NORTH DAKOTA - Annual Forages in Single- & Dual-Crop Systems for Late Season Grazing

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Annual forages planted in late summer provide an early winter grazing option to complement rangeland or extend grazing season. Selection of species within a mixture offers the opportunity to minimize costs and tailor soil health benefits. A 2012-2014 study in south central North Dakota, tested 3 grazing treatments on 2 cropping systems. Angus crossbred beef heifers (18-20 months of age) in mid-gestation were assigned to treatments from mid-October to early December. Single-crop (annual cocktail forage crop) and dual-crop (annual cash crop/annual cocktail forage crop) systems were subjected to grazing treatments: full use, 50% degree of disappearance, and no use. A traditional drylot setting was the control. Herbage production, livestock performance, economic efficiency, and soil health were monitored.

Grazing treatments did not have an effect on herbage production of the cropping system; however, production of the single-crop system was 0.5-16 times greater than the dual-crop system, depending on year and treatment (Table 1). Reduced production of the dual-crop was attributed to limited moisture availability, competition with volunteer crop regrowth, and weeds. Average daily gain (ADG) was higher in the drylot compared to grazing treatments; however, all treatments experienced ADG increase each year (Table 1). Cocktail seed mixture costs ranged $15.20-$18.01/ac. Drylot was the only treatment consistently providing a positive return per head per day. Including costs for land rental, seed and fertilizer, and custom planting and harvesting, only the full-use grazing treatment displayed positive returns during 2 of the 3 years; and losses were limited when compared to the other grazing treatments. Grazing cover crops provided neutral or positive soil health characteristics compared to non-use. Aggregate stability increased in both grazing treatments, but not with the non-use treatment (Table 1). If considering a graze vs. no-graze scenario, the study demonstrated more soil health benefits occurred when grazing each cropping system.

Table 1. Average production of single-crop (SC) and dual-crop (DC) systems, heifer average daily gain (ADG), and aggregate stability measured by grazing treatment and year. Central Grasslands Research Extension Center near Streeter, ND; 2012-2014.

	Average Production (lbs/ac)					
	Full Use		50% Disappearance		No Use	
Year	SC	DC	SC	DC	SC	DC
2012	2245^{a}	1476^{b}	2186^{a}	1217^{b}	2800^{a}	925^{b}
2013	2191^{a}	251^{b}	2471^{a}	157^{b}	2636^{a}	151^{b}
2014	1682^{a}	738^{b}	1783^{a}	634^{b}	2228^{a}	665^{b}

	Heifer ADG (lbs/d)		
	Full Use	50% Disappearance	Drylot
2012	2.02^{a}	2.42^{ab}	2.86^{b}
2013	0.75^{a}	1.28^{a}	2.84^{b}
2014	0.51^{a}	0.84^{ab}	1.03^{b}

	Aggregate Stability		
	Full Use	50% Disappearance	No Use
2012	0.14^{ax}	0.16^{ax}	0.16^{ax}
2014	0.33^{ay}	0.24^{by}	0.15^{cx}

^{a,b,c} Means within row followed by same letter are not different at $P > 0.05$

^{x,y} Means within treatment (column) followed by sameletter are not different at $P > 0.05$