

# Ag Expo

## June 25-27

### Look for precision agriculture demonstrations at Ag Expo

**P**recision agriculture — if you're tired of reading about it and want to see it first-hand, and actually talk to somebody who knows a little more than the average self-professed expert, then take note when you enter the MSU Ag Expo grounds this year.

Attendees to this year's event can see demonstrations on field mapping, crop monitoring, computer-controlled spraying, a Global Positioning System (GPS)-guided variable rate anhydrous applicator, and an all-terrain vehicle (ATV) equipped with GPS soil sampling equipment. Demonstrations will be held at noon and 3 p.m. each day at the main entrance to the Expo grounds, according to Rich Hodupp, MSU area of expertise crops agent.

"Interest in precision ag is growing by leaps and bounds," Hodupp explained. "We hope to be able to help educate some producers, answer some questions, and then be able to direct them to specific exhibitors for additional information, if so desired."

Each demonstration will last approximately one hour, says Hodupp. Individuals can also talk one-on-one with company representatives on products, including: John Deere's GreenStar System and yield monitors; Raven Variable Rate Sprayer Controls, sponsored by FARMCO of Dewitt; TSM's GPS and Grid Soil Sampling; and Rawson Control and John Blue/Blue Jet System's variable rate anhydrous systems, sponsored by Kale Marketing.

#### Variable Rate Anhydrous

Producers will be able to see a variable rate anhydrous system so new, it's still considered a prototype, according to Ray Glaze, sales representative for Kale Marketing. Using a Rawson controller and radar tied into a John Blue/Blue Jet pump and tool bar and GPS unit, the system will be able to vary the application rate of anhydrous based on grid soil tests.

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## Less compaction and more precision focus at Ag Expo



Visitors to this year's Ag Expo will learn some tips on reducing compaction and improving nutrient absorption without sacrificing surface residue. Precision agriculture will also be highlighted as a means to improve overall farming techniques.

### Animal handling demonstrations to focus on managing total mixed rations

**"There's the ration you balance, there's the ration you put into the mixer, there's the ration you deliver to the animal, and then there's the ration the animal consumes" —MSU's Dr. Bill Bickert**

**T**here's little doubt that total mixed rations, or TMRs, are quickly becoming the feeding method of choice for most dairy producers. The economics of this decision have been documented numerous times. However, there are factors about TMR delivery that warrant more attention, says MSU's Bill Bickert, a professor in the Agricultural Engineering Department.

"TMRs are an essential aspect of good dairy management — everyone ought to be aiming toward feeding TMRs to every animal on the farm," Bickert said. "However, we feel there are some opportunities for producers to improve their feed utilization and TMR practices."

With those goals in mind, the animal handling demonstration at MSU's Ag Expo, June 25-27, will focus on improving TMRs, paying close attention to

ration variation, moisture levels, particle length, ration balancing and mixing management guidelines. Livestock producers will also have a unique opportunity to bring in their own TMR samples and have them tested for particle length.

Signs will be posted at the entrance to the Ag Expo grounds giving instructions on where to drop off TMR samples and schedule an appointment for testing and consultation with a nutritionist on their TMR. "We plan to have 10 commercial units, marketed by NASCO, available for producers to use in conducting their own particle length test," Bickert explained.

Producers should be aware that the TMR test will focus on particle length only and will not test for protein or energy levels. Bickert estimates that producers should allow 10 to 15 minutes for the testing and consultation procedure.

Twice a day, at 11 a.m. and 1:30 p.m., producers can also attend a 45-minute program to hear from Dennis Buckmaster, Penn State Associate Professor in Agricultural Biological Engineering.

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### COVER STORY

**H**ow tires and rubber belt tracks on tractors and other field equipment can reduce soil compaction will be the focus of the Ag Expo field demonstrations, June 25-27 at Michigan State University. The three-day event will be open from 9 a.m. to 5 p.m. June 25 and 26 and from 9 a.m. to 4 p.m. June 27.

"Soil compaction has been an increasing concern among many farmers during the past few years as equipment has become larger," explained Tim Harrigan, Ag Expo Director. "There are a number of things farmers can do to minimize soil compaction and yet still get optimal performance from equipment. We will show how that can be accomplished."

According to Harrigan, the field demonstrations will run from 9:30 a.m. to 12:30 p.m. each day and will feature equipment and tillage experts from MSU, John Deere, Ford New Holland, Caterpillar and the Goodyear Tire Company.

Included in the field demonstrations will be tractors on electronic scales to show how farmers can balance them for optimum weight distribution, and a demonstration on tire selection and ballasting for minimum ground pressure. In addition, two tractors using an evener hitch (to see which tractor is pulling the most efficiently) will pull a third tractor or tillage unit to demonstrate traction capability.

#### Weed Tour Planned

The annual MSU Weed Tour will also take place on Wednesday of Ag Expo week. Guided tours will start at the MSU Botany and Plant Pathology field laboratory on College Road. The corn and soybean tour begins at 9 a.m. and the horticultural crops tour starts at 1 p.m. Visitors can take self-guided tours of the plots beginning at 2 p.m. on Tuesday and anytime on Wednesday or Thursday.

#### Animal Handling to Include Free Feed Particle Analysis

The animal handling demonstration at Ag Expo's main exhibition site will be on dairy and animal behavior, feed bunk management and feed mixing. The sessions will be held at 11 a.m. and 1:30 p.m. each day.

Dairy and beef producers are invited to bring gallon-sized samples of fresh TMRs to the demonstrations for free TMR particle analysis and consultation. The samples should be pulled from the TMR mixer wagon delivery chute or from the feedbunk

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### Tell them what you think!

**A**bout 400 farm families visiting Ag Expo will be asked to comment on the quality of the show and the various demonstrations that will take place each day.

"Our aim is to make sure that we are in tune with visitors' expectations of the show and its intended educational content," says Ag Expo Director Tim Harrigan. "The survey is the best way we can keep in touch with the ideas or informational needs that producers have in light of the rapid changes occurring in agriculture. We want Ag Expo to be as beneficial as possible to our visitors."

The survey will be conducted at various times of the day during all three days of Ag Expo by students from the College of Agriculture and Natural Resources, and will take less than 10 minutes to answer.

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# Tires, tracks, traction and flotation

by Tim Harrigan, Associate Professor, Agricultural Engineering Department, Michigan State University

The focus of MSU's Ag Expo field demonstrations this year will be on reducing soil compaction. Demonstrations will illustrate the range of tire and track options available for tractors, combines and other equipment. The events will also show how decisions regarding tire selection, tire pressure and ballasting influence machinery performance and compaction.

Excessive compaction can restrict root development, increase soil and water runoff and decrease crop yields. While some soils are naturally compact, most compaction problems in Michigan are caused by heavy and repetitive loads from large tractors, combines, manure spreaders and other implements.

Since compaction is influenced by contact pressure at the soil surface, as well as total axle load, large equipment should be managed for optimal performance and minimal soil compaction.

## Minimizing Soil Compaction

Symptoms of compaction include soil crusting, cloddy seedbeds, standing water and an absence of plant roots in the soil profile, variable plant emergence and growth, distorted stem shoots, lodging, and depressed yields.

A successful management strategy includes all aspects of the crop production system: soils, tillage, crop rotation and machinery management. The first step in developing a plan to manage compaction is to take stock of what we already know:

- Most soils — including mucks and sandy soils — can suffer compaction, but the most susceptible



Minimizing soil compaction is the focus of numerous field demonstrations at the 1996 Ag Expo. From tracks to tire pressure, all phases of tire compaction will be addressed.

are usually poorly drained and fine-textured soils such as clay loams.

- Most problems are caused by trafficking soil when it is too wet. Water lubricates the soil and makes it easier to squeeze the soil particles together and compact the soil.

Shallow compaction is influenced mostly by contact pressure at the soil surface, deep compaction by both contact pressure and axle load. Heavier loads drive compaction deeper into the soil, even when the ground contact pressure is similar to that of lighter loads.

## Consider the following:

- 70 to 90 percent of the tire sinkage and bulk density change occurs on the first pass across the field.
- Compaction is generally confined to the upper 12 inches if the maximum axle load is less than five tons; however, wet soils and repetitive traffic can push it deeper.
- Yield response to deep compaction often depends on the weather; yields tend to decrease in wet years and increase in dry years.
- Shallow compaction can hurt yields every year in all tillage systems.

- Compaction can be reduced over time by wetting and drying, freezing and thawing, root growth and microbial activity.
- Freezing and thawing is effective near the surface where several freeze-thaw cycles occur. But don't count on freezing and thawing to repair deep compaction in one winter. Deep compaction goes through only one freeze-thaw cycle per year and can persist for several years.
- Increasing soil organic matter with animal/green manure can help manage compaction by decreasing soil bulk density and improving water infiltration, water-holding capacity and aggregate stability.
- The best way to deliberately compact a soil is to first loosen it with tillage and then apply a load. Frequent deep tillage followed by excessive traffic may drive compaction even deeper into the soil. Deep tillage should only be used when a documented compaction problem exists.
- After years of reduced tillage, soil is more resistant to traffic. This can be measured by reduced tire track depth, lower measured soil stress below the tire surface and change in pore volume. However, soil compaction can occur in any tillage system, including no-till.

Managing soil compaction may mean compromising the need to finish field work in a timely fashion and the need to avoid trafficking soil that's too wet. Nature can alleviate machinery-induced compaction in the long-run, but the best way to manage compaction year-to-year is to manage machinery to keep a light load on the soil, choose tillage operations wisely, return organic matter to the soil, and include crops such as alfalfa in the rotation when possible.

## Managing machinery to alleviate soil compaction

A basic machinery management strategy to control soil compaction is to select and operate available equipment in a way that applies the lowest possible pressure to the soil, advises Tim Harrigan, associate professor in MSU's Agricultural Engineering Department.

"With wheel tractors, producers should select a tractor chassis that distributes the load evenly over the axles and decrease ground pressure with larger, low-pressure radial tires," Harrigan explained. "Tracks or low-pressure tires can also be added to combines, grain carts, manure spreaders and other equipment."

### Decrease the Maximum Axle Load

Chassis type affects axle load, says Harrigan. Two-wheel drive (2-WD) tractors carry 75 percent or more of the total tractor weight over the rear axle. A mechanical-front-wheel-drive (MFWD) tractor of similar weight and horsepower is designed to carry about 60 percent of the tractor's weight on the rear axle.

Under load, four-wheel-drive (4-WD) tractor

axle loads are equal front to rear. "For a 175-horsepower tractor, this cuts the maximum axle load by nearly 50 percent for a 4-WD compared to a 2-WD tractor (see Table 1)," Harrigan said. "For manure spreaders and grain carts, tandem axles are better than single axles."

### Decrease Ground Pressure

Several studies have shown a corresponding yield decrease as ground pressure increases. Tracks allow low ground pressure — Caterpillar estimates 4½ to 6 psi — because the tracks spread the load over a larger area. While duals or triples can do the same thing, Harrigan suggests reducing tire pressure according to manufacturer recommendations for the load carried.

"Since 1992, radial tires have been available with design pressures as low as 6 psi for duals and triples," Harrigan said. "Ground pressure is usually estimated as the tire inflation pressure plus one or two psi to account for tire stiffness. Lowering the pressure increases tire contact area and spreads the

load over a larger area."

Likewise, over-inflating a 20.8R42 to 18 psi rather than 10 psi can decrease ground contact area by 33 percent, cautions Harrigan. Traction can be improved by adding weight, using a larger diameter tire, or increasing lug depth in soft soils.

### Increase Travel Speed

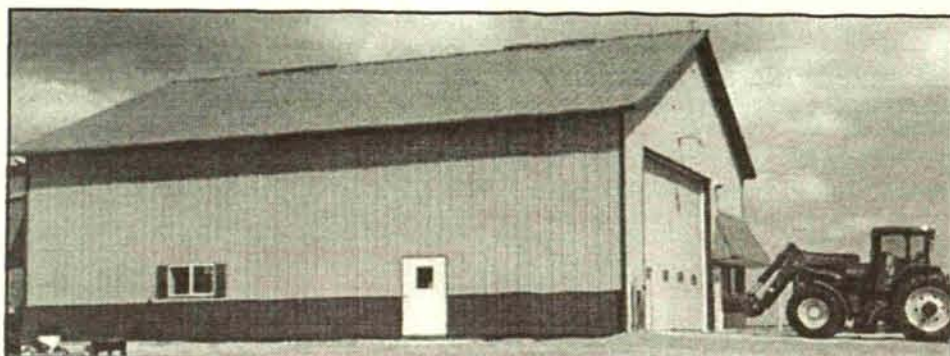
Increasing travel speed decreases soil strain, Harrigan advises. Power is the product of pull and speed. For example, a 20-foot field cultivator operating at 4½ mph requires about the same horsepower as a 15-foot field cultivator traveling at 6 mph. "Both will cover the same amount of ground in a given hour, and reducing draft may allow a lighter tractor to be used," he suggested.

