

COMMITTEE ON SHEEP, GOATS, AND CAMELIDS

Chair: Amy Hendrickson, WY

Vice Chairs: Maggie Highland, WA; Pat Long, OR

Celia Maria Antognoli, CO; Bill Barton, ID; Pierce Bennett, MO; Randall Berrier, CO;Carolynn Bissett, VA; Brian Bohl, TX; Minden Buswell, WA; Beth Carlson, ND; Walter Cook, TX; Donald Davis, TX; Ignacio dela Cruz, MP; Bob Dittmar, TX; Roger Dudley, NE; Anita Edmondson, CA; Dee Ellis, TX; James Evermann, WA; Keith Forbes, NV; Larry Forgey, MO; Robert Gerlach, AK; Michael Gilsdorf, MD; K. Fred Gingrich II, OH; Rod Hall, OK; Burke L. Healey, CO; Carl Heckendorf, CO; Amy Hendrickson, WY; Maggie Highland, KS; Siddra Hines, WA; Larry Holler, SD; Joseph Huff, CO; Pamela Hunter, FL; Anne Justice-Allen, AZ; Susan Keller, ND; Patrice Klein, DC; T.R. Lansford, TX; James Leafstedt, SD; Mary Jane Lis, CT; Linda Logan, TX; Jim Logan, WY; Pat Long, NE; Karen Lopez, DE; Joanne Maki, GA; David Marshall, NC; Chuck Massengill, MO; Shirley McKenzie, NC; Cheryl Miller, IN; Eric Mohlman, NE; Peter Mundschenk, AZ; Alecia Naugle, MD; Danielle Nelson, WA; Gary Olson, MN; Elisabeth Patton, WI; Janet Payeur, IA; Barry Pittman, UT; Justin Roach, OK; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Susan Rollo, TX; Joan Dean Rowe, CA; Mo Salman, CO; Shawn Schafer, OH; Patty Scharko, SC; David Schmitt, IA; David Schneider, WA; Stacey Schwabenlander, MN; Andy Schwartz, TX; Ben Smith, WA; Susan Stehman, PA; Diane Sutton, MD; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Todd Tedrow, SD; Tyler Thacker, IA; Tracy Tomascik, TX; Courtney Wheeler, MN; Stephen White, WA; William Wilson, KS; Nora Wineland, MI; David Winters, TX; Cindy Wolf, MN; Peregrine Wolff, NV; Alan Young, SD; Ralph Zimmerman, NM.

The Committee met on November 29, 2019 at the Rhode Island Convention Center in Providence, Rhode Island, from 1 pm to 6 pm. There were 28 members and 12 guests present.

The Chairman called the meeting to order at 1:02 pm and reviewed some housekeeping matters, including a request for all to sign the attendance sheet. Also discussed was the membership requirements to proposed resolutions and recommendations, and voting. The chairman encouraged all to participate in discussions.

Presentations & Reports

Report of the Subcommittee on Scrapie

Cheryl Miller, Subcommittee Chair

The report of the Subcommittee on Scrapie and Identification can be found at the bottom of this report.

***Coxiella burnetii* shedding from naturally infected, never bred yearling doe goats: Implications for transmission and surveillance**

Dr. Stephen White, Research Geneticist, USDA-ARS Animal Disease Research

Stephen N. White^{1,2,3}, Ryan D. Oliveira², Mehmet Ulas Cinar^{2,4}, Codie J. Durfee¹, Kristy L. Pabilonia⁵, David A. Schneider¹

¹USDA-ARS Animal Disease Research Unit, Pullman, WA 99164

²Department of Veterinary Microbiology & Pathology, Washington State University, Pullman, WA 99164

³Center for Reproductive Biology, Washington State University, Pullman, WA 99164

⁴Department of Animal Science, Faculty of Agriculture, Erciyes University, Kayseri, Turkey

⁵Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO 80523

Coxiella burnetii is a zoonotic bacterium endemic in the U.S. and nearly worldwide. Coxiellosis in ruminants is characterized by abortion events, including abortion storms in goats and sheep. Furthermore, ruminants are blamed for most human *C. burnetii* outbreaks, in part because the minimum infectious dose is a single bacterium while ruminant placentas can accumulate hundreds of millions to billions of organisms per gram. Many exposed human beings develop an acute disease known as Q Fever, characterized by varying degrees of fever, aches, pneumonia, and hepatitis. There is also a much rarer but more serious chronic form characterized by potentially fatal endocarditis, and adverse pregnancy outcomes. Common conditions including pregnancy can predispose to chronic disease.

