Impact of stockpiling initiation method on the biomass and nutritional quality of winter forage from cool-season grass pastures in the Midwest

Stokes, Benjamin T.[1], James R. Russell[1], Patrick Gunn[1], and Lee L. Schulz[2]
[1]Department of Animal Science, Iowa State University, Ames, IA 50011
[2]Department of Economics, Iowa State University, Ames, IA 50011

Introduction

- Sustainability of cow-calf enterprises in the Midwest can be viewed as a function of:
  1. Maximizing use of the natural resources available
  2. Minimizing off-farm inputs,
  3. Reducing overall environmental footprint
  4. Providing a manageable livelihood to the operators
- Stored feed costs are a substantial portion of operational expenses in the Midwest
- Winter confinement feeding requires significant increases in nutrient management practices to mitigate the potential environmental implications
- Stockpiling forages for winter grazing can:
  1. Minimize amount of harvested forages required
  2. Eliminate the need for confinement feeding
  3. Reduce winter feed costs

Objectives

- Evaluate the effects of three different methods of initiating the stockpiling of cool-season grasses:
  1. Spring strip-grazing (SPG)
  2. Summer strip-grazing (SMR)
  3. Hay Harvest (HAY)
- Assess the impact different winter feeding strategies have on feed intake and operational carrying capacity
- Compare costs of stockpiling systems to traditional winter hay feeding systems (DRY) using partial budgeting analysis
- Determine if mechanical harvest, stored feeds, and winter confinement feeding could potentially be replaced with grazing management strategies

Materials and Methods

- Nine, 0.405 ha paddocks blocked in triplicate
- Treatments
  1. Spring strip-grazing (SPG)
  2. Summer strip-grazing (SMR)
  3. Hay harvest (HAY)
- Forage allowance of 2.4% of BW/d
- Samples hand-clipped October - January from six, random, 0.25-m^2 locations
- Analyzed for CP, NDF, ADF, ADL, IVDMD
- Data analyzed with MIXED procedure in SAS
- Intakes derived from the Cornell Net Carbohydrate and Protein System
- Budget assumptions derived from the Iowa State University Extension Ag Decision Maker

