MINNESOTA
BOARD OF ANIMAL HEALTH

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HEALTHY SHEEP AND GOATS

OVINE PROGRESSIVE PNEUMONIA (OPP) — CAPRINE ARTHRITIS ENCEPHALITIS (CAE)

VOLUNTARY PROGRAM ADMINISTERED BY THE MINNESOTA BOARD OF ANIMAL HEALTH (BAH)

REQUIREMENTS FOR PARTICIPATION:

(Note: The word "flock" refers to both sheep and goats.)

The flock owner or manager who wishes to participate will:

- Submit an application to the BAH.
- Designate a flock veterinarian who will assist with processing and submission of serum samples, and may assist with collection. If the flock is found to be infected with the OPP/CAE virus, an eradication plan will be developed in partnership with, and monitored by, the flock veterinarian. *See Appendix 3: Management Recommendations.*
- Schedule inspections to be performed annually by a BAH assigned inspector by contacting the inspector or the BAH at 651-201-6809.
- Maintain a flock inventory in an electronic format. Prior to each annual inspection, submit an updated report to the BAH including additions and dispositions having occurred since the previous inspection.
- Adhere to the OPP/CAE Program Testing Strategy as outlined below. Samples must be collected by or under the supervision of an accredited veterinarian, BAH or United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) official. Delivery of samples to the local veterinarian, and all processing, shipping and laboratory fees, will be the responsibility of the herd owner or manager.

PARTICIPATION / STATUS LEVELS:

- **Enrolled:** Participating flocks that have not achieved test-negative status. Flocks needing to implement an eradication plan will be tested frequently (see Appendix 1).
- **Test-Negative:** Flocks that conduct two consecutive tests of all animals 12 months of age or older, performed at least six months apart with no positives detected, will be assigned "Test-Negative" status.
    - These flocks will continue to test a percentage, plus any purchases, every year (within 10-14 months of the most recent qualifying test).

APPENDIX 1

TESTING STRATEGY:

Sample collection and submission:

- The following protocol must be followed when blood samples are collected for OPP/CAE testing:
  - Producer will provide all required collection supplies (tubes, needles, etc.).
  - Tubes will be pre-labeled and organized for easy access.
  - Laboratory submission form will be completed and ready for signature.
  - Producer will deliver samples to local DVM, who will submit sera to the University of Minnesota Veterinary Diagnostic Laboratory (MN VDL) for 'Elitest' ELISA testing.

Initial screening test, may be either whole- or partial-flock:

- **Whole-flock**: Test all sheep/goats in the flock 12 months of age or older.
  - If 100% negative, the flock should be tested again in 6 to 12 months to confirm test-negative status.
  - If any animals test positive, an eradication strategy will need to be implemented *(see below).*
- **Partial-flock**: Test sheep/goats as indicated in the table below which shows the number of animals 12 months of age and older that need to be randomly sampled and tested to achieve a 95% confidence of detecting at least one positive if 5% or more of the flock is infected.

Partial Flock Test Random Sampling Guide									
Number of sheep/goats	**Test**	**Number of sheep/goats**	**Test**	**Number of sheep/goats**	**Test**	**Number of sheep/goats**	**Test**	**Number of sheep/goats**	**Test**
<30	**All**	**70**	**40**	**140**	**48**	**300**	**54**	**600**	**56**
30	**26**	**80**	**42**	**160**	**49**	**350**	**54**	**700**	**57**
40	**31**	**90**	**43**	**180**	**50**	**400**	**55**	**800**	**57**
50	**35**	**100**	**43**	**200**	**51**	**450**	**55**	**1000**	**57**
60	**38**	**120**	**47**	**250**	**53**	**500**	**56**	**2000**	**58**

Note: It is recommended to select for testing only those animals that have been in the flock for a minimum of two years, with ample representation of all ages. This may increase the odds of detecting infection at the flock level.

  - If any animals test positive on the initial partial-flock test, the producer should consider all options for disease eradication prior to conducting any additional testing *(see below)*.
  - If no positives are identified on the initial screening test, it is recommended, though not required, that the remainder of the flock be tested as soon as possible.
  - If the remainder of the flock is tested within 60 days of the initial test and all animals test negative, this test will be considered a whole-flock 100% negative test.
    - Flock should be tested again in 6 to 12 months to confirm test-negative status.
  - If no positives are identified on the initial screening test, and the producer *does not* test the remainder of the flock within 60 days, all animals in the flock 12 months of age or older will need to be tested.
    - If all animals test negative, this will be considered a whole-flock 100% negative test.
    - Flock should be tested again in 6 to 12 months to confirm test-negative status.

