



► Modified-live virus (MLV) vaccine is “freeze-dried, so you mix it up,” says Ron Gill, TAMU Extension livestock specialist.

“Doing nearly everything right in a vaccination program can cause you some real problems,” says Ron Gill, Texas A&M University (TAMU) Extension livestock specialist. “Vaccine is not 100% effective in the first place. If we had done everything right, we could get close to getting 85% of the cattle immunized on the first vaccination.”

Immunity is “an animal’s long-term response mounted against invasion from a bacteria, virus, toxin, etc.,” explains Scott Nordstrom, manager of veterinary technical services for Intervet Inc.

“Modified-live vaccines stimulate a stronger and more complete immune response than killed vaccine. They contain altered viruses or bacteria that replicate and stimulate the immune system, but do not cause disease in the animals,” Nordstrom says. “When disease strikes, the immune system is then able to respond strongly and quickly to eliminate or minimize the effects of the disease that has been vaccinated for.”

Nordstrom says the advantages of accomplishing immunization with modified-live virus (MLV) vaccine include:

- rapid, longer-lasting protection;
- one-dose vaccination (though sometimes two doses are recommended);
- no required adjuvant (An adjuvant is an element that enhances immune response to a vaccine.);

- better cell-mediated immunity (CMI) response;
- interferon production (Interferons signal the body to manufacture an enzyme that counters infection.); and
- less expense to manufacture.

Because MLV products are “modified live,” they require some extra care in handling to ensure maximum protection against disease.

### Product preparation

“When you go pick up product, make sure you put it on ice,” Gill says. After MLV product has reached its final destination, it’s vital that the product be kept cool.

“Reading that label is important. Following it is even more important,” Gill tells producers at beef quality assurance (BQA) courses. “How many of you store that

product in your refrigerator and use it the next time you work cattle?”

“What’s it say on the bottle? ‘Use entire contents when opened.’ You cannot store [mixed] modified-live product, period. So don’t even try,” he continues. Another common thing to avoid, as pointed out on the label, he says, is prolonged exposure to heat or UV light.

Gill explains that MLV vaccine is freeze-dried and requires mixing. The product comes in two bottles: a vacuum-packed glass bottle containing the freeze-dried MLV product and a plastic bottle containing a sterile liquid. The two have to be mixed before administering.

To mix MLV product, use a transfer needle to penetrate the plastic bottle first. Then, with the other end of the transfer needle, penetrate the glass bottle containing the freeze-dried product. The vacuum will draw the liquid into the glass bottle.

Once the contents from the plastic bottle are drawn into the glass bottle, shake the glass bottle gently, he says.

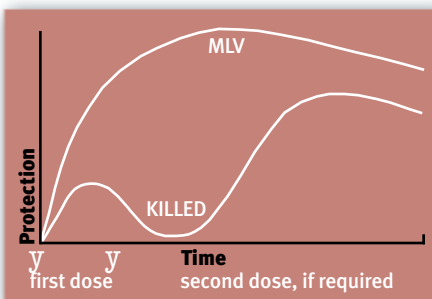
### Chuteside manners

Don’t mix up too much product at a time, Gill warns. For producers with roughly 50 head of cattle, for example, Gill advises the purchase of a 50-dose box of MLV vaccine in five 10-dose units.

“Modified-live [products] have to be given

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**Fig 1: MLV vaccine stimulates a stronger and more complete immune response than killed vaccine**



in a very timely fashion,” he explains. It’s necessary to mix small amounts of MLV product at a time and to vaccinate cattle within an hour to an hour and a half of mixing the product.

Even then, producers need to take steps to protect the product after it’s mixed and before it is used. Imagine yourself out in your working facilities — it’s a sunny, warm spring day, Gill tells producers. While that may be nice for processing, the heat and the sunlight can both damage the MLV product and render it ineffective.

“Now most everybody is good enough to have some type of cooler,” he observes. He recommends having two coolers on hand at the working facility — one for mixed product and one for unopened product.

Syringes containing MLV products also need to be protected, he warns. “Get those

back in your cooler when you’re not processing cattle. Get it out of the sunlight where it’s cool. If you leave it in the light, it’s actually more detrimental to it than heat is.”

To keep vaccine that is contained in the syringe cool and out of damaging light, Gill cuts holes into a Styrofoam™ box so he can poke the barrel of the syringe into the cooler between uses. “I’ll cut three holes if we’re using three different products,” he explains (see photo).

