MINIMIZING IMPACT OF WHEEL TRAFFIC IN FORAGE FIELDS

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In forage production with legumes or grasses, the harvesting equipment operates directly on the plants which will impact the yield for the succeeding cutting or crop. Reducing the wheel traffic or its impact will be beneficial to the yield. Consider three management practices to achieve the benefits of reduced compaction:

1. decrease the pressure at tire-soil interface,
2. reduce the intensity of the wheel traffic, and
3. reduce the time between mowing and succeeding harvesting

Minimizing pressure at the tire-soil interface, which is closely related to tire air pressure, will reduce plant stress. Recommended tire pressure depends on tire construction and load carried. Two types of tire construction commonly found in agricultural tires are bias and radial. Recommended bias tire pressure remains fairly constant regardless of the load. Recommended radial tire pressure changes with load. Based on one tire manufacturer's data, a radial tire (18.4R-38) has a recommended pressure of 15 psi at a load of 10,000 lbs. and 8 psi at 7000 lbs, a significant reduction in the pressure at the soil. Plants will experience less stress at lower pressure. The contact area between the tire and the soil is greater with the radial tire because it deflects more. The radial tire side walls are more flexible than the bias tires'. The operator's manual will provide recommended pressures for various loads for both types of tires.

Tire construction is not the only way of getting a larger area of contact. Selecting wider and larger diameter tires will also increase the contact area. Manufacturers have been making larger diameter tires available partially for this reason. A 18.4R34 tire will have 320 sq. in. of contact on a flat surface, while a larger diameter 18.4R-42 tire will have 350 sq. in.of contact, nearly a 10% increase in contact area. Similar increases are obtained with wider tires.

The intensity of the wheel traffic can be reduced by removing unnecessary weight or reducing traffic of the larger, more massive machines. Tractors are used for multiple purposes requiring different ballasting or weighting. If they're used for tillage, which requires more ballast, then later used for raking, often weight or ballast can be removed. Using caste iron weights provides a more convenient method of changing ballast than fluid in the tires.

Traffic intensity can be reduced by combining windrows with lighter equipment. Combining two windrows will reduce large-machine traffic by 50%. This reduction is replaced by traffic of a lighter weight tractor and rake or merger.

Four systems were evaluated for traffic intensity, determined by multiplying the weight of the equipment times the distance required to travel to mow, rake, merge and harvest one acre of land (see table). The forage wagon was considered to be half-full on average. A 16-ft. mower-conditioner and a 3-cutting-per-year system were used. Without raking and using a pull-type forage chopper the intensity is 14.7; by raking two windrows together and using the pull type harvester, the intensity is 10.4, nearly a 30% reduction. The difference between a pull-type forage harvester and a self-propelled machine is small when raking two windrows together, 10.4 for the pull type vs. 10.1 for the self-propelled (see table). Combining five windrows with two passes of a double merger results in another significant reduction, going from 10.1 for combining two windrows to 7.8 for merging five, about a 23% reduction.

System Comparison - 3 cuttings per year for 16-ft. mower-conditioner

Rake/Merge	Chopper	Intensity
No	Pull	14.7
Yes (2 into 1)	Pull	10.4
Yes (2 into 1)	Self-Prop	10.1
Merge (5 into 1)	Self-Prop	7.8

Reducing the time between mowing and the operations following will be beneficial. Immediately after mowing plants start new growth for the succeeding cutting. Time can be shortened by increasing the drying rate, accomplished by adjusting the conditioning system for the fastest drying rate without excessive losses. Lay the windrow as wide as possible for more rapid drying.

Producers have several opportunities to reduce the impact of wheel traffic in forage production with little or no cost. The degree of the benefits will depend on the steps taken and the soil conditions (steps are more beneficial in wet soils).