

Productivity, Agronomics Rank Highest in Mower Selection

Buying a commercial mower today is almost like buying an automobile. Each year new models and features make you wonder if you should trade in your old car. Manufacturers keep coming up with specialty vehicles to suit growing target markets. Should you buy a minivan for practical reasons? What about a four-wheel-drive truck that can also take you off road? Then, there's the thrill of a sports car with high-tech options that tantalize the car buff.

Are we seeking basic transportation, or something beyond? More than likely, we are after both, and that means more than one vehicle.

You hear the car analogy quite often today in the commercial mower industry. There's a mower for every purpose, and it's almost impossible for any single mower to completely satisfy all needs of sports turf managers with an equal degree of efficiency and performance.

Manufacturers have begun to realize this. Armed with computer-aided design systems, they are unveiling new models each year that provide improved performance, increased efficiency, and greater operator control and comfort. As a result, distributors have a broader selection of mowing equip-

ment on their showroom floors... and your buying decision becomes tougher.

Justifying the purchase of mowing equipment entails more detailed consideration than in the past. Each improvement adds to the price of professional mowers and usually requires education of both operators and mechanics. Maintenance procedures may change and new spare parts may be needed in your inventory. The sports turf manager must weigh each change in terms of productivity and performance.

To help golf course superintendents and sports turf managers make sense out of many of these changes, we spoke to agronomists, mower manufacturers and turf managers. It's clear from their remarks that mower selection today is founded on technical as well as performance issues. Furthermore, the mowing needs of a turf manager depend largely on the type of sport played, and in the case of golf, on the location of the turf on the course. They also vary according to the type of turfgrass and the desired height of cut.

"Listening to customers' requests is the key," explains Jeff Mack, vice president of Lesco, Inc., in Rocky River, OH. "The customer is often the innovator, but he depends

upon manufacturers to develop the final product. This was the case with lightweight fairway mowers."

Superintendents began to mow bentgrass and bermudagrass fairways with triplex greensmowers because they wanted a greens-like cut without compaction-related problems. Compaction on fairways gives annual bluegrass an edge on bentgrass and Kentucky bluegrass and can slow water infiltration. Aerating fairways frequently to counteract compaction is time consuming and disrupts play. You wouldn't take a heavy mower on greens, so it figures that the same precautions would help fairways.

The obvious problem was that greensmowers weren't designed for fairways. Their 60-inch cutting width, maintenance level, and construction were intended for smooth, low-cut greens... not acres of fairways. Then managers of bermudagrass/ryegrass baseball fields discovered the fine cut of greensmowers and the extra benefit of their "grooming attachments." It became clear that a larger, lightweight mower was needed for these specialized uses.

Lesco responded with the 500 Fairway Mower in 1987. This lightweight mower cuts a 100-inch-wide swath for higher productivity. Jacobsen released its LF100 in 1988 with equal success. Both companies were able to shave nearly 1,000 pounds off comparable five-reel fairway mowers primarily by reducing the weight of the "prime mover", or tractor, and by utilizing lightweight materials where possible. Ransomes will introduce its Fairway 5000 this fall, and Toro has announced it will have its new 223-D lightweight fairway mower ready this coming winter.

"The trick to durability in lightweight equipment," explains Tom Carter, vice president of Jacobsen, "is where you put the weight. The LF-100 was designed from the ground up to place the weight where it was most critical in terms of strength. We also incorporated high-strength, lightweight materials. For example, there are very nice lightweight, water-cooled diesel engines available today. These provide economy and durability."

It's important to note that the demand for lightweight equipment grew because the superintendent and sports turf manager were experimenting to improve specialized turf under their care. Specialized is the key word. Lightweight fairway mowers are



Toro Reelmaster 223-D lightweight fairway mower.

designed for mowing heights ranging in general from 1/4 to 3/4 inch. They are also limited in their ability to mow severely damaged turf, such as football and soccer fields. They are a specific tool for a specific use.

"You can't really draw a line to separate lightweight mowers from other mowers," states George Kinkead, marketing manager for National Mower Co. "If weight and compaction are your primary concerns, triplex reel mowers are lighter than five-plex models. It just depends upon your budget and how high-tech you want to get." National and Locke pioneered the riding triplex reel mower in this country.

