

## ANAPLASMOSIS STUDIES CONDUCTED

## ON THE SQUAW BUTTE RANGE

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Anaplasmosis is one of the major diseases of beef cattle in the United States. Losses are difficult to estimate but it is believed that the disease costs the cattle industry at least 100 million dollars per year. In addition, state and international regulations prohibiting the introduction of anaplasmosis infected and exposed cattle are increasing. These regulations may seriously limit cattle sales from herds in which anaplasmosis is present. The disease is prevalent in eastern, central, and southern Oregon, but is seldom observed west of the Cascade Mountains, north of Roseburg.

Anaplasmosis is caused by a microscopic blood parasite, Anaplasma marginale. Small amounts of blood transferred from a sick or healthy appearing carrier animal to a susceptible animal will transmit the disease. Certain species of blood feeding ticks, flies and mosquitoes transmit the disease by first feeding on infected animals and then on susceptible animals. It is often transmitted during vaccination, dehorning, ear tagging, or by other surgical procedures when contaminated instruments are used. It is a disease of cattle and is of no importance in other livestock. However, the California black-tailed deer (Odocoileus hemionus columbianus) is susceptible and many in California are carriers of the disease. There remains a question concerning mule deer (Odocoileus hemionus hemionus) but research conducted recently in eastern Oregon demonstrated no anaplasmosis in 31 mule deer sampled.

Anaplasmosis manifests itself in three forms; peracute, acute, and chronic. The peracute form is characterized by its sudden onset and rapidly fatal course. Usually the animal is found dead. The acute form is characterized by sudden onset, rise in body temperature, difficult or labored breathing, often excitement, and anemia. Icterus, or a yellowing of the membranes may develop later. The infected animal may be ill for several days, may die, or may recover. Recovery may be complete or the disease may develop into the chronic form. In the chronic form, there may be a long convalescent period or the animal may never completely recover. Animals that become infected and develop the disease usually remain carriers for the remainder of their lives.

Losses in calves are rare; they do become infected but seldom become visibly ill. Yearlings often become ill but seldom die while older cattle often develop the acute or peracute forms. Pregnant cows may abort if infected. Adult bulls seem especially susceptible.

RESEARCH CONDUCTED AT SQUAW BUTTE

To increase our knowledge of anaplasmosis as it occurs in eastern and central Oregon as well as in many other Rocky Mountain and Northwest states, a series of studies have been conducted at Squaw Butte. These have been interdisciplinary studies involving the School of Veterinary Medicine, Squaw Butte Experiment Station, and the Department of Entomology of Oregon State University.

The first study was initiated to determine whether the disease was transmitted on the range by ticks, flying blood feeding insects, or both. In the gulf states, horse flies, deer flies, and mosquitoes are the important transmitters of anaplasmosis while in western California a tick is responsible for most transmissions. In this study tick transmission was eliminated by maintaining anaplasmosis free susceptible cattle on tick proof platforms. Two platforms, each capable of holding 10 large calves, were constructed approximately two miles apart on the Squaw Butte high desert range. Twenty anaplasmosis free calves between five and six months of age were hauled from the Willamette Valley on April 29, 1974 and unloaded directly onto the platforms. Ten anaplasmosis free control calves of approximately the same age were maintained on the pasture surrounding each platform. An equal number of infected cows, maintained as a source of infection, were also pastured around the platform. The only water available to the cows and control calves was in tanks immediately adjacent to the platform. This close association between the infected cows and platform calves increased the possibility of insect transmission. The trial was terminated on November 11, 1974. No transmission occurred in the platform calves while 52% of the control calves exposed to ticks became infected.

In 1975 a similar trial was conducted using only one tick-proof platform. On May 5, 1975, eight anaplasmosis free calves were placed on this platform with a known infected steer. The purpose of this procedure was to increase the possibility of insect transmission. Control calves and infected cows were maintained around the platform as in the 1974 trial. The study was terminated on October 8, 1975. None of the platform calves developed the disease, whereas 44% of the controls became infected.

This two year study demonstrates that insects are not important in the transmission of anaplasmosis on the Squaw Butte range. Ticks apparently are the vectors.

The only tick in central and eastern Oregon considered to be the likely transmitter of anaplasmosis is the Rocky Mountain wood tick (Dermacentor andersoni). This tick is commonly observed on cattle during the spring and summer months. It is an important vector of human Rocky Mountain spotted fever, Colorado tick fever, and tularemia. It also causes tick paralysis in man

cattle, dogs, and other animals. Laboratory studies have demonstrated this tick is capable of transmitting anaplasmosis and that the disease may persist in the male tick for more than six months. However, the method of transmission in nature is not fully understood, nor is the period of time known that the tick remains infective. The life span of this tick is usually two to three years.

Before anaplasmosis control methods can be developed for central and eastern Oregon it is essential to determine whether the infective organism persists in the tick over winter. If it does persist, control will be very difficult. To study this problem, another trial was conducted during the 1975 grazing season at Squaw Butte.

Thirty-five anaplasmosis free holstein steers, seven to eight months old, were trucked from the Willamette Valley on April 22, 1975 and unloaded directly onto a 1,278 acre range pasture.

Thirty anaplasmosis free herefords approximately the same age were placed at the same time in the adjoining pasture. These calves were maintained with the adult herd which is approximately 70% infected. The holstein steers were separated from the controls and infected adults by a double fence inclosing a 20 to 30 foot strip. The pastures were as identical as possible relative to types of forage, other vegetation, species of small animals, and other wildlife and species of insects. Rocky Mountain wood ticks were prevalent in both pastures, and both had been grazed by the infected herd during 1974 and many years previously.

The holstein steers were observed daily. Blood samples were collected bi-weekly for hematologic studies and for testing by the anaplasmosis card agglutination test (CT). At this time the steers were also examined for the presence of ticks. The controls were CT tested prior to movement to the pasture, once during the summer, and at trial termination. All animals were removed from the pastures on September 4, 1975 and were trucked to the winter headquarter ranch. Tick activity had ceased prior to this movement. On October 10, the final test was conducted on both holstein steers and the controls. None of the susceptible holstein steers developed the disease while 19 of 30 (63%) of the controls maintained with the adults became infected. Exposure to the Rocky Mountain wood tick should have been similar in both groups. This is a significant finding as it demonstrated that anaplasmosis did not overwinter on this range. Susceptible cattle isolated from infected cattle only by a 20 to 30 foot strip of land did not become infected.

In summary, two years of data from the anaplasmosis platform studies on the Squaw Butte high desert range demonstrates (1) that flying blood feeding insects are of no importance in the transmission of anaplasmosis on this range; (2) the Rocky Mountain wood tick appears to be the only

important vector; and (3) during the tick exposure period, a high rate of transmission occurs in the susceptible cattle maintained in direct contact with infected cattle. One year's data to study the infective organism's persistence in the tick over winter indicates that (1) the disease did not overwinter on this range, as susceptible anaplasmosis free cattle remained free of infection when direct contact with infected cattle was prevented; (2) rodents and other small animals present on this range are not latent carriers of anaplasmosis; and (3) mule deer inhabiting this range were not important reservoirs of infection.