

## Poultry litter improves forage quality and yields

By Tom Basden, Water Quality Specialist, and Ed Rayburn, Forage Agronomist, WVU Extension Service



A summer intern measures pasture height with pasture plate.

Expansion of the poultry industry in West Virginia during the 1990s led to increased use of poultry litter as a fertility amendment on state farms. A 1994 poultry producer survey showed that farmers used 82 percent of their litter as a fertilizer amendment on their hay and pastureland.

To improve poultry litter utilization and grazing management, the Extension Service established four demonstration plots in Grant, Pendleton, and Preston counties. The grazing plots consisted of four fertility treatments: (1) **high poultry litter** (4 tons per acre per year, with 2 tons applied in the spring and 2 tons in the fall); (2) **low poultry litter** (2 tons per acre per year, usually applied in the fall); (3) **commercial fertilizer and lime as required by soil test**; and (4) **lime only as required by soil test**. All plots were overseeded each spring with red clover to improve the botanical composition and reduce the need for purchased nitrogen. Forage quality and yield data were collected from these demonstration plots between 1996 and 1999.

Pastures were rotationally grazed when the pasture reached a height of 8 to 10 inches. Pasture yield was measured with a pasture plate (see photo) calibrated using clipped samples. In the spring, the pasture occasionally got ahead of us and was higher than we had planned.

The high poultry-litter treatment increased yield primarily because of its nitrogen content, compared to the commercial fertilizer programs based on proper lime and phosphorus applications and the use of legumes. However, this high-litter rate of 4 tons/acre/year is not environmentally sustainable because of the high phosphorus load it puts on the land. The 2 tons of litter/acre/year rate gave grazeable forage yields equal to the conventional fertilizer treatment of 2.3 tons forage dry matter/acre/year, compared to 3 tons for the high-litter treatment and 2 tons for the lime-only treatment. Under rotational grazing, the high-litter treatment provided one more grazing than the other treatments each year.

Compared to conventional fertilizer treatments, both the high- and low-litter treatments increased the grass and reduced the legume content of the pastures.

The use of litter did not improve the distribution of forage production. In April and May, pasture production appeared to be limited mainly by soil and air temperatures. In June and July, the high-litter treatment produced the most growth. In July to October, the high-litter treatment also produced the most forage, but this depended on rainfall since soil moisture was the limiting factor for forage production response to soil fertility. In very dry conditions, the high-litter treatment produced the same as the other treatments.

Litter increased crude protein in forage because of higher soil nitrogen availability and quicker forage regrowth, resulting in younger forage at grazing based on the 8- to 10-inch pasture height at turn-in. This younger forage also

resulted in lower fiber and higher total digestible nutrient content in the pasture. Since the high-litter treatment had younger forage at turn-in, it did have a lower nonstructural carbohydrate (sugar and starches) content than the conventional fertilizer treatment. The low-litter and conventional fertilizer treatments resulted in the highest nonstructural carbohydrate content. For legumes, both litter treatments resulted in reduced nonstructural carbohydrate content compared to the lime-only treatment.

Litter consistently gave forage higher in phosphorus and potassium than the conventional fertilizer treatments across both grasses and legumes. Compared to conventional fertilizer treatments, litter did reduce the content of calcium in legume forage. This may have been because the potassium uptake competed with calcium uptake in the legumes. Magnesium uptake by plants was not affected by fertilizer treatment. Plant sulfur content was highest when litter was applied.

With the exception of molybdenum, litter treatments did not affect the trace mineral content. The amount of trace minerals was affected by botanical composition, with grasses generally being lowest, legumes being moderate, and broadleaf weeds being highest in these nutrients. The level of copper was well below the maximum tolerable level for sheep. Litter treatments did increase the forage content of molybdenum.

Grassland farmers in West Virginia having soils testing low or medium in phosphorus can profitably use poultry litter as a soil amendment. Using poultry litter at the high rate (4 tons per acre per year) over a period of years is an unsustainable practice. The soils will accumulate excessive levels of phosphorus and nitrogen and risk losing these nutrients to the environment.