Since *C. burnetii* is not the most common cause of any of these conditions in either ruminant livestock or human beings, it is a widely underdiagnosed pathogen in both systems. Current understanding of *C. burnetii* transmission from domestic goats is derived in large part from experimental infection where no fecal or vaginal shedding was observed prior to parturition. We collected vaginal swabs from over 300 naturally infected U.S. goats with a very high proportion of *C. burnetii* shedders (>90%). Among these, many never-bred yearling doe goats had *C. burnetii* positive swabs by quantitative PCR. Additional analyses of other sample types from this herd are underway. The results to date suggest goats that have never been pregnant can present a transmission risk to goats and human beings, and future surveillance should include this class of animals.

Status of the NAHMS 2019 Goat study

Dr. Amy Delgado Center for Epidemiology and Animal Health, Veterinary Services, USDA

Summary of presentation:

From July 1 through December 2019, the USDA's National Animal Health Monitoring System (NAHMS), in collaboration with the National Agricultural Statistics Service (NASS), is conducting its second national study of the U.S. goat industry. The NAHMS Goat 2019 study will take an in-depth look at the priority issues facing U.S. goat operations and provide new and valuable information regarding animal health and management practices in this growing industry. Approximately 4,700 goat producers from 25 of the Nation's major goat producing States were invited to participate in the study.

The NAHMS Goat 2019 study is designed to provide individual participants and stakeholders with valuable information on the U.S. goat industry. The NAHMS Goat 2019 study will

- Describe changes in animal health, nutrition, and management practices from 2009 to 2019,
- Describe practices producers use to control internal parasites and reduce anthelmintic resistance,
- Describe antimicrobial stewardship on goat operations and estimate the prevalence of enteric pathogens and antimicrobial resistance patterns,
- Describe management practices associated with, and producer-reported occurrence of, economically important goat diseases, and
- Provide a serologic bank for future research.

Phase I of the study began in July 2019 with NASS representatives contacting potential participants. The response rate for Phase I was over 62%, with over 72% of those respondents consenting to continue with Phase II. Phase II of the study began in September 2019 with goat producers who agreed to continue in the study. Phase II participants are contacted by APHIS or State veterinary health professionals to schedule an in-person interview and collect biologics. Free biologic testing for participants includes pre- and postdeworming fecal parasite egg counts, scrapie resistant genotyping, and Salmonella, E. coli, and Campylobacter culture results. Data collection will end in early 2020, with initial reports expected in late 2020.

Because NAHMS relies on voluntary participation, the privacy of every participant is protected. Only those collecting the data know the identity of respondents. No name or contact information will be associated with individual data, and no data will be reported in a way that could reveal the identity of a participant. Data are presented only in an aggregate manner.

Parasite control in small ruminants and camelids in the wake of increasing drug resistance

Dr. Dahlia O'Brien, Associate Professor and Small Ruminant Specialist, Virginia Cooperative Extension Virginia State University.

Summary of presentation

Internal parasite infections are a major cause for reduced productivity in the small ruminant industry. Years of overuse and misuse of available chemical anthelmintic treatments has led to the development of drug resistance in parasite populations on many farms. Anthelmintic resistance occurs when a drug loses its ability to effectively kill internal parasites and they continue to survive in the presence of therapeutic levels of the drug (standard prescribed dose). With an increasing number of farms experiencing drug resistance in the US, there has been research into and the promotion of alternative strategies that support sustainability and slows down the rate of drug resistance on farms. Strategies including targeted

selective treatment, increasing drug efficacy, combination treatments, animal nutrition, pasture management, genetic selection, copper oxide wire particles, condensed tannins (e.g. Sericea lespedeza) and others are now being recommended to manage drug resistance on farms. In the wake of drug resistance, the ultimate goal of any worm control program should be reducing the deworming/drug use frequency and slowing down the rate at which further resistance is occurring to all drugs.

