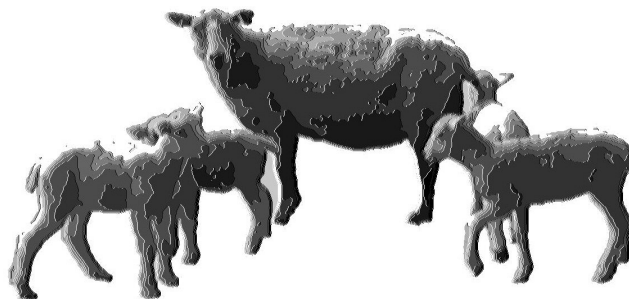


ONTARIO MAEDI VISNA FLOCK STATUS PROGRAM

**Definitions and protocols governing the program
and additional information.**

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Document created January, 2007

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OVERVIEW OF ONTARIO MAEDI VISNA FLOCK STATUS PROGRAM:

The Ontario Maedi Visna Flock Status Program (OMVFSP) is a voluntary program to enable sheep producers to determine the disease status of their flocks with respect to maedi visna (MV) infection (also known as ovine progressive pneumonia or OPP), and to eradicate this infection through a program of serological testing of sheep and subsequent removal of positive animals from the flock. To enroll in the program, the producer must be willing to follow the testing and removal protocols of the program, permanently and uniquely identify all sheep in the flock, and follow specific biosecurity requirements.

“WHOLE FLOCK” TEST (Appendix 1)

At the first qualifying test, all sheep and goats 180 days of age (6 months) and older are serologically tested using the MV recombinant ELISA test developed by the Canadian Food Inspection Agency (CFIA) and confirmatory tests when required. Positive animals and their lambs are removed from the flock. The status of the flock is then “Enrolled”. After a second flock test 120 to 240 days apart in which all sheep tested are negative, the status of the flock will be “B”, indicating a lower risk status. A minimum of 365 days (maximum 395 days) after the second negative test, the flock then qualifies to have only a random proportion of the total flock 365 days of age and older tested. After this third consecutive negative flock test, the flock status will be “A”, designating the lowest risk level. This status is then maintained through annual testing of a random proportion of the flock, with all test results remaining negative. For closed flocks, the frequency of this test will be bi-annual. Biosecurity recommendations and requirements, as outlined in the document must also be followed in order to maintain flock status. The benefits of this program may be realized through increased productivity and increased breeding sales opportunities due to the low risk MV status of the flock.

“MONITORED” TEST (Appendix 2)

Producers may choose to enrol in the “Monitored” MV status option. This is a suitable program for large producers that already believe that their flock is not infected with MV virus (MV-v). A random sample of all sheep and goats 365 days of age and greater will be sampled. If all sample results are negative, the flock is MV “Monitored”. To maintain this status, testing must be repeated annually. Those flocks that adhere to the same biosecurity requirements as the whole flock program, and have remained sero-negative on a minimum of three consecutive annual flock tests, will acquire a status of MV “Monitored - Low Risk”. Flocks can at any time switch to the “Whole Flock” test following the criteria explained in detail below.

1. HOW TO ENROLL:

- a. The sheep producer must first be willing to follow the project protocols and agree to fulfill the minimum biosecurity requirements.
- b. Concomitant enrollment in the Ontario Sheep Health Program¹ (OSHP) is strongly advised for all OMVFSP participating flocks.
- c. Application forms are available from the Projects Manager at the Ontario Sheep Marketing Agency (519-836-0043).
- d. They must also indicate whether they wish to enrol in the “Whole Flock” program or the “Monitored” program.
- e. To qualify for either program, the producer must agree to the following:
 - i. Sheep will be uniquely identified within the flock and this identification will be maintained for the duration of the enrollment in the program.
 - ii. The producer will have the required sheep sampled in the time frames outlined in the program.
 - iii. Sheep and their offspring will be removed from the flock as required by the project.
 - iv. Biosecurity requirements will be followed to reduce the risk of reintroduction of MV-v into the flock.
 - v. The producer will be responsible for paying in a timely fashion for all charges incurred by the OMVFSP.

¹http://www.uoguelph.ca/~pmenzies/OSHP_Home.htm

2. DEFINITIONS

- a. **Maedi visna** is a viral disease of sheep and is caused by infection with MV-v. For purposes of this program, this disease is identical to the disease called ovine progressive pneumonia in the United States. Common clinical signs include chronic wasting, decreased exercise tolerance, respiratory distress and hard udder at lambing. Production losses in serologically positive sheep occur through decreased reproductive performance; higher lamb mortality rates through poor mothering; early culling; and lower weight gains by lambs because of poor milk production. Once a sheep is infected with the virus, it remains infected for its lifetime. It also sheds the virus through respiratory secretions, colostrum and milk, and blood. Infected sheep produce antibodies to the virus which are detected by serological tests.
- b. **Must** means that the owner of the flock, or their designated agent is required to carry out the stated activity (e.g. test, remove).
- c. **A sheep** is a ram, ewe or wether. Usually, a sheep is ≥ 365 days of age, but for parts of this program, this term may be used for animals ≥ 180 days of age.
- d. **All goats** residing in the flock are required to be subjected to the same testing and removal protocols as sheep. This is because goats can become infected with MV-v and may be able to transmit the virus to sheep. Therefore when the protocol says "sheep", it is implicit that all goats in the flock or housed on the flock premises, are counted as sheep and all testing and biosecurity protocols apply to goats as well as sheep.
- e. **A lamb** is a ram, ewe or wether less than 180 days of age and is the offspring of both the birth dam (natural mother or embryo recipient) and of the foster dam (if the lamb was fostered). When determining disease status, the following is considered:
 - i. Serological status of birth mother (natural or recipient).
 - ii. Serological status of foster dam.
 - iii. Not the serological status of the sire unless fathered by fresh semen by artificial insemination.
 - iv. The serological status of the genetic dam (donor) in cases of embryo collection and transfer,
 - (1) unless if the embryos have been handled in accordance with the protocol set out by the International Embryo Transfer Society for the sanitary handling of embryos².
- f. **A flock**, for purposes of this program, is a population of sheep and goats which at any time during the year are managed within the same facility, i.e. if sheep share pastures, housing, feeders, waterers or other equipment that has not been disinfected between groups, then they are considered part of the same flock even if they reside at different farms for part or all of the year.
- g. **A flock premise** are all buildings, dry lots, paddocks and pastures or fields occupied at any time by the flock.
- h. **To remove** from the flock suggests that the sheep or lambs are to be sold directly to slaughter for meat and not as breeding stock. This is a guideline and the actual disposal fate of the animals is not enforced by this program.
- i. **The test date** - is the date that the samples were taken from the sheep, not the date that the results were received.
- j. **Interpretation of Individual MV Test Results:(Appendix 3)**

² Manual of the International Embryo Transfer Society. Third Edition. 1998. Ed. DA Stringfellow and SM Seidel. International Embryo Transfer Society. Champaign Illinois.

- i. **A “Negative” Individual Maedi Visna (MV) Test** For an individual animal test, the MV test is reported as “negative” if the sheep sampled received a result of “negative” by one of the following:
 - (1) CFIA recombinant enzyme-linked immunosorbant assay (ELISA) test. This is the initial test used for all testing protocols.
 - (2) MV agar gel immunodiffusion (AGID) test. This test may be used as a confirmatory test.
 - (3) Western Blot (WB) test. This test may be used as a confirmatory test.
 - ii. **A “Suspect” Individual MV Test.** Only the CFIA ELISA is reported as “suspect”. If the CFIA ELISA result is “suspect”, then the sheep must be either immediately removed or isolated and re-sampled within 30 days of the test date. If on re-sample,
 - (1) The CFIA ELISA or MV AGID or WB test is “negative”, then the individual test is reported as “negative”.
 - (2) The CFIA ELISA or MV AGID or WB test is “positive”, then the individual test is reported as “positive”.
 - iii. **A “Positive” Individual MV test** is an individual “positive” CFIA ELISA test or a “positive” MV AGID test or a “positive” WB test.
 - iv. **A “Non-specific” Individual MV test** is an individual CFIA ELISA test that is reported as “non-specific”. “Non-specific” recombinant ELISA tests are retested by agar gel immunodiffusion (AGID) and/or western blot (WB) tests and interpreted as in 2-j-ii.
- k. **Interpretation of Flock Level MV Test Results**
- i. **A Negative Whole Flock test** requires that all sheep 180 days of age or greater in the flock were sampled within the same time frame (within 7 days of each other) and found to test either all as “negative” on the initial test result, or if any animals test “suspect” or “non-specific” that all those animals received a “negative” test when re-sampled within 30 days of the test date. If one or more animals fails to receive a “negative” test either initially or on re-sampling, then the flock test is not considered “negative”.
 - ii. **A Negative Monitored Flock test** requires that a random sample of sheep 365 days of age or greater in the flock were sampled at the same time (within 7 days of each other) and found to test either all as “negative” on the initial test result or “negative” and “suspect” and that all “suspect” animals all received a “negative” test when re-sampled within 30 days of the initial test. If one or more animals receives a “Positive” test either initially or on re-sampling, then the flock test is not considered “negative”.
- l. **Interpretation of Isolation Group MV Test Results** (Appendix 4). **An Isolation Group test** is an MV test administered within 7 days of each other of all sheep \geq 180 days of age that are in isolation.
- i. **A negative Isolation Group test** requires that all test results are “negative” or “negative” and “suspect”, and that all “suspect” animals received a “negative” test if they qualify for re-sampling within 30 days of the test date.
 - (1) If an animal that has received a previous “suspect” or “non-specific” test result, again tests “suspect”, that animal is considered “positive” and must be removed.
 - (2) If one or more animals fails to receive a “negative” test either initially or on re-sampling, then the Isolation Group test is not considered “negative”.
 - ii. **A positive Isolation Group test** occurs when
 - (1) One or more animals has an MV test result of “positive”
 - (2) At least one animal has an MV test result of “suspect” when that animal has had a previous “suspect” result.
 - (3) In this case, any animal with a “negative” MV test is considered exposed to a positive animal and require two “negative” MV test results 8 to 12 weeks apart, in which the Isolation Group test is negative both times.