The low-litter rate (2 tons per acre per year) applied over several years is also unsustainable because of the excess accumulation of phosphorus in the surface layer of soils. It has the same risk of phosphorus loss to the environment.

Poultry litter should be applied until the soil test results show optimum phosphorus levels. At that point, the farmer's best option is to manage the hay or pasture for optimum legume content to ensure sufficient nitrogen for the sward's grass component. This reduces the amount of nitrogen fertilizer the farmer has to buy and improves the sustainability of the forage production system.

## What vaccines does my horse need?

By Robert E. Pitts, Veterinarian, WVU Extension Service

All horse owners are concerned about the health and well-being of their animals. In order to provide the best care for them, owners must consider housing, feeding, exercise schedules, parasite control, and vaccination schedules.

In the past, vaccination programs were relatively simple because there were fewer vaccines and less chance of exposure to other horses and the diseases they may be carrying. With the increase in horse shows and other equine events, however, it is not uncommon for people to travel longer distances with their horses. With this increased mobility comes increased risk of disease to the horses.

One of the most commonly asked questions by horse owners is, "What vaccinations should my horse have?" The answer to this question depends on where the horse is located, exposure to other livestock, and expected exposure to other horses.

Equine vaccines were available as of this summer for tetanus, Eastern, Western, and Venezuelan encephalomyelitis, influenza, herpesvirus-1 and -4, strangles, rabies, Potomac horse fever, equine protozoal myelitis, West Nile virus, botulism, viral arteritis, anthrax, and endotoxemia. Which vaccines you use in your horses should be based on their risk of contracting the disease and the severity of the disease. You should consult with your veterinarian for recommendations.

Tetanus spores, which can live in the soil for years, are common around all animal environments. "Lockjaw" is contracted after the tetanus organism enters

*Continued on page 4*

## Nonchemical measures can reduce lady beetles indoors

By Sanjay Shah, Agricultural Engineer, and Rakesh S. Chandran, Weed Specialist & IPM Coordinator, WVU Extension Service



The lady beetle (also called multicolored Asian lady beetle, lady bug, Japanese lady beetle, and Asian lady beetle) is a common pest during fall and winter months in many West Virginia households.

This insect, native to Asia, was introduced into the United States before the Great Depression. Since then, several intentional and accidental releases by entomologists or from imported nursery stock and other shipments have led to its emergence as a major pest problem in several parts of the country. The actual cause for its outbreak as a pest, which occurred in the 1990s, is not clearly understood.

Like most insects, the Asian lady beetle has four distinct life stages: egg, larva, pupa, and adult. Eggs are laid outside the house, and the larva and the adult lady bug feed on soft-bodied insect pests, mainly aphids, found in forested areas and agricultural/ornamental plantings during the spring and summer months. Seeking shelter from the cold during the winter months, it could move into dwellings sometime before the first killing frost in the fall.

Houses painted white, yellow, or other light colors may be attractive to this bug because it is attracted to light. Lady beetles often congregate on the sunnier side of the house. Prevention (details below) may be the best option to reduce exposure to this insect.

Lady beetles can cause allergies and skin irritations in some people. Although they are not known to cause structural damages to houses like termites do, they may stain walls and fabrics. They may hide in hard-to-reach places and emit odors.

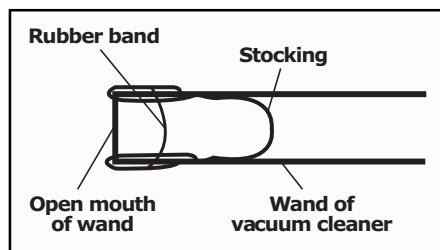
Insecticides are useful before the insects enter the house. Synthetic pyrethroids are effective when applied around lower edges of roofs, attic ventilators, windows, doors, sidings, etc., where the insects could enter the house. Such treatments probably are too late for this season since they have to be applied before the beetles enter buildings to overwinter (September or October).