### Reduce Trips Across the Field

Newer tillage tools allow multiple operations and a range of control over crop residue that allows reducing the number of seedbed tillage operations. Crops such as dry beans are quite sensitive to shallow compaction created in the spring during seedbed tillage.

Table 1 — Gross Vehicle Weight (GVW) and Maximum Axle Loads

Implement	GVW lbs.	Maximum Axle Load, tons
<b>Tractors (under load)</b>		
175 hp, 2-WD	22,750	9.1
175 hp, MFWD	21,000	7.3
175 hp, 4-WD	19,250	4.8
<b>Combines</b>		
Small, 3-4 row	20,000	7.0
Medium, 6-8 row	30,000	10.5
Large, 12 row	40,000	14.0
<b>Manure Spreader, single axle</b>		
Box, 220 bu.	13,000	6.5
V-Tank, 1,400 gal.	16,000	8.0
Tanker, 2,400 gal.	25,000	12.5
<b>Manure Spreader, tandem axle</b>		
Box, 390 bu.	23,000	5.75
V-Tank, 2,950 gal.	31,000	7.75
Tanker, 4,000 gal.	39,000	9.75



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## Less compaction and more precision focus at Ag Expo

### Continued from front page

right after delivery to ensure a random representative feed sample.

### Precision Farming Demonstration Available

Demonstrations of precision farming equipment at the main exhibition site will take place at noon and 3 p.m. each day. There will be demonstration on field mapping, combine yield monitors, an anhydrous applicator fitted with a global positioning system (GPS), a GPS-guided field crop sprayer and an all-terrain ve-

hicle equipped with GPS for soil sampling.

More than 300 manufacturers of farm equipment and suppliers of farm services from 23 states and four Canadian provinces have registered for the show, according to Harrigan.

Visitors can watch antique steam and gasoline-fired tractors, and tour "education row," featuring exhibits, information and demonstrations by more than a dozen departments in the MSU College of Agriculture and Natural Resources.

## House makes further cuts in EEP

The House Appropriations Committee has voted to limit the Export Enhancement Program (EEP) to \$100 million in fiscal 1997, partly to find enough money to pay farmers their full Freedom to Farm payment.

The \$100 million is far below the \$600 million to \$800 million earmarked in recent years. But

USDA has not used EEP to subsidize grain exports since July 1995 and may not have much need for it in the coming year if grain prices remain high.

The agriculture spending bill passed by the Appropriations Committee also contains \$5.5 billion in short-term export credit guarantees and \$500 million in medium-term credits, says Reuters.



## Tractor performance engineers say... Lower your radial tire pressures

**W**ant to hear that advice again? *Lower your radial tire pressures!* It's the simplest, easiest, lowest cost way to increase your tractor's productivity and reduce compaction. Tractor performance engineers say shouting it out may help more people get the message because they continually find farmers running tires overinflated for the job.

Radial tractor tires perform better at lower pressures. When operated at recommended inflation levels, radial tires deliver a 17 percent traction advantage, on average, compared to bias ply tires.

Several years ago, tire manufacturers reduced minimum recommended inflation levels for radial tires to as low as 6 psi. For many tractor owners, filling a big tire with such low air pressure seems to fly in the face of common sense. The fact that the tires look half-flat at these pressures adds to the problem of too-high inflation.

"People have a hard time accepting such low pressures," says Richard Sievert, a Case field training manager who frequently speaks to dealer and customer groups about tractor performance.

"They want to grab the air hose and pump radial tires up to where they 'look right.' But that's the wrong thing to do. For radials, you want the largest 'footprint' you can get, and that only comes at these lower pressures."

To run at the lowest air pressures, your tractor should be as light as possible. This, too, seems to contradict conventional thinking...lots of weights, lots of liquid ballast will give you the best possible traction, right? In the literal sense, that's true. But it's not what you want for maximum productivity.

"You get the best performance from your tractor when it's weighted to pull its load between 5 and 6 mph with wheel slip in the 10 percent to 12 percent range for row-crop tractors," Sievert explains. Four-wheel-drive tractors should have a little less slip.

You want just enough weight to operate in this window. More weight simply wastes fuel, increases compaction and adds undue wear to the drivetrain.

If you're using an implement you don't intend to pull in the 5- to 6-mph range, such as a deep ripper or heavy chisel plow, Sievert says you should still have the tractor and implement matched to run at 5 to 6 mph. If you have an implement you can't pull at 5 to 6 mph because you're limited by traction or horsepower, you should be using a smaller implement or a tractor/tire setup that lets you add more weight while keeping tires inflated at these lower levels.

In fact, Sievert says, if you need to inflate tires beyond 14 psi to carry the load, he recommends using duals or a larger tire so you can run with lower air pressure.

### Aim for less weight, lower pressures



*Radials can function better with less air than the maximum manufacturer guidelines, covering more ground and providing more traction.*

*Many farmers fill their tires up to the level on the sidewall; but that's the maximum amount the tire should have, not the best air pressure. Radials are designed to have a bulge in the side, unlike most other tires, which are under-inflated if the side is sticking out.*

Your goal should be to run with the lowest recommended air pressure for the load your tires are carrying. Because the tire's weight-carrying ability decreases as inflation levels decrease, you need to know how much weight you're carrying per tire. This requires using scales and an accurate tire gauge, but the results are worth the effort.

For example, suppose you have an MFWD tractor. You've added several cast-iron wheel weights that increase your rear axle weight to 13,900 pounds. Its rear tires, two 18.4R42s, are each capable of carrying 6,950 pounds when inflated to 24 psi.

At this pressure and weight, statically, each of these two tires will give a footprint of 335 square inches and exert 20.7 pounds per square inch on the soil surface.

Duals would be a much better choice. Adding two more 18.4R42s will reduce the weight carried per tire to only 3,475 pounds, so you can drop the inflation pressures to 9 psi. The footprint of each

tire stays the same — 335 square inches — but the pressure on the soil is reduced to just 10.37 pounds per square inch. Traction is improved because the tires are more flexible (so you might be able to remove some weight and still have acceptable traction) and soil compaction is greatly reduced.

Of course, most people already use duals for heavier loads. But what's often overlooked is the opportunity to drop the air pressure in all four tires because the per-tire load is much less.

"We usually find tire inflation levels on duals are far higher than they need to be," Sievert explains. If all four of those 18.4R42s are carrying only 3,475 pounds but kept at 24 psi, they won't spread out into that big, fat desirable radial tire footprint. Because they're overinflated for the load, their footprint is only 125 square inches, and the pressure on the soil becomes 25.6 pounds per square inch.

By adding duals, but failing to reduce air pressures to the lowest possible level, you've lost all the

benefits of low soil compaction and much of the radial's traction advantage.

### Reduce liquid ballast

Along with encouraging people to reduce tire inflation levels and add only enough weight to run in the 5- to 6-mph range, Sievert recommends using cast-iron weights, rather than liquid ballast, to get the weight you need.

The reason? Once liquid ballast is added, Sievert says people often don't remove it. "A tractor may need weight added for heavy tillage, then removed for lighter work, but few people want to mess with liquid. Cast-iron weights are easier to manage," he says.

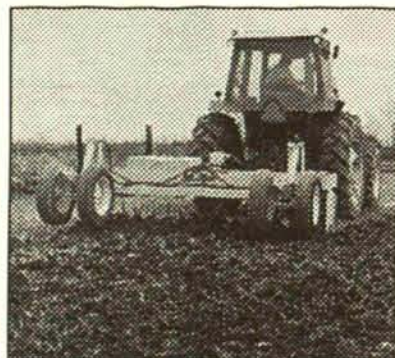
Liquid ballast has other drawbacks. It stiffens the tire, which reduces the radial's inherent "flex" advantage. It increases rolling resistance, and there's the potential for freezing and corrosion of the rims.

It's also easier to adjust weight with cast-iron weights. Because of their "leverage" position ahead of or behind the axles, suitcase-style weights can give the front-rear weight ratios you want with less total weight than you'd need with liquid ballast or wheel weights.

Your tractor's productivity is greatly affected by tire size, inflation pressures and the amount and location of weight. Fine-tuning it to the optimal levels will help you get more field work done faster, using less fuel and with less soil compaction.

### Weight/ballast basics

- Radial tires deliver their best performance at the lowest-rated air pressure for the load.
- Assuming tire loads are not exceeded, radial tires can be operated at inflation pressures as low as 6 psi.
- Higher inflation pressures defeat many of the traction and flotation advantages of radial tires. Consider using larger tires or duals if you must inflate your tires over 14 psi to meet their weight-carrying requirements.
- Your tractors should be weighted to pull implements in the 5- to 6-mph range, even for implements you will normally pull at slower speeds. Add duals, then more weight, to give enough traction to run this fast. If you don't have enough horsepower, consider a smaller implement or higher horsepower tractor.
- Minimize the use of liquid ballast. Cast-iron weights, used only when needed, are preferred.
- Expect to make frequent adjustments of tire inflation pressures and cast-iron weights to gain maximum productivity in varying conditions.
- The larger the tire, the better. You'll gain a larger footprint, resulting in reduced ground pressure and the ability to carry more weight at lower inflation pressures.
- Your goal should be to have the least amount of weight and lowest recommended tire pressures for the job. ■



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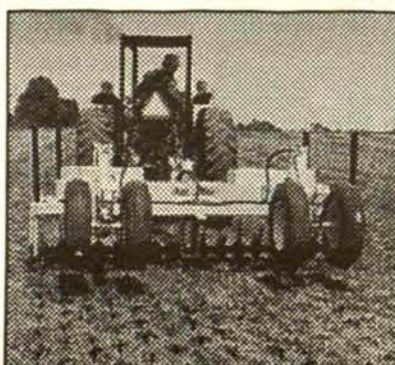
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## AerWay — Improving soil condition and absorption rates

by Mary J. Gawenda

In no-till and minimum till situations, producers often find themselves in a dilemma — how do you deal with surface compaction, and improve nutrient and moisture absorption without sacrificing surface residue. Producers attending the MSU Ag Expo field demonstration may find their answer when they see AerWay's aerator/cultivator in action behind a liquid manure spreader for the Ag Expo Field Demos.

Manure spreaders, grain carts and other heavy payloads can cause compaction, making it harder for soils to absorb nutrients and crops to grow, according to AerWay marketing manager Paul Gillen. "One of the worst compactors on the market is a manure spreader," he said.

The aerator, which can be run independent or behind other implements, including manure spreaders, loosens soil and allows rain, manure and other nutrients to be absorbed quicker and deeper into the soil. The aerator's tines poke holes in the soil and loosen dirt, and can be adjusted to vary the level of tillage, explains Gillen.

The AerWay aerator is a welcome addition to any livestock-producing farm that deals with ma-

nure placement issues, especially for farmers working with highly erodible land. "The AerWay isn't for one soil type or one application — that's the most unique feature of the machine. You can use it in many phases of a farm operation," said Jerry Nyer, state retail representative.

Some farmers are using the AerWay aerator to replace their standard moldboard plow because the AerWay reduces run-off and erosion. Aerating and cultivating also are becoming the precursors to no-till farming.

By running the AerWay ahead of the planter, it loosens soil and allows seeds to embed themselves without a lot of extra plowing. "Farmers can use (the AerWay) in the spring to pre-plant, loosen up the ground and warm it up," Nyer said.

An annual passover with the AerWay keeps soil fresh enough to provide nutrients and soil foundation for several years of crops, instead of rotating every few years, some farmers report.

The AerWay can be purchased in different widths, ranging from 4-feet to 36-feet, Nyer said. A 12-foot unit would cost about \$5,850, he estimates. Each unit is sold with a 1-year manufacturer's warranty. ■

# Schrran portable scales to be featured at MSU Ag Expo field demos

**T**o help demonstrate the concept and importance of proper weight and ballast in maximizing tractor performance, producers attending the MSU Ag Expo field demonstrations will see firsthand how convenient and helpful Schrran Engineering's portable scales can be.

