United States Department of Agriculture

Natural Resources Conservation Service
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July 2014

Evaluation of Grazing Management and Winter Stockpiling of Warm Season Grasses in North-Central Texas and Southwestern Oklahoma

Plant Materials Technical Note

Background:
Accumulation of forage at one time of the year for grazing at a later time, or stockpiling, is a grazing management practice commonly used in cattle production (Lemus, 2008). Stockpiling of warm-season perennial grasses for grazing after frost could potentially reduce input cost in Texas by decreasing winter feeding cost. In Texas, the annual production costs per cow can range from $325 to $522. A rancher can estimate 35-47% of these costs are incurred with grazing and winter feeding (Evers, Redmon and Provin, 2004). While limited work has been done with perennial grasses such as bermudagrass, little has been done with native or plants commonly managed as

primarily native grasses. Grasses such as: 'Alamo' Switchgrass (*Panicum virgatum*), 'Lometa' Indiangrass (*Sorghastrum nutans*), 'Selection 75' kleingrass (*Panicum coloratum*), 'San Marcos' eastern gamagrass (*Tripcacum dactyloides*), OK select germplasm little bluestem (*Schizachyrium scoparium*), and 'WW-B. Dahl' old world bluestem (*Bothriochloa bladhll*) are other common perennial grasses that could be used as a standing hay crop. After freezing temperatures kill the top growth of these grasses, they can be grazed with little effect on the plant health the following year. Winter pastures are usually lower in nutritional value, so additional supplements may need to be added to livestock diets (Mitchell and Anderson, 2008). WW-B Dahl will have a crude protein concentration of 9-12% during the active growing season (May-July), but will drop to 3.5-4% during December to January (Allen and Brown, 2011).

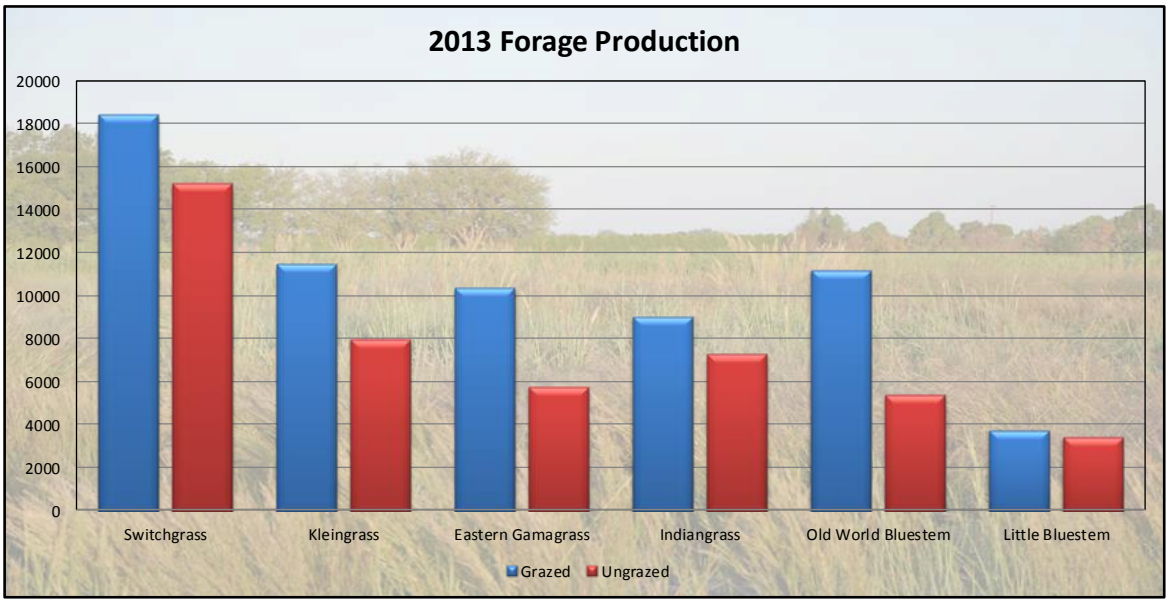
Purpose:

The purpose of this technical note is to provide general information on warm season grass forage quality and quantity as it relates to the timing of harvest. Rangeland plantings are designed with the intent to provide grazing in both the growing and dormant seasons. Forage quality of adapted grasses has been extensively studied, but little work has been done during the dormant season. This tech note compares the forage quantity and quality of warm season grasses to assist producers with management decisions on supplementation needed to meet dietary requirements for cattle production.