3. PROTOCOLS

- a. **An official test** requires the following:
 - i. All official serological samples for any MV testing must be collected by, or their collection supervised by one of the following:

- (1) A licensed veterinarian.
 - (2) An animal health or veterinary technician (AHT) employed by and directly supervised by a licensed veterinarian.
 - (3) Not the owner or manager, spouse, immediate relative or employee of the owner or manager of the flock, even if he or she is a licensed veterinarian or AHT may supervise the collection of the samples, although they may participate in the sample collection.
- b. **Sample collection and record keeping:**
- i. For the "Whole Flock" program, all sheep and goats \geq 180 days of age that reside at the flock premise on the date of the test must be sampled.
 - (1) One exception are sheep that are isolated from the flock and will be sent for slaughter within 30 days of the test date.
 - (a) e.g. market lambs \geq 180 days of age.
 - (b) e.g. adults marked for culling.
 - ii. For the "Monitored Flock" program, a random sample selected from all sheep and goats \geq 365 days of age that reside at the flock premise on the date of the test must be sampled.
 - iii. A minimum of 5 mL of whole clotted blood or 2 mL serum or plasma to be collected by venipuncture per sheep tested. Each tube must be clearly and uniquely identified.
 - iv. Ensure correct identification of the sheep and goats and record this ID with the corresponding correct tube number on an official OMVFSP form (Appendix 5).
 - v. Complete entirely and properly the OMVFSP form (Appendix 5).
 - vi. Initiate rapid transport the the coagulated blood and all required documents to the official laboratory within 24 hrs of sampling. Ensure that the blood will remain chilled but not frozen during transport. If serum is separated prior to shipping, it may be frozen.
 - vii. All sheep and lambs not sampled that reside on the farm on the date of test must be identified as set out in this protocol, and that ID recorded on an official OMVFSP form.
- c. **All official forms** must be signed by a licensed veterinarian verifying that the samples were obtained from the animals identified on the form, that all sheep and lambs were correctly identified and those ID's recorded, and that the protocols for the OMVFSP have been followed.
- d. **The samples must be sent to:**
- | | | |
|---------------------------------------|-----------|----------------|
| Dr. Carole Simard | | |
| Retrovirology Department | telephone | (450) 773-7730 |
| Health of Animals and Food Laboratory | facsimile | (450) 773-8152 |
| 3400 Boulevard Casavant West | | |
| St-Hyacinthe, Quebec | | |
| J2S 8E3 | | |
- e. **The identification information must be maintained by the flock owner / manager:**
- i. A permanent ID that is unique within the flock. This ID may be one of the following:
 - (1) Double ear tag (metal or plastic dangle, button, or kurlock tag or any combination).
Double means one tag in each ear.
 - (2) Legible tattoo - ideally backed up with an eartag.
 - (3) Radio frequency ID (RFID) ear tag or implant.
 - (4) Official CSIP or ADQ identification.
 - ii. Birth date (ddmmyyyy)
 - iii. Sex (ram, ewe, wether)
 - iv. Breed
 - v. Registration information for purebred registered animals.
- f. **The identification must be unique within the flock.** This means:
- i. Each animal currently residing in the flock is uniquely identified.
 - ii. No ID can be reused within the flock for a period of 15 years after initial date of enrollment.
- g. **The identification must be clearly legible to the reader.** This means:

- i. If tattoos are used but cannot be clearly read by the veterinarian, then the animal must also have a unique double ear tag.
 - ii. If the tag is not clearly legible, then the animal must be retagged at the time of sampling with a double tag.
- h. **Each sheep and lamb in the flock must be identified and recorded on the day of the initial enrollment.** Subsequent tests must account for all sheep in the flock, specifically:
- i. Natural additions and removals (births and deaths).
 - ii. Sales.
 - iii. Purchases.
 - (1) All purchases must be accompanied by an MV Transfer Form.
 - (2) Unless transferred from an "A" status flock all purchases must be placed into an isolation facility and cannot enter the flock without two negative MV tests 8 to 12 weeks apart while in isolation.
 - iv. Failure to account for all additions may result in loss of status.
- i. **Isolation facility** means a facility that sheep are housed in for a specific period of time during which they must have no direct contact with other sheep, shared feeders or waterers. The isolation facility must be:
- i. Separately ventilated to minimize the risk of aerosol transmission of the MV virus.
 - ii. Have no direct inside communication with the main flock
 - iii. Or if within the same barn, have a solid partition between the facility and the main flock so there can be no movement of animals or air from the isolation flock to the higher status flock.
 - iv. Inspected and approved by a veterinarian or their designate AHT at the enrollment test.
- j. **Biosecurity Precautions:** In order to minimize the risk of reintroduction of MV-v infection to the flock, the following biosecurity precautions must be followed or are strongly recommended as indicated: (A summary is presented Appendix 6.)
- i. **Surgical and treatment equipment**, (e.g. syringes, dose guns, shearing equipment) that may become contaminated with blood or saliva must not be shared between the flock and any sheep housed in an isolation facility or part of another flock whose status is not "A", without first being disinfected³.
 - ii. **Single-Use needles**
 - (1) must be used when giving injections ("enrolled" and "Monitored - Low Risk" flocks)
 - (2) or are strongly recommended ("B" and "A" status flocks).
 - iii. **All personnel** working with the flock or visiting the flock premises must wear clean clothing that has not been in contact with any sheep or goats not of "A" status (including those in isolation). All protective footwear must be cleaned and disinfected prior to entering the flock premise (e.g. by vigorous scrubbing with a disinfectant soap (e.g. tamed Iodine or creosote based soap) and fresh water). Hands must be washed with a disinfectant soap (e.g. chlorhexadine soap) prior to handling sheep.
 - iv. **Sheep leaving and returning to the flock** where there may be contact with unknown or lower status sheep (e.g. from shows, demonstrations, sales barns or shared pastures),
 - (1) If from "A" status flocks, they must have two negative MV tests between 8 and 12 weeks apart prior to returning to the flock
 - (2) It is strongly recommended that if from Status "Monitored - Low Risk", Status "B", or "Enrolled"

³ Disinfection of equipment can be done with sodium hypochlorite (6% bleach) by mixing 1 part bleach to 2 parts water for a final solution of 2% sodium hypochlorite OR sodium hydroxide by mixing 80 grams of sodium hydroxide crystals with 1 litre of water to make a 2 molar solution. These agents are effective against most viruses, bacteria and the scrapie agent. Both can be used for disinfection of surgical equipment, docking and tattoo equipment, multi-dose syringes and work surfaces. Minimum contact time should be 10 seconds with the product being rinsed or wiped off after disinfecting. Chlorhexadine solution or soap is effective for disinfecting shearing blades. It is effective against the causative agent of caseous lymphadenitis.

- (a) That upon return that they are housed in isolation and have two negative MV tests between 8 and 12 weeks apart prior to returning to the flock.
 - (3) On the next flock test, if random sample, those sheep that have left the facility regardless of status of the flock they must be tested, in addition to the random sample.
- k. **Transportation of Sheep:**
 - i. Livestock handlers must wear clean coveralls and boots.
 - ii. All livestock carriers must be cleaned and disinfected before sheep are loaded.
 - iii. Sheep from Status "A" flocks must be transported so that:
 - (1) There is no contact with sheep of unknown or lower status.
 - (2) They are not unloaded at any other livestock facility with sheep of unknown or lower status en route to the new location.
 - iv. It is strongly recommended that all movement of sheep from Status "Monitored - Low Risk", Status "B", or "Enrolled" be done so that:
 - (1) There is no opportunity for contact with other sheep of unknown or lower status.
 - (2) They are not unloaded at any other livestock facility with sheep of unknown or lower status en route to the new location.
- l. **Movement of sheep between OMVFSP flocks:**
 - i. All sheep moving between flocks, must be accompanied by an OMVFSP animal transfer form (Appendix 7).
 - ii. Only sheep from Status "A" flocks can directly enter a Status "A", "Monitored - Low Risk", "B", or "Enrolled" flock without testing and an isolation period.
 - iii. Sheep from any other flock other than "A" status, must have two negative tests 8 to 12 weeks apart while in an isolation facility prior to entering an OMVFSP flock.
- m. **Qualifying of sheep to enter the flock from the isolation facility:** (Appendix 4)
 - i. Sheep enter isolation for the following reasons:
 - (1) New purchase from a flock not "A" status.
 - (2) Return from outside flock (e.g. show, demonstration) where there was exposure to sheep or goats of unknown or lower MV status.
 - (3) "Suspect" or "non-specific" MV test result. It is strongly recommended that this group be kept separate from new or returning entries as they may only need one test to return to the flock. Otherwise, they will require 2 negative tests to return to the flock.
 - ii. It is strongly recommended that animals enter the group at one time and that no new animals be added to the group. To do so may jeopardize the status of the group.
 - iii. All sheep entering isolation from outside the flock must undergo a MV test at entry.
 - (1) Unless arriving directly from an "A" status flock with no contact of non- "A" status animals.
 - iv. All sheep in isolation are treated as a group. The status of the isolation group is the same as status of the lowest status animal in the group.
 - v. An isolation group test must include all sheep in isolation that are ≥ 180 days of age.
 - vi. If the Isolation Group contains new entries to the flock (i.e. one or more of the animals in the group are new entries) and the Isolation Group Test is negative,
 - (1) Then the group remains in isolation and must undergo a second group test in 8 to 12 weeks after the initial entry test. Do not add any animals to the group during this time.
 - (2) If this second isolation group test is negative, there have been no animals added to the Isolation group, then the group is eligible to enter the main flock.
 - vii. If the Isolation Group is comprised only of animals that originated in the flock and are in isolation because of a previous "suspect" or "non-specific" test and the Isolation Group Test is "negative" then the group may return to the flock after only one group test.
 - viii. If one or more sheep are found to be positive at any test,
 - (1) the positive sheep must be removed and their lambs < 180 days of age.
 - (2) the entire remainder of the group must remain in isolation and be re-tested in 8 to 12 weeks.
 - (3) If the entire isolation group is then found to be negative on this subsequent test, the group may enter the flock.

