Biological Systems Engineering

BSE Announcements—Fall 2005

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Virginia Tech

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Engineering Update – Biological Systems Engineering

September 2005

To: Extension Unit Directors, Extension District Directors, Extension Program Directors, and ANR Agents

Dear Co-Workers: Engineering Update is a joint effort of Biological Systems Engineering and other interested agents. Subject matter areas include timely information on water quality, natural resource management, TMDL, air emissions, animal waste management, machinery management, precision farming, application technology, farm safety, engineering education, and technology. Please use this information in your on-going Extension programs and circulate to all Extension staff. Engineering Update is electronically accessible via the VCE Intranet World Wide Web site (*at http://www.ext.vt.edu/vce/anr/bse/index.html*).

New Extension Publications in Water Quality

Dr. Brian Benham would like to announce the release of two new extension publications in water quality. The first is ***Microbial Source Tracking and the TMDL (Total Maximum Daily Loads) Process*** by Charles Hagedorn III, Brian L. Benham, and Sara C. Zeckoski. It is Publication # 442-554 and can be found at the following URL: http://www.ext.vt.edu/pubs/bse/442-554/442-554.pdf. The publication gives a brief description of microbial source tracking (MST) or bacterial source tracking (BST), its methods, and its relationship to TMDL. The second publication is ***TMDLs (Total Maximum Daily Loads) for Bacteria Impairment*** by Brian L. Benham and Sara C. Zeckoski. It is Publication # 442-555 and can be found at the following URL: http://www.ext.vt.edu/pubs/bse/442-555/442-555.pdf. The publication defines bacteria impairments, how to determine their presence, and the discusses the development of TMDLs for bacteria impairments. Previous extension publications related to water quality include ***TMDLs (Total Maximum Daily Loads) - Terms and Definitions*** (http://www.ext.vt.edu/pubs/bse/442-550/442-550.pdf) and ***TMDLs (Total Maximum Daily Loads) for Benthic Impairments*** (http://www.ext.vt.edu/pubs/bse/442-556/442-556.pdf).

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. Patricia Sobrero, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; Lorenza W. Lyons, Administrator, 1890 Extension Program, Virginia State, Petersburg.

VIRGINIA STATE UNIVERSITY

Yield Monitor Calibration Tips

Getting the Most from Yield Data

Harvest time is quickly approaching and it can be time consuming and sometimes discouraging to calibrate yield monitors on combines. However, improperly calibrated yield monitors can essentially generate useless or difficult yield data to interpret. Taking the time and patience to calibrate a yield monitor can go a long way when it comes time to make important decisions from your yield data.

The first step is to become familiar with your yield monitoring equipment. Information provided by your dealer or manufacturer through on-site support, training sessions, users manuals, and videos are ways to learn about your equipment.

Check with your yield monitor dealer and manufacturer for this information and additional tips on calibration. Each yield monitor has a specific way to be calibrated which is outlined in the manufacturers calibration procedures manual.

Here are a few tips to maximize the benefits of yield monitoring equipment:

Before Operation

Back up any data from the PCMCIA memory cards if not done so from the previous season. After the previous harvest data is backed up, delete the files from the memory card. It is good practice to keep several back up copies of the raw data in different locations in case it is lost, stolen, damaged, or modified.

- Check your PCMCIA card to be sure it works properly.
- Contact your local dealer or manufacturer to determine the most recent software and firmware upgrades for your yield monitoring and mapping systems. Information about these upgrades are available through manufacturers web site or by contacting technical support.
- Check all cables, connections, and sensors for wear or damage from wear and rodents.
- For elevator-mounted moisture sensor units assure the grain is cleaned out and the manual clean-out motor is functional.
- Inspect the flow sensor. Look for wear on the grain elevator and missing or worn paddles. Check to make sure that the spacing between the paddles and the top of the elevator meets the manufacturers requirements.
- Look for wear on the flow sensor's impact or deflector plates and replace if plates appear worn.
- If a new or used combine with an existing yield monitor has been recently installed, double check to make sure it is installed properly.
- Avoid running electrical wires next to the GPS antenna. Close proximity may cause interference with the receiver signal. Running wires perpendicular to each other decreases the chance for electrical noise that may occur from other electronics.

Mark Alley, CSES (right) and crew installing yield monitor on Clarke's (middle) combine for measuring field plots.

During Operation, Prior To Calibration

- The memory card should be installed into your yield monitor before turning on the combine and yield monitor. Ensure proper communication between the card and the display monitor. Usually an error message will appear on the display indicating there is no communication with the card.
- Check to see if you are receiving good differential correction from either Coast Guard, WAAS, or your satellite subscription provider. If you have a satellite subscription, ensure it is renewed so you will not be caught

(Continued on page 3)

Yield Monitor Calibration Tips

(Continued from page 2)

in the middle of the field during harvest without differential correction service.

- Raise and lower the header to make sure the stop height switch operates. Some monitors are equipped with a manual switch which turns on and off data collection to your monitor. Adjust the header height switch to accommodate the preferences of different operators during harvest.
- Set row width according to number of rows for a row crop header and the appropriate width of a cutting platform header.
- Engage the separator and observe the elevator speed on the monitor.
- Put the combine in drive and check the ground speed indicator.
- Use accurate scales to weigh the grain. Certified scales or calibrated weigh wagons are recommended. When using weigh wagons, leave the wagon in one location in the field. Moving the weigh wagon through a field causes it to shake and bounce which can throw off the calibration of the weigh wagon. Use the same scales throughout calibration.