"A lot of sports turf managers who switched to rotaries for efficiency are switching back to reels because they want the look of a reel cut for certain areas," he adds. "They are more inclined to consider a whole range of mowing equipment to achieve both quality and efficiency."

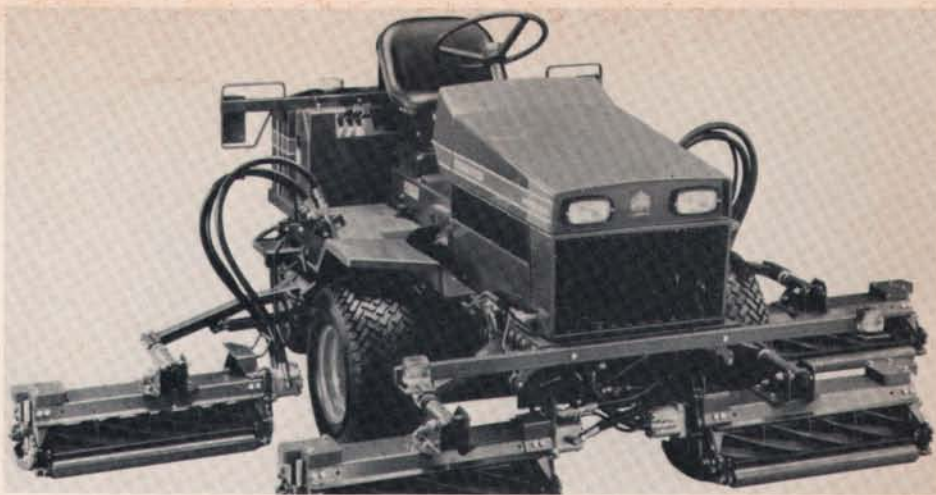
Many of the innovations that have led to improved performance of riding reel mowers were first made on triplex models. Some of these are: reels in front of the wheels, higher frequency of clip, greater maneuverability, all-wheel drive, increased stability on slopes, backlapping, heavy-duty bedknives, hydraulics for lifting reels, and hydrostatic drive. Now turf managers have a choice of the number of blades on each reel, verticut reels, grasscatchers and more.

Examples of triplex mowers are Brouwer's Triplex-376, Deere's 756, Jacobsen's Tri-King, National's 84-inch triplex, Ransomes' Motor 180, and Toro's Turf Pro 84. These improvements were then incorporated into five-reel models to increase productivity. Some examples of five-plex units are Deere's 3325, Jacobsen's HM-11, Ransomes' Motor 350D, and Toro's Reelmaster 350-D. In general, these mowers can mow a swath wider than 11 feet at a cutting height ranging from 3/8 inch to three inches, depending upon the size of the reel. With these mowers sports turf managers can give a high-quality cut to more than seven acres in a single hour.

One factor contributing to the quality of cut by these mowers is frequency of clip. Reel mowers cut with a scissor-like action. Frequency of clip refers to the number of clips made in a given distance. It can be increased a number of ways. The most obvious is to increase the number of blades on a reel. Manufacturers of these mowers offer reels with a range of six to ten blades.

The next way to increase frequency of clip is to boost the speed at which the reels turn. Reel speed can be increased by changing gears in the cutting unit, hiking PTO rpm, or utilizing hydraulic motors to drive the cutting heads. Of course, frequency of clip changes with the rate of forward speed.

"Frequency of clip is mainly important when you are cutting below one inch," points out Dr. James Watson, chief agronomist for Toro. The other thing to keep in mind is that taller turf must be cut with



Ransomes 350D five-plex reel mower.



Deere F932 out-front rotary mower quickly trims around sand trap.

larger diameter reels. The rule of thumb is the turf must be shorter than half the diameter of the reel.

Reels were first utilized for golf courses and other large turf areas in ground-driven, pull-behind gang units. Reel gangs continue to perform a valuable function for mowing utility turf. They too have benefitted from increased frequency of clip through PTO and hydraulic drive. Brouwer, Deere, Jacobsen, National, Ransomes, Roseman and Toro offer improved reel gangs which provide an improved-quality cut with the important option of allowing a turf tractor to be used for other duties.

