



Knowledge

Rotavirus – An evolving challenge

First recognized as a distinct entity in the 1970s, rotavirus continues to present new immunological challenges in livestock. It is one of the most common etiological agents associated with neonatal calf diarrhea¹ – one study documented rotavirus in 54 percent of diarrheic calves and 7 percent of healthy calves.² Rotavirus is tough to control because it's evolving in the field, and the number of viral strains is increasing.

Scientists have divided rotavirus into seven groups (Group A through Group G) based on how the proteins on the outer surface behave antigenically. A number of serotypes also have been identified within rotavirus groups. For example, G6, G8 and G10 are G serotypes of Group A rotaviruses that commonly affect calves. Three P serotypes (P6, P7 and P8) in Group A also have been identified in calves with scours.

While Group A rotavirus is by far the most prevalent, Groups B and C also have been identified in cattle. In a study of diarrheic calves, three of five samples testing positive for Group B also were positive for Group A.³ This suggests that mixed Group A and Group B rotavirus infections in calves might be common in the field.

Genetic recombinations

Mixed infections also may be due to genetic exchange. Eleven distinct gene segments can be exchanged when animals are infected by more than one rotavirus strain. This genetic reassortment results in progeny viruses, which can evade the host immune response and persist in a susceptible population.¹

One problem with rotavirus genetic recombination is that the new strain may be particularly hard on a calf. In addition, it's unlikely that a vaccine containing only one rotavirus isolate will offer effective protection against new strains.

Rotavirus and scours

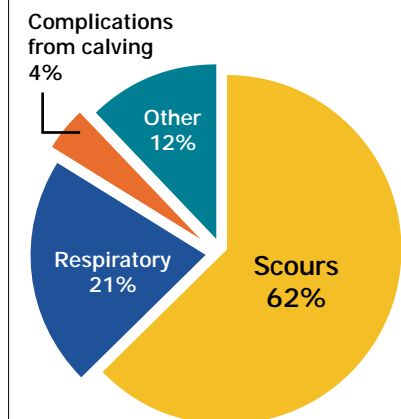
Rotavirus is one of the main viral pathogens involved in calf scours, along with coronavirus. Bacteria such as *E. coli*, *Cl. perfringens* Type C and *Salmonella* also cause scours, as do protozoan parasites, such as cryptosporidia and coccidia. These pathogens often work together to make scours more severe.

Research shows that calves suffering from scours never catch up. In one study, beef calves that became sick in the first four weeks of life weighed 35 pounds less at weaning than their healthy

herdmates.⁴ On a \$1/pound market, this means \$35 less per sick calf come sale day at weaning. Another study documented that heifers treated for scours were nearly three times more likely to calve later than 30 months of age.⁵

Rotavirus is particularly challenging, because antibiotics won't help fight this viral infection. Stricken calves must receive intense supportive therapy, such as oral rehydration to replace lost electrolytes. Because calf scours is the leading cause of unweaned dairy heifer deaths, managing to prevent viral scours is crucial (see Figure 1).

Figure 1. Causes of unweaned calf deaths



2002 National Animal Health Monitoring System Study

A vaccination program will not replace proper cow nutrition, careful calving management and ongoing sanitation. Once those management practices are in place, however, attaining high levels of antibody in the colostrum – through the use of potent vaccines – has proven effective in protecting newborn calves during the critical first weeks of life. Colostral antibody works within the intestine to block infection by bacteria and other viruses that cause neonatal scours.

Vaccination timing

The ideal time to administer a scours vaccine is well before cows are ready to calve.

Scour Bos™ 9 from Novartis Animal Health US, Inc., is administered eight to 16 weeks prior to calving to prevent scours from rotavirus, coronavirus, *E. coli* and *Cl. perfringens* Type C. A booster with Scour Bos™ 4 should be given four weeks prior to calving for maximum rotavirus and coronavirus protection. In subsequent years, only a single dose of Scour Bos 9 is required eight to 10 weeks prior to calving. This timing allows the level of antibodies in the dam's system to peak at or just prior to calving.

Evolving vaccines

Rotavirus strains are evolving in the field. To be effective, vaccines must evolve, too.

