

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

ANIMAL DISEASE RESEARCH

Half of the bacteria known to inhabit the human body also inhabit animals. Animal disease research therefore has valuable application to human health. The following examples give a glimpse at what can be achieved.

E.coli Bacteria



E.coli, bacteria that can be either good or harmful, are abundantly present in the intestines of warm-blooded animals and human. Depending on their type, they can be an aid to the proper digestion of our food or cause multiple diseases including meningitis.

E.coli can be collected from many sources and compared to human strains so that similarities are obtained. Scientists can then create animal models that are used to simulate human reactions. The benefits of this research can be applied to both human and animal populations. It is cheaper, and more efficient, and NDAES already has the facilities to house the animals, but presently this concept has yet to be funded.



Innovative research on *E.coli* by NDAES scientists may enable them to solve the problem of the 'brain blood barrier' - a protective system employed by the brain to keep out disease. Meningitis and other forms of harmful bacteria have evolved ways of beating this system, but human science has not and our drugs are unable to pass through the barrier, leaving the brain helpless if drugs are needed to be delivered specifically to the brain.

Funding research into these harmful bacteria to study their molecular structure could lead to greater understanding and possible cures for these often fatal "brain" diseases.

West Nile Virus



Predictive model for occurrence and outcome (death or survival) of West Nile Virus (WNV) on horses has the potential for adaptation for use as a human model. While birds are the primary reservoir hosts of WNV, the virus has been seen to cause disease in humans and horses (both accidental hosts - not transmitters of the virus) in the US. Horses become infected in the same way as humans making research on horses beneficial in application to human studies. Current research at NDAES includes:

- **Evaluation of effectiveness of West Nile vaccine for horses** Studies evaluated WNV horse vaccine and benefits. A WNV vaccine for horses became available in August of 2001. However its effectiveness in the field had not been evaluated. Research found that the vaccine did improve an infected horse's chance of survival/recovery. It was also shown that even horses not vaccinated according to manufacturer's recommendations still had lower mortality than those not vaccinated at all.
- **Determination of risk factors for horses** Research identified characteristics of horses that are at risk of getting WNV so that targeted vaccination can occur. Also, if a horse has West Nile, a predictive model was developed to predict whether horse will recover or not.
- **Estimation of percent of horses at risk of getting West Nile virus** Research is ongoing to estimate the percent of horses in ND that are at risk. This information can assist veterinarians know the magnitude of the problem and how to advise owners regarding control.

All research on horses has the ability to be applied to a human model and has an important community health application.



Transmissible Spongiform Encephalopathy's (TSE's)

Mad Cow Disease (BSE), Scrapie, Chronic Wasting Disease and Creutzfeldt-Jakob Disease (CJD) are all a form of TSE, a non-curable, neurodegenerative disease in cows, sheep, deer and humans.

When Scrapie was found in an NDAES sheep herd, it was decided that culturing the disease would allow research that can assist in understanding all four related diseases. With US Department of Agriculture sanction, a base of animals is kept in isolation, in a quarantined location. Current research may obtain invaluable insight in understanding disease, formation, control and spread in animals as well as humans.

Currently there are many unknowns about the disease and how it is transmitted. It cannot be spread from sheep to cattle, and there is no evidence that people who consume sheep meat or milk or who work with sheep are at risk of contracting Scrapie. Studying the disease in sheep in a controlled environment will allow research on its cause and effects. Research is being undertaken on :

- Diagnostics for simple genotyping of susceptible or resistant sheep
- Therapeutic ways to inhibit development of the disease
- Development of early disease detection.

Benefits are: • Safe food supply • Human health • Increase in animal production • Policies for control of the disease

NDAES is a leader in this area of research and one of a few research institutions in the world that study this disease in its natural environment. North Dakota has the potential to develop a premier center in this area of research benefiting both agriculture and human health.

