Equine Herpes: A Serum Survey of North Dakota Horses

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Introduction

Respiratory infection and abortion in horses is often the result of infection by equine herpes. Equine herpes virus (EHV) is the major cause of respiratory disease in horses under two years of age. Since EHV can be carried by healthy horses, a steady incidence of new cases is assured.

There are three types of equine herpes viruses, designated EHV 1, EHV 2 and EHV 3. The first type, EHV 1, is the major cause of equine respiratory disease and abortion. The second, EHV 2, is a cytomegalovirus known to cause mild respiratory disease. The third and least common, EHV 3 or equine coital exanthema, is the cause of venereal disease in horses. EHV 3 rarely affects fertility, but produces vaginitis in mares.

Infection by EHV 1 occurs primarily in two forms. The acute respiratory form is seen primarily in young horses, although it may occur in susceptible horses of all ages. Symptoms include anorexia, lethargy, fever and a profuse serous nasal discharge that later becomes mucopurulent. In some cases, the virus may reach the lungs and bronchopneumonia may result. At this point, the threat of a secondary bacterial infection can become a serious consideration. A third form has been reported implicating EHV 1 with a neurological disease resulting in complete or incomplete paralysis (4,5).

The second form of infection by EHV 1 is the reproductive form. This is considered a sequel of a respiratory infection. Abortion in mares usually occurs one to three months following exposure to a respiratory infection. Generally, colts with either clinical or subclinical infections are the source. Abortion is rarely preceded by signs of disease and usually occurs in the last trimester. There are seldom any complications. The fetus may be born at term, but usually dies within a few days. Mares generally have no problems conceiving following an EHV abortion. Indeed, mares which have recently aborted acquire some resistance to infection, but cases of abortion on alternating pregnancies have been reported.

Immunity from a natural infection of EHV 1 is short-lived, and reinfection can occur in the presence of circulating antibody. This is because virus is maintained intracellularly where it is protected from circulating antibody. Data indicate that the number of horses with circulating antibody is greater than the incidence of acute disease; therefore, mild or subclinical cases of this disease must be the rule (6).

Vaccination for EHV 1 has not proven to be highly effective. Since attenuation can decrease antigenicity, vaccine virus that is still capable of producing the disease has been used, which can result in an outbreak of the disease. Intranasal vaccination, with modified live virus, can result in virus being transmitted to non-vaccinated contact horses. Also, immunity to EHV 1 is relatively short-lived. Revaccination, with its inherent consequences, has been necessary in order to maintain protective levels of antibody. Recently a killed virus vaccine has been approved for distribution, which has proved effective. Since the viral agent used in incapable of producing disease, many of the complications inherent with live attenuated vaccines are avoided. The immunization schedule for this vaccine calls for foals to be vaccinated one week after weaning, again three to four weeks after the first injection followed by a six-month booster and thereafter vaccinated once yearly. Mares should be immunized prior to breeding and revaccinated during the fifth, seventh and ninth month of gestation.

Minimization of exposure to the disease, such as avoiding unnecessary contact with other horses, good ventilation, insect control, and isolation of "suspect" horses are management practices which can control or prevent outbreaks of EHV infection.

The object of this study was to determine rhinopneumonitis titers of horses in the NDSU veterinary diagnostic service area.

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Materials and Methods

Equine sera were collected from samples submitted to the NDSU Veterinary Diagnostic Laboratory for serologic studies, such as eastern/western equine influenza, rhinopheumonitis titers, Coggins or pregnancy tests. Microtitration serum neutralization tests were performed, and data were recorded at 48 horus (3).

Of the total number of sera tested for EHV titer, 22 or 3.1% of the specimens were from animals exhibiting clinical symptoms. The titers of these animals ranged from 4 to 64. The remaining sera tested were from seemingly healthy animals.

As recorded in Table 1, 12% of the horses tested had no recent exposure to EHV 1 based on the presence of antibody.

It has been stated that serum neutralizing titers of 100 or greater are protective (1,6). Using this as a standard to evaluate the data, approximately 25% of the horses surveyed had "protective" titers. An additional 28% had titers ranging from 32 to 64 and would be considered to have intermediate susceptibility. These animals could contract the disease; however, the infection would be less severe than that of an animal with a serum titer less than or equal to 16.

Immunity to EHV 1 is influenced by a number of factors. Abortion produces variable titers that are long lived. However, mares that abort may do so again on

continued on page 8

TABLE 2. COMPARISON OF AVERAGE PROTEIN LEVELS AS AFFECTED BY DIFFERENT METHODS OF HARVEST.

Harvest Method	N	Per Cent Crude Protein[1,2]
Silage	7	17.8[a]
Round Bales	39	16.9[a]
Small Bales	3	14.4[a,b]
Stacks	29	13.4[b]

[1]Protein analysis on a 100% dry matter basis.
[2]Means within a column with different superscripts are significantly different (p = .05).

TABLE 3. COMPARISON OF DICOUMAROL LEVELS AS AFFECTED BY METHODS OF HARVEST.

Method of Harvest	N	Dicoumarol Level, ppm[1,2] Mean ± Std. Dev.	Range
Small Bales	7	51.5[a] ± 31.62	14.4-95
Round Bales	173	22.9[b] ± 31.05	0.0-164.7
Stacks	78	1.8[c] ± 6.33	0.0-39.5
Silage	14	0.6[c] ± 2.15	0.0-8.0

[1]Means within a column with different superscripts are significantly different (P = .05); Duncans Multiple Range Test.

[2]It is recognized that one of the assumptions for analysis of variance (within treatment variances equal) is not met with this data.

On a pratical basis, as many samples as possible should be used to obtain the most representative sample possible.

This research has shown that sweet clover hay can be comparable to alfalfa in feeding value and should be recognized as a valuable forage crop. The incidence of dicoumarol above the 10 ppm level is considerable and management practices probably play an important role in this occurrence. More research is needed to determine toxic levels and managerial techniques that will reduce the chance of sweet clover poisoning and preserve forage quality.

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continued from page 3

the next pregnancy. Respiratory infections result in protective titers that persist for three to four months (2). The majority of foals, it has been suggested, convert from passive immunity to active immunity without clinical disease (6). One or a combination of the previously mentioned factors could account for the 72% of sera which have less than "protective" titers.

Based on the evidence that the majority of the horses are susceptible to EHV, one could conclude that the majority of horse owners and breeders either have not instituted an immunization program or the immunization programs have not been effective based on serum titer.

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TABLE 1. Serum Neutralization Titers for Equine Rhinopneumonitis

SN TITER RECIPROCAL OF LOG TITER	4	4	8	16	32	64	128	256	TOTAL
Number of Samples	85	5	95	124	112	81	105	91	698
Percent of Total	12	1	13	18	16	12	15	13	100