

## REPORT OF THE COMMITTEE ON SHEEP AND GOATS

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The Committee met on October 24, 2004, from 12:30 pm-5:00 pm. Chair Dr. Cindy Wolf presided. The Chair welcomed Committee members and guests to the meeting and provided all in attendance an opportunity to introduce themselves.

Dr. Hong Li, United States Department of Agriculture (USDA), Agriculture Research Service (ARS), Animal Disease Research Unit, reported on epidemiology of sheep-associated malignant catarrhal fever (MCF) virus in domestic sheep. Dr. Li reported that they had gleaned some of the information regarding transmission between sheep and bison from their investigation of several serious outbreaks of MCF in bison during the past 3 years. Detailed examination of these incidents have permitted them to draw insights into several important epidemiological factors, such as relationships between distances, numbers and ages of sheep, and the probability of transmission of MCF virus to bison.

Ovine herpesvirus-2 (OvHV-2), the major causative agent of MCF in ruminant species worldwide, has never been propagated *in vitro*. Using reverse transcriptase polymerase chain reaction (PCR), a striking, short-lived, peak of viral DNA, ranging from  $10^5$  to over  $10^8$  copies/2 mg DNA, was detected in nasal secretions from over 60.7% of adolescent sheep ( $n = 56$ ) at some point during the period from 6 to 9 months of age. In contrast only about 18% of adult sheep ( $n = 33$ ) experienced a shedding episode during the study period. There was

## SHEEP AND GOATS

no seasonal pattern of shedding. The general pattern of the appearance of viral DNA in nasal secretions was a dramatic rise and subsequent fall within 24 to 36 hrs, implying a single cycle of viral replication. These episodes occurred sporadically and infrequently, but over the 3-month period, most of the 56 lambs (33, or 60.7%) experienced at least one episode. No corresponding fluctuations in DNA levels were found in either peripheral blood leukocytes or plasma. Using a DNase protection assay, complete, enveloped OvHV-2 virions were demonstrated in the nasal secretions of all sheep examined during the time when they were experiencing an intense shedding episode. OvHV-2 infectivity in nasal secretions was also demonstrated by aerosolization of the secretions into OvHV-2 negative sheep. The data herein show that nasal shedding is the major mode of OvHV-2 transmission among domestic sheep, and that adolescents represent the highest risk group for transmission.

Dr. Suelee Robbe-Austerman, USDA-ARS National Animal Disease Center (NADC), Ames, Iowa, gave an overview of small ruminant Johnes disease research. Details of a Johnes disease flock-status program in Australia were discussed relative to one being considered in the United States. Robbe-Austerman discussed the applications of antibody and cell-mediated immune response-based tests. Liquid media culture systems are recommended to optimize organism growth.

Dr. Janet Alverson, USDA-ARS made a presentation entitled, "Prion Accumulation in the Sheep Placenta and Goat Scrapie Genotyping Project." The presentation was an update on the USDA-ARS project in Hettinger, ND. Genetically AAQR ewes that are progeny of scrapie-infected ewes are being bred to AAQQ rams and the placentas from these ewes are thoroughly examined for the scrapie agent. The AAQQ lambs are being held in quarantine for observation of any clinical signs of scrapie. This project is examining if AAQR females born from infected ewes are carriers of scrapie.

The goat PrP genotyping project is outlined with an appeal for more blood sample submissions for inclusion in the study, especially from the following breeds: Alpine, LaMancha, Nigerian Dwarf, Nubian, Oberhasli, Pygmy, Saanen, Spanish, Toggenburg, and TN fainting. An oral transmission study has been started in goats.

Drs. Jay Parsons and Cleon Kimberling discussed the Colorado Sheep and Goat Identification Pilot Project (CSGIPP) and Performance of Electronic ID in Sheep. The goal of the CSGIPP is to develop an economically feasible model for identifying sheep with unique radio frequency identification (RFID) capable of tracking animals from birth through all phases of production. The project is divided into four phases: a discovery phase, an implant and tag phase, a tracking phase, and an evaluation phase. They are currently in the tracking phase of the project. The purpose of their talk was to share their discoveries so far

## REPORT OF THE COMMITTEE

and to stimulate conversations about future directions.

The discovery phase of the Project was commenced in January 2004. During this phase they carried out an evaluation of using an under the skin implant in the caudal fold of the tail of sheep. RFID devices were placed on 150 head of feedlot sheep forty-five days prior to slaughter and they were tracked through to slaughter. The sheep were split into five treatment groups involving under the skin implants placed at the base of the ear, under the skin implants placed in the caudal fold of the tail, or RFID button ear tags. At the slaughter plant, they were able to read 148 of the 150 RFID devices and to physically retrieve all of the tail implants except one that had fallen out during the final seven days.

