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BLACKLEG VACCINATION IN BELIZE

Vaccination Practices in Belize

Blackleg disease in Belize tends to be sporadic with flares up associated mainly with climate extremes (ie - severe drought or flooding). The Blackleg Vaccine commonly used in Cayo "ANCHOR" is a killed vaccine containing *Cl. chauveoi*, *Cl. nouveoi*, *Cl. septicum*, *Cl. sordellii*, and *Cl. perfringens* Types C & D. The 250 ml bottle of ANCHOR is available – clostridial vaccine from Boehringer Ingelheim. If sold for \$ 55.00, this works out to \$1.10 per 5ml dose.

On some of the larger farms in Belize, calves are vaccinated against black leg at 3 months and again at weaning. On other farms the cattle are brought in once per year and every animal 3 months old to 3 years old is vaccinated annually against blackleg, so a naive young animal under 3 months of age at the first vaccination is not protected until after it is 15 months old.

Of note is the Brazilian experience in which one group of calves were vaccinated with a single dose blackleg at 4 months and another group left unvaccinated. At 8 months of age both groups were tested for blackleg antibodies and showed no significant difference in antibodies to Blackleg. However, when the vaccinated group was given a booster at 8 months and retested 30 days later, that group showed significant increase in blackleg antibodies compared to the unvaccinated group. *Clearly, a first dose of Blackleg given at 3 months of age should be followed by a second dose not earlier than 21 days after the first, and preferably not later than weaning at 6-8 months!*

RECOMMENDED BLACKLEG VACCINATION PROTOCOL

- ❖ Vaccinate calves with first dose killed polyvalent Blackleg vaccine at 3 months of age. Administer this vaccine at the same time that the rabies vaccine is given. Give at separate sites. The first dose of Killed Blackleg vaccine will prime the immune system for an appropriate amnestic response to the second dose of blackleg that should be given.
- ❖ Administer a second dose of Blackleg vaccine 4 – 8 weeks after the first dose. The animal should be 4 - 5 months of age. *(It has been proven by research that one dose blackleg does not provide adequate protection).*
- ❖ Blackleg vaccine should be repeated annually until animals are 3 years old and age resistance replaces the need for blackleg vaccination



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The Disease and Vaccine

Blackleg was first reported in 1870, and the Blackleg vaccine is one of the oldest cattle vaccines in use. In the very early 1900's it was made by heating infected bovine muscle tissue to 95 °C for six hours. The dried tissue was ground up and injected into susceptible unvaccinated cattle (27). Today's Blackleg vaccines are standardized and refined but variability in response to commercial vaccines do occur.

Twenty-three strains of the bacterium have been described, and epidemics can occur when the vaccine strain used does not fully match the wild strain causing the disease. Epidemics of blackleg occur despite well-established vaccination programmes based on commercial vaccines. Serious losses in vaccinated cattle have occurred in Australia, Brazil and Algeria.

The blackleg organism produces a number of toxins- Neuramidase, (gamma-toxins / hyaluronidases), (beta-toxins / deoxyribonucleases) and oxygen labile hemolysin. These cause alteration in vascular endothelium causing thrombosis and necrotic foci in muscle, liver and kidney as well as a peripheral leukopenia and thrombocytopenia (30). The **toxins** produced by the clostridia in the “vaccine making process” is the heart of the vaccine process which is largely a mix of toxin converted to a toxoid by the addition of formalin + killed bacteria + adjuvant. Most of the gene present in clostridia that is involved in toxin production is located on extra – chromosomal elements such as plasmids and bacteriophage, and the expression of this genetic material is affected by growth media (mainly quality of peptones) and the strain of bacteria.

All blackleg vaccines are killed vaccines, also known as fully attenuated vaccines. Fully attenuated vaccines used to be considered the safest vaccines but have now been surpassed by subunit vaccines. Killed vaccines elicit mainly a humoral response that is protective only after 2 doses of the vaccine have been administered. The doses are administered 21 days apart and adequate titres are detected 14 – 21 days after the second dose is administered.