During Calibration

- Take temperature readings close to the moisture sensor on the combine. When collecting temperature readings of the equipment for some yield monitors make sure the combine has been out in normal operating temperatures for several hours. For example, taking a temperature reading from the combine when it has been in the shed or under a shade tree is much different than under direct sunlight.
- Collect moisture calibrations for each grain type. Take a good representation of the moisture of the grain harvested throughout the loads.
- When calibrating monitor for ground speeds, use typical field conditions rather than a road or waterway. Tire slippage can create inaccuracy with calibration.
- Harvest calibration loads at different flow rates. Yield will vary throughout the field. Adjusting flow rates will improve accuracy.
- Calibration loads should be between 5,000 to 8,000 pounds. This helps reduce variability with excess grain that may be in the combine.
- Gather loads in well represented areas of the field. Avoid starting calibration loads on turn rows, weed patches, or areas of major topography changes in the field. Hillsides and rolling ground can impact calibration load data because of how the grain impacts the flow sensor. If you are unable to avoid topographical changes, get a good representation of loads going up-and-down hill and side-to-side of a hill.
- Calibrate for each type of grain for each year. The dynamics of the combine changes from wear and tear and can influence the outcome of your yield data.
- When conducting on-farm research trials or harvesting fields with multiple varieties consider creating a calibration load for each treatment or variety. For example, calibrate for regular corn and high oil corn separately due to the differences in test weight and moisture characteristics of the grain.
- Calibrate for different moisture levels per type of grain. For example, calibrate differently for corn below 22% moisture versus corn above 22% moisture.

During Harvest

- Correct any malfunctions or errors indicated by the yield monitor. This can include moisture and flow sensors not working properly and loss of DGPS signal. Make sure the monitor is actually collecting data. Sometimes one can manually switch off data collection on the monitor and forget to turn it back on.
- Perform periodic calibration loads throughout the season to check or improve accuracy. Recalibrate if more than a 5 percent difference in error, 5 lb/bushel differences in test weight, or temperature changes greater than 10 degrees occur.
- Remove the PCMCIA card from the monitor and back-up data onto a computer and data storage devices frequently throughout the harvest season. A simple electrical shock from improper wiring or lightning can destroy your data on the card.
- If significant changes are made to the elevator chain, paddles, or flow sensor, recalibrate. Tightening the elevator chain, replacing old paddles or changing the gap of the flow sensor to the paddles changes the outcome of the previous calibration.
- If problems arise with the monitoring equipment, check through the trouble shooting information in the operators manual. Contact technical support to resolve problems.

By R. Grisso

Fall Safety Tips
National Farm Safety & Health Week—Sept 17-24, 2005

Safe Use of Harvesting Equipment
Harvesting equipment is a necessity on farms to gather the crops for a bountiful harvest. Harvest time is primary revenue time on many farms and is also one of the peak periods for farm injuries and deaths. Many of these injuries can be prevented through effective farm safety management.

- Develop a "safety first" attitude. Follow safe work practices all the time and set a good example for others.
- Be physically and mentally fit before operating equipment. Fatigue, stress, and worry can distract you from safely operating equipment. Take frequent breaks.
- Pay attention to all safety information. Read the operator's manual and warning decals.
- Inspect the equipment and correct any hazards before operating.
- Identify hazardous areas on equipment and make sure you stay away from moving parts. Beware of pinch points, shear points, wrap points, pull-in areas, thrown objects, crush points, stored energy hazards, and freewheeling parts.
- Make sure everyone who operates the equipment has the appropriate training and is physically able to operate it safely.
- Shut down equipment, turn off the engine, remove the key and wait for moving parts to stop before dismounting equipment.
- Keep bystanders away from equipment operation area. Do not allow "extra riders", especially children.

Inspection:

- Are PTO shields in place?
- Are guards and shields in place?
- Are safety locks operational?
- Are there any leaks in hydraulics?
- Is reflective "Slow Moving Vehicle" signage in place?
- Are lights working properly?
- Is a 20 lb. "ABC" fire extinguisher in place?

Halloween Safety

Halloween is a cherished tradition but the excitement of the night can cause children to forget to be careful. There is no real "trick" to making Halloween a real treat for the entire family. The major dangers are not from witches or spirits but rather from falls and pedestrian/car crashes. Many communities officially designate a "Beggars' Night" and assign specific hours for trick-or-treat activities. Both children and adults need to think about safety on this annual day of make-believe.

Motorists
The National Safety Council urges motorists to be especially alert on Halloween.

- Watch for children darting out from between parked cars.
- Watch for children walking on roadways, medians, and curbs.
- Enter and exit driveways and alleys carefully.
- Watch for children in dark clothing.

Parents
Before children start out on their "trick or treat" rounds, parents should:

- Make sure that an adult or an older, responsible youth will be supervising the outing for children under age 12.
- Plan and discuss the route trick-or-treaters intend to follow. Know the names of older children's companions.
- Instruct your children to travel only in familiar areas and along an established route.
- Teach your children to stop only at houses or apartment buildings that are well-lit, and never to enter a stranger's home.
- Establish a return time.
- Tell your youngsters not to eat any treat until they return home.
- Review all appropriate trick-or-treat safety precautions, including pedestrian/traffic safety rules.
- Pin a slip of paper with the child's name, address and phone number inside a pocket in case the youngster gets separated from the group.