Each scale pad, constructed of aluminum, weighs approximately 55 pounds, is 28 inches long by 24½ inches wide, and measures only 3 inches tall, facilitating quick and easy setup and transport, says Dave Wolf, salesman for Schrran Engineering. He says the small size and light weight also facilitate UPS shipment when needed.

Schrran Engineering, based in Griswold, Iowa, offers a four-pad system for weighing tractors, wagons, and single axle trucks with a 60,000 pound capacity, and a six-pad system for weighing tandem axle trucks with a 90,000 pound capacity. Wolf says that the portable scales are becoming very popular with seed companies in conducting yield checks and test plot work.

"This system allows a seed company to use the farmer's existing equipment along with our portable scales, rather than dragging around weigh wagons," Wolf said. "A number of producers use the scales in working with landlords, and at the bin site as well when they're loading or unloading wagons and trucks. Producers are also using the scales for weighing livestock, feed rations, fertilizer and seed as well."

Although the scales aren't "legal for trade," which would require additional certification and paperwork each time the scales are set up, Wolf says the system is guaranteed 1 percent or better for accuracy.

Each pad is wired and calibrated, via a 30-foot cord, to a Weigh-Tronix indicator which also has an optional RS-232 output jack for connecting to a printer, if so desired. The entire system is powered off of a cigarette lighter.

The scale pads can be set up on gravel, cement, or right in the field, provided soil conditions aren't muddy. "These scales will work well if you simply make a trail with whatever it is your going to weigh, to help firm the ground up," he explained. "This system doesn't have to be set up in a perfectly level condition either."

Maintenance and storage requirements are pretty straightforward — keep the units stored in a dry location when not in use, Wolf advises. "That's not to say you can't use them when it's raining — they're very accurate regardless of the weather — but you need to prevent freezing and thawing of the weigh bars," he explained.

In addition to factory-direct sales, Schrran also provides factory-direct service when needed with turnaround time generally averaging three days. To reduce downtime, Schrran will also send a loaner pad when necessary. "It's a simple fact that you buy it here and we service here," Wolf said. ■



Each scale pad, constructed of aluminum, weighs approximately 55 pounds, is 28 inches long by 24½ inches wide, and measures only 3 inches tall, facilitating quick and easy setup and transport.

## Skid-steer tracks move Bobcats through thick and thin

**S**kid-steers are notorious for the back-breaking work they save producers and the ability to get into and out of tight confinement areas. Unfortunately, they're equally notorious for being almost useless in muddy conditions.

"Skid loaders without tracks are efficient until you get into heavy mud, then you'll start getting slippage. They'll sit there and spin, just like a vehicle in the mud," said Todd Wilcox, Bobcat Central Inc. salesman.

He says that skid-steer loader tracks protect tires and make getting through muddy areas easier. Wilcox sells three different types of skid-steer tracks out of the family-run business in Lansing.

Melroe, which manufactures Bobcat skid-steers, has 12 different models, ranging from 16.5 hp to 74 hp with dozens of attachments. Wilcox said he hopes to have five loaders at the Ag Expo booth.

Cast Trac metal tracks, by Grouser Products, reduce ground pressure, and improve traction and flotation in soft and muddy conditions. To install Grouser tracks, an operator drives the skid-steer onto the tracks and bolts the tracks around slightly deflated tires, Wilcox said.

Designed for convenience in installing, the whole operation takes about 30 minutes to put on and 10 minutes to remove. "Grouser tracks can be used in other applications, but dirt, mud and snow are the main things," Wilcox said.

Tire Crawlers, the Loegering brand of tracks, also provide better flotation and traction than tires, and the metal tracks are custom-built to fit. Crawlers assemble the same way as Grouser tracks and the patented, durable carbon steel tracks have a tighter pivot than tires alone.

Goodyear engineers probably had construction workers in mind when they designed their rubber tracks, but to the advantage of farmers, the allied-approved rubber tracks work well in soft, sandy conditions, too. And if an operator needs to drive the skid loader over concrete or asphalt, the tracks won't damage the hard surfaces.

Grouser and Loegering tracks cost about \$2,500 for a Bobcat 763 model, and Goodyear rubber tracks cost about \$4,500. "You can buy tracks for tractors, irrigation equipment and pretty much any type of equipment," Wilcox said. ■

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## CAT tracks

by Mary J. Gawenda

**M**ost farmers know compaction isn't good for their land or crops, but what some farmers may not know is that Caterpillar (CAT) tractors are proven to reduce compaction and increase yields, said Tim Harmon, CAT territory manager.

Since sales began in 1987, CATs have been a hot item among Michigan farmers, especially Thumb area farmers producing specialized crops and working on difficult soils, said Warren Wilkinson, ag specialist and salesperson for the Northwestern areas of the state.

"Muck farmers have been totally impressed with these tractors because they don't create compaction. But on the same token, we've got these tractors with our traditional crop farmers, such as corn, wheat and soybeans," he said. Wilkinson works with Harmon out of CAT's new Lansing location.

To prove their point, CAT will feature Challenger series row crop and tillage tractors at Ag Expo. CAT's row crop tractors include: the Challenger 35 with 175 horsepower, Challenger 45 loaded with 200



Large tillage Challenger 65D

hp, and Challenger 55 with 225 hp. Till tractors include: the Challenger 65D with 300 hp, Challenger 75C with 325 hp, and the 85C tractor with 355 hp.

Harmon said reduced compaction and time savings are advantages of tractors with tracks, and anyone using tires could be wasting precious time, energy and crop value. And less compaction means farmers can get into the fields sooner, when the soils are still wet.

"When you have precious few days, it really

makes these tractors shine. Effectively, you're getting more days of growing season of crop by having a belted tractor," Harmon said.

A patented Mobile Track system allows the tractor to put more pressure on the front idler and rear driver to keep the positive engagement of the belt to the wheel, he said.

"Because these tractors don't have slip to the degree that wheel tractors will, you utilize a much larger percentage of horsepower," Harmon said.

Wheel tractors have about 15 percent slip, while tracks have about 3 percent slip, making for less time in the fields and less fuel burned trying to get out of the mud, he said.

The Challenger tillage tractor has six axles and the CAT row cropper has five axles, Harmon said, which spreads about 30,000 pounds of machinery to only 5,000 to 6,000 pounds per axle.

"With a wheel tractor, because it only has two axles and usually the weight is slanted more toward the rear, you may have 15,000 to 18,000 pound axle loads, and that's what causes compaction, Harmon said.

When weight on back and front axles don't equal

and the rear tires slip more than the front, power hopping can become a problem for some drivers.

"It's very tough to make wheel tractors always work properly and not have this power hop problem happen, but with a Challenger tractor, power hop never happens," he said.

Sales rates show some Michigan farmers agree with Harmon's assessments; 39 CATs were sold here last year, and although the tractor buying season is done, Wilkinson said he expects to sell three more Challengers this summer. And service after the sale is second to none, he said.

"We have 27 field trucks that are accessible by phone and 95 percent of the service on the Challenger can be addressed right at the location of the farm. And nobody understands the importance of downtime more than Michigan CAT, from working with our construction crews" Wilkinson said.

The most common problems with CAT tractors are fuel related, such as debris in the fuel system or a damaged fuel pump, he said. The standard 1-year or 1,000 hour warranty is guaranteed, but most dealers prefer their customers buy the extended 5-year warranty, Wilkinson said. ■

## Tractors on tracks versus wheels

by Tim Harrigan, Associate Professor, Agricultural Engineering Department, Michigan State University

**T**ractors on tracks have been used for decades. Farmers like the flotation characteristics of tracks; however, the older tractors were on rough-riding steel tracks that were hard to steer and transport over the road. In the late '80s Caterpillar introduced the Challenger model tractors — smooth-riding tractors on rubber belts that could easily travel over the road.

Canadian researchers conducted side-by-side comparisons of rubber-tracked and wheeled vehicles in the early '90s at the Alberta Farm Machinery Research Center (AFMRC). They tested a 270 hp Challenger 65 and a 270 hp 4WD with eight radial tires. The main goal of the test was to measure power delivery efficiency — the ability of the traction system to deliver available engine power to the ground as useful working power.

They also ranked each in terms of pull, optimization, ride, steering and cost with the following results:

### Pull a Plus for Tracks

Only the rubber belts were able to deliver 200 drawbar hp at speeds as low as 3 mph. Farmers should, however, consider the normal working speed of operation. Drawbar horsepower is the product of pull times speed, which is more important than pull alone. Both tractors were able to deliver 200 drawbar hp at 5 mph, a typical working speed.

### Optimization a Plus for Tracks

Optimization is the selection of the correct tractor weight and tire setup for a given speed, pull and ground conditions. Optimizing a tire tractor involves changing ballast and tire inflation pressure. Since many farmers don't understand how to make these adjustments or are reluctant to take time to do it, tire tractors often aren't set up properly for optimal performance.

And if power hop is a problem, some of the adjustments made to eliminate it may move the tractor away from an optimal setup. Rubber-belted tractors operate near optimum over a wider range of speeds than tire tractors and with considerably less adjustment.

### Power Delivery Efficiency a Slight Plus for Tracks

This is a measure of the ability of a traction system to convert available engine horsepower into useful work on the ground. This can make a difference in acres covered per day or fuel burned per acre.

Tests showed little difference between rubber belts and rubber tires, when properly set up. Both had maximum efficiencies near 80 percent, but in some tests, the rubber tracks showed a 1 to 3 percent advantage in efficiency. On the farm, the difference will depend on how close to optimum the tire tractor is operating.

### Ride Equal for Tires and Tracks

There was little difference in average ride quality between the two systems.

### Steering a Plus for Tires

When a rubber belt tractor turns, the outside track speeds up and inside track slows down. The AFMRC noted that under draft loads, a rubber track may not steer unless the draft load is reduced. Tracks also tend to berm soil in a turn, causing ridges and depressions, while tires roll through a turn, causing little disturbance.

### Cost a Plus for Tires

While cost can vary, rubber belt tractors generally cost more than equivalent drawbar horsepower rubber tire tractors.

### Soil Compaction Unresolved

Soil compaction was not measured in the AFMRC tests. ■

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# Precision Agriculture



**Perry M. Petersen,**  
C.P. Ag.-CCA,  
Corporate Manager,  
Precision Agriculture,  
Terra Industries Inc.

**T**he history of U.S. Agriculture is a series of technological advances that have boosted farmers' productivity and efficiency. First, there was the move from horsepower to mechanical power early in this century. Then, the power of science contributed improved seed varieties and crop protection chemicals after World War II. Now, information power is making a dramatic difference in the way crops are grown as farmers adopt the technologies associated with precision agriculture.

Precision agriculture may be one of the most significant crop production advances in the last 50 years. It has the potential to revolutionize the way farmers collect, analyze and use information about their crop production systems, resulting in greater productivity. The key word here is information, because that's what precision agriculture is all about. Much of the attention focused on precision

agriculture has highlighted technology and equipment. While important, they serve only as tools to either collect information or to perform functions based on the information.

Precision agriculture's real value for the farmer is providing information that allows him to make better decisions. Never before have farmers been able to gather such large amounts of data about their land and crops. All this information gives them the power to identify and take control of variables they face in their operations: yields, soil type and chemistry, fertilizer and chemical application, planting populations, and weed and insect pressures.

Terra has a long-standing commitment to offer products and services customers need to maximize the efficiency and profitability of their cropping systems. Many of Terra's farm service centers (including the 17 in Michigan) now make it possible for farmers to take advantage of the information power that precision agriculture offers. To develop its Precision In Agriculture package, Terra studied and analyzed the equipment and technology associated with precision agriculture; global positioning systems (GPS), geographic information systems (GIS), grid soil sampling, variable rate technology and data management systems. Terra eventually selected Rockwell International's Vision System for the integrated GPS/GIS package that forms the backbone of its program.

