Leaving 3 to 5-inch stubble heights during harvest are very common because of rocks, pocket gophers, or crop lodging, but what is the impact of stubble height on the yield and quality of alfalfa? Obviously, increasing the stubble height will reduce forage yield, but it is surprising by how much.

Two experiments evaluating stubble height effects were conducted at Fargo (dryland) and Carrington (irrigated), North Dakota during 1999-2001. Forage yield averaged across three varieties, three years, two cutting systems (3 and 4 annual cuts), and two locations was reduced 0.95 tons/acre for each 2 inches of stubble left in the field (Fig. 1). That’s a 15% reduction in forage yield for 2 inches of stubble left in the field or 30% for leaving a 5-inch stubble.

Harvesting at a 5-inch stubble height increases the forage quality of the hay compared to lower stubble heights (Fig. 2, Fig. 3, Fig. 4, and Fig. 5). Relative feed value (RFV) of the hay was increased 31, 30, 26, and 23 units in the first, second, third, and fourth harvests, respectively, when harvested at 5 (12.7 cm) compared with 1 (2.7 cm)-inch stubble heights (Fig. 5). Likewise, crude protein (CP) was increased 2.2, 2.6, 1.4, and 3.2% in the first, second, third, and fourth harvests, respectively, (Fig. 2). Obviously, the lower stem (lowest 4 inches) is very poor in forage quality averaging only 10.1% CP, 51.3% acid detergent fiber (ADF), 61.5% neutral detergent fiber (NDF), and a RFV of 71 in the fourth harvest while the hay averaged 17.0% CP, 30.5% ADF, 38.5% NDF, and 159 RFV.

Each producer must weigh the advantages of yield, forage quality, harvesting efficiency, overwintering ability, and economics when deciding at what stubble height to harvest the alfalfa.

Cash hay and dairy producers receive a premium for high quality so leaving some stubble in the field to increase quality might be justified if harvest is delayed by rain. But I believe it is better to harvest at a maturity that the lowest stubble height will produced prime hay rather than sacrifice the yield potential. In many cases, the premium price received will not offset the 30% reduction in yield. Beef cow producers should always harvest as low as possible since forage quality of alfalfa is greater than that needed by the cow.

Regrowth rate following harvest was not affected by the stubble height. Height of the canopy before harvest was similar among stubble heights, but the percentage of stems originating from remaining residue increased with increasing stubble height. Overwintering of the four-cut system was slightly better in the 5-inch than 1-inch stands in 2000-01 winter when injury was noted, but forage yields were still higher at the 1- than 5- inch stubble. Harvesting at the 1-inch stubble height will increase the ash content of the forage from soil contamination, especially with some of the flail-type harvesters.
Stubble height at which alfalfa is harvested has a greater impact on forage yield and quality than what you might anticipate, and it should be considered in your management package. More effort on pocket gopher control is warranted. Removal of rocks prior to seeding or rolling to push rocks back into the ground in established stands is also warranted.

Fig. 1. Forage yield of alfalfa harvested at three stubble heights, meaned over 2 locations and three varieties.

Fig. 2. Stubble height effect on crude protein content of alfalfa.
Fig. 3. Stubble height effects on neutral detergent fiber (NDF) content of alfalfa.

Fig. 4. Stubble height effects on acid detergent fiber (ADF) content of alfalfa.
Fig. 5. Stubble height effects on relative feed value (RFV) of alfalfa.