- (4) If the flock's next test is a random sample (e.g. "A" status or "Monitored-Low Risk"), these sheep must be sampled as well as the random sample.
 - (a) If one or more animals are found to be positive, then the whole flock must be re-sampled in order to be able to achieve "A" status again.
 - ix. If one or more sheep are found to be "suspect" or "non-specific" on any test and
 - (1) no other sheep in the isolation group test positive and
 - (2) upon retest, all suspect and non-specific sheep, test negative then
 - (3) the group test will be considered a negative test.
 - x. Sheep that have entered "A" Status Flocks or "Monitored-Low Risk" flocks at subsequent flock tests:
 - (1) At the time of the next annual random flock test, all sheep which have entered the flock from isolation since the last random test, must be sampled in addition to the randomly selected sheep, regardless of the number of negative tests those former isolation sheep have received.
 - xi. If lambs are born while the dam is in isolation,
 - (1) the lamb must be tested and removed as per the protocol set out for the main flock, i.e.
 - (a) lambs < 180 days of age will not be tested;
 - (b) lambs born to positive ewes must be removed from the isolation group;
 - (c) lambs ≥ 180 days must be tested as part of the isolation group.
 - (2) An exception to this is if a lamb was born to a ewe which tests negative will in isolation. The lamb may be tested as young as 150 days of age for its first test
 - xii. If all sheep are in isolation as a result of a "suspect" or "non-specific" test, i.e. no positive test results and
 - (1) The test was a Whole Flock test and
 - (2) A sheep receives a subsequent "negative" test on the retest within 30 days of the flock test,
 - (3) That sheep can return to the flock immediately upon receipt of the test.
 - xiii. Embryo Status: All embryos being implanted in recipients located in the enrolled flock must have either originated from donors located in a Status "A" flock or were handled in accordance with the protocol set out by the International Embryo Transfer Society for the sanitary handling of embryos.
 - xiv. Semen Status: All semen (fresh or frozen) being used in artificial insemination programs within the flock must have originated from rams located in Status "A" flocks, from countries declared free of Maedi Visna virus infection, or from rams collected in a federally accredited AI Centre (ensuring that they have had at least one negative MV test prior to semen collection).
- n. **Removal of offspring (lambs) of test positive ewes:**
- i. Weaned lambs < 180 days of age from test positive ewes (natural or recipient) or foster ewes,
 - (1) may be marketed at a date greater than within 30 days of the test date.
 - (2) If this delayed marketing option is selected, the lambs must be managed separately from the breeding flock, and must be marketed at less than 180 days of age. This is to allow young lambs to be finished appropriately for market purposes.
 - ii. Lambs nursing test positive ewes.
 - (1) Ewes with nursing lambs that test positive, may be held in isolation until the lambs are old enough to be weaned
 - (2) Once the lambs are weaned
 - (a) The test positive ewes must be removed.
 - (b) The weaned lambs can then be kept until market age as outlined above.
 - iii. Weaned lambs ≥ 180 days of age and < 365 days of age from test positive ewes (natural or recipient) or foster ewes, if still present in the flock must be tested on the next flock test. These animals do represent a risk to the flock, even though they may have a negative test so removal is recommended but not required.
- o. **Random Sample Flock Test - how to select sheep for sampling:**
- i. Only sheep ≥ 365 days of age are eligible for testing.
 - ii. The number of sheep to be tested is determined by the table in Appendix 8.

- (1) This number is determined to detect MV infection at a prevalence of $\geq 5\%$ of the flock with 95% confidence.
 - (a) I.e. if at least 5 of every 100 sheep in the flock are MV positive, then there is a 95% chance that at least one animal will be found on the random test.
 - (2) It will not reliably detect a prevalence of MV infection $\leq 5\%$.
 - (3) The animals selected for testing must be randomly selected to ensure an accurate flock test.
- iii. **How to perform the random flock test:**
- (1) Make a list of all sheep in the flock that are eligible for testing, i.e. ≥ 365 days of age. Number the sheep on the list 1, 2, 3,... etc to the last sheep on the list.
 - (2) Consult the table in Appendix 8 to determine how many of those sheep must be tested.
 - (a) e.g. if 200 adult sheep are eligible for testing, then 51 sheep must be tested.
 - (3) Use a random number generator to create a list of randomly selected numbers.
 - (4) The producer can pre-sort the selected animals and have them ready for testing on the day.
 - (5) A second way to use the random number list is to use this list to select animals as they run down the chute. E.g. again using the example in Appendix 8, the first sheep to be sampled would be the 3rd animal to run down the chute, then the 6th animal, then the 8th animal and so on. A drawback to this method is that it requires handling of all the eligible sheep in the flock.
- p. **Timing of Sampling With Respect to Lambing.** There is some evidence that positive sheep may not test positive within one month of lambing (before and after). This may be because the ewe moves large volumes of immunoglobulins into her colostrum, or may have another reason. Occasionally true positive animals then test negative. For this reason, it is recommended that flock tests be scheduled so that sheep are not within one month of lambing, but this is not a requirement.
- q. **Flock Status - "Whole Flock" Test:** (Appendix 1)
- i. Prior to the first qualifying test, the flock has no status.
 - ii. "Enrolled" status is assigned after the the first qualifying test and after positive animals and offspring are removed.
 - (1) "Enrolled - negative flock test" can be used to designate a flock with its first negative flock test.
 - iii. Within 120 to 240 days, a second whole flock test is performed.
 - (1) If two sequential whole flock tests are negative, the status of the flock is "B".
 - (2) If one or more individual MV tests are positive, the flock status is "enrolled".
 - iv. If the flock status is "B", then a third flock test on a random sample of sheep is performed approximately 365 to 395 days later.
 - (1) If the flock test is negative, the status of the flock is "A".
 - (2) If one or more individual MV tests are positive, the flock status is "enrolled".
 - v. To maintain "A" status, the flock must be retested annually.
- r. **Flock Status - "Monitored Flock" test:** (Appendix 2)
- i. Prior to the first test, the flock has no status.
 - ii. If the results of the first random sample test are all negative, the status of the flock is "Monitored".
 - iii. If one or more of the samples is MV positive, the flock has no status.
 - iv. If there are three consecutive annual "Monitored" tests that are all negative, and all biosecurity requirements are met, the flock status is "Monitored - Low Risk".
4. **WHOLE FLOCK TEST:** (Appendix 1)
- a. **Initial Qualifying Test:**
- i. All sheep 180 days of age or greater (calculated from birth date) within the flock must be sampled as described in Section 3.
 - ii. All sheep less than 180 days within the enrolled flock, must be identified and recorded as described in Section 3.

- iii. No pre-screening of animals is permitted prior to submission of samples. Pre-screening means first submitting samples for non-official testing, removing the positive samples and submitting the rest for official testing.
- b. **Results from Initial Qualifying Test:**
 - i. Once results have been recorded and positive sheep and their offspring < 180 days of age have been removed, the flock status is “Enrolled”.
 - (1) If the Initial Qualifying test is negative, the status can be designated as “Enrolled - negative flock test”.
 - (2) If the flock test is negative go to Section 4-f Qualifying Test for “B” Status.
- c. **If the flock test is not negative then, (Appendix 3)**
 - i. All sheep with a “positive” test must be removed as well as their lambs < 180 days of age within 30 days of the test date.
 - ii. All sheep with a “suspect” test may be immediately removed.
 - (1) If they are not they must be held in isolation and must be removed or be retested within 30 days of the test date.
 - (2) If “suspect” or “positive” results are obtained on the retest, the sheep must be removed from the flock within 30 days of the retest date.
 - iii. All sheep with a “non-specific” test result
 - (1) must be held in isolation and
 - (2) must be removed or be retested within 30 days of the test date.
 - (3) If “positive” or “suspect” on the retest they must be removed within 30 days of the retest date.
 - iv. As of the date of the initial qualifying test, all biosecurity requirements must be followed.
- d. **Follow-up Qualifying Test after a positive whole flock test.**
 - i. Must be scheduled between 120 and 240 days after the date of the initial qualifying test date.
 - ii. If this test is negative, then go to Section 4-f Qualifying Test for “B” Status.
 - iii. If one or more samples are positive, then go to back to Section 4-c and follow the protocol.
- e. **Qualifying Test for “B” status - Whole Flock Test**
 - i. To achieve “B” status, the flock must receive two consecutive negative whole flock tests 120 to 240 days apart.
 - ii. All sheep \geq 180 days of age must be tested within 7 days.
 - iii. If the flock Qualifying Test for “B” status is negative, then go to Section 4-f.
 - iv. If the flock qualifying test for “B” status is not negative, then go to Section 4-c and follow the protocol.
 - v. All biosecurity requirements must be followed.
- f. **Qualifying Test for “A” status - Random Sample Test**
 - i. To achieve “A” status, the flock must receive
 - (1) 2 consecutive negative whole flock tests 120 to 240 days apart and
 - (2) An additional negative random sample flock test 365 to 395 days later.
 - ii. Between 365 and 395 days after the second consecutive negative flock test, a randomly selected proportion of all sheep \geq 365 days of age must be tested (note change of age).
 - iii. The statistically derived sample of sheep will be randomly selected and be large enough to detect MV infection at a prevalence of 5% or greater with a 95% confidence interval (Appendix 8)
 - iv. Use the protocol as outlined in Section 3-o to select animals for testing.
 - v. ID’s of all sheep in the flock as well as all sheep sampled must be recorded.
 - vi. If all sheep tested receive a negative MV test, then the flock will be awarded “A” status.
 - vii. If one sheep receives a positive test, then the producer must follow the protocol as outlined in Section 4-i.