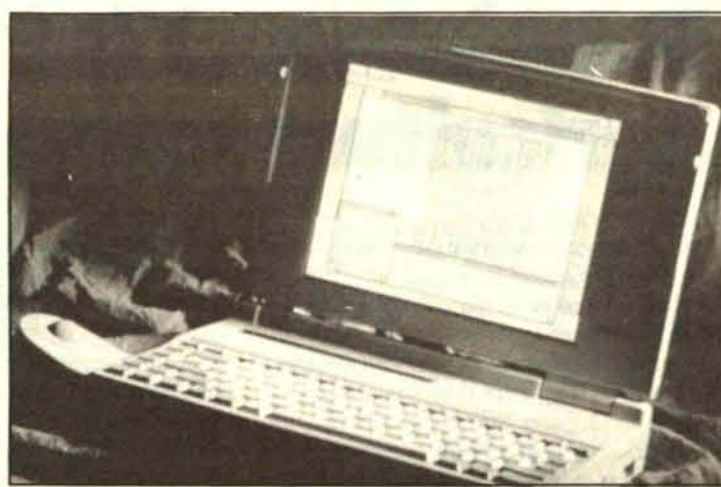
Terra also realized it must help farmers analyze and use the information precision agriculture generates. After all, what good is information to a farmer if he can't use it to benefit his operation

agronomically, environmentally and economically? Terra created a new position, cropping systems advisor, to provide a link between the massive quantity of data collected about a farmer's cropping system and his need to put that information to work.

Terra's cropping systems advisors — such as Ralph Leach in Frankenmuth, Mich. — analyze, maintain and use this information to create cropping prescriptions for customers. Working with personal computers and specially developed software, cropping systems advisors help farmers achieve the most benefit from Terra's precision agriculture services:

- GPS grid soil sampling;
- database management and storage, including analysis of collected information;
- GPS-guided variable rate applications;
- GPS-guided crop scouting; and
- complete map production, including printouts.

In coming months, this column will cover geographic information systems, database management, and information storage and transportation



Data collected by yield monitors can be transferred on a PC card for mapping on home computers. This data becomes the key to utilizing site-specific farming technologies for future crop production decisions.

devices — just some of the ways information power and precision agriculture will help farmers make better management decisions. ■



## PRECISION IN AGRICULTURE

Perry M. Petersen, C.P. Ag.-CCA,  
Corporate Manager, Precision Agriculture  
Terra Industries Inc.  
Phone: (800) 831-1002 & (712) 277-1340  
Fax: (712) 277-7383

## Weed day is June 26 at Michigan State Univ.

**G**rowers interested in fine-tuning weed control in row and horticultural crops will find useful information at the annual weed tour June 26 at Michigan State University. Tour registration will run from 8:30 to 9 a.m. at the MSU Botany Field Laboratory on the west side of College Road between Jolly and Bennett. The morning session begins at 9 a.m. and will focus on weed control in corn and soybeans.

The horticulture farm tour will meet at the Horticulture Field lab on College Road south of Jolly Road at 12:45 p.m. (tour starts at 1 p.m.) It will focus on weed control in cole crops, snap beans, tomatoes, peppers and sweet corn.

The cost is \$20 if registration is made prior to the tour. Registration the day of the tour will be \$25. The fee covers the tour notebook and the noon meal. Tour registration forms are available from MSU Extension county offices.

The corn and soybean plots will have signs up by Tuesday afternoon at 2 p.m.

Farmers and agribusinesses are welcome to take a self-guided tour of corn and soybeans on Tuesday afternoon (2-6 p.m.), Wednesday afternoon (2-6 p.m.) or anytime on Thursday. A handout describing the self-guided tour will be available by the sign 'Weed Control Tour — Michigan State University' located at the Botany Field Lab on College Road. There is no fee for the self-guided tour.

More information about the tour and nearby lodging can be obtained by contacting Karen Renner at MSU by calling (517) 353-5174. The tour is being sponsored by the MSU departments of Crop and Soil Sciences and Horticulture and MSU Extension.

### 1996 Plant Problem Diagnosis Field Day

The 1996 Plant Problem Diagnosis Field Day will be held on the MSU Campus Research Farm on Thursday, Aug. 1. This year's field day will focus on corn, soybeans, and alfalfa. Specific topics to be covered are:

- herbicide resistant crops
- insect resistant crops
- herbicide and weed identification
- corn and soybean root problems
- white mold
- corn growth stages

Details on the field day and registration information will be available through MSU CAT Alerts and MSU Extension County offices by late June. ■



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# Precision Agriculture Yield monitoring optimizes crop management

by Neil R. Miller

Color yield maps make expensive wallpaper. This comment from a crop consultant in the Midwest reflects the fascination many producers and ag industry personnel appear to have with the maps produced by yield monitors. Unfortunately, pretty maps alone won't return a dime to the purchaser. Yield monitor data can, however, produce valuable economic benefits when used as a tool to improve crop management.

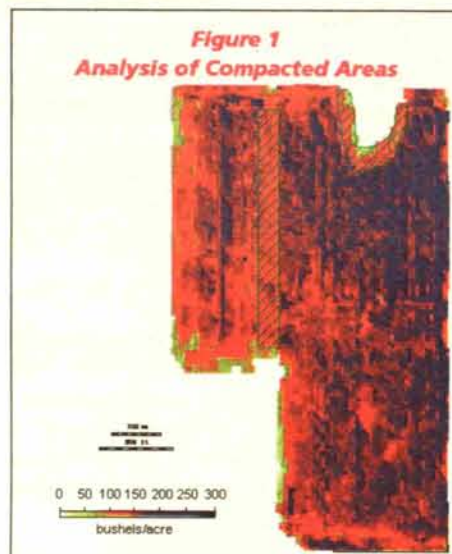
The first step in using a yield monitor profitably is to identify which factors most significantly impact yields in your farming operation. Many of these factors will not be surprising. We all know, for example, that weed escapes hurt yields. However, most farmers have a hard time quantifying those effects in bushels or dollars. One of the most common comments I have heard from my clients who have bought yield monitors is, "Wow, I never realized how much impact weed escapes have on my yields!"

Yield monitoring can also identify factors that might otherwise have been overlooked. One farmer I worked with last fall began with the

assumption that soil pH management was the principal factor he needed to address in order to improve crop yields. Yield monitor results quickly convinced him, however, that he also needed to pay more attention to compaction and tillage practices.

Crop management issues that can be examined through yield monitoring include:

- Poor drainage and the need for tiling
- Weed management decisions



Yield monitors can quantify management issues with remarkable precision. Compaction in the strip on the left reduced corn yields by 13.8 bu/A, while yields in the upper right were reduced 41.9 bu/A.

- Tillage practices
- Soil compaction
- Hybrid or variety performance
- Fertility programs
- Liability and compensation issues
- Etc., etc.

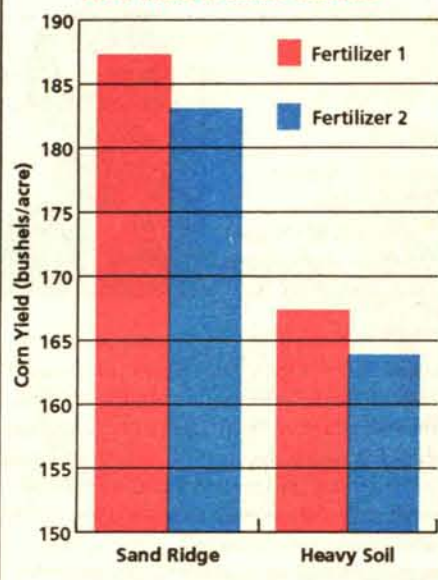
Computer software can help you quantify these issues with remarkable precision (Figure 1). Furthermore, they can calculate which factors are most closely related to the yield variations recorded on your farm. These critical factors will undoubtedly vary from farm to farm due to differences in soils, cropping systems and historical management practices.

Once you've identified your critical management issues, the next step is to examine possible remedies. This may be as simple as calculating which weed escapes reduced yields enough to outweigh the cost of respraying. Or you might estimate how many years it would take to pay for tiling, based on several years of yield data from poorly drained areas.

In some cases, accurate management decisions will necessitate controlled strip trials comparing factors such as varieties, tillage practices or fertilizers. Many such trials are possible using weigh wagons to record yields. But yield monitors vastly simplify the process during harvest when time is inevitably at a premium.

In one trial, which I harvested with a client last fall, the only additional time demand over and above normal harvest operations was the 10-15 seconds that the monitor needed to calculate yields at the end of each strip. Yield monitors can also record variation within strips as well as between strips (Figure 2).

Figure 2 — Corn Starter Fertilizer Trial 1995 Yield Monitor Results



A yield monitor measured the results of this strip trial, in eight replications across two soil types, with very little time demand beyond normal harvest operations.

Farmers who are serious about optimizing crop management will use yield monitors to turn their farming operations into customized experiment stations. If you're looking for attractive wallpaper, the Home Depot can undoubtedly underbid your ag supplier. If you're looking for an education as a crop manager, and aren't afraid of shaking up some long-held assumptions, yield monitoring is for you. ■

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Specialists in Crop Production and Protection  
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## Look for precision agriculture demonstrations at Ag Expo

Continued from front page

"We're going to have variations of about 100 pounds, depending on the soil," Glaze explained. "In theory, if we had a given soil type that was extremely high in organic matter and therefore high in N, we could go as low as zero."

There's little doubt in Glaze's mind as to what the future holds for precision agriculture and how well the Rawson hydraulically driven controller will fit into virtually every phase of crop production. "If we can pump ammonia, then obviously we can pump liquids," he said.

"As we get into the future, everybody's planter is going to be variable rate. The same system that drives the planter can be lifted off the planter and set onto the sidedress bar," Glaze continued. "The producer will also use the same laptop computer, it'll all be right there in the tractor; it'll just be a matter of hooking the system onto a different tool."

### Raven Variable Rate Controller

If it's liquid and you need to vary the applica-

tion rate, then Raven's GPS-Grid Application System, is what you need, says Mike Emery of FARM-CO, distributor of Raven products in Michigan. Producers attending the precision demonstration will be able to see the relatively new system up close and see how it's hooked into the spray system.

The Raven GPS-Grid Application system automatically controls the product application rate based on location in the field. It's functionally a two-part system. The first part is the Grid Development System, which is a home computer the user supplies and Raven software. It's used to create the soil fertility grids prior to application and analyze data logged after application.

The second part of the system is the Raven Variable Rate Controller, which is installed on the sprayer vehicle. The Variable Rate Controller uses differential GPS to determine applicator location. As positions change, pre-determined application rates are sent to the Raven Console where the variable application rates are stored in an electronic file

along with the grid of the field.

This file is created on the user's home computer, then loaded on a flashdisk. This disk is then used to transfer information between the home computer and the Variable Rate Controller on-board the vehicle.

The Raven system can be bought as a complete unit that includes both the controller and the computer to operate the systems software and build the grid maps, and can also include the GPS receiver itself, according to Emery.

In terms of practical application, Emery says the Raven System will be used primarily in variable rate fertility programs, by larger-scale crop producers and, eventually, more custom applicator rigs. "There's a fair amount of manpower and legwork needed to prepare the system to work, in terms of soil sampling, and reviewing yield maps," Emery advised. "I question whether, at first, a custom applicator or co-op will really have the resources and manpower to get the job done."

Emery speculates that the introduction of yield monitors as standard equipment on combines will spur additional interest and eventual implementation of precision agriculture on more Michigan farms. Although the interest level of producers has grown significantly in the last 8 to 10 months, Emery suggests that producers temper their enthusiasm and consider the variable rate application segment of precision agriculture as the last piece of the puzzle.