Costume Design
Only fire-retardant materials should be used for costumes.

- Costumes should be loose so warm clothes can be worn underneath.
- Costumes should not be so long that they are a tripping hazard. (Falls are the leading cause of unintentional injuries on Halloween.)
- If children are allowed out after dark, outfits should be made with light colored materials. Strips of retroreflective tape should be used to make children visible.

Face Design

- Masks can obstruct a child's vision. Use facial make-up instead.
- When buying special Halloween makeup, check for packages containing ingredients that are labeled "Made with U.S. Approved Color Additives," "Laboratory Tested," Meets Federal Standards for Cosmetics," or "Non-Toxic." Follow manufacturer's instruction for application.
- If masks are worn, they should have nose and mouth openings and large eye holes.

Accessories

- Knives, swords, and other accessories should be made from cardboard or flexible materials. Do not allow children to carry sharp objects.
- If children are allowed out after dark, bags or sacks should be light-colored or trimmed with retro-reflective tape .
- Carrying flashlights will help children see better and be seen more clearly.

On the way

Children should understand and follow these rules:

- Do not enter homes or apartments without adult supervision.
- Walk, do not run, from house to house. Do not cross yards and lawns where unseen objects or the uneven terrain can present tripping hazards.
- Walk on sidewalks, not in the street.
- Walk on the left side of the road, facing traffic if there are no sidewalks.

Treats

To ensure a safe trick-or-treat outing, parents are urged to:

- Give children an early meal before going out.
- Insist that treats be brought home for inspection before anything is eaten.
- Wash fruit and slice into small pieces.
- When in doubt, throw it out.

Safety Videos, Slide Sets, and Films

BSE has a loan library of safety presentation materials available on a short-term loan basis for educational programs. Users are required to pay return postage fees.

Following is a categorical listing of safety presentations currently available:

- ATV Safety
- Automobile Safety
- Bicycle Safety
- Chain Saw Safety
- Chemical & Pesticide Safety
- Electrical Safety
- Falls
- Fire Safety
- General Farm Safety
- Gun Safety
- Home Safety
- Garden, & Landscaping
- Spraying Systems
- Tool & Shop Safety
- Tractors & Machinery
- Water & Recreation
- Wood Stoves
- Miscellaneous

Descriptions are found at: ***http://www.ext.vt.edu/vce/anr/bse/farmsafety/videos.html***

To request: Phone (540) 231-6809, Fax (540) 231-3199 or E-mail: tlcox@vt.edu

PLANS

In response to numerous requests, building and facility plans are now available for download from the Virginia Cooperative Extension (VCE) Intranet. Plans are categorized under five main categories: Forage Storage and Feeding, Grain Handling and Feeding, Beef, Horse, and Sheep. You will need Adobe Acrobat to download these files. For the building and facility plans, as well as additional resources, please visit: ***http://www.ext.vt.edu/vce/anr/bse/index.html***
(Susan Gay)

Helping Your Fellow Highway Users See You!

Harvest season always comes with a safety message about important precautions on our rural highways. It's the season when farm machinery and other vehicles use the same two-lane highways. It's also the season when collisions between farm equipment and other vehicles occur more frequently.

These collisions are often the result of the speed differential between farm equipment and cars and trucks. On any rural highway, the closure distance and time between vehicles operating at 55 miles per hour and a farm tractor pulling grain wagons operating at 15 miles per hour can be very short. Many investigations of these incidents have shown that the driver did not allow distance between their vehicle and the farm equipment in order to react quickly enough to avoid the collision.

There are several important ways in which these incidents can be avoided. Slow-moving vehicle (SMV) emblems should be prominently displayed on the back of tractors, wagons, and combines using rural highways. They should not be faded or dirty and need to be placed in the line of the sight of vehicle operators. Most farm tractors and combines are equipped with lighting and marking that will make the equipment more visible. It should be used whenever the equipment is on the highway and must be maintained in good working condition in order to be effective.

Vehicle operators should be especially wary of farm equipment that they could encounter at any time. Lower natural light conditions, especially at dusk, are critical times on rural highways. When encountering farm equipment, vehicle operators should be prepared to stop to avoid a rear-end collision or to avoid a piece of machinery that turns left in front of them into a field or farmstead.

With a little extra patience, careful driving habits, and the use of emergency marking and lighting, many of the collisions between farm machinery and vehicles could be prevented during this fall's corn and soybean harvest.

Prepared by: National Safety Council

Get ready - Manure Application Season

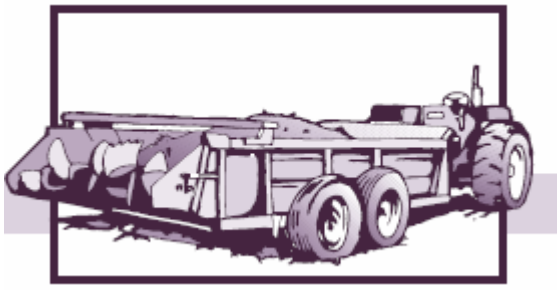
Some things to thinks about:

To get the most value from manure, as well as minimize the potential for environmental (water, air, and soil) pollution, requires careful manure management. This means applying the right amount of manure at the right time. Knowing the nutrient content of the manure and applying the manure at a rate to meet crop nutrient needs (in combination with other sources of fertilizer) will help meet this goal. Pay attention to the following as you prepare to land apply manure as the manure application period approaches.

