

## **Grazing Management Can Reduce Grasshoppers While Increasing Beef Production Profits**

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Crisis management of grasshopper populations after they have reached outbreak numbers is an expensive, no-win situation that producers can work to avoid, says a North Dakota State University range scientist.

“Producers can be proactive and change their grazing practices before grasshopper numbers reach problem levels. By implementing grassland management practices that produce habitat conditions unfavorable for grasshopper growth and development, producers can reduce the intensity and duration of recurring outbreaks,” says Lee Manske, a range scientist at NDSU’s Dickinson Research Extension Center.

Grasshopper populations fluctuate in response to changes in habitat condition. Grasshoppers thrive in habitat where reduced vegetation canopy and large areas of bare ground provide the hot, dry conditions that reduce grasshopper pathogens, increase egg production, elevate metabolic rates, and accelerate maturation rates of immature insects. Grasshoppers are a natural part of grazinglands and haylands of the Northern Plains, and population densities remain below problem levels as long as the habitat conditions remain unfavorable for population increases.

Most traditional management practices produce habitat with conditions near the threshold between those unfavorable and those favorable for grasshopper population increases. During years with normal or above-normal precipitation, grasshopper populations remain below problem levels on pastures under traditional management, but during years with below-normal precipitation or increased stocking rates, grasshopper numbers increase. After a few years with favorable habitat conditions, grasshopper populations can reach outbreak levels.

These outbreaks are often perceived to be associated with the drought conditions alone rather than

with the combination of drought stress and deleterious management practices. Traditional management that does not meet plant biological requirements reduces plant health status. Plant communities with weakened health status are able to endure only minimal stress and require long periods to recover from stress conditions. In contrast, healthy plant communities can endure considerable stress and can quickly rebound from stress.

Long-term grassland management strategies that meet the biological requirements of the plants improve grassland health. Such plant-friendly management strategies as the twice-over rotation system coordinate grazing periods with grass growth stages to stimulate beneficial processes within grass plants and the ecosystem. Grazing that removes a small amount of leaf material from grass plants between the three-leaf stage and flowering stage stimulates vegetative tiller development from axillary buds on the plant crowns and increases the activity of symbiotic soil organisms in the rhizosphere around grass roots.

Together, the resulting increases in plant density and herbage biomass production and the improvements in biogeochemical cycles create habitat with greater vegetation canopy and smaller and fewer areas of bare ground. These healthy grassland habitat conditions reduce the microhabitat favorable for grasshopper growth and reproduction.

The enhanced vegetation structure limits the amount of solar radiation that reaches the soil surface and decreases the airflow over the ground so that air and soil temperatures in grasshopper microhabitat are lower and humidity is higher. The decreased availability of the basking sites grasshoppers need to warm themselves and elevate their metabolic rates slows the insects’ growth rates. Unfavorable conditions on egg-laying sites reduce egg production and development, and improved conditions for important

pathogens that cause grasshopper diseases result in increased mortality rates of immature grasshoppers.

The features of habitat on healthy grassland ecosystems check grasshopper increases so that the population numbers remain below problem levels. During a two-year local outbreak, the biologically effective twice-over rotation grazing system averaged only 3.9 adult grasshoppers per square meter, 82.7 percent fewer grasshoppers than the outbreak density of 22.6 adult grasshoppers per square meter on the traditional management practice of seasonlong grazing.

Plant-friendly grassland management designed to improve the health status of ecosystems has the additional benefit of improving livestock performance and increasing profit margins per acre. Comparisons between the biologically effective twice-over rotation system and a traditional seasonlong grazing practice show that the twice-over rotation system requires 29.1 percent fewer acres per cow-calf pair for a summer, has 49.2 percent greater calf weight gain per acre, has 33.3 percent lower cost per pound of calf gain, and has 110.7 percent greater economic return after pasture and forage costs per acre.

“Proactive long-term grazing management that produces healthy grassland habitat with unfavorable conditions for increases in grasshopper populations is positive for the ecosystem and profitable for beef producers,” Manske says.