GWAS: how it works, limitations, and new developments

Dr. Brenda Murdoch University of Idaho

Summary of presentation

The scientific community has used Genome-Wide Association Studies to identify underlying disease-causing genetic mutations for the past two decades. This information has aided in both the development of new genetic tests as well as a greater understanding of physiological underpinning of numerous livestock diseases, and on the flipside the embodiment of health. The basic information employed in genome wide analyses have also been used to provide information about genetic relatedness within and across breeds. Furthermore, understanding how these technologies and analyses are performed allows a greater comprehension of the power and limitations of these genomic tools. As the cost of generating sequence based genetic information continues to decline, the overall availability and utility of this information to producers is rapidly expanding resulting in the era of big data and hopefully big solutions.

Epigenetics: how stress, nutrition, and the maternal environment impacts offspring

Dr. Brenda Murdoch, University of Idaho

Summary of presentation

Although it is generally understood that maternal nutrition and stress can have an influence on offspring; we are only now beginning to understand the underlying mechanisms involved in this relationship. Epigenetics is a generalized term that describes modifications to the genome that do not change the DNA nucleotide sequence itself, but nevertheless affect gene regulation and therefore directly contribute to biological variation between individuals. These epigenetic modifications include changes in DNA methylation, the expression of small non-coding RNA and the acylation or methylation of histone in chromatin. These epigenetic changes are environmentally induced modifications, which influence the regulation, expression and quantity for many physiologically important genes. Within the confines of this brief presentation, we will review these epigenetic processes to better understand the mechanisms and resulting physiological consequences so that we understand how this may affect an individual as well as its future progeny. Together we will remove the mystery of epigenetics, such that we all better understand its important role in regulation of phenotype.

Developing a North American Approach to Small Ruminant Drug Approvals

Corlena Paterson Canadian Sheep Federation

Access to veterinary drugs and biologics is one of the Canadian sheep industry's key challenges, and one that requires innovative tactics to overcome. Ms. Paterson discussed some of the challenges Canadian producers face, shared some innovative new approaches to drug approvals, and proposed ways by which our cumulative North American sheep and goat industries can work together to get producers the tools they need to be successful.

Some examples of innovative approaches taken in Canada to date include:

- Facilitated access to low risk veterinary health products (VHPs)*.
- Proposed new approval mechanism for MUMS: Review of Foreign Decisions for Veterinary Drugs.
- Adaptation of the PMRA process for supplemental approvals.
- Simultaneous veterinary drug reviews through Regulatory Cooperation Council (RCC) between Canada's VDD and FDA's Center for Veterinary Medicine; 11 animal drug approvals to date but none for sheep or goats.
- Multi-lateral simultaneous reviews; Canada/Australia/New Zealand simultaneous approval of Metacam.

She requested cooperation from this body in pushing forward with these or other potential solutions to the difficulties in getting approval of Minor Use Minor Species drugs and products.

OPPV Update

Cynthia Wolf, DVM, American Sheep Industry

The complete text of Dr. Wolf's paper is attached to the end of this report.

Committee Business:

The committee approved the report of the subcommittee on Scrapie and Identification. The committee reviewed the resolution that came from the Subcommittee to encourage USDA to continue to provide identification tags free of charge to producers who request a flock id for the first time. Since the implementation of the new scrapie regulation, many new premises have been registered, including at least 800 in South Carolina alone.

The full committee considered two additional resolutions. One resolution encouraged continued research and development of preventative and genetic tools to reduce risk of *Coxiella Brunetii*. The second encouraged continued scrapie research to inform the National Scrapie Eradication Program.

The committee discussed the presentation provided by the Canadian Sheep Federation representative and expressed a desire to encourage our government to work with Canadian agencies to coordinate combined efforts to approve minor use minor species drug and products for the benefit of U.S. and Canadian producers. Due to time constraints the committee chose not to craft a resolution and instead develop a letter of recommendation for USAHA action on this important matter. The committee leadership will create a draft letter to be shared with committee members and discussed on a future conference call. When finalized the letter will be submitted to the USAHA Executive Committee for consideration.

There being no further business the committee adjourned at 5:48 pm.

OTHER NOTES:

Subcommittee:

- **Scrapie: Cheryl Miller, IN and Larry Forgey, MO**

REPORT OF THE SUBCOMMITTEE ON SCRAPIE AND IDENTIFICATION

Chair: Cheryl Miller, IN

Vice Chair: Larry Forgey, MO

The Subcommittee met on 10/29/19 at the Rhode Island Convention Center in Providence, Rhode Island, from 9:00 a.m. till 12:10 p.m. There were 18 members and 10 guests present. Meeting was called to order by the chairman, Dr. Cheryl Miller. All attendees were asked to sign in.