- g. **To maintain “A” status**, the producer must
- i. Continue to have a random flock test between 365 and 395 days after the previous negative flock test, following the protocol as outlined in Sections 4-f.
 - ii. Failure to do so without indicating extenuating circumstance in writing to the Program Administrator⁴ may result in a loss of status.
- h. **Maintaining “A” status - Closed Flock Designation:**
- i. A closed flock is one that:
 - (1) never brings in new sheep of unknown or lower status regardless of subsequent testing.
 - (2) only brings in semen and embryos that meet the biosecurity requirements
 - (3) only brings in sheep from other “A” status flocks.
 - ii. After achieving “A” status, closed flocks may choose to randomly test the flock at intervals of up to 2 years, specifically up to 790 days.
 - iii. Producers that wish to be designated as a closed flock must ask for such designation in writing from the project administrator.
 - iv. Otherwise the protocol as outlined in 4-f must be followed.
- i. **Receiving a positive MV test result after receiving “B” or “A” status:**
- i. **If after at least two whole flock negative tests, one or more samples are test positive:**
 - (1) If $\geq 5\%$ of the samples are positive (e.g. 5 or more of 100 samples)
 - (a) Those positive sheep and their lambs < 180 days of age must be removed within 30 days of the test date
 - (i) The status will change to “Enrolled” and
 - (ii) The flock must start at 4-c to reestablish a negative flock status.
 - (b) If the positive sheep are not removed as outlined above, then the flock will have no status in the program.
 - (c) It is recommended that the producer schedule a visit with the flock veterinarian to discuss where the program may have broken down (e.g. break in biosecurity). Appendix 6.
 - (2) If the number of sheep receiving this “positive” result represents a flock prevalence of 5% or less (e.g. ≤ 4 samples of 100), then flock status can be regained through the following method:
 - (a) The test positive sheep and their lambs < 180 days of age are removed within 30 days of the test date.
 - (b) All sheep ≥ 180 days of age are retested 120 to 240 days after the positive flock test.
 - (c) This subsequent whole flock test is negative.
 - (d) The previous status is reinstated (“B” or “A”)
 - (e) If this subsequent whole flock test is not negative, then the protocol at Section 4-i-(1) must be followed.
 - ii. **If after a random sample test, one or more samples are test positive:**
 - (1) If more than one sample is positive, then the flock prevalence is $\geq 5\%$,
 - (a) the status will change to “Enrolled” and the flock must start at 4-c to reestablish a negative flock test.
 - (b) It is recommended that the producer schedule a visit with the flock veterinarian to discuss where the program may have broken down (e.g. break in biosecurity). Appendix 6.
 - (2) If only one sample is test positive, then the flock prevalence is estimated at 5%. “A” status can be reestablished by following the protocol at 4-i-(2).

⁴ This person is the Projects Manager at the Ontario Sheep Marketing Agency 130 Malcolm Rd, Guelph, Ontario N1K 1B1.

5. “MONITORED” MV FLOCK STATUS

- a. The purpose of “Monitored” status is to allow large flocks access to the OMVFSP at a minimum cost. It is of most use to the following flocks:
 - i. Large flocks that believe that there is no MV-v infection present and wish to have an MV status for advertising purposes (e.g. selling of breeding stock).
 - ii. Large commercial flocks that wish to discover the status of the flock to ensure that MV is not a cause of production loss. If a “monitored” status is achieved, the producer may wish to maintain the status by testing any new additions.
- b. No biosecurity or animal movement restrictions apply to “Monitored” flocks.
- c. Testing protocols are as outlined in Section 3.
- d. The protocol to randomly select animals for testing is outlined in Section 3-o and Appendix 8.
- e. In the event of a negative flock test, the flock will be awarded a “Monitored” status for a time period not exceeding 365 days from the date of the test.
 - i. The random flock test must be repeated annually (365 to 396 days) to maintain “Monitored” status.
 - ii. Failure to do so will result in loss of status.
- f. A flock with a positive flock test has no status.

6. “MONITORED - LOW RISK” FLOCK STATUS

- a. Some flocks may wish to eventually achieve “Monitored - Low Risk” status. This requires the following:
 - i. The flock meets all biosecurity requirements of “Enrolled” and “B” status flocks as outlined in Section 3 and summarized in Appendix 6.
 - ii. Random flock sampling and testing will be performed as outlined in Section 3-o.
 - iii. If the above are performed for a minimum of two years, i.e. three consecutive annual “Monitored” flock tests and each test is negative, the flock will be awarded “Monitored - Low Risk” status after the third flock test.
 - iv. “Monitored - Low Risk” status is valid for 365 days from the date of the last test.
 - v. This status implies that the flock is at low risk of being infected with MV-v but “A” status and “Monitored - Low Risk” status are not equivalent in risk.
 - vi. Sheep may not transfer from an “Monitored - Low Risk” flock to an “A” flock without testing and isolation as per Section 3.

7. Moving From the “MONITORED” or “MONITORED-LOW RISK” program to the “WHOLE FLOCK” program.

- a. For flocks with “Monitored” status, at any time the producer may opt to join the MV Flock Status “Whole Flock” program but must start at Section 4-a - Initial Qualifying Test at which time all rules will apply.
- b. Flocks with “Monitored - Low Risk” status may opt to enter the “Whole Flock” program at any time. If the initial qualifying test is negative, then the flock will be awarded “B” status rather than “Enrolled”. If the flock test is positive, then after the positive sheep are removed, the flock will be awarded “Enrolled” status.

8. CREATING A “NEGATIVE” MV FLOCK FROM “POSITIVE” FLOCK GENETICS. In some purebred flocks with valuable genetics and a high prevalence of MV positive sheep, it may be desirable to establish a negative flock from lambs born to “positive” ewes. The following outline two methods as to how this might be done and it does not modify the main program.

- a. **Artificial Rearing of Lambs Born to Test “Positive” or Unknown Status Ewes**
 - i. Lambs should be removed at birth and not allowed to suckle from the birth dam because of the risk of MV-v transfer from the milk or colostrum.
 - ii. Ovine colostrum from MV negative flocks or bovine colostrum obtained from Bovine Leucosis virus (BLV) free herds should be used as the colostrum substitute. Ideally the colostrum will be pooled to reduce the risk of bovine colostrum anaemia, and should be from older cows vaccinated against clostridial diseases.
 - iii. Lamb milk replacer is a suitable supplement to raise the lambs artificially until weaned.
 - iv. Artificially reared lambs must be housed separately from the main “positive” flock and from any “negative” enrolled flock and managed in an isolation facility and according to the guidelines in Appendix 9.
 - (1) This is because the status of the artificially reared lamb flock is currently unknown.
 - (2) Infection with MV-v may also occur from in utero transmission before the lamb is born as well as accidental colostrum intake.
 - (3) So until proven otherwise, the artificially reared lamb flock is considered high risk.
 - v. As artificially reared lambs reach 180 days of age, they must be managed separately from any new lambs entering from the positive flock as well as the “positive” and “negative” flocks.
 - (1) These isolation facilities must meet the protocols as set out in Section 3.
 - (2) When the lambs are \geq 180 days of age, the group of lambs must undergo two negative tests between 8 to 12 weeks apart before entering the flock.
- b. **Establishing a New Flock From First Time Lambing Ewes.** (Appendix 10)
 - i. This program is suitable for producers that wish to preserve flock genetics, have lots of barns and space but not labour. It requires that for 2 to 3 years, 3 flocks would need to be maintained for a period of time. The protocol is as follows:
 - ii. First Time Lambing Ewes From Main Flock:
 - (1) Pregnant ewe-lambs (that have never lambed before) are moved away from the main flock to lamb in a separate premise. They are to be managed as a separate flock following the guidelines available in Appendix 9.
 - (2) The lambs born to the ewe-lambs are raised until weaning. At weaning (~ 2 months of age), the lambs selected as replacements are moved to a different facility away from the main flock.
 - (3) Lambs not identified as replacements are marketed for meat.
 - (4) This first-time lambing flock only needs to exist for ~ 3 months.
 - (5) The dams are returned to the main flock when their lambs are weaned.
 - (6) The rationale for using ewe-lambs that have never lambed before:
 - (a) Young ewe-lambs are likely less infected with MV-v than their older flock-mates.
 - (b) Young ewe-lambs likely have less damage caused by MV-v if they are infected and may be less likely to pass the infection to their offspring.
 - iii. Offspring of First-Time Lambing Ewes:
 - (1) These lambs have a low risk of being infected with MV-v but the risk is not zero.
 - (2) This flock is subjected to the same testing protocols as for the Whole Flock program (Section 4-a), i.e. should undergo testing as a separate flock when they reach 180 days of age.
 - iv. Subsequent Additions to Offspring Flock:
 - (1) The procedure as outlined in Section 8-c-ii can be repeated as necessary but the offspring cannot enter the “Offspring Flock” until they reach 180 days of age and have had 2 negative tests 8 to 12 weeks apart.
 - v. Main Flock:
 - (1) This flock can continue to produce market lambs but should be culled as quickly as the producer can afford as it represents a potential source of infection for the “Offspring Flock”.