Gill puts a cool pack in the cooler with the syringes to keep the vaccine cool. “If something happens — you break down — you’ve got the chance to salvage that product and not have it get hot,” he says.

“How many of you still use a 60-cc syringe for everything?” Gill asks. “If you’re using a 5-cc product, these syringes work great.”

However, Gill advises producers giving 2-

cc doses of product to use a smaller syringe. “When you’re giving a 2-cc product, how important is it that the syringe and dosage be accurate? At 5 cc, we can waste or lose a little bit of vaccine and still have an effective dose. You waste or lose product when you vaccinate with a 2-cc vaccine, and you’ve lost 15%, 20% of the product,” he explains.

Further, Gill advises producers to “identify your syringes in some shape, form or fashion” and to fill syringes with the same product every time to avoid product mixture. “Once we’ve used modified-live product in a syringe, that’s all we use that syringe for.”

### **Keep equipment clean**

Many producers are very meticulous about the sterility of their equipment. Producers using MLV product need to take caution when cleaning equipment. Disinfectant is designed to kill viruses, the active component in MLV vaccine.

“Do not use [MLV] in syringes contaminated with cleaning and disinfectant residues,” Nordstrom warns. Part of that residue will end up in the MLV vaccine by attaching itself to the oil in the product. The same applies for needles. If a needle is disinfected, most likely a drop of disinfectant was left on the end of the needle, and it will inactivate MLV vaccine that goes through the disinfected needle.

“So, let’s not use disinfectant in or on syringes that are used on modified-live product, period,” Gill says. “The way to sterilize them — take them apart.” (For more information about sterilizing equipment, see “Keeping it clean.”)

Gill also warns producers not to stick a used needle back in a bottle.

“Every time you go back in a bottle, change the needle,” he says. “If you ever go into that bottle with a needle that’s been in an animal, what’s on the end of that needle? It’s contaminated with something — either skin tissue, blood, something.” Refilling a syringe with a needle that has been in contact with an animal contaminates the product in that bottle.

Nordstrom suggests the industry standard — changing needles every 10 head — to avoid contamination and injection-site infection. Ideally, however, he says he would like to see the needle changed for each animal.

“We would never think of reusing a needle on a person, but we do it with cattle,” Nordstrom points out.

Even with new products on the market

## **Keeping it clean**

“Inadequately cleaned vaccine syringes are often responsible for localized infections associated with vaccination,” according to a January 2002 University of Nebraska NebGuide titled “Care of Veterinary Syringes.” The NebGuide provides special care points for multiple dose, metal and plastic automatic syringes, and transfer needles. Some pointers follow. For the full text, visit [www.ianrpubs.unl.edu/epublic/live/g1443/build/g1443.pdf](http://www.ianrpubs.unl.edu/epublic/live/g1443/build/g1443.pdf).

### **Special care points for metal syringes**

Metal syringes can be taken apart and boiled in hot water. Do so according to the following steps:

- 1) Wash your hands for two minutes.
- 2) Clean work area. Cover clean work area with new, clean paper towels.
- 3) Wash external surface of syringes.
- 4) Disassemble syringes.
- 5) Wash syringe parts with clean hot tap water (do not wash the internal parts with soap or disinfectant).
- 6) Boil all internal syringe parts in boiling de-ionized or distilled water for five minutes.
- 7) Reassemble while hot.
- 8) Use a small amount of *clean* vegetable oil spray to lubricate rubbers.
- 9) After assembly is completed, rinse internal parts three to five times with water hotter than 180° F. Allow syringe 10 minutes to cool before using.
- 10) If storing syringe, place in new sealable sandwich bag. Store syringe in the freezer. Prior to using syringe after storage, rinse internal syringe with water hotter than 180°. Boil two cups of water in a microwave and pull boiled water into syringe three to five times. Let syringe cool for five to 10 minutes before using.

### **Microwave sterilization of vaccine transfer needles**

Vaccine transfer needles can be heat-sterilized in a microwave. The transfer needle must be covered in water while being heated in the microwave. Two methods are available.