Presentations & Reports

1. Scrapie Program Updates

Dr. Diane Sutton, National Scrapie Program Coordinator, VS, USDA, Riverdale

Highlights of Scrapie Program Regulatory changes

- Scrapie Final Rule and revised Scrapie Eradication Program Standards were published March 25, 2019 and went into effect April 24, 2019
- Goats now have the same federal ID and recordkeeping requirements as sheep; however, the consistent state ID requirements did not change
- Expanded use of Owner/Hauler Statements to include all animals in slaughter channels in interstate commerce

- All female scrapie exposed goats are now considered high-risk animals
- Low-risk animal definition added to regulation to:
 - Allow animals to be re-designated when warranted based on epidemiology, and
 - Allow APHIS to establish policies on genetic resistance in goats and Nor98 like scrapie or other scrapie strains that may be discovered without revising 9 CFR.
- States are required to meet surveillance minimums in FY 2021

Scrapie Eradication Program*

- The National Scrapie Eradication Program sampled over 26,884 sheep and 7,846 goats in FY 2019. Sampling was down in FY 2019 due to the government furlough and vND deployments.
- The United States has gone from 1 in 500 cull sheep tested at slaughter that were positive for classical scrapie in 2002, to none out of 22,664 cull sheep sampled at slaughter in FY 2019 and tested as of Sept. 30th.
- The FY 2018 Pennsylvania source herd was depopulated in October 2018; 5 sheep and 1 goat tested positive for classical scrapie; 3 of the positive sheep were AVQR and 2 were VVQQ
- Classical scrapie was confirmed in an Indiana goat sampled at slaughter in June 2019. The herd of origin was designated and infected herd but no exposed animals remained in the herd and are believed to have been slaughtered. Further investigation determined that two herds were the potential birth herd of the positive goat. Test eligible goats in these herds were rectal biopsied and all results were not detected. The herds were placed on monitoring plans.
- This was 3rd positive goat sampled at slaughter; 1st found November 2014 and the second in July 2018.
- APHIS is doing an evaluation of the prevalence of genetic resistance codons in goats using slaughter and on-farm testing including samples collected as part of the NAHMS Goat Study. This data will be used to inform how genetic resistance will be used in the program.

National Scrapie Surveillance Plan Changes

- Sample all sheep and goats at least 18 months and under 6 years
 - No longer target older black-faced sheep
 - Sample untraceable sheep and goats
- Regional approach to setting sampling minimums
- Pilot and potentially fully implement genotyping of RSSS samples and only test susceptible sheep for scrapie to reduce cost
- Implement point system by FY 2021

Official Eartags:

In FY 2019, APHIS provided metal serial ear tags at no cost to markets and dealers and up to 100 tags to sheep and goat producers that had not gotten tags in the preceding 2 years. At the request of industry in February 2019 APHIS started providing up to 80 plastic tags to producers who had not previously been assigned a flock ID in exchange for no longer providing metal tags to producers after August 2019. At the end of FY 2019 APHIS entered into a new plastic tag contract where the pricing allowed the maximum order to be increased to 100 plastic tags. APHIS is no longer providing applicators to industry.

Scrapie Flock Certification Program (SFCP)

- At the end of September FY 2019 there were 232 producers enrolled in the program:
 - 43 Export Certified,
 - 48 Export Monitored, and
 - 144 Select Monitored

*As of September 30, 2019. FY 2019 numbers are not final and may change.