"This (precision agriculture) is still in its infancy enough so that I wouldn't necessarily encourage somebody to go out and start with a liquid variable rate system," he cautioned. "I think they need to have some of the other parts of their program implemented and documented with some data before they try to introduce this system into it. You need to have a record of your soil samples over the course of a few years, as well as your yield monitor samples over the course of a few years before you can start trying to apply that information in treating specific areas of a field differently." ■

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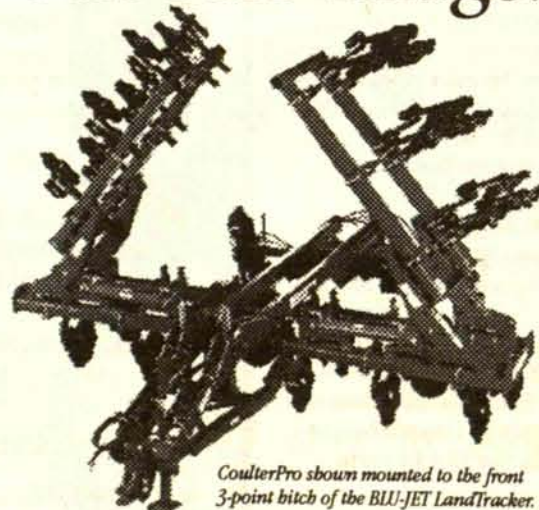
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# Precision Agriculture John Deere GreenStar combine yield-mapping system

by Mary J. Gawenda

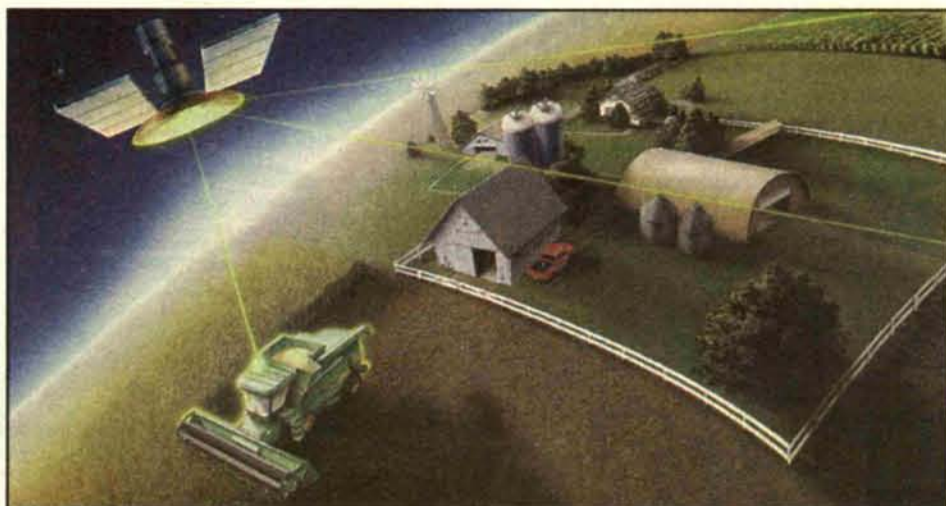
**W**ith the introduction of its GreenStar Precision Farming System, John Deere is ready to lead farmers off the fields and onto the information superhighway.

The GreenStar System provides some of the most accurate yield data for farmers looking to optimize land, time and profits, said Doug Penny, local John Deere territory manager.

The system is easily operated and can be added to any John Deere combine dating back to 1989.

"Ours is a totally integrative package that ties into the whole machine, where some other systems hang outside (the combine), Penny said. The system takes about one day to install and costs about \$8,000.

A Global Position Satellite (GPS) receiver is mounted on the top of the combine and acts as an antenna to receive signals from GPS. The satellites were installed by the U.S. military and are scrambled, so 10 other satellites also are used to pinpoint the farmer's location in the field.



Yield measurements are based on a mass-flow sensor, and moisture readings are collected from a moisture sensor hooked to the side of the elevator.

All the information is sent to a display mounted inside the combine cab (see picture). The display shows moisture readings, productivity data, wet and dry bushels per acre, and other information.

Convenience in monitoring moisture is a major attraction of John Deere's system, Penny said. With the GreenStar system, the moisture is figured automatically, while most other systems require the driver to stop and sample the crop, he said.

Farmers also can use the display to "flag" a spot in the field where there's a problem, such as a broken tile, big rock or water gully. By watching the display, the farmer can learn harvest quality and quantity before leaving the field.

Penny says the information can translate into savings in time and fuel, but farmers won't automatically save money by having the GreenStar system. Analyzing and applying several years of data is the

key to managing a more productive farm.

"GreenStar will not save you any money. However, it will give you the information to better manage your farm and hopefully, that way you'll save money," he said.

Although precision farming is relatively new, Deere engineers are already looking to future applications of their system for next planting season.

"The part that's unique about our (system) is that we will be able to take the satellite system off the combine and install it on a tractor or onto a sprayer. It's not just a combine mapping system, you can move it to your tractor in the spring when you're planting," Penny said.

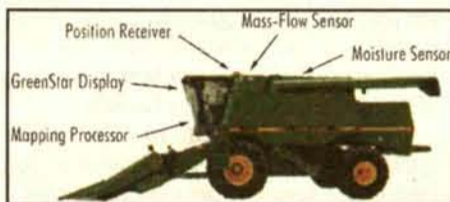
But Penny said farmers shouldn't make any planting changes until a few years of data is collected and analyzed, because fields change from year to year.

"The first leg of precision farming is to know exactly what your outputs are. Because without knowing what your outputs are at the end,

how do you know what your inputs should be?"

Because all the GreenStar equipment for planters and sprayers hasn't been developed yet, Penny was unsure if it will be compatible with other brand equipment.

Visitors can inspect the display monitor and other components of GreenStar at the John Deere's Ag Expo booth and the Field Demo combine should be equipped with the complete system, Penny said. ■



Equipped with a GreenStar position receiver (mounted on top of the cab), this combine receives positioning information from as many as eight different satellites to pinpoint the combine's exact position in the field. This makes it possible to measure and map yield and other harvest data in wheat, corn, soybeans, oats, rice, sorghum, barley and many other small-grain crops.



The GreenStar™ display, a component of John Deere's GreenStar Combine Yield-Mapping System, provides the operator with on-the-go yield measurement in both wet and dry bushels per acre, moisture readings, productivity data, and other harvest information. The operator can also use the display to "flag" weedy areas or other field conditions as they are encountered during harvest, recording them for future analysis or to generate a map.

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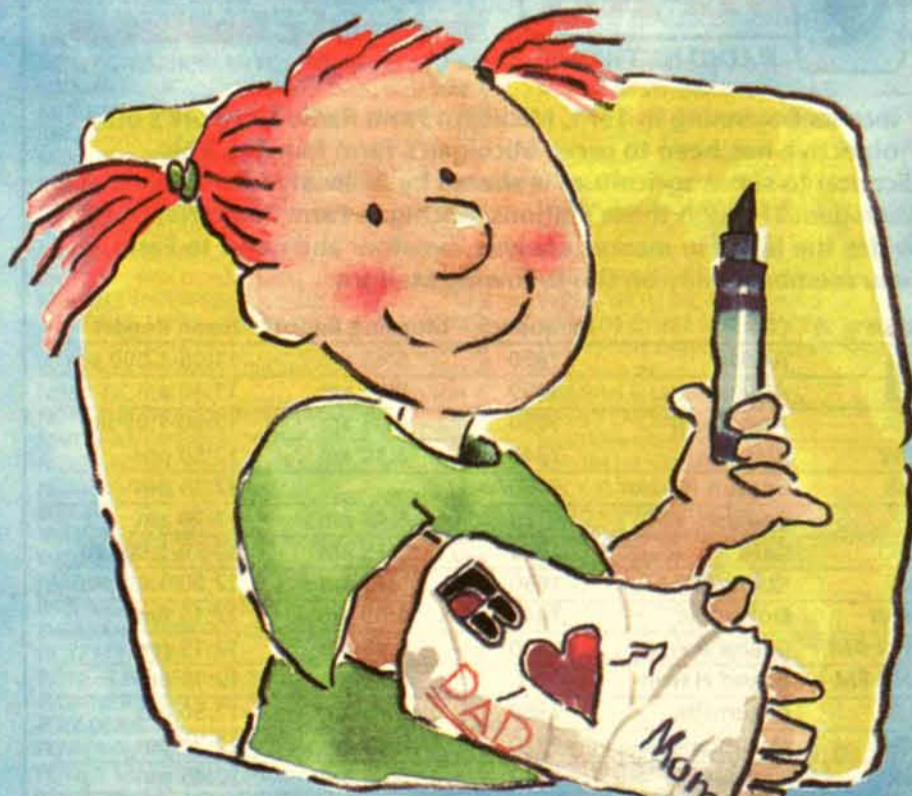
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## Something for everyone to bid on at the third annual FFA Silent Auction!

Over \$6,000 worth of items including collectible tractors, limited edition artist's prints and computer software have been donated to benefit the third annual FFA Silent Auction at the 1996 Ag Expo. Anyone can bid on the items during the three-day event, with the highest bidders taking home the merchandise.

### Auction Details

The auction will run from 9 a.m. on Tuesday, June 25 through noon on Thursday, June 27 on the grounds of the expo site. All items will be displayed or represented with a bid sheet in the

Michigan Farm Radio Network tent (Lot 307) near the entrance of the expo grounds.

Items will be delivered upon receipt of the donation either by mail or through the vendors supplying the donated article.

Bid early and bid often! All proceeds will go to the Michigan FFA Foundation to support leadership activities and conferences for FFA students, and agriscience education. The silent auction is being coordinated by the Past State Officers FFA Alumni Affiliate. ■

### Listing of items — watch for an updated list at Ag Expo!

Item	Business
5 gal. — Baler's Choice Hay Preservative	Ag-Hap Inc.
Bags of Alfalfa Seed	AgriPro Seeds
10 bags of RoundUp-Ready Soybeans	Asgrow Seed Co.
Buffalo Farm Eqpt. Jacket and Hats	Buffalo Farm Equipment
All-Poly Feed Bunk Model PFB-10	Countrymark Co-op
John Deere 1930 "GP" Collector Tractor	D&G Equipment
1 bag corn, soybean, alfalfa	Dairyland Seed
Dekalb boar	Dekalb Swine Breeders, Inc.
DuraTech Hay Grinder Collectible	DuraTech/Haybuster
DuraTech Big Bale Buster Collectible	DuraTech/Haybuster
Computer Farming Game	Farm Works Software
Set of four Silvermark Passenger Car Tires	Farmers Petroleum Co-op.
Camspray model 1000A powerwasher	Gilbert Sales and Service
Cecil Fielder Autographed Jersey	Gordon LaFontaine
5 gal. — Hotsy Carbonate plus vehicle wash soap with wax, pole and brush	Great Lakes Cleaning Systems
Port-a-Hut	Growe Systems, Inc.
H&S Manufacturing Jackets and Hats	H&S Manufacturing
Two 50cc Pistol Grip Syringes	Ideal Instruments
John Deere Belt Buckles, Hats, Jacket	John Deere Co.
Kill Bros. Hats	Kill Bros.
John Deere DC-3 Airplane Bank	Litchfield Farm Equipment
Michigan CAT Spring Jacket	Michigan CAT
16' White Painted Flaggpole	Mid-Michigan Snow Equipment
Limited Edition Framed Artist's Proof	Pharmacia & Upjohn
Corona Pruners, Bow Saws, Sunbeam Outdoor Thermometer	Plummer Supply, Inc.
Collectable Tractor	Salisbury Mgt.
1/64 Scale Brent Dual-Wheeled Grain Carts	Unverferth Mfg. Co., Inc.
Dairy Plan 4.4 Dairy Herd Mgt. Software	Westfalia Systemat, Inc.
Ford-New Holland 8670 Collector Tractor	Williams Farm Machinery
Limited Edition Artist's Proof (full size)	Southpaw Studio
8 — Limited Edition Artist's Proofs (small size)	Southpaw Studio
7' Round Bale Feeder	Weldy Enterprises
Monitor Gift Basket	Monitor Sugar Co.

## Michigan Farm Bureau's Summerfest scheduled for June 26



In addition to Ag Expo, Michigan State University will once again play host to MFB's tenth annual Summerfest event this year on June 26 at the 4-H youth show facility located at the Farm Service Center on College Road. In addition to the date change, this year's activities will also include a Truck Drive and Ride, replacing last year's Truck Showdown event.

According to MFB Summerfest event manager Mike Kovacic, the Truck Drive and Ride will allow interested MFB members to actually test-drive new Dodge pickups in off-road conditions. "This program format will allow more individuals to actually test-drive a new truck as opposed to just watching the trucks being driven by someone else," he said, referring to last year's Truck Showdown, which was limited to just 12 drivers.

Summerfest participants interested in the Truck Drive and Ride, which is scheduled from 4 to 7 p.m., will need to sign a damage and liability waiver and show a valid Michigan driver license before driving a new Dodge truck on a course around MSU's research farm.

Typical Summerfest activities, including a beef and pork barbecue and games for the kids, will be running in conjunction with the Truck Drive and Ride. You can also kick up your heels to the music of the country rock band, "The Last Ride."

Weather permitting, parking will be available at the Summerfest site this year. However, in the event of rain, Kovacic suggests that Summerfest participants check in at the MFB Ag Expo Tent for further parking instructions and transportation to the Summerfest site.

Tickets for Summerfest must be purchased in advance and are still just \$5. The ticket is good for all of the events, including your choice of a pork or beef dinner, the games, the barn dance and the Truck Drive and Ride.

