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Effect of supplementing forage-based diets for late-gestation wintering beef cows with dried distillers grains plus solubles or rolled barley grain on methane emissions

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Introduction

Expansion of the ethanol biofuel industry creates a challenge for beef cattle producers by increasing competition for cereal grain, as well as an opportunity through increased supply of co-products suitable for use as livestock feed. However, there is limited information available regarding the value of dried distillers grains plus solubles (DDGS) as a supplemental feed in forage-based production systems that livestock producers can use to make feed formulation decisions. To address this limitation, drylot and metabolism trials were conducted to evaluate the performance of late-gestation wintering cows fed forage-based diets that were un-supplemented, or supplemented with DDGS or rolled barley grain.

Materials and Methods

Drylot Trial (2 years):

- 56-d trial using 3 pens of 8 cows per treatment
- Control (hay/silage or straw/silage), barley (control plus ca. 20% rolled barley grain), and DDGS (control plus ca. 20% DDGS) treatments
- Data collection
  - Total trial feed intake
  - Weight at 0, 14, 28, 42, and 56 d
  - Ultrasound backfat at 0, 28, and 56 d

Metabolism Trial (2 years):

- 63-d replicated Latin square trial
- Three 21-d periods using 9 individually fed cows
- Control (hay/silage), barley (control plus ca. 20% rolled barley grain), and DDGS (control plus ca. 20% DDGS) treatments
- Data collection
  - 4-d (year 1) or 5-d (year 2) feed intake
  - Fecal samples for digestibility (TiO_2 marker)
  - 3-d methane emissions (SF_6 marker)

Statistical Analyses

- Mixed models procedure of SAS (Version 9, SAS Institute Inc. Cary, NC)
- Year and period fixed
- Cow random
- Repeated measures when appropriate

Image 1. Methane emissions sampling with metabolism trial cows

Results and Discussion

Table 1. Diet composition, % of DM (drylot)

	Year 1			Year 2		
	Control	Barley	DDGS	Control	Barley	DDGS
Ingredient						
Barley silage	41.0	31.7	31.4	39.1	30.7	30.8
Grass hay	59.0	45.7	46.2	-	-	-
Oat straw	-	-	-	60.9	46.3	47.0
Rolled barley grain	-	22.6	-	-	23.1	-
DDGS	-	-	22.4	-	-	22.2

Table 2. Diet composition, % of DM (metabolism)

	Year 1			Year 2		
	Control	Barley	DDGS	Control	Barley	DDGS
Ingredient						
Barley silage	39.9	31.0	31.0	38.0	29.6	29.7
Grass hay	57.6	44.6	44.6	-	-	-
Oat straw	-	-	-	58.3	45.4	45.5
Rolled barley grain	-	21.8	-	-	21.5	-
DDGS	-	-	22.1	-	-	21.5
TiO_2 marker pellet	2.6	2.5	2.4	3.7	3.5	3.4

Figure 1. Trial temperatures (metabolism)

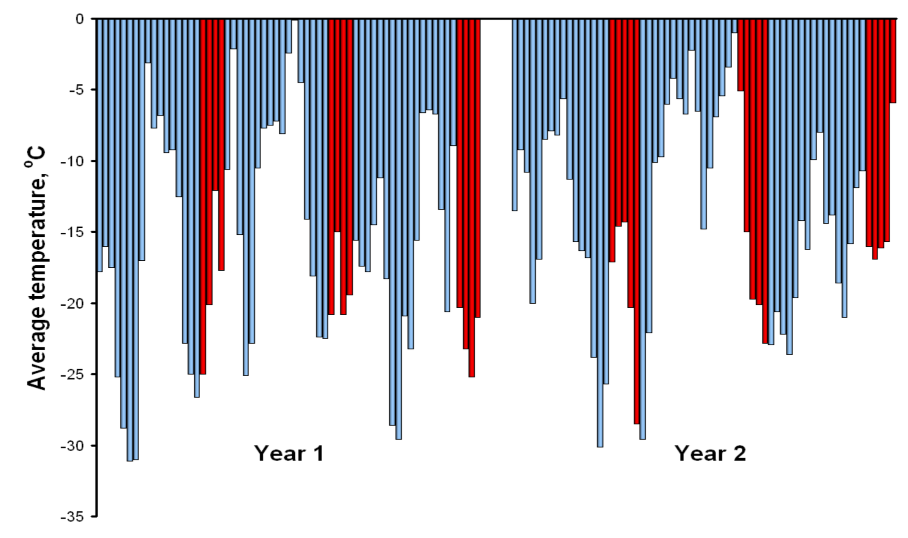

Figure 2. Feed consumption (drylot)

