

Calf Diarrhea- New Research into Oral Electrolyte Therapy

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Diarrhea in neonatal calves remains the leading cause of morbidity (sickness) and mortality (death) in North America and Europe with no change in mortality rates between 1995 and 2001 in dairy heifer calves in the United States. According to the 2007 National Animal Health Monitoring System for U.S. Dairy which can be found at: http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy07/Dairy07_ir_CalfHealth.pdf scours, diarrhea or other digestive problems accounted for the highest percentage of preweaned heifer deaths at 56.5%. There are five major infectious causes of diarrhea in calves less than 21 days of age: *E. coli* K99, rotavirus, coronavirus, Cryptosporidia, and *Salmonella* species. Noninfectious factors such as insufficient or poor quality colostrum, poor sanitation, stress, and cold weather can cause or contribute to neonatal calf diarrhea as well. Regardless of the cause, diarrhea results in increased loss of electrolytes and water in the feces of calves and decreases milk intake. Ultimately, this process causes dehydration, metabolic acidosis (the blood is more acidic than it should be), electrolyte abnormalities including sodium deficiency, and a negative energy balance from the lost nutrients and lack of milk. Oral electrolyte solutions have typically been used to replace fluid losses, correct acid-base and electrolyte levels in the blood, and provide nutritional support with the added benefit of being relatively inexpensive and easy to administer. Recent research has elicited better methods to assess and treat a calf with diarrhea as well as better guidelines for choosing an oral electrolyte solution. Faster and more accurate diagnostic tests have also been developed to uncover the underlying cause of the diarrhea. Rapid diagnosis is critical to develop the best treatment options and to prevent future outbreaks.

Accurate assessment of a calf with diarrhea is necessary to determine if oral fluid therapy is adequate or if intravenous fluids are indicated. The choice depends on determination of two important factors: 1) if the severity of the dehydration is more or less than 8% and/or 2) the severity of the metabolic acidosis or low pH of the blood. Dehydration is relatively easy to monitor by examination of the position of the eyeball and by skin elasticity or the “skin tent” test. The degree of recession of the eyeball in the orbit (how far the eye is “sunken in”) can be estimated by gently pulling the lower eyelid down and measuring the distance between the eye and the socket. If the distance is greater than 0.2 inches, dehydration is more than 8%. Likewise, if the skin is pinched on the side of the neck and rotated 90 degrees then released and the time for the skinfold to disappear is greater than 6 seconds, the calf is considered greater than 8% dehydrated and in need of intravenous fluids. Although these measurements are somewhat subjective and may occasionally be inaccurate, they are by far the most accurate clinical indicators of dehydration that can be easily measured in the field. Conversely, field methods to assess acid-base status are not as good because they are based on a depression or demeanor score to predict the level of acidosis. Calves often have other concurrent metabolic problems that cause depression so these scores may be incorrect in complicated cases. Two parameters are important to assess: 1) the ability to stand (strong, weak or wobbly, down or recumbent) and 2) the ability to suck (strong, weak or slow, or no suckle reflex). In general, a standing calf with a strong to moderate suckle reflex or that demonstrates a “chewing action” should safely tolerate oral fluids. Any calf with a very weak or absent suckle reflex should be given intravenous fluid therapy because if oral fluids are given to a calf with ileus (no

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gut motility), the fluid is not absorbed but instead pools in the rumen resulting in bloat and rumen acidosis. Calves that are weak and wobbly with a weak or absent suckle reflex will benefit greatly from intravenous fluids that rapidly replace fluid volume and correct acid-base balance at the same time followed by oral fluids. ANY calf that is severely depressed and unable to stand requires intravenous fluids. A table summarizing these assessments and treatment options can be found at: <http://www.extension.org/pages/65519/early-identification-of-sick-dairy-calves-important-to-their-survival-and-future-milk-production>

In general, when oral fluids are indicated, they should be fed as an extra meal to calves that have diarrhea. For example, if calves are normally being fed morning and evening, then oral electrolytes can be fed in the middle of the day. If this is not possible, then electrolytes can be fed along with milk (particularly the products that contain acetate or very low concentrations of bicarbonate). Some experts used to recommend a “rest the gut” approach to calf diarrhea, suggesting that continued milk feeding worsens diarrhea. However, research has shown that milk feeding does not prolong or worsen diarrhea, nor does it speed healing of the intestines. Calves should be maintained on their full milk diet plus oral electrolytes when possible. If calves are depressed and refuse to suckle, milk can be withheld for one feeding and a hypertonic oral electrolyte product such as Calf-Lyte II HE or Enterolyte HE may be substituted. Milk feeding should always be resumed within 12 hours or blood glucose concentrations will drop too low and the calves get too weak to respond to treatment.

Improved diagnostics are now available to ascertain the cause of neonatal calf diarrhea. The UKVDL has recently developed a Calf Diarrhea Multiplex PCR panel (cost of \$50 plus a \$10 accession fee) which tests for the major diarrhea pathogens *E.coli* K99, Rotavirus, Coronavirus, *Salmonella* spp., and Cryptosporidia from one fecal sample submitted early in the course of disease and before any treatment is instituted. It is highly accurate as it detects the DNA or “molecular fingerprint” of the various pathogens and results are available within 1-2 days. A culture of the bacteria is also recommended (an additional \$15) in order to identify which antibiotics will work best against bacterial agents. At least 5 grams of feces must be submitted in a labeled, leak-proof container maintained at a cold temperature during transport. Do not submit fecal samples in gloves; screw cap tubes or vials are preferred in the laboratory. Call the UKVDL (859) 257-8283 or check the website <http://vdl.uky.edu> for more information.