9. **TRANSFER OF FLOCK STATUS WHEN SELLING OR BUYING SHEEP.** If a producer purchases sheep from a flock enrolled in the OMVFSP, those sheep will only retain the status of the originating flock if:
 - a. The purchased sheep
 - i. Do not contact sheep of lower or unknown status en route to the new location and

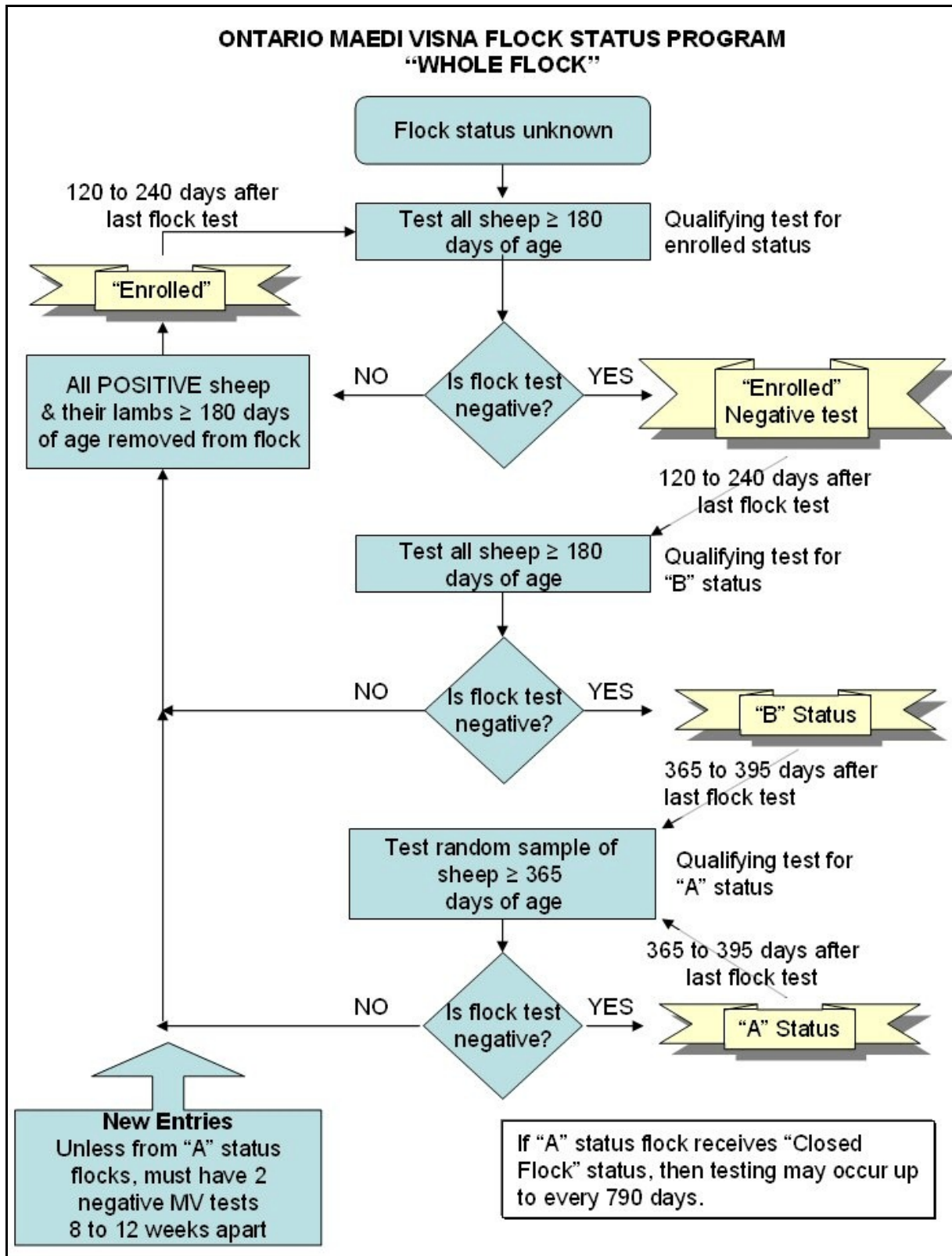
- ii. Are the only sheep to be housed at the new location which has not housed sheep for at least 90 days or has been clean and disinfected as outlined in Appendix 9.
- b. OR the purchased sheep are housed separately from other sheep at that location that are of lower or unknown status as outlined in section 1 k and as per Appendix 9.
- c. OR the contact sheep have the same as or higher MV status than the purchased sheep.
- d. It is important to remember that if sheep are mixed, the status will immediately change to the lowest health status of the mixed group. The purchaser of the sheep assumes all health risks once the sheep have left the premises of origin.

10. **ADVERTISING OF MV STATUS**

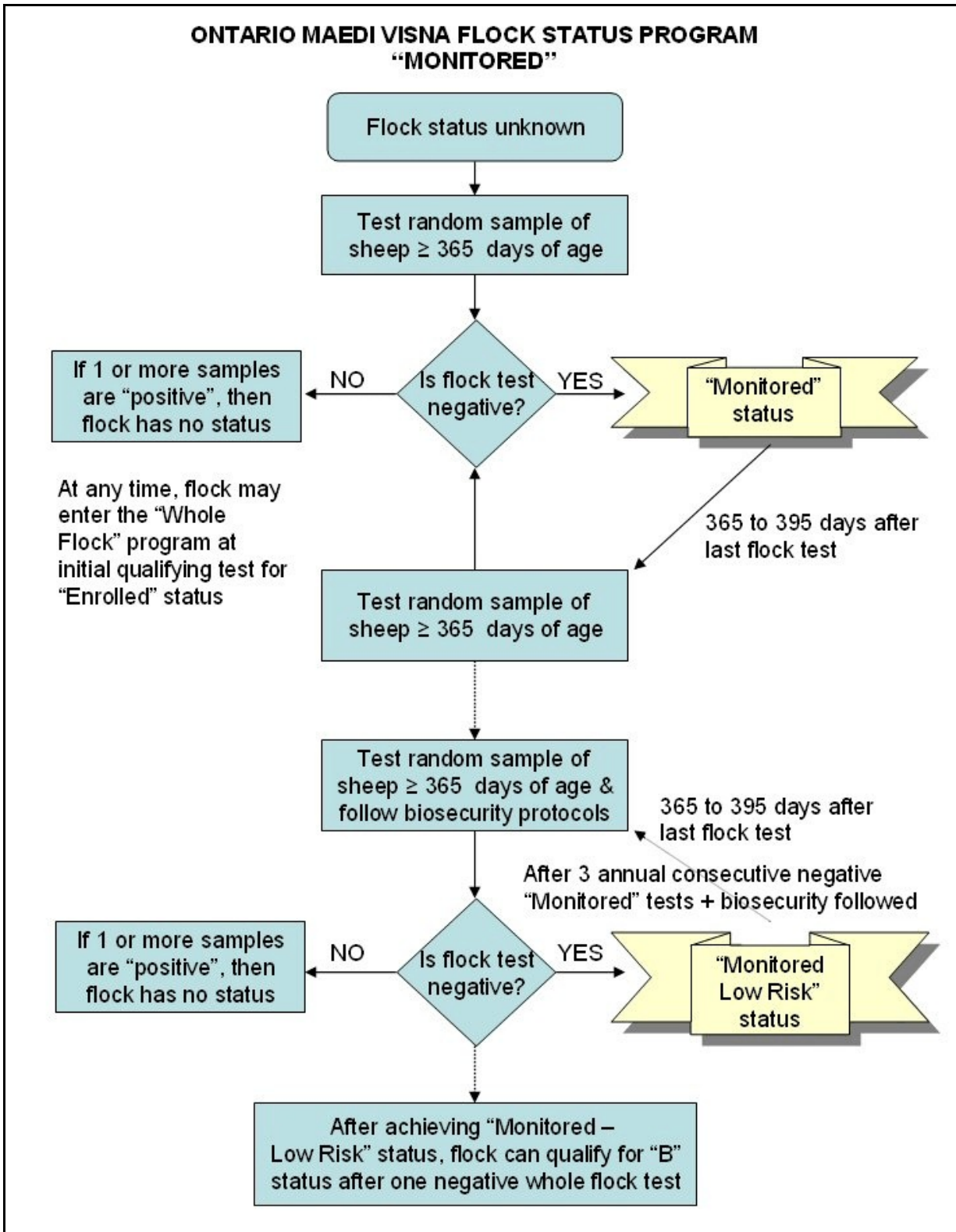
- a. Producers are encouraged to advertise the MV status of their flocks.
- b. However, there are restrictions on what can be said or implied.
 - i. Only the official name of the project may be used, specifically "The Ontario Maedi Visna Flock Status Program".
 - ii. The names of the Canadian Food Inspection Agency and The Ontario Sheep Marketing Agency and the University of Guelph can be used only in reference to their role as program administrators or collaborators.
 - iii. The Ontario Sheep Health Program logo can be used in the advertisement if the flock is in good standing.
 - iv. Only the terms of "Enrolled", "B" status, "A" status, "Monitored" MV or "Monitored - Low Risk" status, can be used and must be used only if the status is in good standing.
 - v. No reference should be made as to the flock being free of Maedi Visna infection.
- c. The Ontario Sheep Marketing Agency will publish a list of participating flocks, their current status at the time of publication along with contact information in each issue of Sheep News - only if the producer contacts OSMA in writing and indicates a willingness for this to occur.

