

# Nutritional Value of Eastern Gamagrass Hay Compared with Alfalfa Hay

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## Story in Brief

A feeding trial utilizing lactating dairy cows was conducted to compare Eastern gamagrass (*Tripsacum dactyloides*) and alfalfa hay. Response criteria included feed intake, weight change, and yield and composition of milk. Dry matter intake and milk yield of cows fed alfalfa hay exceeded that of those fed gamagrass hay. There was no significant difference in milk composition, and average weight change was positive and similar for the two groups of cows in the feeding trial. Even under conditions where the lower protein content of gamagrass hay was compensated for by feeding a grain mix with a higher protein percentage, it was not equal to alfalfa hay as a forage source for lactating dairy cows.

## Introduction

Eastern gamagrass is a warm-season, perennial, tall grass usually found in the eastern half of the United States and in all regions of Oklahoma. This native grass grows best on moist, well-drained, fertile soils and with proper management may average four to five tons of hay per acre. It may have potential as a forage source in dairy rations; however, very little information is available regarding its relative nutritional value. Since many dairymen utilize alfalfa hay as a forage source in their feeding programs, the objective of this study was to compare Eastern gamagrass with alfalfa hay as an energy source in the dairy ration.

## Materials and Methods

Sixteen lactating cows (11 Holsteins, 5 Ayrshires) ranging from 7 to 8 weeks postpartum, were utilized in a feeding trial to compare Eastern gamagrass and alfalfa hay. A switchback design was used with three 4-week periods consisting of a 2-week adjustment followed by 2 weeks of data collection.

The cows were divided into 2 blocks, with each block representing the cutting of hay to be fed. All cows were randomly assigned to one of two feeding sequences and one of the two blocks, with each block consisting of 8 cows. The forages were compared as energy sources in this trial with protein intake equalized by feeding grain mixtures containing 12, 15, or 18 percent crude protein with alfalfa hay, first cutting gamagrass and second cutting gamagrass, respectively (Table 1).

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**Table 1. Composition of concentrate mixtures**

Item	Protein Level		
	Low	Medium	High
Ingredients, % as fed			
Corn, ground	73	64	55
Soybean meal	9	18	27
Oats	10	10	10
Molasses	5	5	5
Dicalcium phosphate	2	2	2
Salt	1	1	1
Protein content, % air dry	12.0	15.0	18.0

Prior to initiation of the study, the cows were adjusted to rations consisting of a 50:50 concentrate-to-forage ratio and continued on rations with this ratio throughout the trial. Response criteria included feed intake, weight change, and yield and composition of milk. Cows were fed in individual stalls twice daily, with grain and hay refusals being recorded daily. Hay and grain were sampled weekly and analyzed for protein, dry matter, acid detergent fiber, and neutral detergent fiber. Cows were weighed on 3 consecutive days at the beginning of the trial and at the end of each experimental period. Individual cow milk yields were recorded twice daily, and samples were collected at four consecutive milkings each week for analysis of milk fat content.

## Results and Discussion

Intake of dry matter and protein by cows consuming gamagrass was lower than for those fed alfalfa hay (Table 2). There was also a tendency among the cows to consume more of the first cutting grass than the second cutting. This was probably due to the presence of various types of weeds found in the second cutting which accounted for reduced palatability, although both cuttings of grass were harvested at approximately the same stage of maturity.

It was planned that protein intake would be equalized by feeding grain mixtures of different protein levels. The cows consuming gamagrass did have a higher intake of protein from the grain; however, due to a reduction in the consumption of the gamagrass, these cows did not receive as much total protein as those fed alfalfa. But, the amount of total protein consumed was adequate to meet NRC requirements even at the highest level of production during the first period.

Milk yield was highest for the cows fed alfalfa hay (Table 2). This can be attributed partly to the fact that dry matter intake of cows consuming alfalfa was somewhat higher than that of those fed gamagrass hay. This amount of difference in dry matter intake could easily account for the additional milk yield by cows fed alfalfa hay. The alfalfa was slightly more mature than the gamagrass, but the fiber and protein analyses would indicate an overall lower feeding value for gamagrass than for alfalfa (Table 3). This provides another possible explanation for the decrease in milk yield when gamagrass was fed. Milk fat content was similar for all cows and average weight change was positive



**Table 2. Response of cows fed two different hays**

Variable	Hay	
	Alfalfa	Eastern gamagrass
Feed intake		
Dry matter, lb/day	44.2	42.3
Crude protein, lb/day	7.6	6.9
Protein, % of DM	17.2	16.3
Weight change, lb/day	.11	.37
Milk yield		
Milk, lb/day	53.0	50.5
Fat, %	4.1	4.2

**Table 3. Chemical composition of the hays**

Hay	Crude protein	Acid detergent fiber	Neutral detergent fiber
Alfalfa, 1st cut	21.4	35.3	55.6
Alfalfa, 2nd cut	16.5	36.6	51.2
Gamagrass, 1st cut	13.8	37.6	70.1
Gamagrass, 2nd cut	9.1	39.7	73.3

and similar for both groups, although weight change varied considerably within groups.

The data in this study provides more evidence that alfalfa is an excellent forage source. Even when the deficiency in protein content of the gamagrass was compensated for by use of a higher protein grain mix, performance still was lower than when alfalfa was fed. One would expect forage intake and milk yield to be somewhat less if gamagrass replaced alfalfa hay in a feeding program. With proper management including harvesting at optimum stage of maturity, application of fertilizer, and prevention of weed infestation, Eastern gamagrass does have agronomic characteristics that make it suitable for hay or silage production where deeper, moist soils would favor its development. Further study would be needed concerning its relative nutritional value in comparison with other grasses utilized as common forage sources.