Results:

The first year of data collection and analysis showed statistical differences in forage quality and quantity between management practices throughout the dormant season. Figure 1 shows the difference between the two management practices during the growing season. The grazed plots were clipped on the 1st of July to simulate grazing a pasture. The amount of forage was calculated and added with the amount of regrowth calculated at the end of the growing season. The ungrazed plots were not clipped until the end of the growing season and represent the amount of forage produced from green up in the spring until dormancy in the fall. Most of the six grasses responded well to the mid-season clipping. The old world bluestem, kleingrass, and eastern gamagrass produced almost twice as much biomass when they were clipped compared to leaving them all season. Pastures of these grasses have the capability to be grazed and still produce a substantial standing hay crop.

Figure 1. Forage production potential (lb/ac) of six perennial, warm-season grasses collected at the end of the growing season season under different management practices.



	Grazed[1]	Ungrazed[2]
Switchgrass	18 386a[3]	15 198a
Kleingrass	11 498b	7949b
Eastern Gamagrass	10 346b	5739bc
Indiangrass	9004b	7302b
Old World Bluestem	11 193b	5406bc
Little Bluestem	3759c	3419c

[1]Grazed is biomass produced from spring greenup to July 1st combined with biomass produced from July 1st to killing frost.

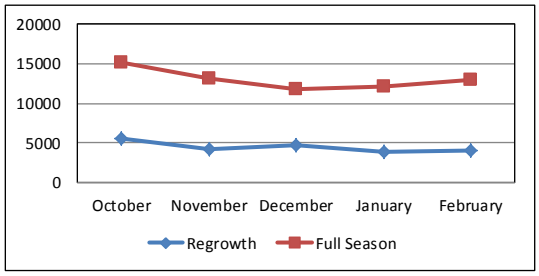
[2]Ungrazed is biomass produced from greenup in the spring to killing frost.

[3]Values within columns followed by different lower-case letters differ between specie ($P \leq 0.05$).

Figure 2 shows the forage yield comparison for each specie throughout the winter months. The yield in most cases will decrease the longer the forage is subjected to weathering. The switchgrass that was allowed to grow all season long produced the most biomass throughout the winter with values remaining above 10,000 lb/ac.

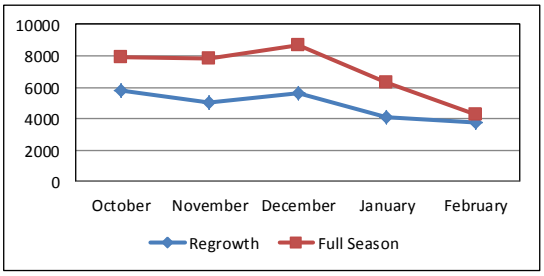
Figure 2. Comparision of forage yield (lb/ac) of six dormant warm season grasses used for winter stockpiling

Switchgrass



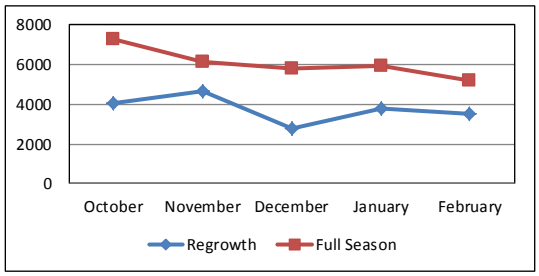
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	5568A[3]	4264B	4727B	3927B	4019B
Full Season[2]	15 198A	13 225AB	11 754B	12 191AB	13 042AB

Kleingrass



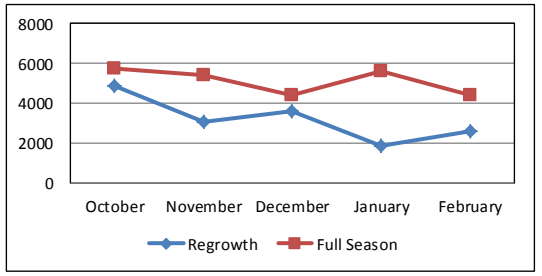
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	5776A[3]	5032AB	5645A	4106AB	3728B
Full Season[2]	7949AB	7850AB	8676A	6337B	4265C

