetados adecuadamente para lograr la vía correcta de administración. Usar equipo estéril para inyectar bajo la piel en la parte delantera del lomo (ver ilustración).

<table>
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Las leyes federales (EE. UU.) restringen el uso de este fármaco que se comercializa por Merial en EE. UU. Inyectar bajo la piel en la parte delantera del lomo (ver ilustración).

La correlación entre los datos de susceptibilidad in vitro y la eficacia clínica es desconocida.

** La menor MIC para abarcar el 50 % y 90 % de los patógenos más indicados en los estudios de campo de tratamiento de BRD en EE. UU.

Eficacia
La eficacia de ZACTRAN para el tratamiento de la BRD asociada a Mannheimia haemolytica, Pasteurella multocida y Mycoplasma bovis se demostró en un estudio de campo realizado en cuatro zonas geográficas de los Estados Unidos. Un total de 497 bovinos que presentaban signos clínicos de BRD se inscribieron en el estudio. Al ganado vacuno se le administró ZACTRAN (6 mg/kg de BW) o un volumen equivalente de solución salina estéril por vía subcutánea una vez en el Día 0. Durante el tratamiento se observó clínicamente una mejora significativa en el Día 10. El porcentaje de éxito en el ganado bovino tratado con ZACTRAN (58 %) fue significativamente mayor (p < 0.05) que el control de tratamiento. En el grupo que recibió solución salina estéril, el porcentaje de éxito fue de 24 % (p = 0.0016). Además, en el grupo de terneros tratados con gamitromicina que se confirmaron como positivos para Mycoplasma bovis, una mayor reducción del patógeno se observó en los animales en cada sitio (0S a 57 terneros y 5 de 6 terneros) (clasicados como exitosos que fallidos). La eficacia de ZACTRAN para el control de la enfermedad respiratoria en ganado en alto riesgo de desarrollar BRD asociada a Mannheimia haemolytica y Pasteurella multocida se demostró en dos estudios independientes conducidos en los Estados Unidos. Se inscribió en el estudio un total de 497 ganados de raza mixta en alto riesgo de desarrollar BRD. Se administró ZACTRAN (6 mg/kg de BW) y un volumen equivalente de solución salina estéril como una inyección subcutánea única dentro del día posterior a la llegada. El ganado se observó clínicamente una mejora significativa en el Día 10 posteriores al tratamiento. En cada uno de los dos estudios, el porcentaje de éxito en el ganado bovino tratado con ZACTRAN (86 % y 78 %) fue significativamente mayor (p = 0.0079 y p = 0.0016), desde el punto de vista estadístico, que el porcentaje de éxito en los animales tratados con solución salina (34 % y 58 %).

SEGURIDAD ANIMAL
En un estudio de seguridad animal efectuado en ganado saludable de seis meses de edad, se administró ZACTRAN vía inyección subcutánea a 6, 18 y 30 mg/kg de peso (1, 3 y 5 veces la dosis en la etiqueta) al día 5, y 10 (3 veces la frecuencia de administración en la etiqueta). Se observó inmunocompetencia en el lugar de la inyección (frecuencia, intentos de rascar o lamá el lugar de la inyección y dar patadas al suelo) en terneros en los grupos de 18 mg/kg de BW y 30 mg/kg de BW 10 minutos posterior al tratamiento después de cada inyección. Inclusión leve a moderada en el lugar de la inyección y cambios de patología consistentes con inflamación se observaron en los grupos tratados con gamitromicina. No se observaron efectos clínicamente relevantes relacionados con el tratamiento diferentes a las reacciones en el lugar de la inyección.

CONDICIONES DE ALMACENAMIENTO
Guarde a 77 °F (25 °C) o menos con excepciones entre 59- 66 °F (15-30 °C). Use dentro de los 18 meses posteriores a la primera puesta.

PRESENTACIÓN
ZACTRAN está disponible en tres tamaños de frasco listo para usar. Los frascos de 100, 250 y 500 ml contienen suficiente solución para tratar a 10, 25 y 50 cabezas de ganado de 550 lb (250 kg) respectivamente.

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