Operation of Manure Applicators

Proper operation of manure applicators ensures accurate and uniform application rates or placement of manure nutrients for crop growth. Research has shown that variations in manure nutrient distribution can be substantial, but that relatively simple changes in application practice can significantly improve nutrient distribution and protect environmental pollution. Consider the following when applying manure:

- Surface water pollution is likely to occur from broken pipes and malfunctioning irrigation equipment
- Minimize or avoid overspray or drift of manure onto neighboring properties and highways
- There is a likelihood of widespread odor dispersion and negative public perception. Atomizing manure and throwing it high in the air will disperse odors further from the field than application methods that keep manure near the ground. The dark appearance of manure stream shooting through the air may draw negative attention from the non farming community. Puddles of manure or even worse, manure running from the fields can quickly lead observers to assume a careless operation
- Be aware of direct manure runoff due to excessive application rates
- Operate spreaders at the PTO speed specified by the manufacturer. The correct PTO speed optimizes manure output and the uniformity of spreading
- Maintain spreaders by removing any undesirable material from beater paddles, lubrication where necessary and cleaning the spreader floor
- Load spreader uniformly
- Annually, alternate spreading patterns on the field
- Reduce ground speed as the spreader nears the end of its load to ensure more uniform application



Manure Applicator Calibration

The objective of calibrating a manure applicator is to determine how much nutrients are being put out by the applicator per acre. Neither the type of manure applicator nor the consistency (liquid, solids, or semi-solid) of the manure matters. Knowing the application rate in gallons/acre or tons per acre is not sufficient. Manure applicator calibration should be performed twice a year.

Some basic information you need to record each time you perform a calibration include:

- Description of the manure
- Nutrient (e.g. nitrogen, phosphorus) content of the manure
- Moisture content of the manure
- Type of manure applicator (spreader, big gun etc)
- Settings that control the flow of manure
- Type, size, and settings of tractor or truck used.
- Travel speed

Take a representative sample from the manure used to calibrate the spreading equipment. Have the sample analyzed for nutrient and moisture content and keep reports with the calibration records. The moisture content of the manure determines how dilute or concentrated the nutrients in the manure are and can greatly affect the calibration.

Low moisture can result in more nutrients being applied if you base the application on volume of manure and high moisture contents may result in low nutrient application based on volume application rates. Therefore it is important that the calibration be done using manure with moisture content that is typical for the manure that will normally be land applied with the equipment to be calibrated.

There are a number ways to estimate each of these parameters and some of the details are covered in the fact sheet: Manure spreader calibration for rear-discharge equipment is available at http://www.ext.vt.edu/pubs/bse/442-004/442-004.pdf.

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To calibrate your manure applicator, you will need to:

1. Estimate amount applied or spreader capacity
2. Estimate the area covered
3. Calculate the manure application rate by dividing the amount applied by the area covered.

You will probably need to adjust the application rate to obtain the desired rate. Usually, for a spreader, this can be achieved by changing a combination of speed of forward travel and spreader controls. Note that you need to recalibrate the spreader by the same method as you change the controls. When the desired application is obtained, record the forward speed and the spreader settings for future reference.

For sprinkler systems, you may estimate the liquid application rates by placing straight sided catch cans at various locations under the sprinkler system. Measure the depth of liquid accumulated in the can in inches over a period of time (e.g. 1 h). Calculate the average depth of liquid in the cans and divide by the time interval to determine the application rates in inches per hour.

Emergency Response Plan

Review your manure application emergency response plan for containment and timely clean up of any spills. Make sure everyone involved with manure application is familiar with the plan and has access to the required authority, labor and equipment to implement the plan. If you have a sprinkler system, it is a good idea to have one or more full time observers to continually check the sprinklers, pipes, hoses, and pumps when pumping long distances.

Operator, Equipment, and Farm Pond Safety

Observe safety regulations associated with manure application and operation of manure applicators.

- Be especially careful when applying manure on uneven or steep terrain to ensure that the applicator units do not tip over
- Manure storage ponds, tanks or lagoons present a drowning hazard. All ponds and lagoons should be fenced
- Remember to warn visitors and guests about manure storage hazards. You are legally responsible for their health and safety while they are on your farm

Manure Storage Volume

While the main reason of applying manure is to apply nutrients to the field, it is important to remember that we also want to have adequate manure storage capacity for the winter season.

(by Jactone Arogo Ogejo)

Electrocution can be a serious problem on farms

This summer's tragic incident during a national scouting event in Virginia reminds us that electrocution incidents can happen any time in a seemingly safe and tranquil setting. Farms are no exception! The simple movement of a portable grain auger from one bin to another can have tragic results if the individuals involved are not extremely careful. Tractors with large cabs and antennas and oversized grain wagons can also result in preventable electrocution incidents.

Most farmsteads could use a very careful overhead electrical line visual inspection. Service lines may no longer meet the proper height codes because of age and/or damage to poles and pole guy wires. The sag may have increased over the years, while the height of the machinery being used today may be much higher.

Don't be fooled by those birds perching on the overhead lines, or the thought that insulation on the lines could protect you. Always assume that the lines have no insulation and that they may not be as high as they look. Never undertake the height measurement of the lines without the on-site help of utility company officials.

During normal farming operations, maintain at least a 10 ft. margin of safety from the lines. When in doubt, don't operate taller equipment, including tractors and combines with antennas, tractors with their front buckets raised, and large, fold-up cultivators under electrical service lines on your farmstead. Make sure that all family members and workers on your farm are aware of the electrocution dangers.