ERADICATION STRATEGY (producer may follow either method below, or a combination):

- **Test-and-Remove**: *This method is best used when initial test reports less than 50% of the flock is infected, and owner is comfortable with immediate removal of all animals testing positive.*
    - Test all sheep/goats 4 months of age and older not included in the initial test.
    - Remove all positive sheep/goats 4 months of age and older.
    - Within the following 2 to 3 months, retest all sheep/goats and remove all positives.
    - Continue to test-and-remove every 2 to 3 months until two consecutive 100% negative tests are achieved.

- **Alternative:** *Consider this method if initial test reports more than 50% of the flock is infected, or in cases where owner prefers to retain test-positives until sufficient replacements are obtained. Refer to Appendix 3, Testing and Management Recommendations, for additional guidance.*
    - Manage all ewes/does from the "Parent Flock" as a single unit, regardless of their test status, allowing them to lamb/kid and raise all offspring until weaned.
    - Two months after weaning test all lambs/kids selected as potential replacements, then permanently segregate all negatives.
    - Continue to test the negative replacement animals every 2 to 3 months until their entire management group has achieved two consecutive 100% negative tests.

Regardless of the eradication method, "Test-Negative" status will not be awarded until the flock achieves two consecutive 100% negative tests following the removal of all positives.

Flocks with documented prior test-negative history:

- At the discretion of the BAH, tests conducted prior to program enrollment may qualify for test-negative status. The producer must provide official copies of test results and tests must have been conducted by an accredited, approved laboratory with an approved test.

Acquisitions:

- All acquisitions, unless from an OPP/CAE Program enrolled flock of equal or higher status, must be tested within the 30 days immediately before or after arrival on the premises, and annually for as long as they remain in the flock.
    - Two consecutive negative tests must be achieved before the animal can be considered part of the negative flock.

Maintaining "Test-Negative" Status:

- Once "Test-Negative" status has been achieved, 10% of the flock (but no less than 5 animals) must be tested annually.
    - The state or federal animal official conducting the annual inspection may, at his/her discretion, specify which animals are to be tested.
    - If possible, animals selected for testing must be ewes that have been in the flock for at least 2 years.
    - All acquisitions must be tested as noted above.

IF TEST-POSITIVE OR BORDERLINE ANIMALS ARE FOUND IN A "TEST-NEGATIVE" FLOCK:

- Any animal testing positive, will be immediately removed from the premises, or isolated and retested.
    - If retest is negative, the animal may return to the flock but must be included in the next annual round of testing.
    - If retest is positive, the BAH will consult with the owner and flock veterinarian to determine next steps.

APPENDIX 2

FLOW CHART:

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

Initial Partial-Flock Test

If infected: Develop eradication plan in consultation with local DVM

Whole-flock test-and-remove: Test all at 2 to 3 month intervals, removing positives, until achieving 2 consecutive 100% negative reports. Test-positives may be retained if permanently segregated from the test-negative flock.

- or -

Partial-flock test-and-remove: Selected animals determined to be test-negative (and preferably known to be most productive) are permanently segregated and retested every 2 to 3 months until receiving two consecutive 100% negative reports. All other retained animals must run as a separate group, permanently segregated from the newly test-negative flock.

All adults, regardless of status, are run together as the 'parent flock' and allowed to birth and raise all lambs/kids until weaning.

- and-

Offspring selected as potential replacements are tested 2 to 3 months post-weaning, positives removed, and negatives retested every 2 to 3 months until receiving two consecutive 100% negative reports.; these become the basis for a new test-negative flock.

- optional-

Adults from the 'parent flock,' if confirmed negative by at least two (preferably three) negative tests after all positives are gone, may join the test-negative flock.

Once two consecutive 100% negative tests have been achieved, and all positives are gone, flock will be listed as 'Test-Negative' on Board of Animal Health and OPP Society websites

If all negative: Test remainder of the flock to verify status

If all negative, and owner can provide documentation of prior whole-flock neg tests having occurred within the most recent two years, flock is determined to be Test-Negative.

If all negative, but owner does not provide documentation of prior whole-flock neg tests, flock is tested again in 6 to 12 months. If all again negative, flock is determined to be Test-Negative.

Flock listed as 'Test-Negative' on Board of Animal Health and OPP Society websites

Maintaining Test-Negative Status

Once Test-Negative status has been achieved, only 10% of the flock (but no less than 5 animals) need to be tested annually, preferably consisting of ewes that have been in the flock for at least two years.

In addition, all acquisitions must be tested within the 30 days immediately before or after arrival on the premises, and retested at 2- to 3-month intervals until achieving 2 additional consecutive negative tests.