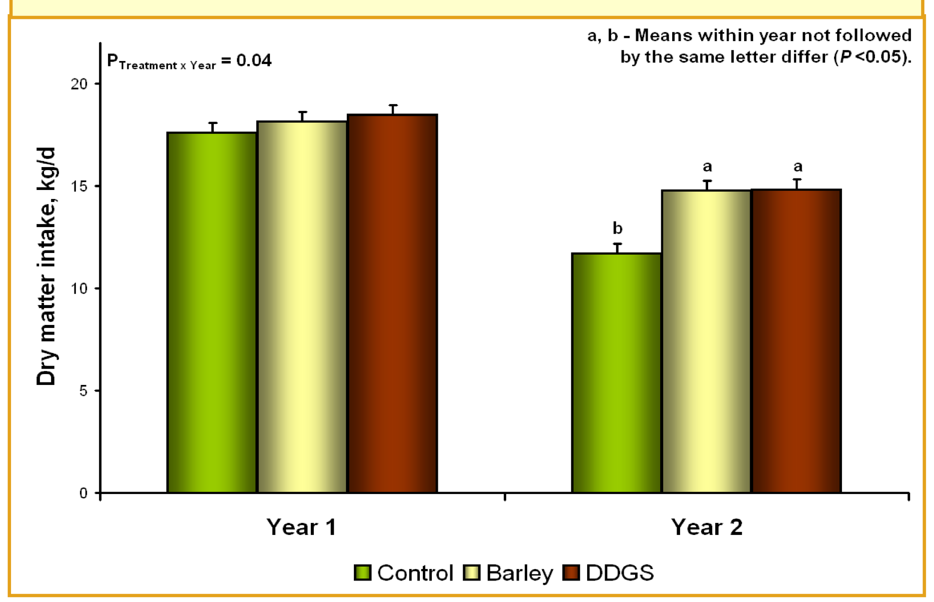

Figure 3. Weight gain (drylot)

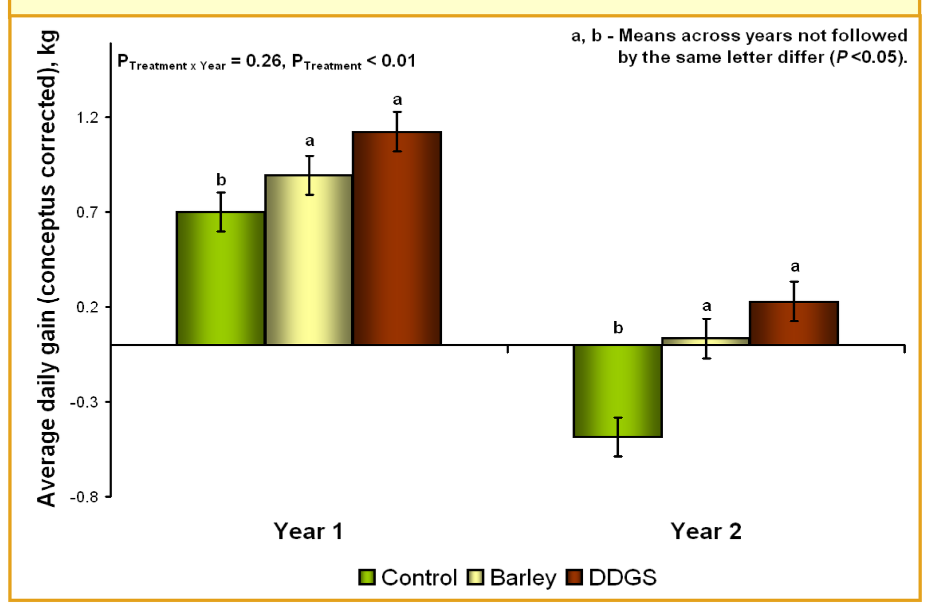

Figure 4. Feed efficiency (drylot)