APPENDICES

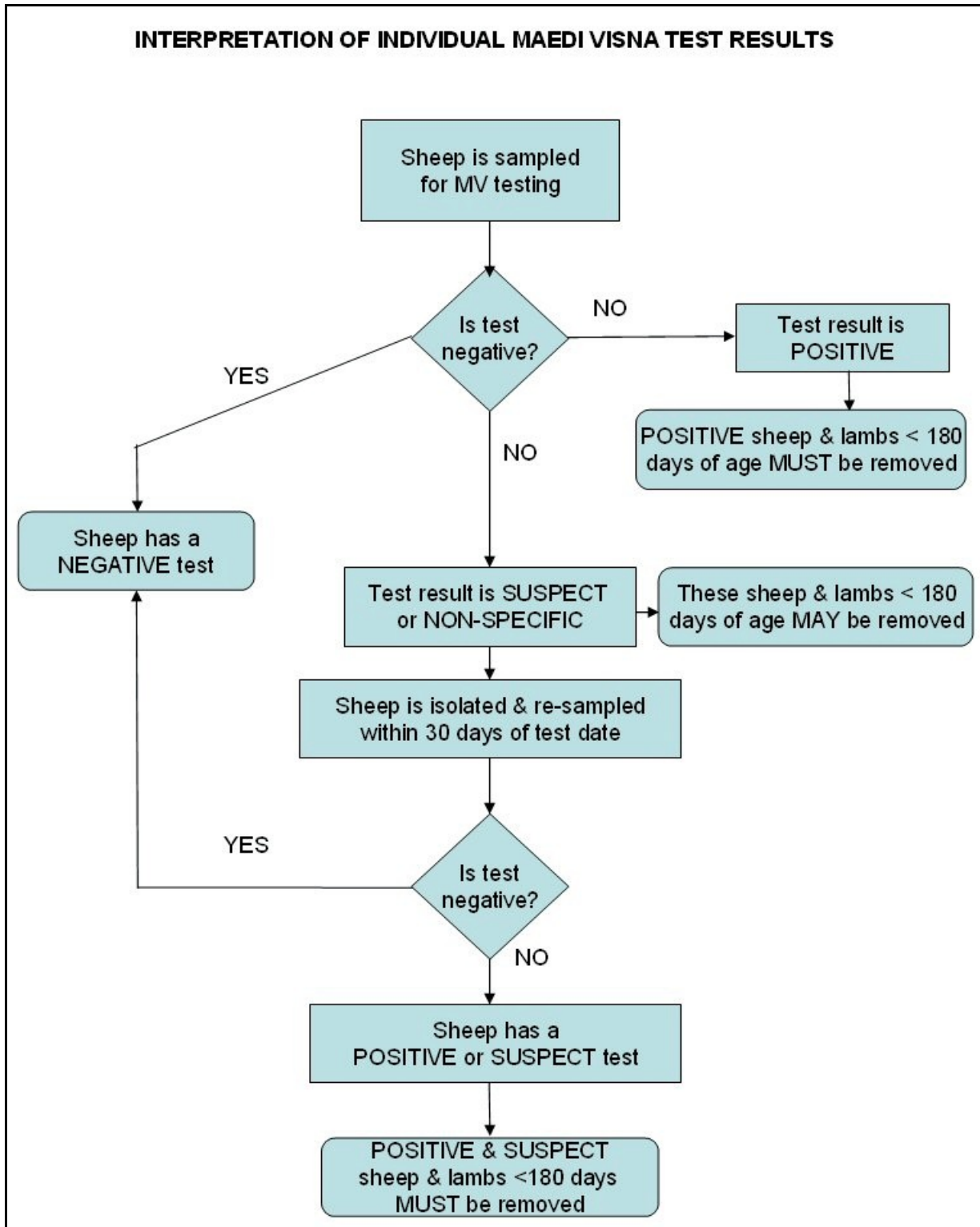
Appendix 1. OMVFSP - WHOLE FLOCK PROGRAM



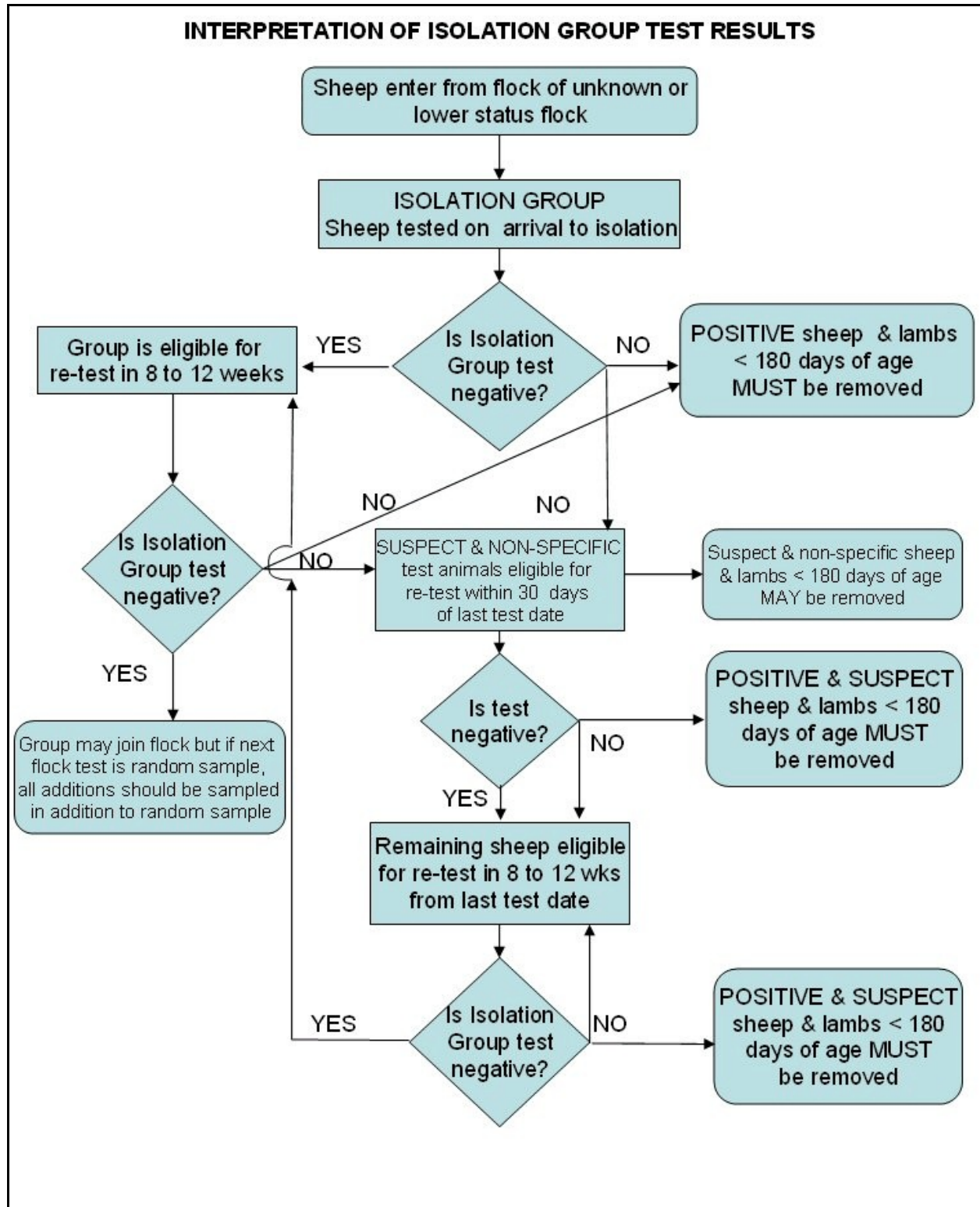
Appendix 2. OMVFSP - MONITORED PROGRAM



Appendix 3. Interpretation of Individual MV Test Results



Appendix 4. Interpretation of Isolation Group MV Test Results



Appendix 5. Official OMVFSP Enrollment and Sampling Forms

ONTARIO MAEDI-VISNA FLOCK STATUS PROGRAM
SERUM TEST REPORT

OWNER INFORMATION

Owner & Farm Name: _____ PO or Street Address: _____
 Town: _____ Province: _____ Postal Code: _____
 Phone: _____ Fax: _____ Email: _____

Flock Location

Lot No.: _____ Concession: _____ Township: _____ County: _____

REASON FOR TEST

No. sheep tested on the premises (≤ 180 of ≤ 365 d) (ewe): _____ No. lambs not tested (≤ 180 of ≤ 365 d) (ewe): _____
 No. sheep eligible for testing (≤ 180 of ≤ 365 d) (ewe): _____ Total No. sheep on the premises: _____

Check one only:
 Qualifying test Monitored Status test "A" Status test
 Releas Addition to flock Sales from flock
 Embryo transfer or AI entry Return from AI unit

ANIMAL INFORMATION

CSIP ID or permanent tag or tattoo	Birth Date	Sex	Breed	Tattoo / Perm. Tag / Description / Registration No. (optional)	Vial No.	Test Result
Day	Mo	Yr				
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					10	

Submitting Information

I certify that I have taken the samples listed from the animals described on the date and the location shown

Rock Veterinarian (Print Name): _____ Address of Veterinarian: _____ Sampling Date: _____
 Rock Veterinarian (Signature): _____ Telephone: _____ Fax: _____

Laboratory Use Only

Date Received: _____ Date Reported: _____ Name of Laboratory: _____
 Tested by (Print Name): _____ Tested by (signature): _____

ONT MV REPORT FORM - JAN 2007

ONTARIO MAEDI-VISNA FLOCK STATUS PROGRAM
SERUM TEST REPORT - SUPPLEMENTARY FORM

Owner Information

Owner & Farm Name: _____

Animal Information

CSIP ID or permanent tag or tattoo	Birth Date	Sex	Breed	Tattoo / Perm. Tag / Description / Registration No. (Optional)	Vial No.	Test Result
Day	Mo	Yr				
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					10	
					11	
					12	
					13	
					14	
					15	
					16	
					17	
					18	
					19	
					20	

Submitting Information

I certify that I have taken the samples listed from the animals described on the date and the location shown

Rock Veterinarian (Print Name): _____ Signature of Veterinarian: _____ Sampling Date: _____

Laboratory Use Only

Date Received: _____ Date Reported: _____ Name of Laboratory: _____
 Tested by (Print Name): _____ Tested by (signature): _____

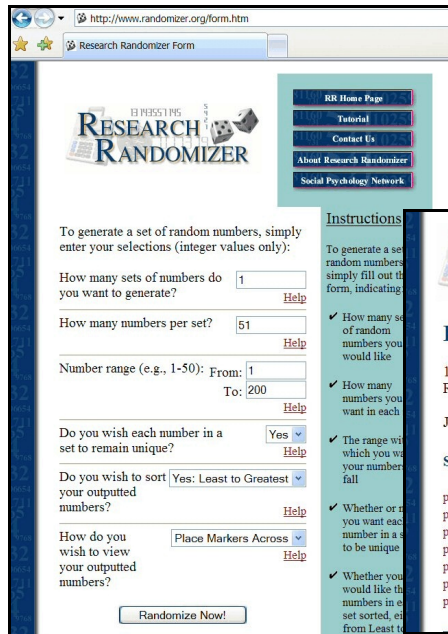
ONT MV SUPPLEMENTARY FORM - JAN 2007

Appendix 6. Overview of Biosecurity Requirements for OMVFSP

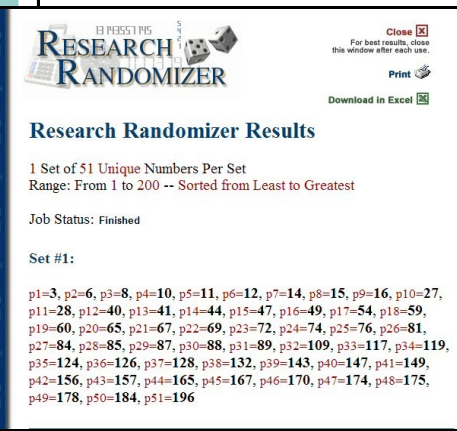
BIOSECURITY PROTOCOL	FLOCK STATUS LEVEL				
	MO	M-LR	EN	B	A
<p>“O” = obligatory “R” = recommended</p> <p>Animal Identification</p> <p>3-e. Each animal must be permanently identified.</p> <p>3-f. The ID must be within the flock.</p> <p>3-g. The ID must be legible to the reader.</p> <p>3-h. Each animal must be identified and recorded on test day.</p>	O	O	O	O	O
<p>3-l. Isolation Facility must have no direct contact with other sheep, shared feeders or waterers and must be:</p> <ul style="list-style-type: none"> Separately ventilated. Have no direct inside communication with the main flock Or if within the same barn, have a solid partition between the facility and the main flock. Inspected and approved by a veterinarian or their designate AHT at the enrollment test. 	R	O	O	O	O
<p>3-j-i. Surgical and Medical Equipment</p> <p>Surgical and treatment equipment, (e.g. syringes, dose guns, shearing equipment) that may become contaminated with blood or saliva must not be shared between the flock and any sheep housed in an isolation facility or part of another flock whose status is not “A”, without first being disinfected.</p>	R	O	O	O	O
<p>“MO” = monitored; “M-LR” = monitored low risk; “EN” = Enrolled; NA = not applicable</p>					