In April of 2004, the implant and tag phase of the project was started. Working with three cooperating producers, RFID devices were placed on 900 lambs at spring processing time. Half of those lambs received an RFID implant in the caudal fold of the tail and half received an RFID button ear tag. Three different manufacturers were used for both the implants and the ear tags. All of the animals also received approved scrapie tags. These animals had been grazing the rangelands of northern Colorado and southern Wyoming for the past six months. Recently, they had the opportunity to scan the animals of one of their cooperating producers and found the overall retention rates to be around 97% with ear tags slightly outperforming the implants. They will be scanning the rest of the animals in the next few weeks and tracking all of them through until the last of them are slaughtered in March of 2005.

Their project has also involved looking into the various works being done using RFID in sheep. Their travels have taken them as far away as Australia and they have learned many interesting things regarding sheep RFID applications. In light of what has been learned, they managed to expand the study considerably to look at a possible RFID application for on-farm disease management. They now have RFID ear tags on almost 3,000 head of ewes owned by one of the cooperating producers. That producer is utilizing the RFID devices to streamline a testing and sorting regime designed to eliminate ovine progressive pneumonia in the ranch flock.

Mr. Paul Rodgers, American Sheep Institute, discussed sheep industry concerns. Tissues available from the regulatory scrapie slaughter surveillance program may provide other disease surveillance possibilities for the sheep industry. Concerns regarding sample bias were discussed.

Dr. Howard Lehmkuhl, USDA-ARS-NADC discussed adenovirus infection in sheep and goats. Respiratory and enteric diseases are a cause of economic loss in the sheep and goat industries. Viral agents are well recognized as primary pathogens and even uncomplicated infections can cause substantial economic loss. A portion of their prob-

## SHEEP AND GOATS

lem is attributable to adenoviruses, which have not been extensively evaluated. Currently, there are eight known types of ovine (OAdV 2 through OAdV 8) and 1 serotype of bovine adenovirus (BAdV 2) isolated and characterized from sheep. Two caprine adenoviruses serotypes have been isolated and characterized in goats (GAdV1 and 2) as well as OAdV 2 and 5. Our results from virus isolation and characterization, serologic, and pathogenesis studies indicate OAdV 5, 7 and 8 are important contributors to clinical disease in lambs in the United States. Less is known about adenovirus infection in kids, but GAdV 1 and 2 appear to be important contributors to clinical disease.

Dr. Lynn M. Herrmann, USDA-ARS and Washington State University, Pullman, WA, made a presentation entitled, "Predicting Ovine Progressive Pneumonia Virus Loads Using MHC Class II DRB1 Immunogenetics." Screening and culling of ovine progressive pneumonia virus (OPPV) seropositive sheep is not an economical feasible option for the sheep industry. Therefore, an accurate prediction tool for determining which OPPV-infected sheep will actually progress toward clinical disease is highly sought. They are exploring if specific expressed MHC Class II DRB1 alleles or DRB1 allomorphs can be used as an accurate prediction tool of high OPPV loads. To determine this, a preliminary study using ten OPPV-infected sheep was conducted. The OPPV-infected sheep were evaluated for their OPPV loads using real time PCR and their MHC Class II DRB1 allomorphs were determined. Preliminary results indicated one MHC II DRB1 allomorph (H) associates with high OPPV loads. Larger studies using 300 sheep are being conducted to determine if specific DRB1 allomorphs can predict OPPV loads.

Dr. Jim Logan discussed, "*Brucella ovis* ELISA Testing - What Are the Concerns?" According to reports from technicians at several laboratories that are conducting *Brucella ovis* Enzyme-Linked Immunosorbent Assay (ELISA) testing, there are problems with both control sera and antigens produced/provided by USDA-APHIS-VS National Veterinary Services Laboratories (NVSL). There have been many false-positive tests results as a result of inconsistent quality in the control sera and antigens. NVSL has not contacted all affected labs, even though they have been made aware of this quality control issue. The outcome has been a loss of confidence in the test as control programs are threatened and the potential disease spread across state lines.

The committee discussed three possibilities regarding the reagent quality control issues. They were: NVSL must improve the quality of the *B. ovis* reagents that they provide; NVSL should contract with another laboratory to produce and provide such reagents; or reagents should be purchased from Australia where they are commercially available.

It was also brought up that there wasn't a standard testing method

## REPORT OF THE COMMITTEE

across all labs in part due to inconsistent quality of reagents. The committee expressed the desire to have NVSL uniformly communicate with all affected labs (California, Utah, Wyoming, South Dakota, North Dakota, Colorado) regarding this test.

The Committee approved a recommendation regarding Johnes Disease in small ruminants. The Committee recommended that USDA-ARS and other institutions conducting Johnes's disease research on small ruminants provide annual updates to the Committee.

One resolution was approved and forwarded to the Committee on Nominations and Resolutions. The resolution requested NVSL to provide a standardized *Brucella ovis* ELISA test and to provide testing for this process.