Where possible, install electrical safety warning signage to prevent equipment and personal contact with power lines. This will be beneficial to your suppliers who may be making deliveries to your farm. Always keep in mind this message, "Electricity doesn't allow mistakes. And neither should you."

(Prepared by National Safety Council)

Broiler Chicken Production in the US - Part 1

The commercial broiler industry in Virginia began over 80 years ago. A "broiler" is a chicken raised for meat rather than eggs. Before the development of the broiler industry, chicken meat was mostly a by-product of egg production.

Chicken was reserved for special occasions and not consumed on a regular basis. Large-scale, year round broiler production became possible in the mid 1920's, because scientists developed ways to meet the nutritional needs of chickens in protected environments.

Inspecting broiler chickens.

Americans consume nearly 80 lb of chicken per person annually, which is more than either beef or pork. Nationally, broiler production has increased greatly to meet this demand. The National Agricultural Statistic Service reports over 170 million broiler chicks are placed on feed each week. The average live weight of the broilers produced is 5.06 lb. Broiler industry has emerged from millions of small backyard flocks in the early 1900's into less than 50 highly specialized, vertically integrated agribusiness firms.

The vertical integration of the broiler industry provides an efficient way to produce chicken meat. Integrators are companies with hatcheries, feed mills, grain elevators, processing plants, and distribution networks who contract with individual farmers to grow chickens. They do everything in the process of delivering fresh chicken to the marketplace except tending the birds. Ownership of the birds is maintained by the company.

The interior of a broiler chicken house

Contract growers, often family farmers, contract with the integrators to grow chickens. A family farm unit on a full time basis is generally considered to be approximately 120,000 birds. Growers must adhere to the specific quality standards established by the integrator. The primary functions of the grower are to feed and water the birds and monitor and maintain environmental conditions in the house (temperature, humidity, and air quality) to ensure a comfortable environment for the birds. Growers are paid an agreed dollar amount per thousand birds based on the contract.

The integrator delivers the chicks from the company hatcheries to the grower. For energy reasons chicks are placed in one end of the house upon initial placement. As the chicks grow, the area is expanded until the entire house is open to the flock. The floor of the house is covered with litter, a wood-based bedding material that is normally distributed in poultry houses prior to birds being placed. Without any significant disease, there will be a normal mortality rate of 4 percent. The integrator returns approximately 50 days later to pick up the adult chickens.

Photographs courtesy of the USDA On Line Photography Center, http://www.usda.gov/oc/photo/opclibra.htm.

For more about the AgrAbility Project: http://www.agrability.ext.vt.edu/

Assistive Technologies for Poultry Operations

Poultry growers with disabilities are a growing clientele within the Virginia AgrAbility Project. Disabilities among all farm populations include the following: arthritis, orthopedic conditions, injury, vision and hearing impairments, stroke, respiratory conditions, and other health conditions. The following are technologies and workplace modifications commonly recommended for its clients.

Although some of the recommended equipment is now standard in newer poultry houses, growers who work in older poultry houses should consider the labor saving value of these technologies.

Mobility Around the Farm

For growers who have mobility or endurance limitations, it may be difficult to check on the flock and remove dead birds to disposal areas. A utility vehicle or modified golf cart can facilitate mobility and also serve to carry cargo.

Some growers may benefit from technology that reduces the number of trips to their poultry houses by allowing them to monitor environmental conditions from their residence. A phone dialing alarm system is standard equipment in new poultry house construction. Older poultry houses without updated alarm systems may require the grower to make frequent daily trips to inspect houses. These inspections guard against serious equipment malfunctions that could be costly and/or cause catastrophic bird loss.

Figure 1: A typical phone alarm system allows growers to remotely monitor house conditions.

Installation of a phone dialing alarm system would reduce the number of trips made by the grower to check on the houses.

Electronic devices to monitor temperature, power outages, and malfunctions in the water and feed systems are becoming standard equipment for many growers. Manufacturers of these devices have realized the advantages of convenient remote control and have produced communications software that will allow growers to access their controllers as if they were there in the poultry house.

In-House Mobility

Growers must walk around their houses several times a day to remove dead birds and check the birds and equipment. Crossing over equipment is one task that some growers may need assistance with inside a poultry house. Migration fences are used to keep poultry properly distributed and are especially important in tunnel ventilated housing. These fences are often too high for growers to step over easily or contain only a gate in the center of the house to walk through. An adaptation for growers with mobility issues may be to use an 8 in. diameter plastic drain piping as a migration fence. Often this is easier for a grower to traverse than a higher fence. In some cases, simple hand grips and grab bars at key locations provide growers a support aid they need to climb over low migration fences.

Figure 2: 8 in. diameter drain tubing used as a migration fence separate the birds within the chicken house.

Another potential obstacle to in house mobility is drinker lines. In many poultry houses that are 400 or 500 ft long, it is common to find drinker lines that are 200 ft long. Stepping over the 12 in. high drinker lines can be very difficult, especially when the grower needs to remove large dead birds.

Breaking long drinker lines into shorter sections creates alley ways for growers to carry dead birds to the side of the house without crossing drinker lines or having to walk hundreds of feet. Creating additional sections of drinker lines means additional pressure regulators to check. This can be addressed by installing a central pressure controller where all drinker lines can be adjusted at a single location.