BIOSECURITY PROTOCOL	FLOCK STATUS LEVEL				
	MO	M-LR	EN	B	A
<p>“O” = obligatory “R” = recommended</p>					
<p>3-j-ii. Injections All injections must use single use needles.</p>	R	O	O	R	R
<p>3-j-iii. Personnel and Visitors</p> <ul style="list-style-type: none"> • must wear clean clothing that has not been in contact with any sheep or goats not “A” health status. • All protective footwear must be cleaned prior to entering the flock by vigorous scrubbing with a disinfectant soap (e.g. tamed Iodine or creosote based soap) and fresh water. • Hands must be washed with a disinfectant soap (e.g. chlorhexadine soap) prior to handling 	R	O	O	O	O
<p>3-k. Transportation of Sheep</p> <ul style="list-style-type: none"> • Livestock handlers must wear clean coveralls and boots. • All livestock carriers must be cleaned and disinfected before sheep are loaded. • Sheep must be transported so that: <ul style="list-style-type: none"> • There is no contact with sheep or other livestock of unknown or lower status. • They are not unloaded at any other livestock facility with sheep or other livestock of unknown or lower status en route to the new location. 	R	R	R	R	O
<p>2. k. vi. Sheep Entering Flocks on the OMVFSP: Only sheep from Status “A” flocks can directly enter a Status “A”, “Monitored - Low Risk”, “B”, or “enrolled” flock without an isolation period.</p>	R	O	O	O	O
<p>3-m. Qualifying to Enter the Flock from the Isolation Facility All sheep entering isolation from outside the flock must undergo a MV test at entry. All sheep in isolation are treated as a group. The status of the isolation group is the same as the last sheep that entered isolation. More details in Appendix 4.</p>	R	O	O	O	O
<p>3-m-xiii. Embryo Status All embryos being implanted in recipients located in the enrolled flock must have either originated from donors located in a Status “A” flock or were handled in accordance with the protocol set out by the International Embryo Transfer Society for the sanitary handling of embryos.</p>	R	O	O	O	O
<p>3-m-xiv. Semen Status All semen (fresh or frozen) being used in artificial insemination programs within the flock must have originated from rams located in Status “A” flocks, from countries declared free of Maedi Visna virus infection, or from rams collected in a federally accredited AI Centre (ensuring that they have had at least one negative MV-v test prior to semen collection).</p>	R	O	O	O	O
<p>3-n. Removal of offspring (lambs) of test positive ewes: Weaned lambs < 180 days of age from test positive ewes may be marketed at a date > within 30 days of the test date. If delayed marketing is selected, the lambs must be managed separately and be marketed at < 180 days of age. Lambs nursing test positive ewes. Ewes with nursing lambs that test positive, may be held in isolation until the lambs are old enough to be weaned</p>	R	O	O	O	O
<p>“M” = monitored; “M-LR” = monitored low risk; NA = not applicable</p>					

Random number tables are available as appendices in statistics texts. Some statistical software programs have random number generators available. An example of a random number generator available on line is located at: <http://www.randomizer.org/form.htm> . Figures below are examples of output which can also be downloaded into an MS Excel spreadsheet.



Input page



Example of output

Example Farm					
	A	B	C	D	E
1	Example Farm				
2	Test Date	15-Jan-07			
3					
4		Sheep ID			
5	#	Number	Letter	To be sampled?	
6	1	23	L		
7	2	12	M		
8	3	22	M	yes	
9	4	36	M		
10	5	49	M		
11	6	54	M	yes	
12	7	68	M		
13	8	4	N	yes	
14	9	8	N		
15	10	12	N	yes	
16	11	16	N	yes	
17	12	25	N	yes	
18	13	26	N		
19	14	33	N	yes	
20	15	41	N	yes	
21	16	45	N	yes	
22	17	55	N		

Example of spreadsheet for sampling

Appendix 9. Protocol for Maintaining Two Flocks of Different Health Status - Generic Recommendations

For producers that wish to keep animals of unknown or lower disease status on the same premises as animals of higher health status, there are strict requirements to follow to ensure that disease is not transmitted to the higher status flock. These protocols are generic, i.e. aren't specific to one contagious disease .

Buildings

- Separate buildings housing different status animals by at least 5 metres from other livestock buildings.
- One exception to this is if the buildings have no internal access to each other and ventilation can only flow from the higher status flock to the lower.

Leaving and Returning to the Higher Status Flock

- Sheep leaving the higher status flock for any reason cannot return to the higher status flock without a period of isolation (NB, this includes rams).
- This period of isolation and the required testing protocol will vary with the disease under consideration.
- Please note that the required biosecurity precautions for a specific disease certification program, ALWAYS supercede these recommendations.

Pastures

- Sheep of differing health status should not graze the same pastures during the same grazing season. This period of time may be longer depending on the disease in question.
- Fences should be constructed so that there is no opportunity for physical contact between the two flocks (e.g. escapes, shared water source, mineral and salt supplements) and no opportunity for manure run-off from the lower status flock to the higher.

- c. If the only water source is a stream or river, the higher status sheep should have access up-stream from the lower status sheep. Ponds or lakes should not be shared if there is any concern regarding Johne's disease (ovine paratuberculosis).
- d. If there is concern of preventing Johne's exposure,
 - i. Pastures should be empty of lower status sheep and of cattle for at least one grazing season which includes two full winter seasons, before being used by higher status sheep.
 - ii. Plowing and reseeded of the empty pasture is also required to reduce bacterial pathogen load.
 - iii. Manure should not be spread on these pastures unless composted for at least 2 years.
 - iv. In cases of known high prevalence of Johne's disease in the lower status flocks, it is strongly advised that this period be increased to a minimum of two years.

Protective Clothing

- a. Separate boots and coveralls should be worn whenever working with the higher status flock.
- b. These do not leave the higher status barn except for laundering.
- c. They can be worn over clean "street" clothes but not over protective clothing worn to handle lower status sheep.
- d. Hands and arms should be washed with iodine or chlorhexadine soap before entering clean facilities.
- e. Hats, overcoats, mittens and gloves should also be changed or not worn into higher status facilities.

Entry Biosecurity

- a. The main laneway to the buildings housing the higher status sheep should be gated with a locking device.
- b. This gate, which may be in the form of a gate or chain barrier, should be clearly signed, indicating no admittance without permission of the farm manager.
- c. Visitors from off-farm that need to visit the flock (e.g. shearer, veterinarian, purchaser), should wear clean coveralls and boots that have not been exposed to lower status sheep. Rubber boots must be thoroughly washed prior to entry with a disinfectant soap. Leather boots should be worn inside clean rubber boots or plastic disposable boots. Coveralls should be freshly laundered. All visitors should first visit the higher status flock, following the protocol above, before visiting the lower status flock.

Vehicles and Large Equipment

- a. Trucks, tractors, manure removal equipment, feeding and watering equipment should not be shared between flocks. If large pieces of equipment must be shared, they should be thoroughly washed and disinfected before coming into the higher status flock.
- b. Vehicles from off-farm should not enter the yard to which sheep may have access, unless first cleaned of manure. Vehicles of particular risk are commercial livestock trucks or trailers. If shipping lambs to market regularly and using a commercial livestock carrier, it is advisable to build a loading ramp away from any areas where sheep may be housed.

Other Equipment

- a. Separate equipment for shearing (blades, shearing unit, board, clothing and footwear), taildocking, castrating (ringing equipment), drenching, automatic syringes, lamb tubes & artificial rearing equipment, warming boxes, crates, restraint equipment and any equipment that is used in direct contact with sheep is strongly recommended. In the face of economic hardship that precludes having two of everything above, disinfection must be used⁵.

⁵ Disinfection of equipment can be done with sodium hypochlorite (6% bleach) by mixing 1 part bleach to 2 parts water for a final solution of 2% sodium hypochlorite OR sodium hydroxide by mixing 80 grams of sodium hydroxide crystals with 1 litre of water to make a 2 molar solution. These agents are effective against most viruses, bacteria and the Scrapie agent. Both can be used for disinfection of surgical equipment, docking and tattoo equipment, multi-dose syringes and work surfaces. Minimum contact time should be 10 seconds with the product being rinsed or wiped off after disinfecting. Chlorhexadine solution or soap is effective for disinfecting shearing blades. It is effective against the causative agent of caseous lymphadenitis. Formaldehyde gas is very effective for disinfecting buildings but toxic if inhaled. QUATS and Phenols can be used for generalized cleaning but have

Manure Management

- a. Fresh manure from the lower status flock must not be spread on pastures or hay fields unless the hay is being sold off-farm or is to be fed to other species of livestock (e.g. horses).
- b. Manure run-off must be contained so that it cannot reach yards, fields or contaminate water sources.
- c. Composting manure is an acceptable way to “rehabilitate” manure. However, the manure should be a minimum of two years of age and turned at least once to ensure total composting. A composting manure pile should not have fresh manure added to it.