Chemical control may not always be a suitable option for managing this pest indoors. Household insecticides used to control this beetle have to come into contact with it to be effective. Therefore, such insecticides have to be sprayed directly on the insects or the insects have to crawl over a significant sprayed area to receive a lethal dose.

While it may not be possible to eliminate the beetles, the following nonchemical measures could substantially reduce their numbers inside the house:

1. Asian lady beetles can enter the house through openings larger than 1/8 inch. To keep out the beetles, seal cracks around windows, doors, and other openings with weather stripping, silicone, or silicone-latex caulk. Larger gaps can be sealed with urethane foam or glass wool. Install tight-fitting door sweeps or thresholds at all exterior entry doors. Use 20-mesh insect screens over attic and exhaust vents. These measures should be taken by mid- to late fall. Sealing cracks and gaps around the house will also reduce energy costs. The materials are available at local hardware stores.

2. Swatting the beetles inside the house will result in unsightly stains on carpets or walls. While small numbers of beetles can be removed using sticky tape, vacuuming is more effective for large numbers. Either discard the beetles immediately or “bag” them for release outdoors during spring. To bag the beetles, insert a knee-high stocking into the extension wand of a vacuum cleaner and fasten the open end of the stocking on the mouth of the wand with a rubber band (see figure). Transfer the beetles from the stocking into a container with minute air holes and place a piece of damp cloth in the container since the beetles require moisture to survive. Store the container in an unheated area over the winter and release them in your garden during spring.



3. Beetles inside the house can also be collected with a trap developed by the Agricultural Research Service (ARS) of the U.S. Department of Agriculture (USDA). The USDA-ARS trap is used in a darkened room since it uses a blacklight to attract the beetles into a plastic bag. Beetles collected in the bag may be stored for release outdoors in spring (as described earlier) or killed using a mixture of dishwashing liquid and water kept in the plastic bag. The trap has to be moved from one room to another to treat the whole house.

Drawings and instructions for building the USDA-ARS trap are available on the Web ([www.ars.usda.gov/is/pr/2000/001030.trap.pdf](http://www.ars.usda.gov/is/pr/2000/001030.trap.pdf)). Some private companies sell traps via the Internet; they cost between \$65 and \$145. The WVU Extension Service is working with a Morgantown firm to develop a less expensive trap, which would allow homeowners to buy multiple units for simultaneous use throughout the house.

## Management plan first step in forest stewardship

By David McGill, Forest Resource Management Specialist, WVU Extension Service

Forests are complex systems. If a tree falls in the woods, many reactions take place. Light streams through the newly opened hole or “gap” in the canopy and hits the forest floor. Seeds that have fallen from trees and other plants over the years—now struck by full sunlight—germinate and take root.

While plants on the forest floor grow rapidly because of the additional light, the crowns of the trees adjacent to the fallen stem begin to expand into the newly created gap. The gap shrinks until once again crowns touch, the gap disappears, and the same direct light no longer falls to the forest floor but is captured by the forest canopy. This example only begins to describe the complexity, actions, reactions, and processes of forests. With such complexity, how can one manage a forest system to produce sustainable benefits?



By developing a forest management plan, this woodlands owner is protecting an asset that he'll pass on to his heirs.

In West Virginia, there is enormous potential for private landowners to manage their own complex forest ecosystems to produce diverse products and amenities. Some of these include increasing personal income through sales of forest products, enhancing visual quality, creating access for hiking, improving wildlife habitat, and investing in the woodlot as an asset to pass on to heirs.

One of the first steps in managing a woodlot is to develop a forest management plan. A management plan is key to improving the efficiency of forested property. These plans typically include landowner objectives, maps showing property boundaries, a forest inventory, and a series of planned operations over a period of five to 10 years. The plan provides focus through an activity schedule to help landowners achieve their objectives. A plan is also a prerequisite for participating in the Managed Timberland Tax Program, a state-sponsored program that provides a tax incentive to owners for managing their woodlands.