Make plans to be part of the biggest event of the summer — Summerfest '96 at Michigan State University, June 26.

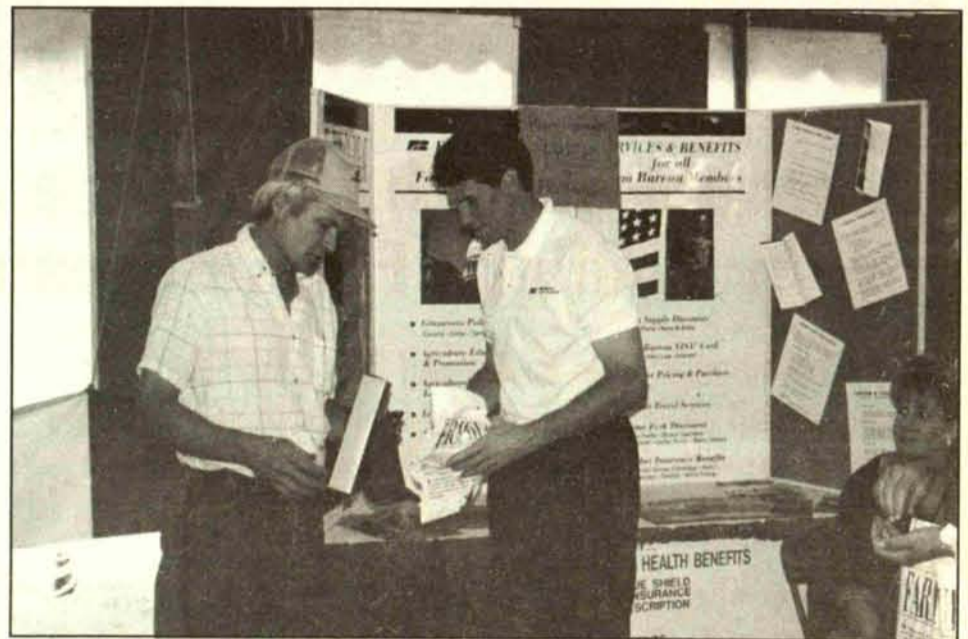
Contact your county Farm Bureau for more information, or for last minute Summerfest ticket orders call Michigan Farm Bureau at 800-292-2680, ext. 3204. ■



**Serving Michigan farm families is our only business**

Since its beginning in 1971, Michigan Farm Radio Network's only objective has been to serve Michigan's farm families. This dedication to serve agriculture is shared by 26 local radio stations in Michigan. Through these stations, Michigan Farm Radio Network provides the latest in market analysis, weather and news to Farm Bureau members daily on the following stations:

Station	City	Frequency	Morning Report	Noon Report
WABJ	Adrian	1490	5:45 am	11:05-12:00 pm
WATZ	Alpena	1450	5:30 am	11:30 am
WTKA	Ann Arbor	1050	6:05 am	12:00-1:00 pm
WLEW	Bad Axe	1340	6:30 am	12:50 pm
WHFB	Benton Harbor	1060		12:15 pm
WKJF	Cadillac	1370	5:45 am	11:10 am
WKYO	Caro	1360	6:15 am	12:10-1:00 pm
WTVB	Coldwater	1590	5:45 am	12:00-1:00 pm
WDOW	Dowagiac	1440	6:05 am	12:15 pm
WGHN AM	Grand Haven	1370	5:45 am	12:15 pm
WGHN FM	Grand Haven	92.1	5:45 am	12:15 pm
WPLB	Greenville	1380	6:15 am	11:50 am
WBCH	Hastings	1220	6:15 am	12:30 pm
WCSR	Hillsdale	1340	6:45 am	12:45 pm
WHTC	Holland	1450		12:15 pm
WKZO	Kalamazoo	590	5:00-6:00 am	12:00-1:00 pm
WPLB FM	Lakeview	106.3	6:15 am	12:15 pm
WOAP	Owosso	1080	7:15 am	12:40 pm
WHAK	Rogers City	960		12:15 pm
WSJ	St. Johns	1580	6:15 am	12:05-1:05 pm
WMLM	St. Louis	1520	6:05 am	12:20 pm
WSGW	Saginaw	790	5:55 am	11:30-12:30 pm
WMIC	Sandusky	660	6:15 am	12:45 pm
WKJC FM	Tawas City	104.7		12:40 pm
WLKM	Three Rivers	1510	5:45 am	12:15 pm
WTCM	Traverse City	580	5:45 am	11:10 am



## 1996 Farm Bureau Family of Companies Ag Expo exhibit

Those visiting the 1996 Ag Expo will find the Farm Bureau Family of Companies in the big red and white tent located in the center of the Expo grounds. Personnel from Michigan Farm Bureau and all affiliate companies will be available to discuss a full array of member benefits, programs, products and services.

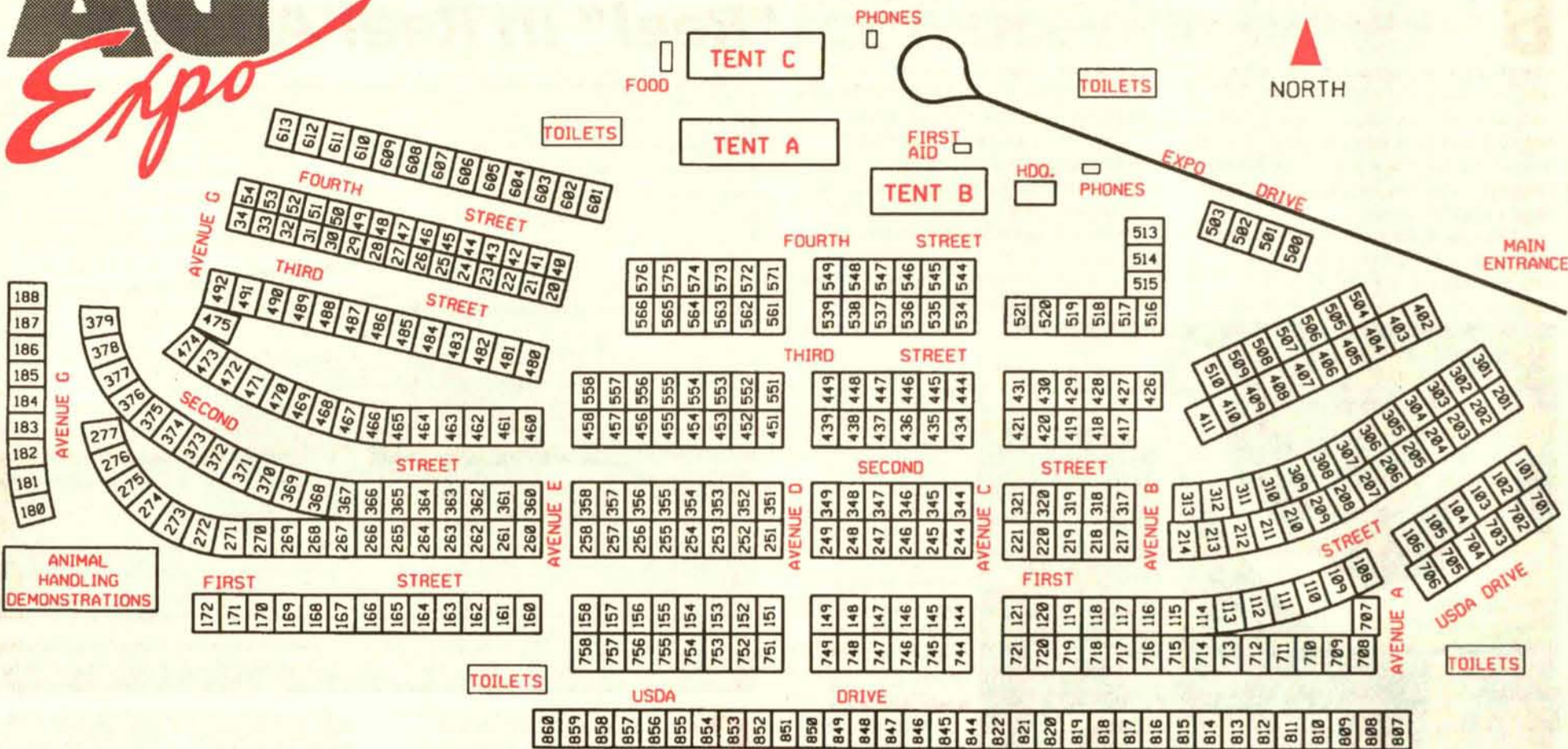
Expo attendees will be able to learn about member benefits, programs and services from Michigan Farm Bureau; petroleum and farm supplies from Farmers Petroleum Cooperative; marketing services from Michigan Agricultural Cooperative Marketing Association; tillage tools and equipment

from MFB Group Purchasing; and insurance services from Farm Bureau Insurance. Dodge trucks will also be on-hand promoting Farm Bureaus \$500 cash back on selected Dodge trucks.

Just for fun, a race track will be set up in the center of the tent where individuals 16 and older can test their skills in guiding a remote controlled battery operated truck through an obstacle course. All drivers participating in the Mini Truck Challenge will receive a Family of Company prize for the efforts — top finishers will receive additional prizes. The track will be in operation from 9:00 a.m. to 3:00 p.m. ■

# AG Expo

## Central Exhibit Area



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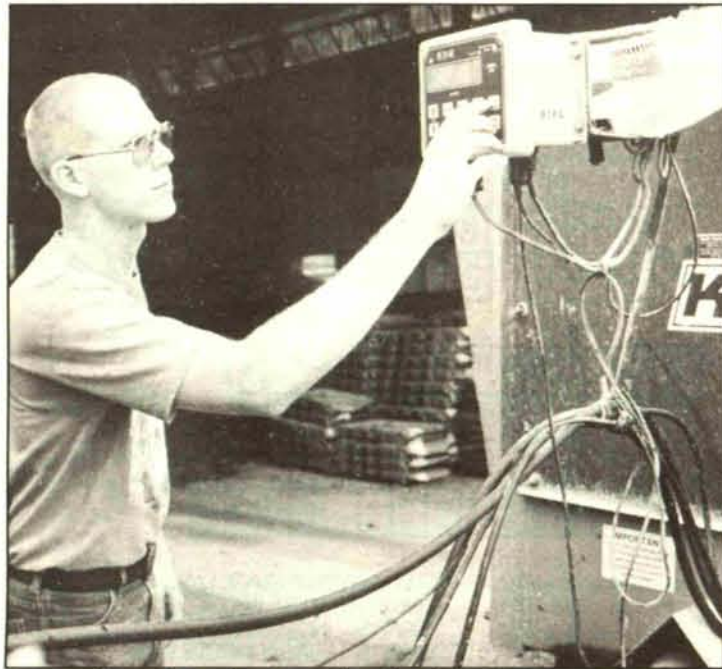
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## Avoiding common TMR problems

**B**y most standards, total mixed rations (TMRs) are the preferred method for feeding dairy herds, especially in situations where herd averages demand precise feed ration formulations. But regardless of how good a nutritionist you work with, or the quality of the feed you have on hand, there's still plenty of opportunity for your ration to fall short of expectations, cautions MSU's Dr. Herb Bucholtz, professor in the Animal Science Department.

TMR variation due to changing dry matter or moisture levels, mixing instructions and procedures, scale accuracy, personnel skill level and changes in feed can provide a recipe for failure



Personnel are often a key ingredient in mixing TMRs.

when trying to fine-tune your herd's rations, boost production, and ultimately increase net revenue.

"The old rule of thumb is that feed costs are 50 percent of the cost of producing milk — this year it's probably more than that," Bucholtz suggested. "If a farmer wants to start looking at where he can get a handle on controlling costs and influencing production, the nutrition program should be the first thing to be looked at."

Bucholtz will be doing presentations on controlling TMR variation at MSU's Ag Expo, June 25-27, during the animal handling demonstrations at 11 a.m. and 1:30 p.m. each day. A large part of that presentation will focus on dry matter and moisture levels of individual feed items and the total ration.

### Moisture Testing Crucial

Are you and your nutritionist comparing apples to apples when talking about dry matter and feed volume? Bucholtz says that while most feed rations are calculated on a dry-matter basis, most feed ingredients are added to the mixer on a wet-matter basis, meaning that conversions must be done accurately, and moisture tests conducted at least weekly to avoid costly complications.

"All of the problems producers had with corn silage and high moisture corn this past year could have been avoided if they had simply used a \$200 moisture tester to test this stuff," Bucholtz explained. "For a person running TMRs and making corn silage and haylage, not having a moisture tester is like owning a chopper but not having a tractor to run it with."

