Higher Quality Alfalfa Cultivar Yield & Nutritive Value Response to Cutting Schedule Management Strategies in a Mediterranean Environment

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Achieving high yields of high-quality alfalfa (*Medicago sativa* L.) has been a challenge for producers due to the yield-quality tradeoff associated with crop maturation. Delayed cutting increases yield but results in hay with high lignin content, and reduction in fiber digestibility and nutritive value. However, recent introductions of cultivars with higher quality (the genetically-engineered HarvXtra, and the 'HiGest' conventional cultivars) have shown the potential to minimize the yield-quality tradeoff due to crop maturity. There have been few reports of these lines in semi- or non-dormant (FD 6-9) lines grown in a long-season environment. We compared nutritive value and dry matter yield of eight cultivars (2 HarvXtra, 2 Hi-Gest, and 4 Conventional) at Parlier, CA in 2017-2021 in a split-plot design with cutting schedules (28 d, 35 d, and staggered with 21 d/35 d alternating) as the main-plot effect and cultivar as sub-plots. Cutting schedule and cultivar effects were significant (P<0.0001) for all measured variables, and response of cultivar types across years and cutting schedules were similar. Yields increased with delayed cutting (35 d vs. 28 d), while nutritive value decreased. Nutritive value of cultivar types, averaged over years and cutting schedules, were in the order of HarvXtra > Hi-Gest > conventional. HarvXtra and Hi-Gest, respectively, were an average of 6% and 1% greater in neutral detergent fiber digestibility (NDFD), 6 % and 4 % lower in acid detergent lignin and 2% greater in crude protein than conventional cultivar types. Only HarvXtra at 35d achieved similar NDFD to conventional cultivar types cut at 28d. The 'staggered' schedule offers the opportunity for improved yields while providing sum-total higher-quality harvests than a regular 28 d schedule. Adaptation of higher quality semi- and non-dormant cultivars, in conjunction with delayed harvests is a potential strategy to improve yields balanced with the need for high fiber digestibility required for high energy-demanding animals.

Table 1. Cutting Schedule effects on forage yield, Parlier, CA, 2018-2021.

	2018	2019	2020	2021	4-yrs avg.	4-yrs sum
Cutting Schedules treatments			Dry Matter Yield (Mgha^{-1})			
Normal	23.2b	22.7c	20.7c	24.2b	22.7c	90.7c
Staggered	23.8ab	24.2b	23.5b	24.7b	24.1b	96.2b
Late	24.5a	25.6a	26.8a	28.6a	26.4a	105.5a
SE	0.248	0.389	0.660	0.688	0.361	1.434

Within column means with different letters are significantly different at p<0.05. Standard error (SE)

Table 2. Cultivar Type Effects on average Neutral Detergent Fiber Digestibility, Parlier, CA, 2018-2021.

	2018		2019		2020		2021		4-yr avg.	
Cultivar Type					NDFD (gKg^{-1})					
		SE		SE		SE		SE		SE
Conv	402.0c	1.33	400.9c	1.73	442.4c	2.62	442.7b	2.76	422.0c	1.31
HarvXtra	419.2a	1.88	424.6a	2.21	451.6a	2.76	489.0a	3.91	446.1a	1.84
HiGest	408.6b	1.88	408.3b	2.21	446.2b	2.76	449.8b	3.91	428.2b	1.84

Within column means with different letters are significantly different at p<0.05. Standard error (SE)