Landowners who possess at least 10 acres of forestland in the state can get professional assistance in developing management plans from the West Virginia Forest Stewardship Program. This program helps landowners manage their forests in a productive, sustainable, and environmentally sensitive manner. Over the past decade, the West Virginia Division of Forestry (WVDF) has administered this federally funded program that provides up to 75 percent of the cost of writing a plan. Nearly 4,000 private landowners have participated in the program, and the combined forest area in these management plans exceeds 600,000 acres.

Developing a management plan is the first step toward sound forest stewardship. By specifying their personal objectives and identifying their forest resources as they plan, landowners acknowledge that they are indeed the stewards who control the destiny and future condition of their woodlots and the products and amenities they produce.

For more details about developing management plans, contact Steve Milauskas or David McGill at the WVU Appalachian Hardwood Center by calling 304-293-2941, ext. 2465. For information about the Forest Stewardship Program, contact your county WVDF Service Forester listed in the phone book or call 304-558-2788.

# Choose the correct herbicide to control weeds in ponds

By Rakesh S. Chandran, Weed Specialist & IPM Coordinator, and Ken Semmens, Aquaculture Specialist, WVU Extension Service

Weeds in ponds and lakes can be aesthetically unpleasant and interfere with human activities. There are several options for controlling pond weeds. These include taking preventive measures like proper site selection and pond management; mechanically removing them with weed commercial rakes, harvesters, or dredgers; implementing cultural practices such as reducing water levels; using a biological control agent like triploid grass carp; or using chemicals or herbicides.

The situation will determine the appropriate control strategy. For instance, mechanical or cultural practices may be used to clear smaller areas or new weed infestations. Grass carp may be used for long-term weed management with limited selectivity of vegetation controlled. However, using a combination of suitable techniques is often the most effective and environmentally safe way to control aquatic weeds.

Several herbicides can be used to manage aquatic weeds. Choosing a herbicide for this purpose would depend on such factors as the size and location of treatment area, time of the year, water use and movement, total versus selective control, and regulatory restrictions. The water's oxygen depletion, especially during the summer months, also should be taken into consideration. Using the appropriate herbicide at the correct time to prevent fish kill is another important consideration.

To simplify the decision-making process, it is useful to understand basic types of herbicides. Classification of aquatic herbicides may be based on herbicide activity and selectivity. Herbicides may be active at the site at which they come into contact with the plant (contact herbicide), or they may have to be absorbed by the plant and transported to different parts where they become active (systemic herbicide).

A contact herbicide will kill only exposed tissues or plant parts that come into physical contact with the herbicide. These herbicides usually act faster than systemic herbicides. Common examples of contact herbicides are diquat and endothall. Systemic herbicides, which move inside the plant to become active, usually will kill the entire plant eventually. They act more slowly than contact herbicides. Common systemic herbicides include 2,4-D, glyphosate, and fluridone.

Herbicides capable of selectively controlling certain species of plants and not injuring others are called selective herbicides. A nonselective herbicide causes injury to all plants. Diquat and glyphosate are nonselective herbicides, and 2,4-D, endothall, and fluridone are selective herbicides.

Contact herbicides are effective to control annual weeds (weeds that take a year to complete the life cycle) and to treat shorelines, ramps, and small bodies of water where quick kill is desired and plant regrowth is not a concern. Systemic herbicides offer longer duration of weed control because they disrupt growth processes, leading to limited regeneration of treated weeds, especially perennial ones.

To be optimally effective, the herbicide should adequately cover the plant surface. Floating and emergent weeds can be controlled with a contact or systemic herbicide applied directly as a spray to the weed. However, submerged weeds are best controlled by a herbicide that will form a dilute solution and remain active after being applied to the pond. Limited or no water movement will be necessary for such treatments to be effective.

