Vista Vaccines

# Vista®: Endotoxin Load

## OVERVIEW

The presence of endotoxin in commercial vaccines may have negative effects on vaccine recipients[1]. Endotoxins are part of the cell wall of gram-negative bacteria. Endotoxins, whether introduced into an animal via vaccines released during a disease process caused by gram-negative bacteria, during respiratory disease due to Mannheimia haemolytica and/or Pasteurella multocida, enteric disease caused by Salmonella or E. coli, pinkeye caused by Moraxella or through digestive disturbances such as acidosis, can lead to an immunocompromised animal[2]. Endotoxins can cause fever, decreased white blood cell counts, lowered blood and tissue mineral levels such as zinc and calcium, liver disturbances, inflammation as evidenced by rises in acute phase proteins such as haptoglobin and immune system suppression[3]. The immunosuppressed animal in turn can't respond properly to vaccination nor handle viral or bacterial infections well.


## SUMMARY

Besides having the lowest endotoxin level, Once PMH® IN administered intranasally avoids endotoxin processing by the immune system, thus handling them more efficiently than parenterally administered vaccines.

## ABSTRACT

In a recent study conducted by researchers at Iowa State University College of Veterinary Medicine, rectal temperatures and haptoglobin values were monitored over a three-day period following vaccination with Once PMH IN or One Shot® (Zoetis, Florham Park, N.J.) administered as labeled. Calves receiving Once PMH IN had significantly lower rectal temperatures (p=0.008) and haptoglobin levels (p=0.001) over the observation period than calves receiving One Shot. While not directly tested in this study, endotoxin levels could be partially responsible for these unintended side effects following vaccination with One Shot[4] .



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Vista

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## MATERIALS AND METHODS

To evaluate endotoxin levels in commercially available M. haemolytica, M. haemolytica/P. multocida combination or multivalent viral/M. haemolytica/P. multocida vaccines, products were procured directly from retail distributor sources. The vaccines were kept refrigerated under recommended storage conditions from the time of purchase until receipt by a commercial endotoxin testing laboratory. All products were reconstituted per manufacturer's recommendations by the testing laboratory with testing beginning within 20 minutes of reconstitution. The products tested were Bovishield Gold® One Shot (Zoetis), Once PMH IN (Merck Animal Health), Pyramid 5® + Presponse (Boehringer Ingelheim Vetmedica), Titanium 5® +Ph-M (Elanco Animal Health) and Vista Once SQ (Merck Animal Health). The results are listed without product descriptors except for the Merck Animal Health products in Table 1.

Table 1:
Endotoxin concentration of five commercially available M. haemolytica containing cattle vaccines testing using a characterization assay, Kinetic Turbidimetric Method.

| Sample Identifier | Endotoxin Concentration | % Change From Base |
|---|---|---|
| Once PMH IN | 40,900 EU/mL | Base |
| Vista Once SQ | 46,600 EU/mL | +14% |
| Product A | 63,450 EU/mL | +55% |
| Product B | 238,250 EU/mL | +583% |
| Product C | 387,000 EU/mL | +946% |

## RESULTS

The turbidmetric kinetic assay shows that Once PMH IN and Vista Once SQ had considerably less endotoxin than competitor vaccines. Are these levels of concern? A 2003 review paper by P.H. Andersen stated that an endotoxin level at 2 µg/kg of calf body weight is toxic and can lead to death. A 40 kg calf would receive a lethal dose if it received a product containing 1,040,000 EU. Two of the tested products, Products B and C, were at 25 percent or greater of this value. The Iowa State study would make one wonder as to the underlying cause of the post-vaccinal fever spike and acute phase protein elevation.

## CONCLUSION

As high levels of endotoxin may be correlated with a higher incidence of adverse events in cattle receiving vaccines containing gram-negative components, the use of the products containing the lowest levels of endotoxin would be justified[5]. This is particularly important when more than one gram-negative containing product may be used at processing, when dealing with highly stressed cattle and/or when high temperatures and humidity may be present at the time of vaccination. To avoid compromising gram-negative containing vaccines, ensure that vaccines are stored and handled correctly to avoid inadvertently releasing endotoxin due to cellular damage. In this current evaluation of commercially available M. haemolytica containing vaccines, Once PMH IN contained the lowest level of endotoxin assayed.

## REFERENCES


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