APPENDIX 3

TESTING AND MANAGEMENT RECOMMENDATIONS:

DEFINITIONS SPECIFIC TO NEW ERADICATION STRATEGY:

- **Alternative Eradication Strategy:** Simply stated, Test-Negative Replacements will be *permanently segregated* from the Parent Flock after weaning, and retested every 2 to 3 months with any positives immediately removed, until the management group has achieved two consecutive 100% negative tests, thereby creating the base for a 100% test-negative flock.
- **Parent Flock:** Animals of both sexes, 12 months and older; may be either OPP/CAE positive or negative. Ewes/does are managed as a single unit, regardless of positive/negative status, and allowed to birth and raise all lambs/kids to weaning.
- **Test-Negative Replacement Flock:** Offspring of the Parent Flock that have been selected for replacements and found to be test-negative post-weaning. To confirm test-negative status, this group will be segregated and retested every 2 to 3 months, with any positives immediately removed, until the entire group has achieved two consecutive 100% negative tests.

RECOMMENDATIONS, REGARDLESS OF WHICH ERADICATION STRATEGY IS SELECTED:

- Wean replacements at 6 to 8 weeks of age and test 2 to 3 months post-weaning.
    - It has been observed that if lambs are weaned at 8 months of age from OPP infected ewes, some lambs may still have maternal (OPP) antibodies at 12 months of age.
- Potential replacements of high value, if positive post-weaning, should be separated in a pen with solid sides as far apart from all others as is practical and then retested in 4 to 6 weeks to reduce the possibility of a false positive test resulting from passive maternal antibodies.
- Animals with discrepant results, if not removed from the premises, should remain segregated from all others until at least two consecutive negative tests have been achieved.
- Retest the test-negative management group 2 to 3 months (minimum 7 weeks to avoid missing early infections) following the *removal date* of any positives (not bleed date).
- Testing should preferably be performed before rams/bucks go in for breeding, or at a time of year when animals are not stressed.
- Continue testing at 2 to 3 month intervals, promptly removing all test-positives, until receiving at least two consecutive 100% negative reports for the entire management group.
- Rams/bucks being collected for artificial insemination should be tested well in advance of the collection date, and again prior to use of the semen.
    - While OPP *transmission* via semen has not been documented, *the OPP virus has been detected in semen*.
- Permanent and legible identification should be applied to all animals in the program.
    - Accurate individual identification has proven crucial to the success of eradication efforts.
    - In flocks with more than 30 animals, electronic identification should be considered.
- If positive and negative groups rotate through buildings and pastures, the test-negative group should be handled before the positives.
- If test-negatives must be confined to the same barn during lambing as test-positives, it's best to lamb them either before or after the positive group. If this is not feasible, designate an upwind section of the barn for the test-negatives with at least 10 feet separation or solid barrier between them and the positives.

- Utilize 'Electronet' and/or an electrified offset wire (either can be powered by a small portable battery unit) to discourage nose-to-nose contact between test-negative and test-positive groups through fences or dry lot panels.
- Avoid shared feeders since these result in close nose-to-nose contact.
- Avoid shared waterers whenever possible.
    - The OPP virus is carried in cells called macrophages, which are found in nasal discharge that usually sinks to the bottom of a water tank. Thus, while not recommended, shared water sources may not spread the virus if a solid barrier can be placed in the middle of the trough or automatic waterer so that each group (positive and negative) can drink without nose-to-nose contact with those on the other side of the barrier.
- Do not reuse needles.
    - There is significant correlation between needle reuse and OPP/CAE seroprevalence as flock size increases. Therefore, to decrease the risk of OPP/CAE and other infectious disease transmission when giving injections, a fresh needle should always be used for each animal. Consideration should also be given to the use of needle-free injectors, especially in large flocks.
- Clean and disinfect all equipment between use with test-negative and test-positive management groups.
    - Due to the unstable nature of the OPP/CAE virus in the environment, equipment such as syringes, ear taggers, tattoo pliers and water buckets may be used for both positive and negative management groups if appropriately cleaned and disinfected.
- Quarantine all new purchases and animals returning to the flock following exhibition, or other potential contact offsite, until at least two consecutive negative tests have been achieved with a minimum 4 to 6 week interval.
- Purchase only from flocks confirmed to be of equal or greater OPP/CAE status whenever possible.
- Do not share equipment or trailers with other flocks.
- Be alert to the risk of transmission via nose-to-nose contact and aerosol transmission via coughs.

SALVAGING OF TEST-NEGATIVE ANIMALS FROM THE PARENT FLOCK:

- Those with adequate facilities for managing multiple groups over an extended period may wish to reintroduce test-negative animals from the parent flock. This must be done only after all positive animals have been removed from the parent flock, and re-introductions have achieved three consecutive negative tests performed at a minimum 4 to 6 week interval.

GENETIC SELECTION:

- At this time the OPP Society does not advocate genetic selection as a route to eradication. As noted below, *ALL breeds are susceptible to infection with the OPP/CAE virus*, so concentration needs to be on removing the virus and maintaining adequate biosecurity.
    - United States Department of Agriculture (USDA) researchers have discovered that some strains of the OPP virus have adapted to infect sheep *regardless of their TMEM154 susceptibility genotype*.