Dedicated mowing tractors, such as Jacobsen's HF-15 and Toro's Parkmaster or HTM-175, can easily justify their use by mowing up to 60 acres of turf each working day. Hydraulics have greatly improved the mobility of these tractors as well as their cutting ability.

As the availability of flat sites for golf courses, parks and schools decreases, stability of mowers on slopes is becoming more of a factor. Manufacturers are designing riding mowers with a lower center of gravity, all-wheel drive, and weight transfer mechanisms to increase stability. Bunton, Jacobsen and Lely have also begun to import multi-purpose tractors from Europe that can handle steep slopes with greater safety.

Perhaps the most specialized type of mower in the market today is the greensmower. Superintendents, striving to increase the putting speed of their greens during tournaments, are lowering cutting heights to 3/32 inch. They are also "grooming" or lightly verticutting frequently to eliminate any grain in the short-cut bentgrass or bermudagrass.

To reduce further stress on greens, superintendents are very cautious about compaction. This has revitalized the role of the walk-behind greensmower and led to advanced attachments such as rollers, groomers, combs, brushes and verticutters to prepare the turf immediately ahead of the blades for cutting. Brouwer, Deere, Jacobsen, Lescro, Ransomes and Toro are all adapting their walk-behind greensmowers to meet the challenge of extremely low cutting heights.

They are also evaluating the "footprint" and mowing quality of their riding greensmowers. Deere recently introduced a greensmower with offset cutting units to reduce ground compaction problems of daily mowing.

Advances in mowing equipment have not been confined to reel mowers. Out-front rotary mowers have led the race in productivity with unmatched maneuverability. They also have a lower maintenance requirement than reels. "A reel unit is a precision piece of equipment that must be checked daily," says Mack. Regular adjustment of the bedknives is necessary and blade sharpening requires special equipment. Rotaries can also take more of a pounding, he states.

Manufacturers have come a long way since the days of belly-mounted rotaries on tractors. By moving the cutting units in front of the tractor and steering with rear wheels instead of front, manufacturers have made great strides in maneuverability. More companies are offering out-front rotaries with zero-turning radius, something impossible with reel units. This is eliminating hours of trim mowing around trees and other objects.

Riding out-front rotaries have progressed
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Mower Selection

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from sulky-type units to sophisticated multi-purpose prime movers. A few examples are the Cushman Front Line, Deere's 900 series mowers, the Excel Hustler, Gravely's Pro-Master, Jacobsen's Turfcats, Ransomes' Jaguar, the Steiner tractor and the Toro Groundsmaster.

By utilizing rotaries for turf areas where reels are inefficient or cumbersome, the sports turf manager can devote more attention to fine turf under his care. Golf course superintendents can mow roughs dotted with trees, bunkers and lakes in considerably less time than with reels. Athletic field managers can trim around fences, buildings, goals and tracks quickly.

Rotary units can also be ganged on mowing tractors to provide cutting widths up to 15 feet. Hydraulic lift can raise side-mounted cutting units for transport to different sites quickly. Once on location, these large rotary mowers can cut large expanses of rough, parkland or campus turf in the least amount of time.

Hydraulics have allowed blade speed to be independent of ground speed or engine rpm and have eliminated drive belts in many models. Increased blade speed combined with daily blade sharpening results in a cleaner cut. Hydrostatic drive can provide instant forward or reverse with the touch of a pedal. By installing hydraulic motors on each drive wheel, a small turning radius is made possible and traction on slopes and wet areas is improved.

As you will see later in the story, speed translates into productivity. The time gained from efficient mowing can be used either to expand the amount of turf under your care or to allow you the time to increase mowing frequency.

Flail cutting units are beginning to contribute to the productivity of sports turf managers. Both reel and rotary units are limited as to the height and coarseness of grass they can cut. Flails have the ability to mow taller, stemmy turf. The advent of fine-cut flail heads, such as those available on Jacobsen's Turfcats and HR-15, have also improved the quality of cut.