### Mixing Instructions and Personnel

Proper mixing instruction and well-trained personnel go hand in hand in getting the desired ration actually delivered to the cow. Bucholtz suggests that

mixing instructions include not only an ingredients list, but also a procedure for how and when various feed items should be added. "Most mixers will work better if some of the grains are put in first, such as corn or corn silage, then the haylage with the rest of the grain and mineral placed on top," he said.

Incremental adjustments to allow for increased/decreased feed consumption levels is another critical item that should be included with feed instruction sheets to ensure that all of the ingredients are adjusted properly. Bucholtz says that, depending on the ration program being used, producers can elect to have incremental feed levels based on a per-cow basis or, in larger herd group sizes, based on five-cow increments.

"If you're feeding 5,000 pounds of TMR and the cows have it all cleaned up and you think you should add 200 pounds — what do you do?" Bucholtz asked. "You want something out there on that instruction sheet that doesn't require the person doing the feeding to make a calculating decision at that time."

### Scale Accuracy

Although not a prevalent problem, Bucholtz says producers often overlook the obvious of checking scale accuracy when trying to determine why feed consumption may be off. For an added

margin of safety, he suggests checking the mixer scales for accuracy once per month using a standard unit of weight, such as a tractor suitcase weight.

While quick to acknowledge the benefits of mixing feed, Bucholtz says weighing the individual feed ingredients provides the real pay-off in TMRs. "Without accurate scales, it's almost senseless to even balance the ration because there's no degree of accuracy," he explained.

### Feeding Frequency

While many producers feed twice per day, or more often to encourage feed consumption, Bucholtz says more producers are going to once-per-day feeding as a way to save on labor and to keep an adequate supply of feed in front of the cow at all times. During high summer temperatures, however, feed may start to heat up and go out of condition, requiring multiple feedings. "We see many farms feeding once per day and doing very, very well," Bucholtz claimed, "and from a labor standpoint it makes a lot of sense."

### Who Should Balance Your Ration?

While individual skill level and comprehension of computer ration balancing programs obviously varies, Bucholtz recommends that all producers, at a minimum, play an active role in working with their nutritionist to balance their TMRs. In an ideal situation, he suggests that a producer have his own ration program, such as MSU's Spartan ration program, to evaluate the nutritionist's ration recommendations.

"For a producer to tell a nutritionist, 'you develop the ration and I'll feed it,' is really saying 'I don't want to be involved in a tremendously important part of the dairy management program,' which is foolish," Bucholtz concluded. ■

## The principle behind the "Reel" in Reel Auggie



**S**ince its introduction in 1988, the Reel Auggie mixer, patented and produced by Knight Manufacturing in Wis., has won over several loyal producers. The reel design eliminates much of the force and pressure inherent in most auger-style mixers, virtually eliminating compaction of feed, resulting in less fiber breakdown and fewer fines.

Feed ingredients are blended by the gentle lifting, fluffing and tumbling action of the patented large-diameter reel which leaves the ingredients loose and whole — not crushed — and in a more palatable condition.

Most nutritionists agree that longer dry hay helps activate the rumen for improved digestion in

cattle and improved weight gains, better milk production and improved animal health. The Reel Auggie can easily handle long stem hay in small square bales, wafers of large square bales, and broken up round bales, with an optional hay kit.

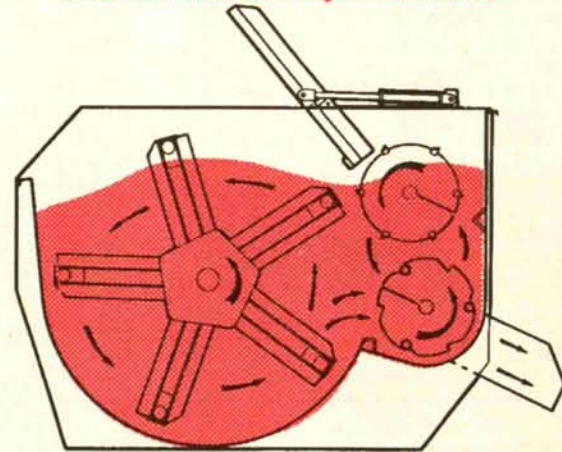
Aside from benefits to the animals, significant feed cost savings are possible. The reel design easily blends inexpensive by-products such as cotton seed, wheat midds, brewers grain and sweet corn

silage. Accurate control of each ingredient through the use of scales helps to reduce cost and eliminates over-feeding. Other advantages of the reel design include reduced mixing time, reduced power requirements, less machine wear and fewer dead spots.

Each Reel Auggie features a dust-free oil bath on its primary drives. Smaller models feature rugged front primary drives, while the two larger units feature a rear drive unit.

Another feature is the faster unloading time thanks to a simple slide tray discharge chute located next to the lower mixing auger. The Reel Auggie is available in tow, truck and stationary models, with capacities ranging from 147 to 600 cubic feet. ■

Front end view with Hay-Max installed

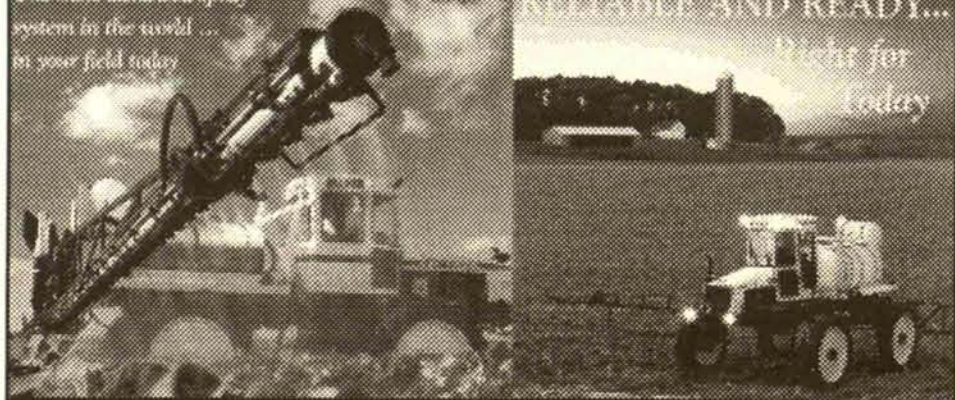


## WILLMAR SELF-PROPELLED SPRAYERS

The most advanced spray system in the world... in your field today

RELIABLE AND READY...

Right for today



### AIR TRAK

### AIR RIDE

- The latest in engineering and computerized spray technology
- The only self-propelled sprayer with three spray options
- Penetrate the crop canopy with minimal carrier
- Optimal spray coverage maximizes chemical effectiveness

- John Deere diesel engine
- Reduced crop damage
- 18-Foot turning radius
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## Animal handling demonstrations to focus on managing total mixed rations

### Continued from front page

He'll provide some helpful take-home tips producers can use on the importance of particle length and proper mixing procedures in TMR processing, as well as the pros and cons of various mixer wagons (drum vs. auger, etc.)

"Dr. Buckmaster has done a great deal of work on the importance of controlling particle length," Bickert explained. "Many times, because we're not filling the mixer correctly or because we're running the mixer too long, we're altering the particle size more than we realize."

MSU's Dr. Herb Bucholtz, professor in the Animal Sciences department, will also provide attendees with some helpful tips on avoiding common problems associated with TMRs, including dry

matter and moisture calculation demonstrations, minimizing ration variation, and avoiding problems with "hot dairy rations" for high-producing herds.

"If we're going to make TMRs work, we really need to be accurate in measuring the components that go in — which implies testing of our feeds in advance and then measuring these feeds accurately," Bickert suggested. "All of this means that we may need to fine-tune some of our management skills."

Although there won't be a side-by-side comparison of mixers, Bickert expects the demonstration will arm producers with enough information to then visit commercial exhibits and ask the right questions to ensure they pick a mixer that best meets their particular need — both in type and size. ■

## Want to improve your TMRs? Cut your mixing time!

**"Based on my experience, I can't imagine needing to mix a TMR for more than eight minutes — from start to finish!" Dr. Dennis Buckmaster, Penn State University**

If you want to improve your TMR, save fuel, time, and wear and tear on your mixer wagon, then reduce your mixing time, advises Penn. State's Dr. Dennis Buckmaster, associate professor in Agricultural and Biological Engineering. He says that while it's not uncommon for producers to run their mixers the entire time they're adding feed, they may be doing more harm than good by seriously reducing particle length.

"It's not uncommon for mixers to be running 30 minutes — that's just too long," Buckmaster said. "My recommendation is to fill the mixer, put everything in there, and then turn it on and — depending on the feed being mixed and the brand of mixer being used — start to unload it four to eight minutes later and unload it as quick as you can."

Buckmaster will be presenting TMR mixer tips during the animal handling demonstrations at MSU's Ag Expo on June 25-27 at 11 a.m. and 1:30 p.m. each day. While the focus on rations has generally dealt with the nutritional aspects, Buckmaster says the issue of particle length, credited with improving saliva flow, rumen health and butterfat tests, is starting to receive its proper attention as well.

"If you've got a group of cows with a 16,000 pound herd average, you probably won't have too much trouble meeting their nutritional demands, both in terms of chemical and physical form," he explained. "But as averages go up to 25,000 and 30,000 pounds, we need to pay more attention to the physical characteristics or particle size."

Buckmaster conducted a study on mixing times and measured corresponding reductions in particle length and distribution using a four-auger mixer. The rations contained alfalfa haylage, corn silage, ground ear corn and a concentrate premix.

For some of the rations, the haylage was replaced with alfalfa hay. During the experiment, the mixer was not running during loading. Mixing times were varied from four to 32 minutes.

The results were surprising. While uniformity of blend improved with more mixing time, particle size suffered. There was a significant reduction in the percentage of mass consisting of long particles as mixing time increased from four to eight minutes, from eight to 16 minutes and from 16 to 32 minutes.

"This study showed that not only do you break down the larger particles into smaller ones, the smaller particles also get even smaller during extended mixing," Buckmaster warned. "Mixing beyond five to eight minutes isn't likely to improve uniformity."

While the study was conducted using an auger mixer, Buckmaster says the particle size in reel and drum mixers can also be reduced with needless mixing time. Decisions affecting which mixer to use should hinge on whether a producer plans to be adding dry hay to the ration to improve particle length. If a producer has other means for chopping dry hay, a drum mixer would be equally suitable to either the auger or reel mixers, which can be outfitted with hay kits.

If your ration particle length is less than ideal, Buckmaster says adding dry hay is an excellent way to improve the ration, provided the mixer isn't run too long. "It's amazing what a couple bales of hay in a relatively large ration can do — it really makes a difference," he said.

So what is the ideal particle length? Buckmaster says that storage considerations should be the deciding factor in determining length of cut and that there may be a trade-off between getting the right cut for storage versus ideal length for feeding. "What most people talk about is a theoretical length of  $\frac{3}{8}$  of an inch," he said. "If you chop a  $\frac{3}{8}$  to  $\frac{1}{2}$  inch length of cut, I think you'll be in pretty good shape with either haylage or corn silage." ■

## Design considerations for fence-line bunks

A post and rail feeding fence is usually used for fence-line feeding, such as in a drive-through freestall barn, since the design lends itself well to mixer wagons and larger herd sizes. Before rushing out to build a fence-line bunk, however, there are a few design basics worth considering.

MSU Ag Engineer Bill Bickert recommends elevating the floor of the feedbunk three to six inches above the cow alley to provide the cow a natural grazing-like position. He also suggests that the floor of the bunk be smooth and clean to encourage feed intake.

In new construction situations, he advises using high-strength concrete (4,500 psi) to prolong the condition of the manger surface used for feeding silage and other feeds that tend to etch the concrete. Producers can also line the bunk floor with resistant material such as ceramic tile. In situations where wood is used, Bickert encourages producers to inspect and repair worn and splintered surfaces as soon as possible.

