Effects of Optigen® in commercial dairy herd diets on milk composition, milk production, and economics

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Introduction

While nutritionists are typically concerned with the effect of protein source on ration cost, there is a growing appreciation of the cost of inefficient crude protein (CP) usage. As a result, nonprotein nitrogen (NPN) is used in dairy rations as a less expensive alternative to protein of plant or animal origin.

Objectives

To determine the effect of Optigen® (blended, controlled-release urea), as a source of dietary nitrogen on milk composition, milk production, and economics in commercial dairy herds in Wisconsin.

Materials and Methods

Animals and experimental design

- 16 commercial Wisconsin dairy herds (average 148 cows/herd; range 58 – 550 cows/herd).
- Crossover experimental design using two 30-d feeding periods.
- Within herds, cows were fed a single-diet TMR.
- Across the 16 herds, TMR contained 56±3% forages composed of 43±9% corn silage and formulated for 17.1±0.4% CP and 30.5±1.7% NDF (DM basis).

Treatments

- **Control** ¬– TMR
- **Otpigen®** – TMR with 114 g/cow/d Optigen® replacing an equivalent amount of supplemental CP, primarily from SBM.
- Treatments were isonitrogenous.
- Diet formulation space created by Optigen® was filled with DM from either corn grain or corn silage.

Measurements

- Weight and composition (fat, protein, MUN) of bulk tank milk shipments per herd were recorded.
- Number of cows with milk in the bulk tank per shipment was recorded.
- Average daily milk yield and milk component yields were calculated.
- A spreadsheet economic simulation was performed using the Optigen® feeding rate and milk yield response from the field trial and monthly (as-fed) prices for SBM-48 ($0.373±0.054/kg), dry corn ($0.188 ±0.020/kg), corn silage ($0.059±0.005/kg), and high-moisture corn ($0.149 ±0.016/kg) and milk prices ($0.38±0.03/kg) for January – December, 2008. Local pricing for Optigen® was used. A total of 32 combinations of varying feed and milk prices were simulated.

Data analysis

- Mixed model procedure of SAS with period, sequence and treatment as fixed effects and herd as a random effect.

Results

- Milk yield was 0.5 kg/d/cow greater (P<0.01) for Optigen® compared with the control (Table 1).
- Optigen® reduced feed cost only when corn silage was used to fill the formulation space. However, milk income minus feed cost was increased by Optigen® for all forms of dry corn used to fill the formulation space. This difference was greatest for the corn silage treatment at $0.21/cow/d.
- A decision tool spreadsheet was developed to allow additional economic simulations. The tool allowed for varying the following: milk yield response to Optigen®, cost of Optigen®, and the CP and energy supplements evaluated (Table 2).

Table 1. Milk production and milk composition in response to Optigen®.

	Control	Optigen®	*SEM*	*P-Value*
Milk yield, kg/d	35.4	35.9	0.2	0.01
Fat, %	3.72	3.69	0.02	0.07
yield, g/d	1317	1322	8	NS
Protein, %	2.98	2.97	0.01	NS
yield, g/d	1055	1065	6	0.13
MUN, mg/dL	12.4	13.2	0.3	0.01

Table 2. Economic impact of Optigen® use in dairy herd diets.

Crude protein supplement replaced by Optigen®	Ingredient used to fill formulation space	Feed cost OPT - CON ($/cow/d)	Milk income OPT - CON ($/cow/d)	Milk income minus feed cost ($/cow/d)
SBM-48	Dry corn	0.047 (± 0.027)	0.192 (± 0.016)	0.145 (± 0.039)
SBM-48	Corn silage	-0.020 (± 0.039)	0.192 (± 0.016)	0.212 (± 0.051)
SBM-48	High-moisture corn	0.042 (± 0.028)	0.192 (± 0.016)	0.150 (± 0.040)

Conclusions

- Under the conditions of this study, Optigen® reduced feed cost only when corn silage was used to fill the formulation space, however milk income minus feed cost was increased by Optigen® for all forms of corn used.
- A decision tool spreadsheet was developed to help producers, consultants, and extension agents compare and select feed supplements in diets of lactating cows.

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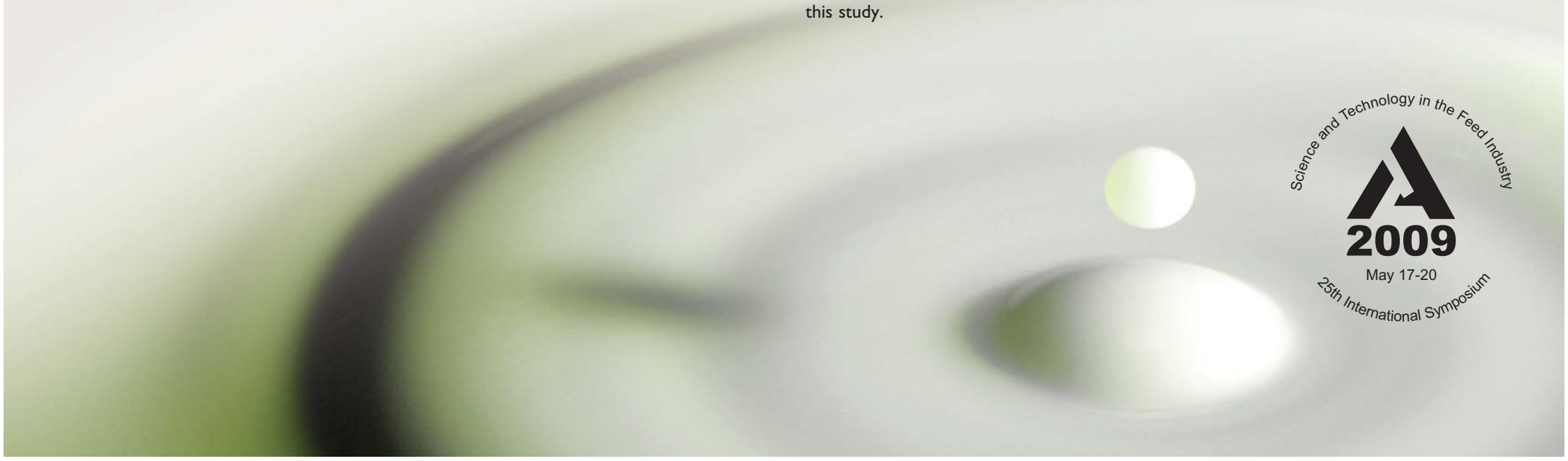

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