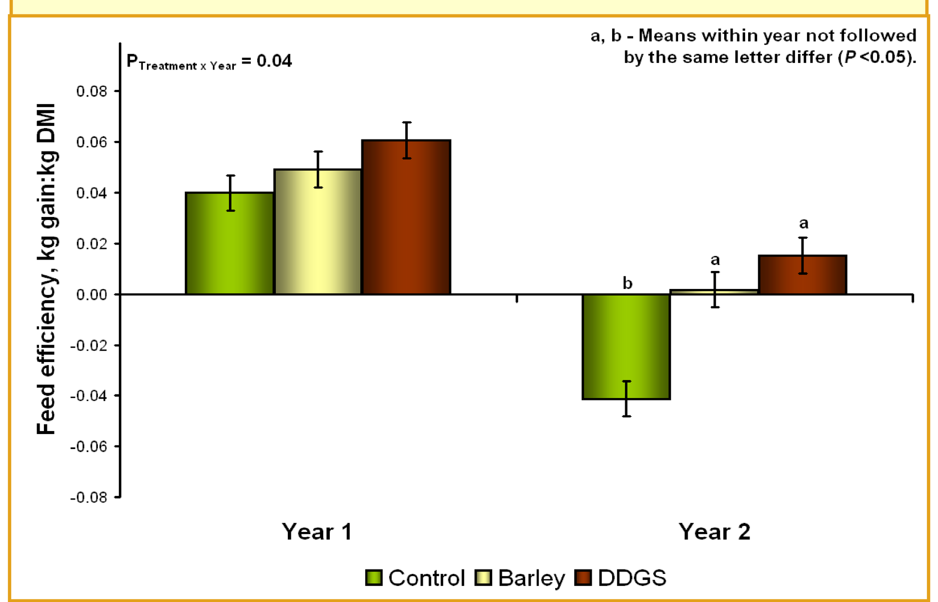

Figure 5. Feed consumption (metabolism)

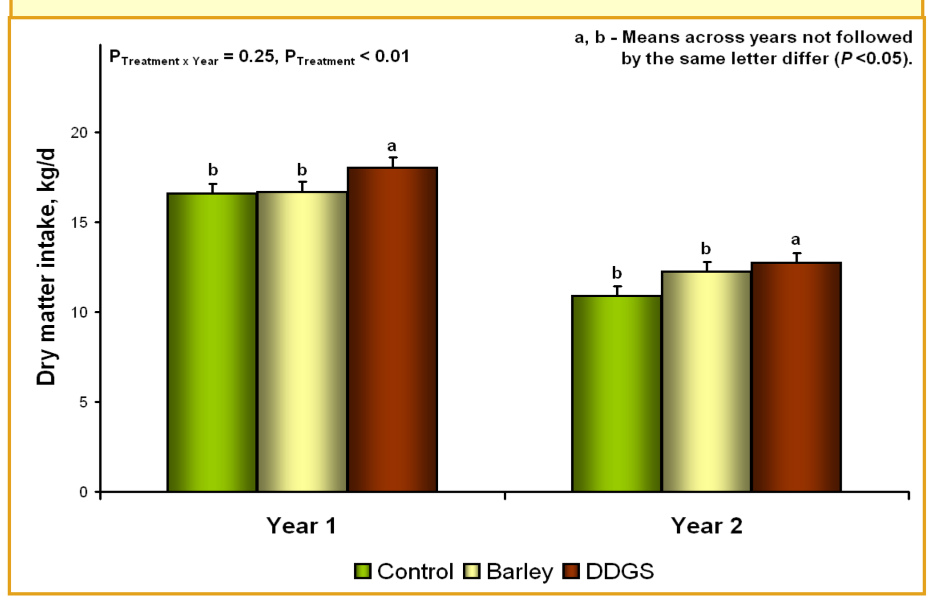

Figure 6. Weight gain (metabolism)