Dead birds are difficult to pick up, carry and remove from a house, especially heavier, older birds. One option to reduce handling of the dead birds is a conveyor system that can carry birds to the end of the house . From the conveyor the dead birds fall into a tractor bucket or other transport device and are carried to a composter or incinerator.

Figure 3: Dead birds are carried to the end of the house by a conveyor.

Another strategy to reduce the distance a grower must carry dead birds is the installation of a series of small insulated doors along the side walls. These doors are similar to the doors sometimes used in homes to let dogs and cats outdoors. The doors allow dead birds to be placed outside the house where a grower can pick them up with a farm utility vehicle or a tractor with bucket for transport to the disposal site. These doors are especially helpful in newer houses which tend to be wider and have fewer access doors.

Litter treatment products are spread in houses prior to chick placement. Using a common lawn fertilizer spreader with small hard tires is difficult for growers to maneuver over a litter-covered floor. A spreader equipped with larger pneumatic tires makes this task much easier for

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Assistive Technologies for Poultry Operations

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growers. Feeding chicks Chick feeding can be a challenge for growers who have to roll out paper or position box lids to contain the feed. Frequently, chick feeding is done by hand.

Installing feed dispensers on existing feed lines can be a tremendous labor saver. In older houses a pull or rail-type feed cart is found to be a solution to help with chick feeding.

Feeding paper is commonly used when chicks start eating feed. Placing the feed on the paper makes it easier for chicks to eat. The task of rolling out this paper over the entire length of a house under each feed line can be very strenuous on a person's back, knees and legs. Devices are available that attach to a farm utility vehicle or a golf cart to help roll out feeding paper.

Dead Bird Disposal and Composting

Composting is a common practice for disposing of dead birds. Individual compost bins are usually rectangular in shape and constructed of heavy lumber. The birds are placed on one side of the bin and additional boards are added as the bin is filled. The lifting activities involved in this task can be physically difficult for some growers. An alternative design is to use swinging gates on these bins, which a grower can easily open and close.

Channel composters offer a labor-saving alternative to individual bins. The compost mixtures are layered using a front-end loader in a series of long channels or alleys. This method eliminates the use of boards or gates and much of the hand labor associated with composting mortalities

Clean, double-burner incinerators are an option for growers who have difficulty with the manual labor involved with bin composters. State regulations vary between states so prospective users should check their state regulations thoroughly.

Conclusion

There are numerous tasks involved in poultry farming that make it a physically demanding occupation. Today's technology can make it possible for farmers with disabilities or chronic health conditions to continue farming.

For more information review: http://www.agrabilityproject.org/assistivetech/tips/ag_tech_broch.cfm

Free Telephone Assistance for Speech Disabilities

People who have a speech disability and live in the USA, including Puerto Rico and the Virgin Islands, can now use a new, free telephone service 24 hours a day. This service, called Speech to Speech (STS), provides communication assistants (CAs) for people with difficulty being understood by the public on the telephone. The Federal Communications Commission (FCC) in Washington, D.C. regulates relay service: STS is a form of relay service.

People with speech disabilities can dial toll free to reach a patient, trained CA who is familiar with many speech patterns and has excellent language recognition skills. This CA makes telephone calls for them and repeats their words exactly in a 3-way calling environment. Every month users make about 6,000 calls nationally. STS is the only way for many people to telephone others not accustomed to their speech.

Many STS users have Parkinson's disease, cerebral palsy, ALS, multiple sclerosis, or muscular dystrophy. Other users stutter or have had a laryngectomy. STS also helps some speech synthesizer users. Users of Augmentative and Alternative Communication (AAC) may ask the STS CA set up the call, negotiate the menu, introduce the call explaining AAC and then go into the background. This enables AAC users to communicate independently once the other party is on the line. In Minnesota and Texas, Deaf Voice Carryover (VCO) Relay users with slurred speech can combine VCO with STS to facilitate communication.

Bob Segalman, Ph.D. has cerebral palsy and developed the concept of STS. Now it makes telephone use much easier for him. To try out STS, report problems or get more information: Call 877-833-6341 and ask for Dr. Bob Segalman (direct 916-362-0982). You may also visit the STS website: http://www.stsnews.com or contact Katherine Keller at stslistserv@stsnews.com to place you on the STS List Serve.

Bob is gathering support letters to insure that every state implements an STS Outreach Service to tell people with speech disabilities about STS. If you're willing to sign a support letter, please e-mail Bob at: drsts@comcast.net and indicate which state you live in and request a draft.

For a list of U. S. Speech-to-Speech access numbers go to: http://www.stsnews.com/RelayNews/STSDialUpTelnumbers.html. You can also access STS by dialing 711 and asking for Speech to Speech. If the communications assistant can not assist you with an STS call, please let Bob know by e-mail stating your name, date and time of call, location, and telephone number. (Submitted by C. Rivas, CalAgrAbility)

Crash risk is four times higher when driver is on the phone

Common sense and experience tell us that handling and dialing cell phones while driving compromises safety, and evidence is accumulating that phone conversations also increase crash risk.

New research by the Insurance Institute for Highway Safety quantifies the added risk – drivers using phones are four times as likely to get into crashes serious enough to injure themselves. The increased risk was estimated by comparing phone use within 10 minutes before an actual crash occurred with use by the same driver during the prior week. Subjects were drivers treated in hospital emergency rooms for injuries suffered in crashes from April 2002 to July 2004.