Dead Stock

- a. Dead carcasses must be buried or composted promptly away from contact with either flock.
- b. Carrion eaters (dogs, coyotes, foxes, crows, seagulls, hawks and eagles) must be prevented from gaining access to these carcasses as they can spread disease.

Predator Livestock

- a. Use of guard dogs, llamas and donkeys are acceptable ways of protecting livestock from predators. Dogs often travel from flock to flock within a farm and this is acceptable. Donkeys do not share diseases with sheep and can be moved from flock to flock although if foot rot is present in either flock, disinfection the donkey’s feet prior to moving with zinc sulphate is recommended.
- b. Llamas can be infected with some sheep diseases, notably Johnne’s disease and caseous lymphadenitis. Tests have not been developed to ensure that this species is free of disease. For this reason it is recommended that llamas that come from sheep farms of unknown or lower health status not be used for predator protection in the higher status flocks.

Insect and Vermin Control

- a. Flies can spread disease. Control flies through prompt removal of manure from yards, using fly traps and fumigating if necessary.
- b. Rodent (rats, mice) and bird control (pigeons, crows, sparrows, swallows, seagulls) should be practised as they can spread disease. This can be done by using rat poison down rodent holes (dicoumarol), fumigating or trapping.
- c. Screen windows and ledges that can be used for bird nests. Plug holes.

Shearing CLA Negative Flocks

- a. For closed flocks, the shearer represents a significant risk for the introduction of caseous lymphadenitis. The onus is on the flock owner, with the cooperation of the shearer, to ensure that the disease does not have an opportunity to enter the flock at shearing time.
- b. The bacteria (*Corynebacterium pseudotuberculosis*) can survive for weeks and months in dried pus on shearing equipment and can invade slightly abraded and unbroken skin.
- c. For this reason, it is recommended that
 - i. The higher status flock have its own shearing equipment, shearing board, moccasins, table for tagging and folding fleeces. These equipment are very difficult to disinfect in an effective manner so, if shared, pose a significant risk to the flock.
 - ii. Coveralls or shearing pants as well as shirts, coats and hats used by the shearer and any assistants should be freshly laundered and not used in any other flock.
 - iii. Boots used by assistants should be freshly scrubbed and disinfected.
 - iv. Wool bags should either be new, freshly laundered or left outside the yard.
 - v. Before shearing, the shearer should wash his/her arms and hands with chlorhexidine soap.
 - vi. All nicks and abrasions post-shearing should be treated immediately with 2% iodine solution.

General Guidelines for Disinfection:

Disinfection = process of eliminating infectious organisms by using chemical or physical agents.

some limitations in efficacy. Follow the guidelines in this document for general disinfection.

What follows is a brief overview of disinfection and disinfectant agents. For a more complete overview, please consult the publication: Disinfectants: actions and applications. Scientific and Technical Review, Office internationale Epizootic, Vols 14 (1) & 14 (2), 1995

Disinfection of a Premise

- Remove all animals, utensils & equipment (e.g. feeders and waterers) - scrub and clean utensils and equipment with detergent soap. Rinse well.
- Make sure electrical outlets are covered. Wear protective clothing (boots, rubber gloves, coveralls, mask).
- If waterers are not removable, empty completely and clean as above. Make sure they are rinsed well after disinfecting.
- Make sure run-off isn't available to livestock or contaminates water sources.
- Gently wet area to prevent dust (e.g. *Coxiella burnetti* is highly infective when inhaled in dust), knock down cobwebs after wetting.
- Scrub, scrape and flush away all gross organic material using a cleaner/sanitizer detergent compound (e.g. 2-4% sodium carbonate).
- Rinse well. High pressure hot water will help to dissolve fats and other organic debris when cleaning and rinsing. The premises must be rinsed well to prevent inactivation of disinfectant. They must also be dry before applying disinfectant.
- Apply disinfectant and leave on for recommended time as outlined in the directions.
- Dirt yards that cannot be disinfected, should have organic debris scraped away and wet areas drained or built up. Fences around yards and outdoor equipment should be scrubbed and disinfected as above.
- Lamb milk feeding equipment - wash with detergent, rinse well and rinse with 2% hypochlorite solution (bleach).

Footbaths

- Locate at every doorway with a boot brush hanging nearby
- Boots should be scrubbed and washed every time an individual enters and exits the premises
- Change every 3 days or more frequently if become contaminated with organic material
- do not add salt or antifreeze to prevent freezing.
- should be a minimum of 10 centimetres in depth

Selecting a Disinfectant

Disinfectants will not work well unless organic material is removed, the detergent flushed well and the premises dry. After that, the main considerations are environmental hazard, the agent to be killed and availability. A short description on the uses of common disinfectants:

Phenols: These are commonly found in household disinfectants (e.g. Lysol) and often have a pungent smell (even after no longer effective as a disinfectant!). They are effective against a broad range of bacteria, particularly gram positive bacteria but not against bacterial spores (e.g. Clostridial diseases, Anthrax). Effective against enveloped viruses. They are also corrosive and irritating to skin.

Quaternary Ammonium Compounds (QUATS): They have a broad spectrum of activity (gram + and gram - bacteria and enveloped viruses. Not effective against *Mycobacterium* sp. (e.g. Johne's disease), bacterial spores, fungi and non-enveloped viruses. They are useful in general disinfecting and cleaning, even in the presence of trace organic debris. They are often the disinfectant of choice since they are effective and non-toxic. Some individuals may develop contact dermatitis with repeated exposure.

Alcohols: This is usually ethyl alcohol or isopropyl alcohol. They are effective against a wide range of organisms but not bacterial spores or some non-enveloped viruses. The concentration must be high to be effective (60-90%). Repeated use on rubber equipment can cause damage, they are irritating to the skin with prolonged use and are expensive to use for cleaning of large surfaces.

Hypochlorites (Chlorine): e.g. Bleach is sodium hypochlorite. Very effective against many bacteria, viruses and prions (e.g. scrapie) but inactivated in the presence of organic material and not effective against bacterial spores. Ammonia (animal urine) will also inactivate. Sodium and calcium hypochlorites are effective but corrosive. Useful for disinfecting metal equipment. 1 parts 6% bleach to 2 parts water

makes an effective solution of 2% bleach. If using for equipment that may be contaminated with prions, use at a 5% solution.

Iodine and Iodine Based Disinfectants: Aqueous (Lugol's) and alcoholic iodine (tincture) are often used as antiseptics on wounds. Iodophors (iodine + carrier) release iodine in an acid medium and are effective in the presence of trace organic material against bacteria and viruses. They can be used as skin disinfectants or for general disinfection and cleaning.

Hydrogen Peroxide (30%): A stabilized peroxide makes an excellent disinfectant for surfaces and works against almost all pathogens including enveloped and non-enveloped viruses, bacteria, fungi and some activity against bacterial spores. These products may be blended with QUATS, peracetic acid and iodophors.

Chlorhexadine: Used as skin cleaners in low concentrations (<4%). It is useful against gram positive bacteria (e.g. *Corynebacterium pseudotuberculosis*) but less so against coliforms and viruses. It can be used for cold sterilization of surgical instruments and shears if they are rinsed clean first. It does not work well in presence of organic material.

Glutaraldehyde: Are bacteriocidal, virucidal, fungicidal and parasiticidal and work well in the presence of organic material. But they need to be used in a well-ventilated area and are dangerous to work with.

Formaldehyde: Formaldehyde is a gas but is available as a 37% solution known as formalin. Formaldehyde is often used to fumigate buildings (swine, poultry, veal) by pouring formalin onto potassium permanganate. This is rarely used in sheep premises because of the danger. 1 to 5% formalin is sometimes used as a disinfectant but is very irritating and toxic and may be carcinogenic to workers.

Peracetic Acid: Is a very strong oxidizing agent and effective against many pathogens including bacterial spores. It is mildly corrosive and should be used with care but doesn't harm the environment.

Sodium Hydroxide: lye or caustic soda (NaOH) is effective at 2% but caustic to handle. 80 gms of crystal to 1 L of water makes a 2 molar solution which is good for disinfecting equipment if Scrapie is a concern. Allow 10 minute contact time and then rinse.

For cold sterilization, glutaraldehydes, phenols and 70% alcohol (with antirust tablets) can be used. Check with your veterinarian to determine what they use. However, to be effective, the instrument should first be cleaned of organic material and fats and then left in the solution a minimum of 5 minutes. The solution should be changed frequently. Shearing blades, scalpels, and other surgical instruments would come under this.

Examples of some common commercial disinfectants:

Trade Name	Active Ingredients	Activity
Oo-cide (Vetoquinol)	Ammonium chloride + sodium hydroxide	When combined, destroys coccidial oocysts. For use after animals and litter removed.
Hibitain (Wyeth)	chlorhexadine (2%)	To clean surfaces and kills viruses
Virkon (Vetoquinol)	potassium monosulfate	Non-corrosive virucidal, fungicidal and bacteriocidal disinfectant. Replaces formaldehyde fumigation
Metricide (Metrex)	glutaraldehyde (2.6%)	Useful to disinfect and sterilize surgical equipment
Premise Disinfectant (Westagro)	iodine (1.7%)	Useful for a boot disinfectant as well as surface once organic material has been removed.
Beaucoup (Ecolab Health Care)	phenols	Useful as a surface disinfectant
Peroxigard (Ecolab Health Care)	hydrogen peroxide (7%)	Useful for disinfecting walkways and floor surfaces after cleaning

1. Disinfectants: actions and applications. Rev. Sci. Tech. Off. Int. Epiz. 14: 9 - 472.
2. Anderson NG. Health protection and sanitation strategies for cattle. OMAFRA FactSheet 90-202. 1990.

Appendix 10. Protocol for Establishing an MV-Negative Flock From Ewe Lambs That Are Lambing for the First Time