Indiangrass



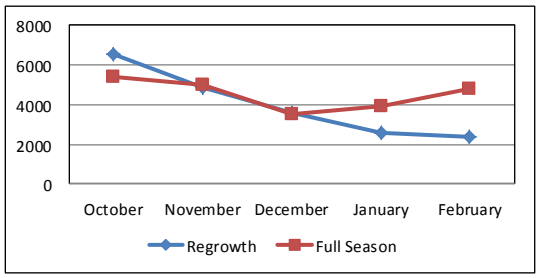
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	4072AB[3]	4690A	2817C	3768B	3536BC
Full Season[2]	7302A	6168AB	5801AB	5946AB	5229B

Eastern Gamagrass



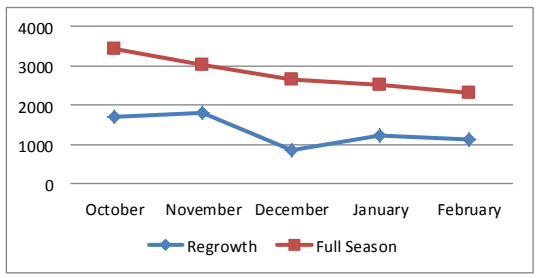
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	4900A[3]	3099BC	3589AB	1854C	2617BC
Full Season[2]	5739A	5430A	4385A	5617A	4444A

Old World Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	6519A[3]	4893AB	3590BC	2569C	2367C
Full Season[2]	5406A	5005AB	3543B	3953AB	4795AB

Little Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	1725A[3]	1808A	876B	1219B	1149B
Full Season[2]	3419A	3022A	2644A	2528A	2313A

[1]Regrowth is biomass produced from July 1st to killing frost

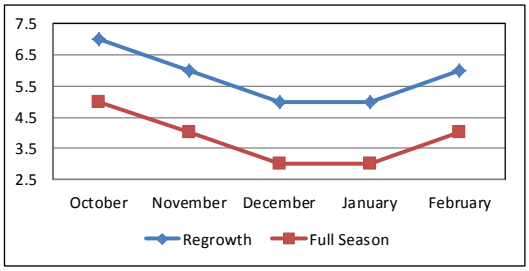
[2]Full season is biomass produced from greenup in the spring to killing frost

[3]Values within rows followed by different upper-case letters differ between date ($P \leq 0.05$)

Figure 3 shows the change in percent crude protein from October to February. As the winter progressed, all the grasses began to see a decrease in the percent crude protein with the exception of kleingrass. It remained between 4-6% until February. Eastern gamagrass had the highest crude protein percent ranging from 7-9%. Although there is a slight increase in February, in most cases, it is insignificant and could be attributed to spring greenup.

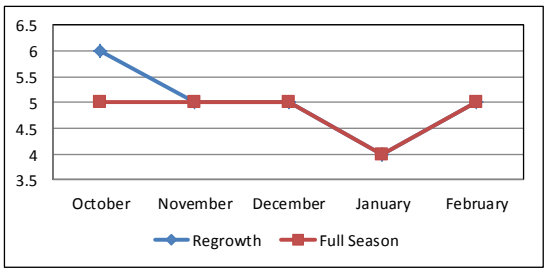
Figure 3. Comparision of crude protein percent of six dormant warm season grasses used for winter stockpiling

Switchgrass



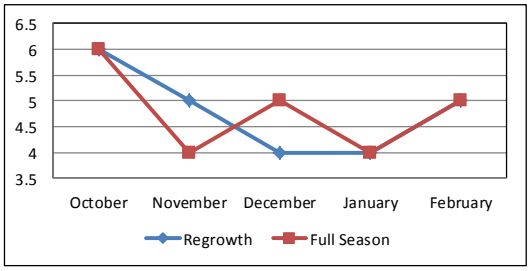
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	7A[3]	6B	5B	5B	6B
Full Season[2]	5A	4B	3B	3B	4B