The study, "Role of cellular phones in motor vehicle crashes resulting in hospital attendance," is published in the British Medical Journal, available at www.bmj.com. They received financial support from its member companies and organizations, which include Virginia Farm Bureau and dozens of insurance companies.

The main finding of a fourfold increase in injury crash risk was consistent across groups of drivers. Male and female drivers experienced about the same increase in risk from using a phone. So did drivers older and younger than 30 and drivers using hand-held and hands-free phones.

Weather wasn't a factor in the crashes, almost 75 percent of which occurred in clear conditions. Eighty-nine percent of the crashes involved other vehicles.

More than half the injured drivers reported that their crashes occurred within 10 minutes of the start of the trip.

The study was conducted in the Western Australian city of Perth. They first tried to conduct research in the United States, but U.S. phone companies were unwilling to make customers' billing records available, even with permission from the drivers. Phone records could be obtained in Australia, and researchers obtained a high rate of cooperation among drivers who had been in crashes.

Another reason for conducting the study in Australia was to estimate crash risk in a jurisdiction where hand-held phone use while driving is banned. It has been illegal in Western Australia since July 2001. Still one-third of the drivers said their calls had been placed on hand-held phones.

Hands-free versus hand-held

The study results suggest that banning hand-held phone use won't necessarily enhance safety if drivers simply switch to hands-free phones.

One would think using a hands-free phone would be less distracting, so it wouldn't increase crash risk as much as using a hand-held phone. Either phone type was found to increase the risk. This could be because the hands-free phones that are in common use aren't really hands-free. There is insufficient data to compare the different types of hands-free phones, such as those that are fully voice-activated.

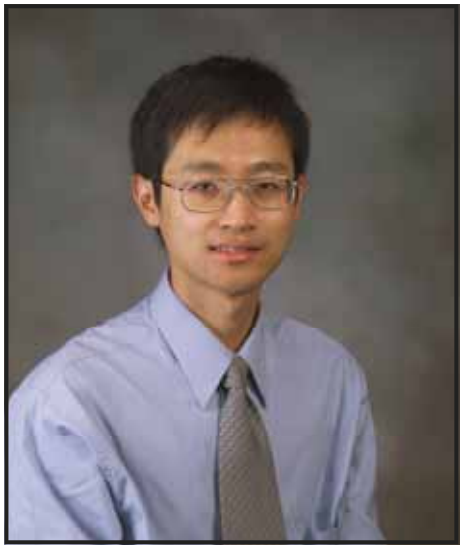
The findings, based on the experience of about 500 drivers, are consistent with 1997 research that showed phone use was associated with a fourfold increase in the risk of a property damage crash.

Taken together, the two studies confirm that distractions associated with phone use contribute significantly to vehicle crashes. Other studies have been published about cell phone use while driving, but most have been small-scale and have involved simulated or instrumented driving, and not the actual experience of drivers on the road. When researchers have tried to assess the effects of phone use on real-world crashes, they usually have relied on police reports for information. But such reports aren't reliable because, without witnesses, police cannot determine whether a driver was using a phone.

For more information go to www.iihs.org. (Source: Virginia Farm Bureau Magazine, August 2005, pg 29)

Welcome New BioProduct Utilization Faculty

Dr. Zhiyou Wen joined BSE in August, with research and extension responsibilities in agricultural byproduct utilization. Dr. Wen received his B.S. and M.S. degrees in Biochemical Engineering from East China University of Science and Technology. He then received his Ph.D. degree from University of Hong Kong in 2001. Since 2001 he has been a Post-doctoral Research Associate at Washington State University.



Dr. Wen has an excellent scholarly record. He has been a Co-PI on three grants at Washington State University. Dr. Wen is the author of 2 book chapters and 18 refereed publications. In addition he has filed three patent disclosures. He also has advised a Ph.D. student, a Research Associate and three part-time assistants. Dr. Wen has also participated in several extension activities at Washington State University and taught two courses at University of Hong Kong. His research interest is in conversion of animal wastes and other agricultural byproducts to value-added products.

Upcoming Events and Important Dates

"National Farm Safety & Health Week" - September 18-24, 2005

"Precision Agriculture Forum," September 21, 2005 at the Patuxent National Wildlife Center, Laurel, Maryland**.** For more detail: http://www.mda.state.md.us/pdf/precision_ag_forum_2005.pdf

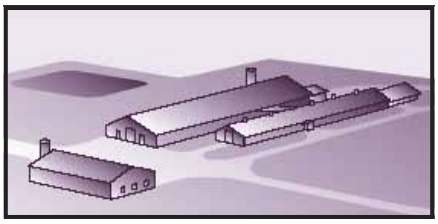
"Preparedness and Response to Agricultural Terrorism," October 18-20, 2005, Asburn, Virginia.

"Stormwater Management from a Watershed Perspective," October 11, 2005 at noon – 2:30 pm (EDT), Fourth in the Watershed Issues Series Satellite and Videostream Conference. Further information is available at http://wawater.wsu.edu or by calling 509-574-1584. There is no charge for the videostream or satellite downlink (http://wawater.wsu.edu). The coordinates for the satellite downlink are Galaxy 3C, 95 degrees West, Transponder 2. There will be a ½-hour test pattern before the actual airing time.

Congratulations to Susan Gay

BSE is proud to announce that Dr. Susan Gay was awarded a Blue Ribbon in the ASABE 2005 Educational Aids Competition. Her publication entitled, "Site Selection for Dairy Housing Systems" was selected to receive Blue Ribbon in the Fact Sheets category.