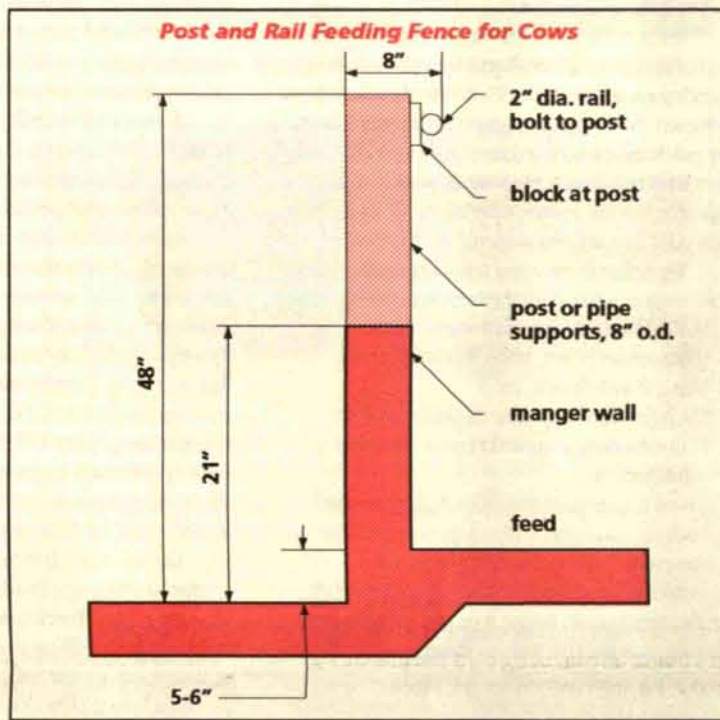
Spacing is equally important to encourage maximum feed intake. Bickert recommends that producers use the figures in Tables 1 and 2 in situations where cows are all expected to eat at once. In situations where cows will have access to feed most of the day, 18 to 24 inches per cow should be adequate. Bunk volume is also critical, especially when feeding only once per day.

Self-locking headgates, a variation of the divided feeding fence, can restrain animals and

permit selective feeding. A lever mechanism opens or closes all headgates simultaneously. Desirable features include individual or group cow release, self-locking headgates as the cow lowers her head to eat, and a quick release for downed cows.

As an added measure to protect your investment in the fence-line feedbunk, consider adding a curb next to the manger wall, says Bickert, to protect it while scraping manure. Limit the width of the curb, however, to two to six inches on the cow side of the manger wall to avoid the possibility of the curb being used as a step by the cow.

The manger wall, usually made of poured concrete, should be no more than 21 inches tall from the cow alley floor. In cases where feed panels or headgates aren't used, Bickert recommends that an upper rail, constructed of either cable, pipe or plank, be located approximately 48 inches from the cow alley floor. ■



**Table 1 — Suggested dimensions for post-and-rail feeding fences**

age, months	weight, lbs.	throat height, in.	neck rail height, in.
6-8*	360-490	14	28
9-12	490-650	16	30
13-15	650-780	17	34
16-24	780-1,200	19	41
Cows	1,200-1,500	21	48

\*A diagonal bar feeding panel is recommended for the group to prevent calves from escaping. Bars should be on a 7-inch spacing.

**Table 2 — Feed space requirements**

age, months	mature					
Type	3-4	5-8	9-12	13-15	16-24	cow
	in./animal					
Self Feeder						
Hay	4	4	5	6	6	6
Mixed Ration						
Grain	12	12	15	18	18	18
Once-a-Day Feeding						
Hay/silage/TMR	12	18	22	26	26	26-30



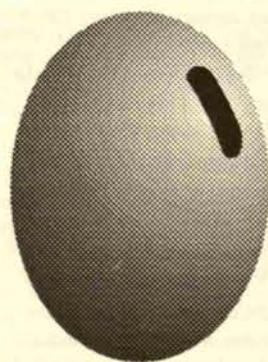
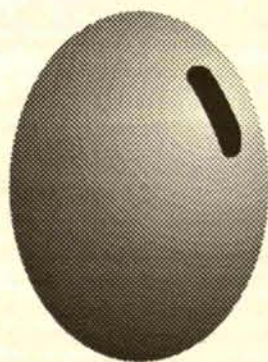
## New GEHL Total Mix mixer feeders

New "Total Mix" TMR mixer feeders let you mix more long-stemmed hay into your ration — up to 30 percent by weight depending on hay type and moisture content.

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GEHL's four auger system is known for exceptional blending and mixing of all feed ingredients into the most homogenous ration possible in much less time. The new hay auger delivers the fast mixing action in a wide variety of feed materials.

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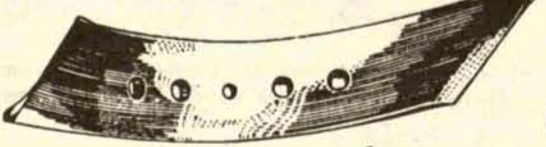
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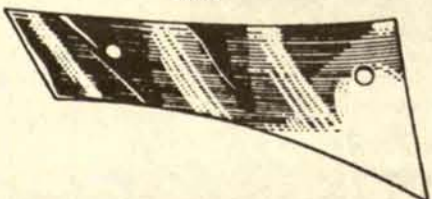
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## New Holland tractors designed with the driver in mind

by Mary J. Gawenda

Lorin Cook says New Holland tractors are the best on the market, and based on recent sales, many farmers appear to agree. "Hopefully we'll have two models (at Ag Expo), but they've been selling very well, so they're in short supply," Cook said of the New Holland tractors.

Although the company changed their main logo from Ford to New Holland, the change hasn't led engineers to sacrifice quality in designing the line of Genesis tractors, Cook said. The Ford name is still on the tractors, but they are known as New Holland now.

Engineers developed a well-balanced 7.5 liter,



SuperSteer FWD allows the tractor to turn on a dime...15-feet exactly, with any size tire.

turbo-charged diesel engine with high torque rise and horsepower for the Genesis 8670, 8770, 8870 and 8970 series, giving operators more power and convenience in the fields. Genesis 8670 model is rated at 145 hp, the 8770 has 160 hp, the 8870 has 180 hp, and the 8970 at 210 hp.

Genesis models have a torque rise of up to 50 percent instead of the typical 28 to 35 percent on other models, making down shifting less frequent and reducing stress on the engine, says Cook. "The torque rise on these tractors is second to none."

Torque and horsepower combine with New Holland's patented steering system to make Genesis tractors one of the most economic choices for farmers looking to add power and dependability to their operation, Cook said. SuperSteer FWD allows the tractor to turn on a dime...15-feet exactly, with any size tire.

An adjusting axle moves the inside front tire away from the frame and the outside tire moves in front of the tractor, allowing for a tighter turning angle, Cook explained. "Our SuperSteer front axles allow the Genesis to be the sharpest turning model on the market," Cook said.

With tighter turning, drivers will save in three areas: travel distance, time and money — three areas every farmer is interested in, Cook said.

Farmers looking for an added boost will appreciate New Holland's MegaFlow hydraulic system which pumps a whopping 55 gallons per minute and provides 2,750 psi.



Genesis' hood lifts like a car's to expose the engine, allowing for no-hassle maintenance.

The no-clutch transmission allows the driver to shuttle-shift through 16 forward and nine reverse gears. Pushing the lever forward moves the tractor forward and pulling it back reverses the tractor.

To up shift rapidly, the driver can hold the lever to the right or tap the stick to the right to

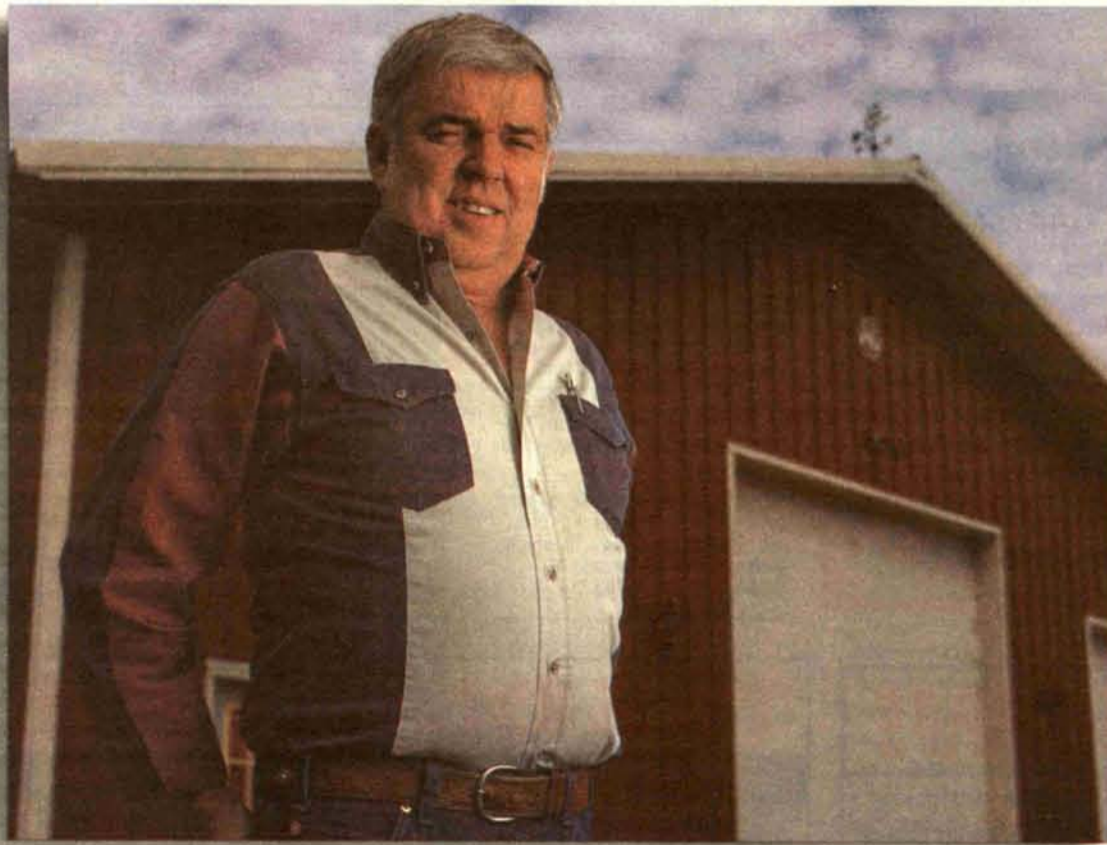
make the tractor shift slower. Other transition features make driving less hassle and more efficient.

Easy access to engine components is no longer a luxury, but a necessity for the Genesis models. The hood lifts like a car's to expose the whole engine, allowing for no-hassle maintenance. And with an easy-access door panel, oil checks and filter changes are easier, too.

The cab was also designed with the operator in mind. A swivel chair and patented Sidewinder console provide comfort and convenience. With the touch of a button, the console adjusts to the driver's needs and the swivel chair allows the driver to check equipment behind the tractor without straining the neck or upper body.

Look for the Genesis tractors at the Ag Expo Field Demos. ■

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## Bunk basics

Costly corn increases importance of consistency

Good feedbunk management is always important, but when corn prices are sky high, it's a good idea for feeders to revisit bunk basics. "Good bunk management can be worth \$10 to \$20 per head more than average management," says beef cattle nutritionist, Dr. Robbi Pritchard. He offers these basic points to consider:

### Consistency is critical

Pritchard points out that cattle are "self-propelled fermentation vats," and the biggest enemy of fermentation is variation. Since cattle are not able to monitor their own feed intake (the brain may indicate to keep eating when the rumen microbes are maxed out) feeders must do it for them, he advises. Consistent intake in cattle is based on them having a consistent diet in consistent amounts at consistent times.

### Check machinery and inputs

The accuracy of scales and feed trucks, as well as the quality of feed ingredients, can make or break good bunk management. "Details like watching ingredients to be sure there aren't a lot of fines being left in the bunk can help avoid wasting high-cost components of the diet," Pritchard suggests.

### Keeping records means using records

Having records of what cattle are eating day-to-day doesn't do much good unless the information is used and analyzed. Pritchard says it's important to use bunk scores in combination with records of the amount being fed in order to have a firm handle on where cattle have been in terms on consumption and where they need to go.

"The bunk score tells us if intakes are going up, coming down, or holding steady. It can help avoid erratic feed delivery problems (see Table 1)," Pritchard explained. "Good bunk management costs nothing more than a few minutes each day." ■

Table 1 — 4-Point Bunk Scoring System

Score	Description
0	No feed left in bunk.
1/2	Scattered feed present, most of bottom of bunk is exposed.
1	Thin, uniform layer of feed across bottom of bunk — typically 1 kernel deep.
2	25 to 50 percent of previous feed remaining.
3	Crown of feed is thoroughly disturbed. Over 50 percent of feed remains.
4	Feed is virtually untouched. Crown of feed still noticeable.