An effective vaccine will contain the correct organisms responsible for current scours outbreaks in livestock herds. Scour Bos 9 includes three rotavirus isolates, along with four different *E. coli* strains, coronavirus and *Cl. perfringens* Type C. In addition to Scour Bos 9, producers can also use Scour Bos 4 (rotavirus and coronavirus protection), depending on the herd health history and herd management program. Scour Bos 9 and Scour Bos 4 provide ideal coverage under real-world conditions.

Standing up to the challenge

Scour Bos 9 has undergone controlled challenge trials that prove its ability to provide superior protection against scours. In this trial, there were 30 first-calf heifers.

Twelve were vaccinated, 18 were not. Of the 12 vaccinated, the first dose was administered eight weeks prior to calving; the second dose* was given two weeks prior to calving.

Calves were allowed to ingest adequate volumes of colostrum, and then were challenged with virulent rotavirus orally and nasally four to 10 hours after birth. Calves were closely observed for 14 days.

Note that none of the calves from the vaccinated heifers died vs. 11 percent of the calves from non-vaccinated dams (see Figure 2).⁶ Calves from nonvaccinated heifers also showed three times the levels of clinical signs of illness (see Figure 3) – and they gained less than one-third as much weight over the 14-day trial period (see Figure 4).

* Second dose contained only rotavirus.

Figure 2. Percent death loss following rotavirus challenge

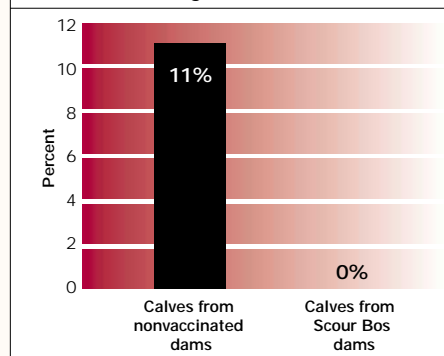


Figure 3. Average clinical score (dehydration, depression and fecal consistency)

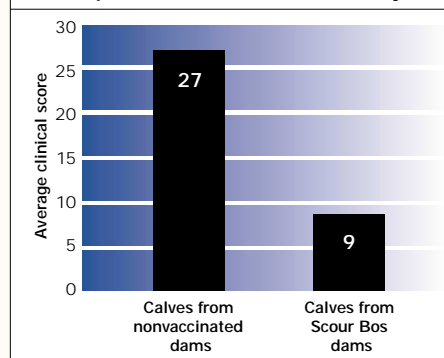
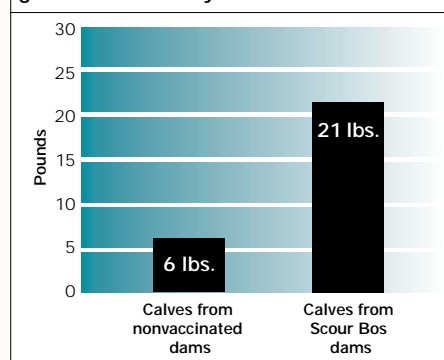


Figure 4. Average total pounds gained over 14 days



1. Grotelueschen DM, Duhamel GE, Lu W, Hesse RA, Berry JG. Rotavirus: Consider multiple strains in calf diarrhea outbreaks. Nebraska Veterinary Medical Association 1993 Convention Proceedings.
2. Bezek D. Rotavirus enteritis in food animals. *The Compendium*. Vol. 16(3):391-405.
3. Chang KO, Parwani AV, Smith D, Saif LJ. Detection of Group B rotaviruses in fecal samples from diarrheic calves and adult cows and characterization of their VP7 genes. *J Clin Microbiol*. Vol. 35(8): 2107-2110.
4. Wittum TE, Perino LJ. Passive immune status at postpartum hour 24 and long term health performance of calves. *Am J Vet Res*. 56(9):1149-1154, 1995.
5. Waltner-Toews D, Martin SW, Meek AH. The effect of early calfhood health status on survivorship and age at first calving. *Can J Vet Res*. Vol. 50(3): 314-317.
6. Data on file, Novartis Animal Health US, Inc. Study #99-001.