Aquatic herbicides are usually formulated as granules or liquids. Liquids are diluted with water and then applied with a sprayer or other equipment. Granular formulations can be applied by using a gloved hand, a scoop, or a fertilizer spreading bucket. Liquid formulations are more economical for large-scale treatments since they are more concentrated. Granules are more effective for deep (4 feet or more) ponds and smaller treated areas. Directions for dilution and application are stated clearly on the labels.

The herbicide has to be labeled and registered for the intended use. The product label should display the Environmental Protection Agency registration number. The intended uses will be stated under "General Information" on the label. To make an informed decision, a person has to carefully consider any restrictions given on the label. Other precautions on handling, storage, and disposal may need to be considered also.

The stage of application is another important factor. Usually, herbicides work better when applied to young, actively growing weeds. But some systemic herbicides like glyphosate are more effective when applied later in the growing season to facilitate better movement to the underground organs.

Finally, the herbicide of choice should control the weeds without causing much injury to the desirable vegetation. Selective weed control can be the most challenging predicament for people trying to manage aquatic weeds. This will depend primarily on the flora and fauna of the pond. The label of a given herbicide carries a list of weeds it controls fully or partially.

Several resources are available on the Internet to help you identify herbicides effective for a given pond weed. The Web sites of North Carolina State University ([www.cropsci.ncsu.edu/aquaticweeds/](http://www.cropsci.ncsu.edu/aquaticweeds/)) and Ohio State University ([ohioline.osu.edu/b374/](http://ohioline.osu.edu/b374/)) include herbicide efficacy ratings and control recommendations for common aquatic weeds.

The Southern Regional Aquaculture Center also has a fact sheet (number 361) explaining the response of common aquatic weeds to herbicides. For a copy, check the Internet ([www.aquanic.org/publicat/usda\\_rac/efs/srac.htm](http://www.aquanic.org/publicat/usda_rac/efs/srac.htm)) or contact either of us at PO Box 6108, Morgantown, WV 26506-6108; telephone, 304-293-6131.

## Nutrition and exercise: You can take control

By Guen Brown, Nutrition and Health Specialist, WVU Extension Service

Remember when kids walked and rode bicycles everywhere—to a friend's house, to school, around the block, down the road, or just around the yard? Remember when all members of the family sat at the table together to eat most of their meals? Certainly, family mealtime and freedom to explore our communities rank among some of our most cherished childhood memories.

For many of us, things are different now. Meals are rushed and often eaten "on-the-go." Children, as well as parents, have a hard time keeping up with their busy schedules, even when using a car to rush from one activity to another.

However, even with busy, hectic schedules, there's help for us and for our children in planning and following a healthy lifestyle. The U.S. Department of Agriculture and the U.S. Department of Health and Human Services jointly publish *Dietary Guidelines for Americans*. These guidelines are reviewed and updated every five years.

For the first time ever, the 2000 edition includes recommendations on physical activity. There are 10 guidelines, grouped together under three main headings. The following recommendations can help you develop a good "health plan" for you and your family.

### Dietary Guidelines for Americans

#### Aim for Fitness...

- Aim for a healthy weight.
- Be physically active each day.

#### Build a Healthy Base...

- Let the Food Guide Pyramid guide your food choices.
- Choose a variety of grains daily, especially whole grains.
- Choose a variety of fruits and vegetables daily.
- Keep food safe to eat.

#### Choose Sensibly...

- Choose a diet that is low in saturated fat and cholesterol and moderate in total fat.
- Choose beverages and foods to moderate your intake of sugars.
- Choose and prepare foods with less salt.
- If you drink alcoholic beverages, do so in moderation.



For more information, contact your county office of the WVU Extension Service.

## USDA standards offer 'organic' definition

New U.S. Department of Agriculture (USDA) standards essentially provide a national definition of the term "organic."

The national standards detail the methods, practices, and substances that can be used in producing and handling organic crops and livestock, as well as processed products.

Under the standards, all agricultural products labeled "organic" must originate from farms or handling operations certified by a state or private agency accredited by the USDA. However, farms and handling operations that sell less than \$5,000 worth per year of organic agricultural products are exempt from certification.