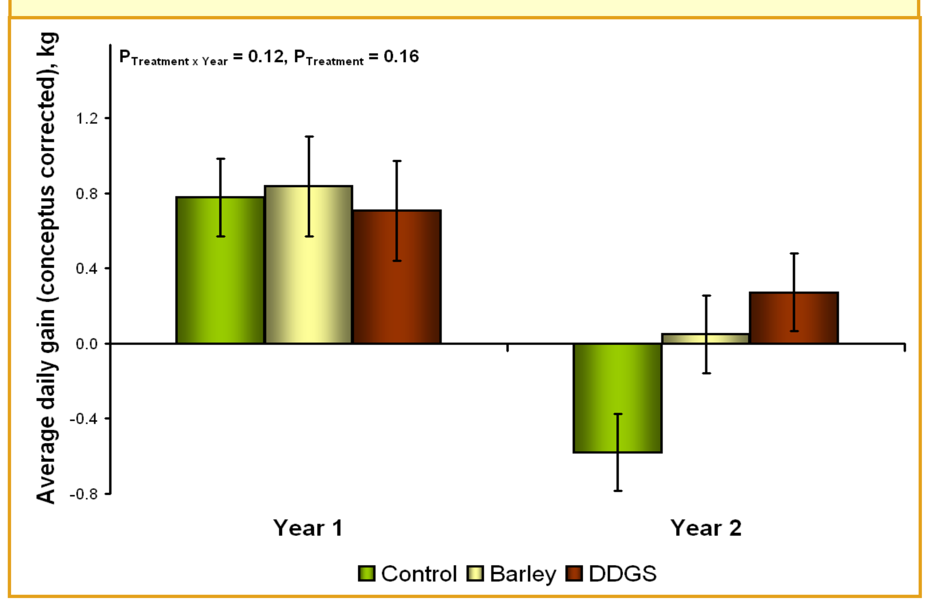

Figure 7. Feed efficiency (metabolism)

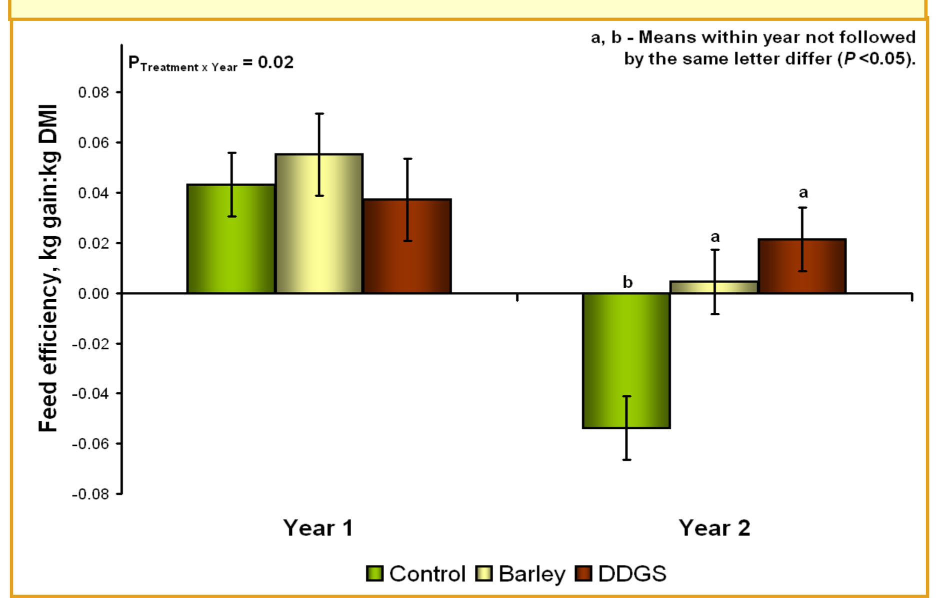

Figure 8. Methane emissions (metabolism)