Kleingrass



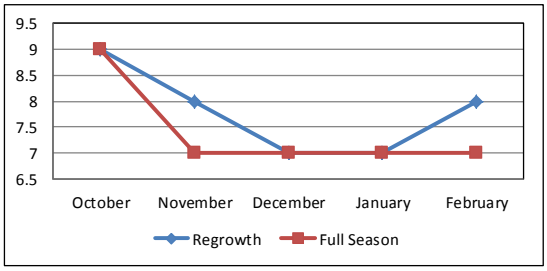
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	6A[3]	5AB	5ABC	4C	5BC
Full Season[2]	5A	5A	5A	4A	5A

Indiangrass



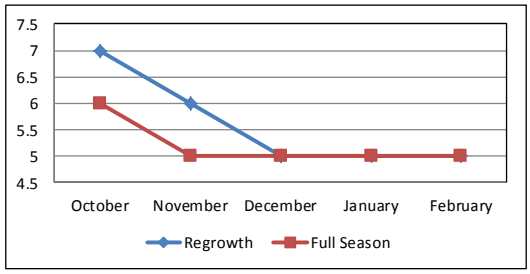
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	6A[3]	5B	4BC	4C	5BC
Full Season[2]	6A	4C	5B	4C	5B

Eastern Gamagrass



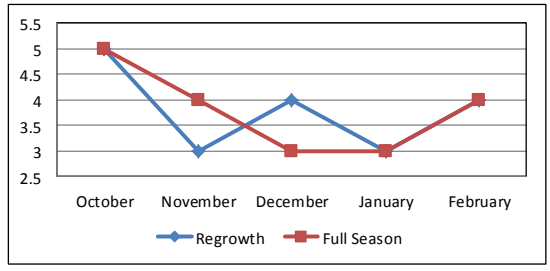
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	9A[3]	8B	7B	7B	8B
Full Season[2]	9A	7B	7B	7B	7B

Old World Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	7A[3]	6B	5C	5BC	5BC
Full Season[2]	6A	5B	5B	5B	5B

Little Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	5A[3]	3B	4B	3B	4B
Full Season[2]	5A	4BC	3D	3CD	4B

[1]Regrowth is biomass produced from July 1st to killing frost

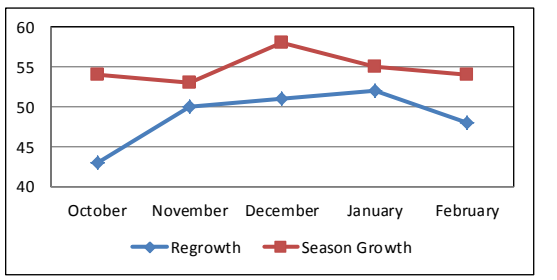
[2]Full season is biomass produced from greenup in the spring to killing frost

[3]Values within rows followed by different upper-case letters differ between date ($P \leq 0.05$)

Figure 4 presents the percent in-vitro dry matter disappearance (%IVDM). Although there were differences between species during the months, switchgrass appeared to be the only grass where %IVDM was affected throughout the winter months.

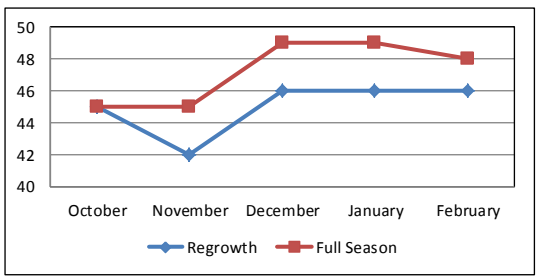
Figure 4. Comparision of percent in-vitro dry matter disapperance (%IVDM) of six dormant warm season grasses used for winter stockpiling

Switchgrass



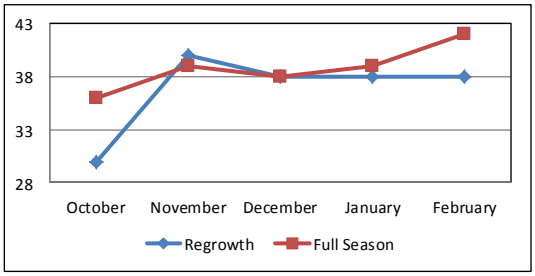
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	43B[3]	50A	51A	52A	48AB
Full Season[2]	54A	53A	58A	55A	54A