In addition to establishing clear organic labeling criteria, the standards specifically prohibit the use of genetic engineering methods, ionizing radiation, and sewage sludge for fertilization. Consumers should see full implementation of the product labeling program by midyear.

The USDA established the National Organic Program (NOP) under the direction of its Agricultural Marketing Service (AMS). The NOP will facilitate domestic and international marketing of organically produced fresh and processed food and assure consumers that such products meet consistent, uniform standards.

The NOP also includes a national list of substances approved for and prohibited from use in organic production and handling. A national-level accreditation program will be implemented for state officials and private persons who want to be accredited as certifying agents.

Organic farming is one of the fastest-growing segments of U.S. agriculture. The USDA estimates that the value of retail sales of organic foods in 1999 was approximately \$6 billion. Now standing at about 12,200 nationwide, the number of organic farmers increases by about 12 percent per year. Most are small-scale producers.

According to a recent USDA study, certified organic cropland more than doubled from 1992 to 1997. Two organic livestock sectors, eggs and dairy, grew even faster.

The NOP also provides for importation of organic agricultural products from foreign nations determined to have equivalent organic program requirements.

"This is the strongest and most comprehensive organic standard in the world," said former Agriculture Secretary Dan Glickman when the standards were implemented.

He also announced that the USDA will provide financial assistance to farmers in 15 states, including West Virginia, to help pay their costs for organic certification. Payments will be limited to 70 percent of an individual producer's certification costs, up to a maximum of \$500.

"For consumers who want to buy organic foods, the standards ensure that they can be confident in knowing what they are buying," Glickman added.

The national organic standards, detailed fact sheets, and other background information are available on the Web ([www.ams.usda.gov/nop](http://www.ams.usda.gov/nop)). You can also obtain them by mail from the USDA National Organic Program at USDA-AMS-TM-NOP, Room 2510 South Building, 1400 Independence Avenue, SW, Washington, DC 20250-0020.

## What vaccines does my horse need? (continued)

a wound (usually a cut or puncture), multiplies, and produces toxin. Eighty percent of the horses that contract tetanus die. This is probably the most important vaccine a horse should receive. Colts should receive an initial vaccination and then a booster to establish immunity. After this, horses should be vaccinated at least annually and more often if an injury increases the risk of tetanus.

Eastern, Western, and Venezuelan encephalomyelitis are usually grouped as "sleeping sickness." Half or more of the horses that contract one of these diseases usually die. Because mosquitoes transmit these diseases, there is a higher risk of contracting these diseases during warm weather. Since these diseases are transmitted by an insect, your horse does not have to come in direct contact with an infected animal to become infected. Spring is the ideal time to vaccinate against these viruses.

Equine influenza is fairly common. This viral disease is spread by contact from horse to horse. Symptoms of influenza include fever, depression, loss of appetite, and hacking cough. A horse may have influenza, but show few symptoms until a secondary bacterial disease infects the animal. Horses that come in contact with other horses are at greater risk of getting influenza and definitely should be vaccinated. Two types of vaccine are available for use in horses. One vaccine is injected either alone or in combination with other vaccines such as tetanus and/or encephalitis. A new intranasal vaccine is available for influenza.

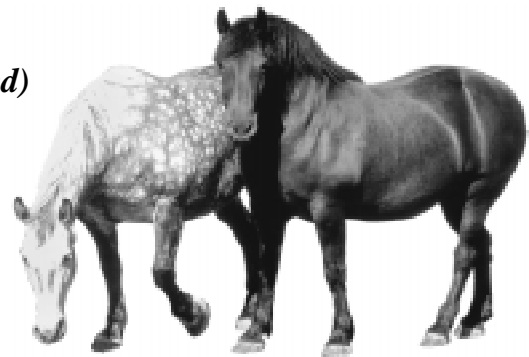
"Rhino" or equine viral rhinopneumonitis is another viral disease caused by herpesviruses. There are three forms of this disease. A respiratory form is common in weanlings, yearlings, and 2-year-olds. An abortigenic form causes abortions or the birth of weak foals. A neurological form causes posterior paresis, ataxia, and paralysis. Several vaccines are available for this disease, which are administered alone or in combination vaccines. These viruses are spread by direct contact. Horses that come in contact with other horses should be considered for vaccination to prevent the respiratory form of the disease. Some veterinarians recommend vaccinating show horses as often as every two or three months to prevent the respiratory form. Only one vaccine at this time is labeled as an aid in preventing abortions due to rhinopneumonitis.