Figure 1. Biomass by treatment over the winter sampling months

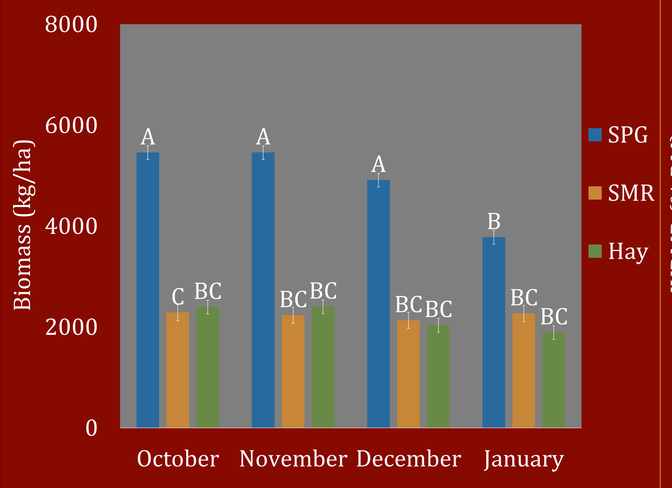

Figure 2. CP by treatment over the winter sampling months

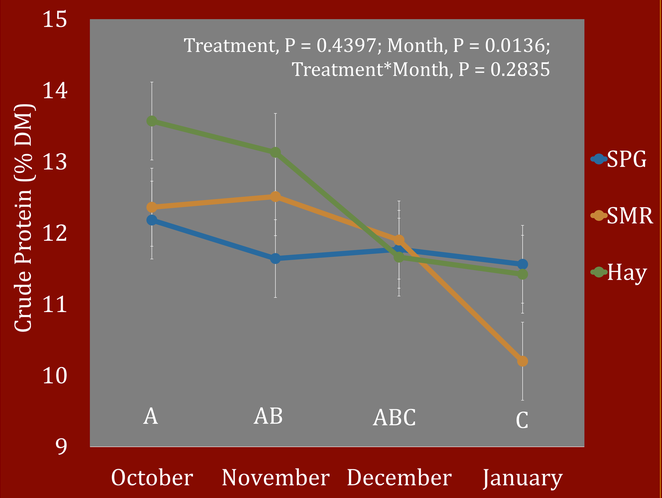

Figure 3. IVDMD by treatment over the winter sampling months

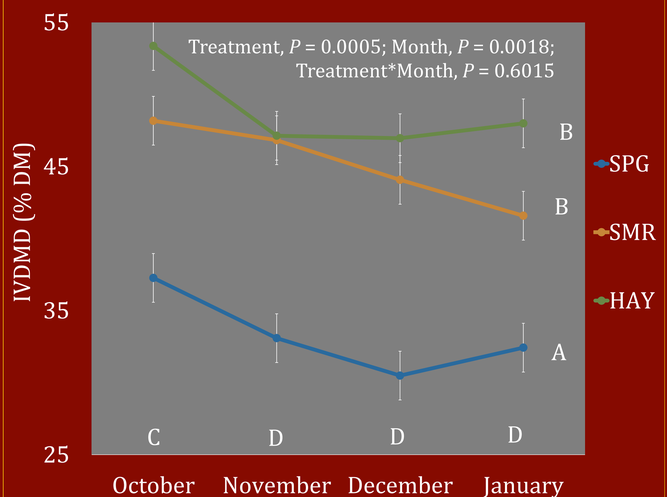

Figure 4. Intake predicted by CNCPS over the winter sampling months

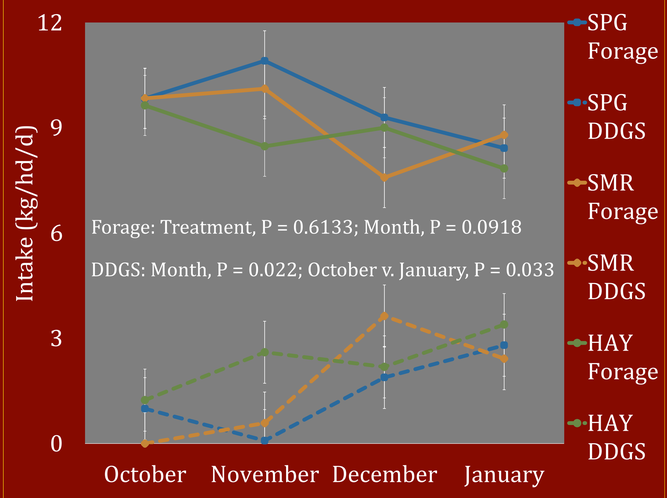

Table 1. Cost Assessments

	Treatment					
Economic Estimate	SPG	SMR	HAY	DRY	SEM[1]	P-value
Carrying Capacity, hd*ha^{-1}	2.10^{A}	1.22^{A}	1.11^{A}	1.36^{A}	0.085	0.1471
Gross Cost, $*hd^{-1}*d^{-1}	0.78^{A}	1.18^{AB}	1.35^{AB}	1.80^{B}	0.097	0.0488
Net Cost, $*hd^{-1}*d^{-1}	0.41^{A}	0.67^{AB}	1.51^{AB}	1.80^{B}	0.143	0.0519
Total Cost, $*ha^{-1}	212.70^{A}	119.67^{A}	248.02^{AB}	366.72^{B}	5.349	0.0165

[1]Mean standard error of least square means; n=3.
[A-B]Least square means without a common letter differ (P < 0.05).

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Results

Biomass

- Greater biomass stockpiled after SPG than SMR ($P < 0.05$) or HAY ($P < 0.05$)
- Greater forage biomass ($P < 0.05$) available in October than January

Crude Protein

- No effect of treatment ($P > 0.10$) nor treatment by sample month interaction ($P > 0.10$)
- CP was greater ($P < 0.05$) in October than January

IVDMD

- SPG had lower IVDMD than SMR ($P < 0.05$) or HAY ($P < 0.05$)
- IVDMD was greater in October than November ($P < 0.05$), December ($P < 0.05$) or January ($P < 0.05$)

Carrying Capacity and Costs

- CC of DRY was greater ($P < 0.05$) than other models
- CC did not differ ($P > 0.10$) between SPG, SMR, and HAY
- No difference ($P > 0.10$) in gross or net costs
- DRY incurred greater ($P < 0.05$) total costs than SPG, SMR, or HAY

Conclusions

- Lower yields of SMR and HAY is compensated for by higher nutritional value compared to SPG
- SMR and HAY allows for greater use of late spring and summer grazing than SPG
- Cattle winter grazing on tall fescue could be at risk for fescue toxicosis
- Strip-grazing of stockpiled forage is economically comparable to mechanical harvest
- SMR is a viable method for generating quality stockpiled winter forage when compared to HAY
- Strip-grazing can reduce the amount of stored feeds required to winter cattle
- Strip-grazing could provide young producers an opportunity to bypass barriers to entry in the beef industry by minimizing the capital investment required to maintain a beef, cow-calf herd in the Midwest
- Strip-grazing can minimize the need to confinement feed cattle over the winter, reducing the need for intensive nutrient management and minimize environmental repercussions of cow-calf systems