2. How the US can use Electronic Identification in the National Scrapie Eradication Program Cindy Wolf DVM, Rushford, Minnesota

The USDA APHIS requested that the US sheep industry develop a plan to assist with the transition from mandatory visual identification to electronic identification (EID) used in the National Scrapie Eradication program. The industry believes that all facets of the production chain need to learn of the economic and business benefits that EID offers. In countries such as the United Kingdom, Canada and the state of Victoria In Australia, their sheep industries collaborated with their governments to develop their program of mandatory EID use and traceability when sheep leave the flock of origin and travel to the marketplace or other farms. The tags chosen are sheep- and people-friendly, not expensive and function well. Interestingly, in both Australia and the UK, replacement EID tags are mandated to be a specific color. Some animal transactions are captured by panel readers and others by wand readers, both of which readily communicate with field-friendly apps on tablets and smartphones to create real-time lists of animals being moved. Multiple educational methods have been developed addressing the details on how to use EID, achieve its economic benefits, and comply with lifetime traceability regulations. Details on the EID tag subsidy program in Victoria were shared. Lastly the industry is interested in forming a working group to resolve the existing technological challenges and use the lessons learned from other countries in order to develop a beneficial EID-based traceability program for the US sheep industry.

3. Scrapie Transmission, Diagnostics, & Genetics David A. Schneider, DVM, PhD Research Veterinary Medical Officer Animal Disease Research Unit Pullman, WA

To evaluate the risk of natural transmission of Nor98-like scrapie in U.S. sheep, four ewes homozygous for the PRNP codon R171 were inoculated by the intracerebral route with brain homogenate from a genotype matched U.S.-field case. Transmission was confirmed in all four by conventional methods. Placentas collected from these ewes were generally negative for detection of PrP-Sc(Nor98) accumulation, though in each case suspect accumulation appeared to increase with age. Testing for placental infectivity is underway using transgenic mice susceptible to Nor98-like scrapie. In addition, F1 progeny of these ewes are tested postmortem at 7 years of age for evidence of natural transmission. To date, we have observed no evidence of placental infectivity nor of natural transmission to F1 progeny. Peripheral lymphoid accumulation of PrP-Sc is most commonly associated with the highly transmissible form of scrapie, classical scrapie, in genotype-susceptible sheep (QQ171). The first case of PrP-Sc accumulation in the lymphoid tissue of an RR171 sheep was recently detected in the U.S. through the RSSS. Limited to testing residual samples of FFPE tissue from this case, an effort to detect infectivity has commenced in Tg mice. In addition, initial results from sPMCA have detected no misfolding activity in thin sections from these samples. Though rare in occurrence, PrP-Sc accumulation in lymphoid tissues of resistant animals may indicate other genetic factors relevant to susceptibility are at play. To determine the effects of other PRNP genotypes, a study is underway on the long-incubation phenotype of GS127 goats. In the first two years of the study, all goat recipients were inoculated at birth by the oral route. Initial culls confirm strong transmission to GG127 goats (wildtype) by 18 mos of age and have produced clinical disease in a few at <36 months. No clinical cases have yet been observed in GS127 goats. The GS127 progeny will help determine if slow incubation genotypes are associated with delayed peripheral accumulation of PrPSc. Finally, updates will be given on our collaborative efforts to develop methods of enhanced detection of both classical and atypical forms of scrapie.

Subcommittee Business:

- The subcommittee mission statement was read. The subcommittee discussed updating the mission statement to reflect current terminology. Motion was made and approved by the subcommittee to update the mission statement. The updated mission statement was sent on to the parent committee for approval.
- The subcommittee was informed that all recommendations and resolutions will be forwarded to the parent committee, Committee on Sheep, Goat, Camelid.

- The subcommittee's old business from 2018 which included the resolutions submitted to the parent committee were reviewed.
- The importance of continuing free plastic tags for 1st time producers and free metal tags for concentration points was discussed and resulted in the formation of a resolution supporting these efforts. A motion was made by Dr. Ben Smith to accept this resolution, seconded by Dr. Cindy Wolf, and passed by the subcommittee unanimously. This resolution was forwarded to the Sheep, Goat, and Camelid Committee.
- Dr. David Schneider moved that the meeting be adjourned. Dr. Patty Scharko seconded this motion.

Addendums to the committee report should be in the following order:

- Working Group Reports - None
- Other Presentations/Papers - None
- Supplemental information - None

OVINE PROGRESSIVE PNEUMONIA (OPP): CONTROL AND CHALLENGES

Cindy Wolf, DVM

SUMMARY

Recent research by Leymaster et al, has demonstrated that the primary route of transmission of the Ovine Progressive Pneumonia virus (OPPV) is via contact with infected mature sheep. This work demonstrated that the virus is primarily spread through contact with nasal and oral secretions directly from infected to uninfected sheep.