There really is no university research comparing the impact of different types of mowers on turf. Instead, turf managers on their own have pieced together research on compaction, drought tolerance, water use, turf density, optimum cutting height, aesthetics, weed control, and other related subjects. Then they weigh these against productivity, maneuverability, safety, operator comfort and price.

Superintendents and other sports turf managers are in a constant struggle to increase productivity and to meet higher turf standards. Add to this the goals of conserving water, reducing dependence upon pesticides, and keeping pace with the growing demand on sports turf facilities, and you can easily appreciate the huge challenge ahead.

One agronomic principle that can help

everyone in the industry toward reaching these goals is *increased mowing frequency improves turf quality*. It improves turf density, conserves water, and results in better playing conditions and appearance. By keeping turf at its optimal height, many secondary problems, such as weed encroachment, thatch buildup, disease incidence, and clipping disposal are more controllable.

Dr. Robert Shearman, head of the department of agronomy at the University of Nebraska in Lincoln, has performed the most research related specifically to the physiology of mowing. He has investigated how mowing fits into other cultural practices such as irrigation, fertilization, and pesticide applications. His findings point strongly toward increasing mowing frequency.

To improve playing conditions, superintendents and sports turf managers are lowering mowing heights. This increases the stress on the plant, largely by a reduction in root depth. Working from a reduced root system, turfgrass requires more attention in terms of cultural practices such as irrigation, aeration, drainage, fertilization, and applications of herbicides and pesticides.

Shearman has revealed that increased mowing frequency increases shoot density and tissue succulence. Greater density results in improved playing conditions. It also creates a canopy within the turf that reduces evapotranspiration, conserves

water and cools the soil. This helps counteract the effects of shorter root depth during periods of high temperature.

By mowing daily, instead of weekly, plant water use can decrease by as much as 30 percent, says Shearman. While daily mowing is impractical for many sports turf managers, increasing frequency to two or three times per week can conserve water. Furthermore, the practice of reducing mowing frequency during the off-season may have an adverse effect on turf density.

Shearman adds that turf water use also increases with mowing height. While a higher cut of cool-season grasses does benefit turf during periods of heat stress, it may be better to maintain it at the original mowing height, increase mowing frequency and use syringing to reduce maximum soil temperatures and heat stress. For bentgrass, he suggests raising mowing heights before periods of heat stress to encourage deeper rooting.

Both Shearman and Watson warn that maintaining turfgrasses below their optimal height for any extended period of time is asking for trouble. Furthermore, turf cut below optimal heights requires intensive maintenance. Raising mowing heights back to optimal levels, especially during periods of high temperature, will not immediately restore root depth. The taller turf will require more water before the root system has had a chance to catch up. "This emphasizes the importance of timing and manipulating

mowing height and frequency to benefit playing conditions and turf quality," states Shearman.

In general, optimal cutting heights are 1¼ to 1½ inch for Kentucky bluegrass, 3/8 inch for bentgrasses, 3/4 to 1 inch for bermudagrasses and perennial ryegrass, and 2 inches for tall fescues. Individual cultivars vary considerably in their best cutting height. Turfgrass breeders have developed dwarf cultivars of bentgrass, bermudagrass, Kentucky bluegrass and tall fescues. Some growth regulators stimulate certain turfgrasses to favor lateral growth over vertical growth. Also, optimal cutting height varies with temperature.

The ultimate goal of golf course superintendents and sports turf managers is to achieve a combination of quality and playability that fits each particular area under their care. There may be a wide variety of sites, each with its own level of quality and playability. Therefore, no one mower or mowing program is appropriate for all cases.

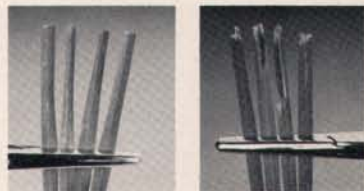
Efficiency, productivity, quality and playability are derived today from utilizing the right combination of mowing equipment. One cannot be overlooked in an attempt to maximize another. The agronomics of mowing as they relate to the quality and durability of high-use recreational turf provide a strong case for industry professionals to justify their current needs. ●



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