- 1) Clean the transfer needle in hot tap water (do not use soap or disinfectant) and place cleaned transfer needle in a clean cup. Completely cover with 6 to 8 ounces (oz.) of de-ionized or distilled water. Microwave using the high setting to bring water to a boil, and continue to boil for one additional minute. Never allow water level to evaporate to the level of the transfer needle. The needle must be completely covered during the entire process.
- 2) Clean the transfer needle in hot tap water (do not use soap or disinfectant), and wrap it in several layers of paper towels. Soak towels and transfer needle in water and place in a sandwich bag. Place the bag in microwave and leave the top open. Microwave, using the high setting, for two minutes. Do not let paper towels dry out while being heated in the microwave.



designed for subcutaneous (sub-Q) injection, many products, particularly MLV products, still require intramuscular (IM) injection. Referring to BQA guidelines, Gill says, "Reserve that neck for all intramuscular injections."

There's no excuse for putting an intramuscular injection anywhere other than in the center portion of the neck, in the muscle, he says. "If you can move your syringe needle under the skin, you're sub-Q. If not, you're in the muscle."

Gill recommends putting used needles in a container marked as "sharps." Your local vet may take the container when it's full and dispose of the used needles properly. If not, he recommends used needles be encased in concrete so they can be disposed of properly.

### Cattle handling

Stress level affects the animal's ability to respond to that vaccine, Gill explains. When processing cattle, "you want the stress level to be down; you want the nutrition level to be up." Referring to nutrition level, Gill says cattle need to be well-hydrated before they will respond correctly to vaccine.

Extra people and dogs can hinder cattle handling. When processing his own cattle, Gill uses very little outside help. "We're trying to get everybody on the same page, doing the same thing every time," he explains.

"Most of the problems with processing cattle are our own fault," Gill adds, recommending producers handle cattle calmly. "That's why we spend so much time with them on foot. And, it has helped a bunch. Our gain went up a quarter to half a pound a day."

In addition to handling cattle, Gill discusses working facilities. "One of the bigger problems I see on a cow-calf operation [for] giving injections in the neck would be a chute that doesn't allow you access to the neck," Gill says. "Every chute I know has a problem with it."

Gill advises slowing cattle down when they are coming in the chute. If being pushed too hard from behind, cattle can hit their shoulders and neck extremely hard coming into the chute. As a result, they will not absorb product correctly.



► Left: Gill demonstrates proper handling of vaccines during the Cattlemen's College at the 2006 Cattle Industry Annual Convention and Trade Show.



PHOTOS BY SHAUNA ROSE HERMEL

► Gill shows how holes could be cut into a Styrofoam box to provide a resting place for syringes to protect vaccine from extreme temperatures and UV light while not in use.

### Begin with the end in mind

Gill suggests that as many records as possible be transcribed before processing begins to eliminate reading labels at chuteside. Among other items, he suggests recording what products are being used, product injection-site location and number of head being processed. He also suggests preparing records in advance to be used at chuteside, including pen/lot number and calf gender, as well as the product administrator's initials.

Gill recommends recording the serial/lot number of the vaccine being used. "Unless you have a serial number, there's no recourse even to get some support from the vaccine companies," he says. "That's probably more important than even the expiration date. Make that a part of your normal operating procedures."

Nordstrom continues on that note, saying, "Only federally licensed products should be used, with strict attention afforded the manufacturer's recommendations regarding storage, handling and routes of administration of the vaccines to maximize the efficacy and safety."

"A properly administered, licensed product should not be assumed to provide absolute protection during any given field epidemic," Nordstrom concludes. "If managerial changes cannot or will not be implemented to optimize control of infectious diseases, vaccination alone cannot be expected to be successful."



## Designing an MLV vaccination protocol

Scott Nordstrom, manager of veterinary technical services for Intervet Inc., summarizes factors and precautions that should be considered when providing recommendations and developing a modified-live virus (MLV) vaccine protocol.

- A vaccination program should always be developed with a veterinarian whom you have a valid client-patient relationship.
- Vaccination programs will not succeed without appropriate managerial practices. Each operation should be assessed to assure management practices are optimized to ensure successful vaccination response.
- Not all animals that receive a vaccine will mount an immunologic response; those that do respond will not have equal responses.
- Herd immunity is a very important factor in herd protection.
- Strict attention should be afforded to the manufacturer's recommendations for storage, handling and route of administration of the vaccine.
- Whenever safely possible, MLV vaccines should be utilized to provide a broader protection against disease through stimulation of cell-mediated immunity (CMI) and non-specific immune factors.