Prior to this research, the historical belief was that this virus was spread by the ingestion of infected colostrum and milk thus infected ewes were blamed as sources of infection for their progeny. In 2013, interested sheep producers began eradicating OPPV from their flocks by participating in a cooperative state and industry-led program developed in Minnesota.

METHODS

There are four key components to this current eradication program:

1. All serological testing is performed using HYPHEN BioMed's Elitest® ELISA for MVV/CAEV.
2. Producers with heavily infected flocks have been testing lambs intended as replacement breeding stock at 2-3-months post-weaning. The research published in 2013 indicated that 10-30% of the weaned lambs would initially test positive from infected ewe flocks. Recent field experiences support this finding.
3. The lambs that test negative are kept as a separate group away from the infected ewes with no nose-to-nose contact.
4. Once serologically positive lambs are removed after the initial test, follow-up testing, again using the Elitest® is scheduled to occur two months later. This testing strategy is repeated until the entire lamb group has tested negative two consecutive times. It is imperative that producers adhere to test intervals of every 2-3 months to make expedited progress. See Appendix 2 on the Minnesota's Healthy Sheep and Goats Program on the <https://www.bah.state.mn.us> and/or the [oppociety.org](http://www.oppociety.org) site for the recommended flow of testing depending on the initial results and the flock owner's objectives.

RESULTS

It is possible to rebuild a test-negative flock from test-positive parent sheep in a single generation following this newer strategy, although it is recommended to proceed with caution to retain genetic diversity. A more prudent goal for achieving eradication would be three to five years, a timeline during which we have observed multiple flocks produce enough seronegative replacements such that all remaining seropositive sheep can be culled. See OPP/CAE Program details at: <https://www.bah.state.mn.us> and at <http://www.oppociety.org> (Excerpted from Minnesota's Healthy Sheep and Goats Program).

Producers need to be realistic about the budget and facilities required to meet the eradication effort's needs over a three to five-year period. The needs are as follows: multiple tests per animal are usually needed, improvement may be necessary in the individual animal identification, an electronic flock inventory needs to be generated and kept up to date, and practical straight-forward facility changes made to prevent nose-to-nose contact between positive, negative and untested sheep.

CONCLUSIONS

This eradication strategy has worked assuming certain caveats are followed.

1. The producer ought to maintain an electronic inventory of the flock to ensure that all sheep in the tested group have been sampled and are found at time of removal once results are returned.
2. All seropositive sheep need highly visible and permanent identification to distinguish them from the seronegative group in case of accidental mixing which serves to spread virus.
3. Modifications need to be made on the farm to ensure that nose-to-nose contact never occurs between seronegative and seropositive groups.
4. Adhering to the testing schedule is vital such that new infections are detected before there has been more than low levels of transmission.
5. This strategy requires financial and management commitment by the producer even though rearing on milk replacer is not needed.
6. Engaged producers have documented or been convinced of having higher levels of productivity in their seronegative vs. seropositive ewe groups and have been pleased with the outcome of their efforts.

REFERENCES

- Brinkhof, J.M.A., Moll, L., van Maanen, C., Houwers, D.J. 2010. Use of serology and polymerase chain reaction for the rapid eradication of small ruminant lentivirus infections from a sheep flock: a case report. *Research in Veterinary Science*, 88:1. 41-43.
- Leymaster, K., Chitko-McKown, C.G., Clawson, M.L., Harhay, G.P., Heaton, M.P. 2013. Effects of TMEM 154 haplotypes 1 and 3 on susceptibility to ovine progressive pneumonia virus following natural exposure in sheep. *J. Anim. Sci.* 91:5114:5121.
- Saman, E., Van Eynde, G., Lujan, L., Extramiana, B., Harkiss, G., Tolari, F., Gonzalez, L., Amorena, B., Watt, N., and Badiola, J. 1999. A New Serological Assay for Detection of Lentivirus Infections in Small Ruminants. *Clinical and Diagnostic Laboratory Immunology*, 6, 734-740.
- Minnesota's OPP Eradication Trial, 2013-2017, a collaborative effort of the educational, industry and government entities. Final report at www.OPPsociety.org/download/opp_trial_final_report.pdf

APPENDIX 2

FLOW CHART:

MN Board of Animal Health or USDA visits flock to conduct annual inspection, collect samples and verify inventory