Strangles, another disease commonly found in horses, is caused by the bacteria *Streptococcus equi*. This bacterium is found in a normal horse's respiratory tract. This bacterium can spread directly between horses or be spread on inanimate objects such as grooming equipment, water buckets, or even clothing. This highly contagious disease usually runs its course in three to six weeks. Two types of vaccines are commercially available. One is an intramuscular injection, and the other is an intranasal vaccine that is sprayed in the nostrils.

Rabies should be considered in your horse's vaccination program. This disease is of importance not only to the horse, but also to the people who come in contact with a horse having rabies. Several years ago a horse came to a veterinary school clinic as a referral. Several students, faculty, and staff were exposed to the animal before rabies was diagnosed. The symptoms accompanying rabies are unpredictable and highly variable. This vaccine should be boosted annually.

Potomac horse fever was first diagnosed about 20 years ago in the Northeast near the Potomac River. Since then, blood titers have been found in horses in 35 states. Symptoms may include high fever, abortion,

diarrhea, and laminitis. An insect vector is suspected to be involved



in transmitting this disease. Most cases occur in late spring to early fall. Annual vaccinations may be timed to have peak immunity at that time.

Equine protozoal myelitis (EPM) is caused by the protozoa *Sarcocystis neurona*. The opossum is the end host for this organism. The sporocysts, which infect the horse, are passed in the opossum feces and then ingested by the horse while grazing. Random blood tests have shown that approximately half of the horses in the United States have been exposed to this organism but only 2 percent to 3 percent have contracted the disease it causes. This neurological disease may take from two weeks to two years to develop. A vaccine that may prevent this disease recently received conditional approval.

The U.S. Department of Agriculture recently issued a conditional license for a vaccine to aid in preventing West Nile virus. This mosquito-borne virus was first detected in the United States in 1999. The virus causes encephalitis, which may result in stumbling, limb weakness, abnormal muscle twitching, and death. This vaccine, which has been licensed for a year, is subject to restrictions by state regulatory agencies.

Vaccines for botulism, viral arteritis, anthrax, and endotoxemia are not commonly used due to the low risk of infection in West Virginia or because of regulatory restrictions.

Although all vaccinations may not successfully prevent a disease, this is the best way to attempt to protect your horse. In all cases, ask your local veterinarian about the diseases your horse is most likely to encounter. Your local veterinarian is also best qualified to recommend vaccination schedules and inform you of manufacturer's recommendations for initial immunization and boosters.

## WVU UPDATE

The West Virginia University Extension Service and the WVU Davis College of Agriculture, Forestry, and Consumer Sciences are pleased to offer this educational insert to the Farm Bureau NEWS as a service to West Virginians. We welcome your questions or comments.

**Joyce Bower**  
Editor 304-293-4221

**Pat Kerns**, Graphic Designer  
**Nathan Hamric**, Illustration

**Edmond Collins, Shelly Courtney, William Grafton, John Jett, Sue Miles, David Snively, Wayne Wagner, and David Welsh**, Editorial Planning Committee

Programs and activities offered by the West Virginia University Extension Service are available to all persons without regard to race, color, sex, disability, religion, age, veteran status, political beliefs, sexual orientation, national origin, and marital or family status.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Lawrence S. Cote, Director, Cooperative Extension Service, West Virginia University.

West Virginia University is governed by the West Virginia University Board of Governors and the West Virginia Higher Education Policy Commission.