

Therapy of Diarrhea in Calves

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Abstract

Diarrhea in calves can result in physiological derangements including dehydration, acidosis, hypothermia, septicemia and infection, systemically or elsewhere. A thorough physical examination of calves presented with diarrhea will help to determine which problems are present. Therapeutic options include oral or intravenous administration of fluids containing electrolytes, energy sources and/or alkalinizing agents, warming the calf, antimicrobial drugs, and changes in feeding management.

Résumé

Chez les veaux, la diarrhée peut entraîner des désordres physiologiques comme la déshydratation, l'acidose, l'hypothermie, la septicémie ou l'infection, de manière localisée ou systémique. L'examen physique complet des veaux atteints de diarrhée aidera à identifier les problèmes. La thérapie comprendra l'administration orale ou intraveineuse de fluides contenant des électrolytes, des sources d'énergie et/ou des agents alcalifiants, des médicaments antimicrobiens, le réchauffement physique des veaux et le changement approprié de l'alimentation.

Physical Examination

A thorough physical examination of calves presenting with scours is imperative to determine the severity of the illness, pathophysiological derangements present, and course of treatment. Physical examination of a scouring calf should include at least the following assessments:

1. Alertness/appearance. Calves that are standing and have a suckle reflex may be treated with oral fluids. Those recumbent in a sternal or lateral position, without a suckle reflex, require intravenous therapy. Calves in lateral recumbency, particularly those that over one week of age, are likely to be suffering from significant acidosis. This may be confirmed by a measurement of decreased blood bicarbonate or carbon dioxide (CO₂) levels. Calves that are less than a week old, and collapsed or weak, may be septicemic. Calves in poor body condition are more likely to hypoglycemic.

2. Dehydration. Skin tenting to evaluate hydration is best performed on the neck, in a lateral direction to avoid the natural folds of the neck. Sinking of the eyeball in the socket is also an accurate measure of dehydration. Degree of dehydration and degree of acidosis are not correlated.¹

3. Heart rate and rhythm. Bradycardia in calves with scours suggests the presence of hypoglycemia, while cardiac arrhythmia may be due to hyperkalemia associated with acidosis.² Calves with cardiac arrhythmia may be treated with a slow bolus of a 50-ml vial containing 50 mmol of bicarbonate prior to instituting any other therapy.

4. Hypothermia. Recumbent calves with diarrhea may be severely hypothermic and must be warmed. Fluids administered to such calves must also be warmed to normal body temperature.

5. Signs of other infection. Auscultation of the lungs, palpation of joints and umbilicus, and observation for head and neck stiffness should be conducted to determine if other sites of infection are present in addition to the enteric disease. Infection at other sites results in a poorer prognosis than enteric disease alone.

Instituting Therapy

Oral fluid therapy

Calves that can stand and suckle may be treated with oral fluids to maintain hydration and electrolyte balance. Commercial preparations are available as powders to be mixed with water and administered for this purpose. Oral fluids should contain an alkalinizing agent such as bicarbonate, citrate or acetate. Bicarbonate and citrate are likely to interfere with proper digestion of milk, but acetate is unlikely to do so.³ Oral solutions must also contain amino acids, such as glycine, to facilitate uptake of sodium and glucose from the gut. These products are commonly administered two to three times daily, with small frequent milk feedings interspersed between administration of oral fluid and electrolyte solutions.

Intravenous fluid therapy

Intravenous fluids are commonly administered

through the jugular vein of calves. Long catheters for IV use in cattle and horses are not recommended as they may enter and irritate the right atrium of the heart.⁴ Surgical preparation of the site prior to placement of the catheter is recommended. Placement of the catheter is greatly facilitated by cutting through the thick neck skin with a surgical blade prior to attempting to place the catheter. Very dehydrated calves may have poor perfusion and slow “flashback” of blood into the hub of the catheter, requiring patience on the part of the person placing the catheter. Having an assistant hold up or prop up the rear end of the calf while the catheter is placed may promote engorgement of the jugular veins and facilitate the process. The catheter is usually attached to the neck by staples or stitches; the fluid line should also be taped to some part of the calf, such as the ear, to prevent movement causing the line and catheter to be pulled out of place if the calf moves.