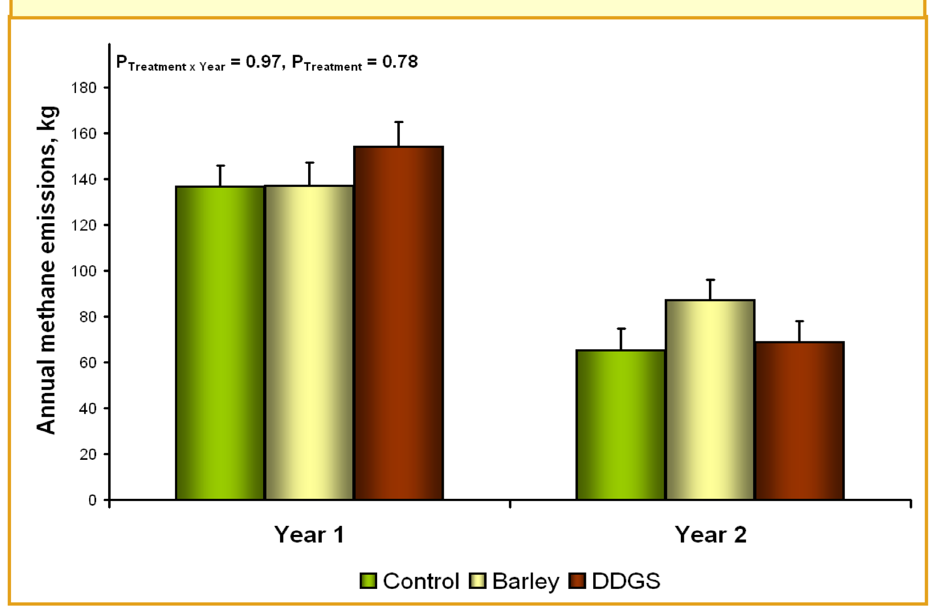

Figure 9. Methane emissions rate (metabolism)

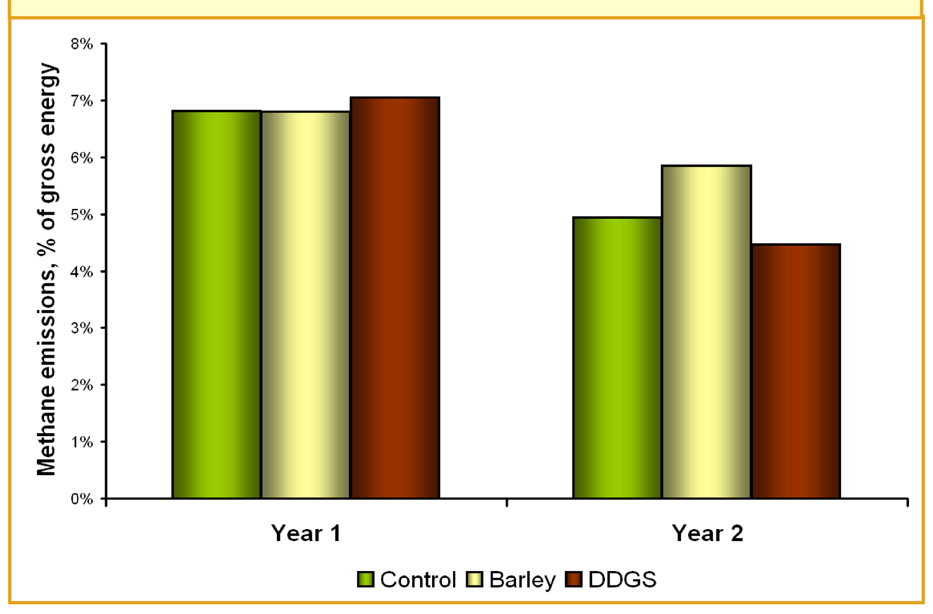

Image 2. Sampling halter and yoke in use

Conclusions

- Providing supplemental feed as rolled barley grain or DDGS was important in stimulating intake when the forage-based diet was of lower quality.
- Supplemental DDGS for late-gestation wintering beef cows fed a forage-based diet resulted in weight gain and feed efficiency comparable to barley grain providing a basis for feed formulation decisions.
- No effect on methane emissions with improved intake, gain, and feed efficiency suggests supplementation can reduce methane emissions rates with forage-based diets for late-gestation wintering beef cows.
- Estimates emissions rates are at or lower than IPCC (1996) recommended rates.

Acknowledgements

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