Kleingrass



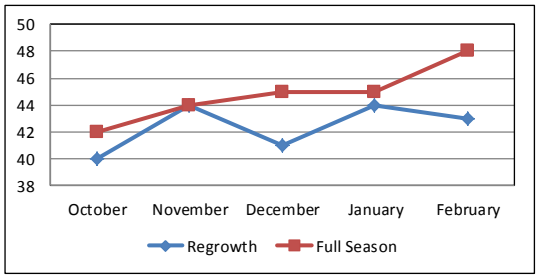
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	45A[3]	42A	46A	46A	46A
Full Season[2]	45A	45A	49A	49A	48A

Indiangrass



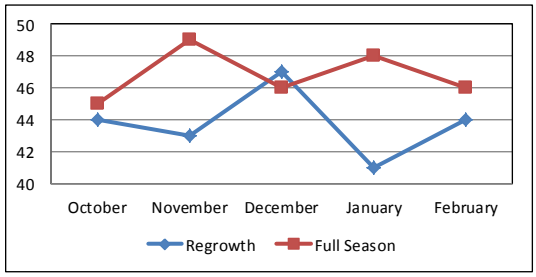
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	30B[3]	40A	38AB	38AB	38AB
Full Season[2]	36B	39AB	38AB	39AB	42A

Eastern Gamagrass



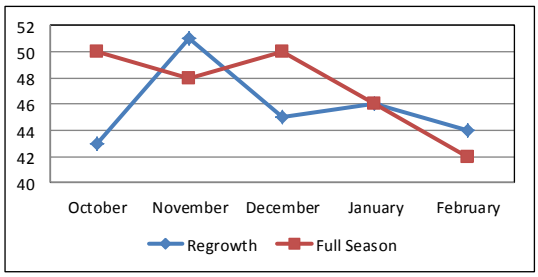
	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	40A[3]	44A	41A	44A	43A
Full Season[2]	42A	44A	45A	45A	48A

Old World Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	44A[3]	43A	47A	41A	44A
Full Season[2]	45A	49A	46A	48A	46A

Little Bluestem



	Oct	Nov	Dec	Jan	Feb
Regrowth[1]	43B[3]	51A	45AB	46AB	44AB
Full Season[2]	50A	48AB	50A	46AB	42B

[1]Regrowth is biomass produced from July 1st to killing frost

[2]Full season is biomass produced from greenup in the spring to killing frost

[3]Values within rows followed by different upper-case letters differ between date ($P \leq 0.05$)

Summary:
Range and pasture plantings should be managed in a manner to provide grazing in the growing season as well as the dormant season. These grasses responded positively to grazing for part of the growing season. Old world bluestem and eastern gamagrass doubled or greatly increased the total forage potential by grazing them. Other grasses like Indiangrass and little bluestem showed very little benefit in forage quantity whether they were grazed or not. Range and pasture plantings should be grazed for part of the growing season in order to reap the benefit of the maximum production potential of the forage. Standing hay crops also tend to decline in available pounds further into the winter months. One main reason for this decline is the effect weather such as wind, rain, and snow, has on the pasture. The quality of the forage also changes throughout the dormant season. In these species, the crude protein decreased from October to November in both the grazed and ungrazed scenarios due to the drying down of the forage. The stem to leaf ratio will be lower in pastures that are not grazed compared to the grazed pastures. While the digestibility did change, it was insignificant. While these grasses will provide ample dry matter for cattle, nutrient supplementation may still be necessary depending on specific producer objectives.

Special thanks to the Texas Coalition Grazing Land Conservation Initiative for their collaboration on this project.

Bibliography

Allen, V.G., and P. Brown. "'WW-B.Dahl' Old World Bluestem." Forage/Livestock Systems Research Unit Department of Plant and Soil Science Texas Tech University, 2011.

Evers, G.W., L.A. Redmon, and T.L. Provin. "Comparison of Bermudagrass, Bahiagrass, and Kikuyugrass as a Standing Hay Crop." Crop Science, 2004: 1370-1378.

Lemus, Rocky. Stockpiling Warm-Season Perennial Grasses to Extend the Grazing Season. September 2008. http://msucares.com/crops/forages/newsletters/08/9.pdf (accessed January 26, 2010).

Mitchell, Robert B., and Bruce E. Anderson. Switchgrass, Big Bluestem, and Indiangrass for Grazing and Hay. December 2008. http://elkhorn.unl.edu/epublic/live/g1908/build/ (accessed January 26, 2011).

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