As with oral fluids, IV fluids must contain an alkalinizing agent; the most common is sodium bicarbonate (NaHCO₃). IV fluids for scouring calves should be isotonic, about the same concentration as normal blood, not hypertonic, as these calves are dehydrated. Isotonic solutions include Lactated Ringer’s Solution (LRS) and 0.9% sodium chloride (NaCl), also called physiologic saline. An isotonic bicarbonate solution may be created by mixing 13 grams (about 12cc) of baking soda with 1 liter of distilled water. This solution may be mixed with NaCl but not with LRS, as a precipitate may form. A 50:50 mixture of bicarbonate solution and saline solution may be used to replace fluid deficits over 12-24 hours.

Oral medications

Kaolin-pectin solutions may improve the solidity of feces, but they do not reduce fluid loss in calves with diarrhea. Bismuth subsalicylate is anti-inflammatory, and can reduce secretion of fluid into the intestine.⁵

Antimicrobial drugs

Antibacterial drugs are not indicated in most cases of diarrhea, especially in older calves, as bacterial infection may not be the cause of the diarrhea. Enrofloxacin is illegal for treatment of scours in calves, and the use of gentamicin in food animals is discouraged by many organizations, including *The American Association of Bovine Practitioners*. These two drugs may do more harm than good in any case, as they are active only against aerobic bacteria. Drugs with a strictly aerobic spectrum of activity, such as enrofloxacin and gentamicin, may kill the causative pathogen and the normal gut flora, enhancing the opportunity for overgrowth of anaerobic bacteria such as *Clostridium perfringens*, which may cause fatal disease. Furthermore, the administration of gentamicin in an intrave-

nous drip serves to minimize efficacy and maximize toxicity of the drug.

For recumbent animals less than one week of age, there is a chance that septicemia may be present. Evidence suggests that beta-lactam drugs such as amoxicillin, ampicillin and ceftiofur are the best therapeutic choice for such calves.⁶ Protozoal infections that cause scours have not been shown to be responsive to antimicrobial drug therapy.

Anti-inflammatory drugs

Anti-inflammatory drugs may have some benefit in calves with scours. Care must be taken to restore hydration of animals treated with non-steroidal anti-inflammatory drugs (NSAIDs), such as flunixin or the salicylates in oral preparations, as dehydration potentiates toxicity in this drug class.

Dextrose

Animals in poor body condition or those which have been held off milk and are depressed, hypothermic and/or bradycardic are likely to be hypoglycemic. This can be confirmed using readily available hand-held glucometers. For animals with hypoglycemia, 50% dextrose solution may be added to sodium chloride or bicarbonate solutions at the rate of 50 ml dextrose solution per liter of fluid.⁷

Milk feeding

Calves that will suckle should be fed milk. Calves with diarrhea frequently have gut damage that causes malabsorption. Feeding these calves frequent small meals will minimize the likelihood of overwhelming the reduced absorptive capacity of the gut and causing recurrence of diarrhea.

Conclusions

Calves with diarrhea may have a number of pathologies in addition to the primary complaint. A careful evaluation of the patient, followed by appropriate oral or parenteral therapy, will improve success rates when treating scouring calves.

Footnotes

1, 3, 4 and 7: Jonathan M. Naylor, DVM, Julia B. Ewaschuk, BSc., Gordon A. Zello, PhD, “Intravenous fluid therapy for diarrheic calves”, Large Animal Veterinary Rounds, Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, March 2003, Volume 3, Issue 3 http://www.idrounds.ca/cgi-bin/templates/framesets/veterinaryRoundsCa/fs_snell.cfm

2 and 6. Naylor, Jonathan M, “Diseases of Neona-

tal Calves: An Update”, Large Animal Veterinary Rounds, Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, January 2005, Volume 5, Issue 1 http://www.idrounds.ca/cgi-bin/templates/framesets/veterinaryRoundsCa/fs_snell.cfm

5. Naylor, Jonathan M: Neonatal ruminant diarrhea, in *Large Animal Internal Medicine*, ed 3. St. Louis, Mosby, 2002, pp 352-366.