Balance Water Application/Intake Rates When Irrigating

NEWARK, Del. – "The next time your irrigation system is operating, climb into a rain suit and take a look at what the water's doing, once it hits the ground," advises University of Delaware extension agricultural engineer Tom Williams. "It's the only way to tell whether you're irrigating properly."

The speed with which an irrigation system applies water to the soil is the application rate in inches per hour. This must be balanced with the soil's infiltration or intake rate (its ability to absorb water). When the application rate exceeds the intake rate, runoff occurs unless the field is perfectly level.

Runoff causes uneven water distribution as well as erosion, Williams says. With runoff, fertilizers and chemicals applied through the irrigation system aren't uniformly distributed. And erosion moves topsoil–along with nutrients–to other parts of the field, or off of it entirely, thus reducing potential yield.

"Center pivots can have the highest application rates of any of the mechanically moved irrigation systems," the engineer says. "The longer the lateral pipeline and the higher the crop's water requirement, the higher the application rate required. This rate also varies along the lateral, with rates increasing from the pivot to the end gun. On a 1,320 foot system, the last 177 feet have to cover the same area as the first 660. This means the water has to be applied faster at the end of a pivot system than at the beginning."

On all irrigation systems, the application rate depends on the sprinkler or spray package. Once the nozzles are selected, the peak application rate is fixed. The only way to change it is to change the nozzles. Changing the travel speed of the system only changes the total amount of water applied, not the application rate, Williams says.

"The further a sprinkler throws water, the lower the application rate on center pivot and linear move systems," he adds. "It takes a lot of pressure and pumping energy to get those large wetted diameters. Most farmers have opted for low-pressure systems to reduce pumping costs, and application rates have increased accordingly." For instance, a high-pressure center pivot system might have a peak application rate of 0.7 inches per hour, whereas the same system with a low-pressure 180 degree nozzle package could have a peak rate of 8 inches per hour–more than 11 times higher.

"Obviously, there's a tradeoff between reduced pressure and potential runoff," the engineer says. "Dr. Robert D. vonBernuth at the University of Tennessee has studied this problem. He's concluded that it's probably cheaper to use a low-pressure system and increase pumping time to offset the resulting runoff. In his study, low-pressure spray booms on the center pivots had the least pumping costs of the systems he compared, because they had the least runoff of the low-pressure systems. However, vonBernuth did not compare cost differences between systems."

Droplet size also affects soil intake rates. Large droplets striking bare soil expend a lot of energy on impact, dislodging soil particles and causing surface sealing and compaction, which in turn reduce infiltration. The larger the droplets and the heavier the soil, the worse the problem. High pressure and small nozzles give smaller droplets and higher intake rates. That's why it's important to use high pressures on big gun sprinklers to get the proper stream breakup, William says.

Many factors determine soil intake rates, and this makes it hard to establish general guidelines for matching application and intake rates. Soil texture is the biggest factor influencing intake, he says. Coarse-textured sandy soils will absorb water much faster than fine-textured silty soils. The higher the sand content, the higher the intake rate; the higher the silt content, the lower the rate. For instance, a sandy soil may take in 2 inches or more of water per hour, compared to only ½ inch or less, on a silt loam.

Intake rate also depends on the initial moisture content of the soil. A dry soil will absorb water very rapidly at first, and then level off to a lower rate as it becomes wetter. This means potential runoff can be reduced by applying less water more often. For the same reason, Williams says to apply as little water as possible when chemigating.

Other factors which affect water intake rate are soil structure, aggregate stability, organic matter content, the tillage method used and soil cover. In turn, all of these are influenced by soil and crop management practices. A covered soil (that is, a well-mulched soil) can have twice the intake rate of bare soil.

"The only way you can know whether your irrigation system is applying water as effectively as possible is to observe it in operation," Williams concludes. "So climb into that rain suit and go take a look. Note the application rate, surface ponding, soil texture and cover when deciding what adjustments are best for your farm. If runoff is a concern, keeping the ground covered with no-tillage under irrigation will usually help reduce this problem."

California All-Jersey Donates Funds

COLUMBUS, Ohio. – California All-Jersey, Inc., has donated $30,000 to the J.F. Cavanaugh Research Fund, pushing the fund over its original goal of $100,000.

The donation brings the total AJCC research endowment to over a quarter of a million dollars. At this present level, $20,000 or more of Jersey research could be funded annually.

California All-Jersey has been involved in partial funding of research projects in the past, including casein test research and research on a cheese yield formula for end-product pricing at Utah State University.

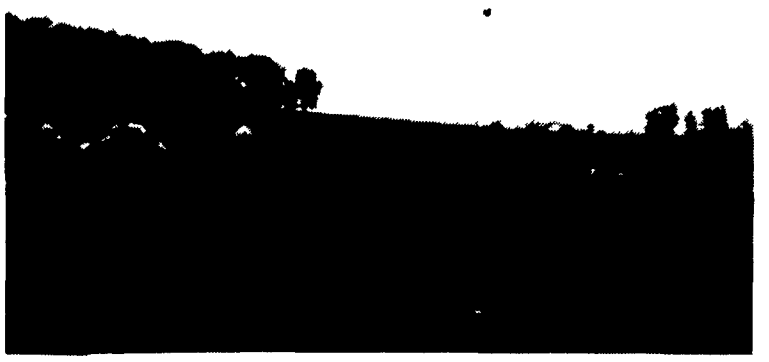
California All-Jersey, incorporated in 1953, was also a primary advocate for the establishment of National All-Jersey, incorporated four years later. Many of the officers and directors of National All-Jersey have come from the ranks of California's organization.

The research fund donation was made possible by California All-Jersey's voluntary check-off program for Jersey dairymen.

The J.F. Cavanaugh Research Fund is managed by the American Jersey Cattle Club. The Club's Research Committee selects the projects to be funded.

Areas of study that could be funded by the foundation include nutritional needs of high-producing Jerseys, accuracy of fat and protein testing, variants in Jersey milk and their relationship to yield of products, factors that influence lifetime profit from Jerseys, genetic abnormality research, Jersey feed efficiency, and value of Jersey milk in manufactured products.

Md. Hampshire Breeders Meet For Annual Picnic



Members of the Maryland Hampshire Breeders Association watch as Ladd herds sheep during their annual picnic/meeting. The meeting was held at the historic home of Dane and Belle Fangmeyer near Westminster, Md., on July 20.