The competition recognizes outstanding educational methods and materials which contribute to the understanding of agricultural engineering subjects. Major emphasis is placed upon how well the needs of the intended audience are met.



The publication can be found at: http://www.ext.vt.edu/pubs/bse/442-096/442-096.html

Over half of U.S. farms have Internet access

A total of 51% of U.S. farms now have Internet access, compared to 48% with Internet access in 2003. 58% of farms have access to a computer in 2005, the same level as 2003. 55% of all U.S. farms own or lease a computer, up slightly from 54% in 2003. Farms using computers for their farm business increased one percent from 2003 to 31% in 2005. It appears that computer usage, ownership, and Internet access on farms are leveling off. In 2005, 79% of U.S. farms with sales and government payments of $250,000 or more have access to a computer, 77% own or lease a computer, 66% are using a computer for their farm business and 72% have Internet access. From *The Corn & Soybean Digest* for more details see: http://www.cornandsoybeandigest.com/news/farms-internet-081005/

USDA Launches Soil Survey Web Site

The U.S. Department of Agriculture (USDA) has launched a Web site that will provide -- for no charge -- secure public access to the national soils information system.

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(Continued from page 12)
This site is a simple yet powerful way to access and analyze soils data that contributes to every aspect of public and private land use and development.

The Web site has been designed with three easy to use features- Define, View and Explore and operates much like internet sites that provide locator and directional information. When viewers visit the web soil survey, they are asked to "Define" a geographic area of interest by selecting a state and county or just by highlighting an area or areas. Once a location has been defined and projected on the screen, the viewer has the choice to print the map and related information, save it to their hard drive or download the data for use in a geographic information system (GIS).

The viewer also can "Explore" the designated location for specific soils data giving the viewer important information on soil suitability in relationship to usage. This flexibility provides the viewer an opportunity to build a customized report that addresses the viewer's individual needs. Information can be delivered in a variety of formats to include print, CD, DVD or other media.

Prior to the Aug. 16 launch all soil survey maps were printed and bound into soil survey books that were free to the public at local USDA Service Centers, NRCS field offices and public libraries. The once familiar soil survey publications will be phased out slowly and the federal government's initiative of electronic government information (eGov) will replace the printed publications through the use of this site.

Currently, NRCS has soils maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site will be updated and maintained online as the single authoritative source of soil survey information.

To view the Web site go to http://soils.usda.gov/survey.

Chain saw Safety

Chain saws can be great labor saving tools. But if not operated properly and with respect, they can quickly cause severe injury and death. This note cannot address every potential hazard you may encounter while using a chain saw. If you are not familiar with techniques of sawing, saw operation, or maintenance, read your owner's manual, consult a more detailed publication, or ask a dealer for more information.

Owner's Manual Read the owner's manual before operating a chain saw for the first time. Note the safety practices. Note how to check and adjust the chain tension. It's important for safe operation.

Personal Protective Equipment One of the best safeguards against injury is wearing the proper protective equipment. This includes: safety glasses or goggles heavy-duty, non-slip gloves sturdy non-slip shoes hearing protection trim fitting clothes (not loose or ragged) long-sleeve shirt and pants (chaps if you have them) hardhat

Transporting the Saw Put the chain guard on the saw when not in use. Always carry the saw at your side with the cutting bar and chain to the rear and to the outside. Never carry a chain saw in the passenger area of a vehicle.

Fueling a Chain Saw Use the fuel mix recommended by the manufacturer. Never fuel a hot chain saw; let it cool first. Always fuel in a clear area away from debris. If your fuel can has no spout, use a funnel. Wipe the saw clean of any spilled fuel after fueling. Never smoke while fueling.

Starting the Chain Saw There is only one safe way to start a chain saw: Move 10 feet or more away from the fueling area. Place the saw in a clear, debris-free area. Hold the saw firmly on the ground by putting your foot through the rear handle (if possible) and by holding it down with one hand on the top handle. Pull the starter cord with the other hand. The chain should not be moving while the saw is idling. Never start the saw while holding it off the ground, or by "drop starting" it.

Preparing to Cut
Clear away anything that has a chance of interfering with the operation. Remove debris that could cause you to slip or lose your balance or accidentally contact the chain. Keep both hands firmly on the saw when cutting.

Avoiding Kickback Kickback occurs when the saw rotates back, or "kicks back" at the operator, due to the nose of the saw contacting an object or obstruction. To prevent kickback:

- Use a saw equipped with **chain brake** or **kickback guard**.
- **Hold** the saw firmly with both hands. **Grip** the top handle by putting the thumb around it.
- **Watch** for twigs that can snag the chain.
- **Don't pinch** the chain while cutting the log.
- Saw with the lower part of the bar close to the bumper, not on the top near the nose.
- Maintain **high saw speed** when entering or leaving a cut.
- Keep the chain **sharp**.
- **Do not reach** above your shoulder to cut. The chain is too close to your face in this position.

Felling, Limbing, and Bucking Cutting down large trees is not simple and should be left to experienced operators who have felled trees before. Limbing requires proper position and consideration of kickback potential, the springing back of branches, and the chance the log will roll. Bucking (cutting a log into lengths) requires knowing how to block the log to prevent binding, kickback, and rolling. If you are not familiar with these operations, get more information from your owner's manual, a saw dealer, a book or video, or from an experienced operator.