

NUTRITION DURING THE FAR-OFF AND CLOSE-UP DRY PERIODS

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TAKE HOME MESSAGES

- Nutrition during the far-off period can impact transition cow success.
- Do not overfeed cows during the far-off dry period.
- Restricting intake is impractical in a group-fed situation.

INTRODUCTION

Dry cow nutrition has been an active area of research during the past 15 years, resulting in numerous studies that provide some insight into how to feed cows during the close-up dry period. However, the lack of repeatable success with close-up dry period nutrition programs in decreasing the occurrence of health disorders and increasing subsequent milk production has been frustrating and problematic to farmers, nutritionists, and researchers.

Nutrition during the far-off period might impact how cows respond during the close-up dry period and early lactation. Unfortunately, most studies that have focused on nutrition during the close-up dry period have not reported how cows were fed during the far-off dry period.

The objectives of this study were to determine the effects of far-off dry and close-up dry diets on prepartum metabolism, postpartum metabolism, and postpartum performance of multiparous Holstein cows.

MATERIALS AND METHODS

During the far-off dry period, 74 multiparous Holstein cows were fed a high-forage, low energy diet (~0.59 Mcal NE_L/lb) that contained ~26% chopped wheat straw or a moderate energy diet (~0.72 Mcal NE_L/lb). The moderate energy diet was fed at either ad libitum intake or restricted intake to supply only 80% of energy requirements during the far-off dry period.

At approximately 3 weeks before calving, half of the cows in each group were switched to a typical close-up diet fed for ad libitum intake and the other half of the cows were fed the close-up diet at restricted intake (80% of energy requirement). After calving, all cows received the same lactation diet.

Dry matter intake (DMI) and milk production were recorded. Samples of blood, liver, and milk were collected and analyzed.

RESULTS AND DISCUSSION

Prepartum metabolism was consistent with plane of nutrition. During the first 10 DIM, far-off dry period treatments had significant carryover effects on DMI, energy balance, serum nonesterified fatty acids (NEFA) concentration, and serum β -hydroxybutyrate (BHBA) concentration. Cows with the lower energy balance (cow fed the low energy diet ad libitum or moderate energy diet with restricted intake) during the far-off dry period had higher DMI and energy balance and lower serum NEFA and BHBA. Interestingly, the close-up dietary treatments (ad libitum or restricted intakes) had no effect on transition cow performance.

During the first 56 DIM, there were no residual effects of far-off or close-up dry diets on DMI, milk yield or composition, body weight, body condition score, serum glucose concentration, or serum insulin concentration. Serum NEFA was higher for cows fed the moderate energy diet with ad libitum intake than cows with restricted intake. The effects of far-off dietary treatments on postpartum variables diminished as lactation progressed.

Cows used in the study were housed in tiestalls. From a practical standpoint, it would be difficult to feed at a restricted level of intake for a group of cows housed in freestalls (some cows might over consume and some cows might not eat enough). Our results indicate, however, that cows allowed free access to diets too high in energy density during the far-off dry period have poorer outcomes during early lactation than cows fed to National Research Council recommendations.

Table 1. Ingredient and chemical composition of diets fed to multiparous Holstein cows during the dry and lactating periods.

Component	Diet			
	Far-off low	Far-off moderate	Close-up	Lactation
	% of DM			
Ingredient				
Alfalfa silage	41.7	26.2	25.1	20.1
Alfalfa hay	...	14.0	13.4	...
Corn silage	21.1	25.5	24.5	28.1
Chopped wheat straw	26.2
Cottonseed	...	4.4	4.2	9.7
Ground shelled corn	7.2	17.2	16.3	25.7
Soybean meal	3.1	5.2
Expeller soybean meal	...	1.7	1.6	5.9
Soybean hulls	...	10.2	9.7	1.5
Minerals and vitamins	0.7	0.8	5.2	3.8
Chemical				
CP	15.8	16.5	15.7	18.1
ADF	31.8	26.1	25.6	19.0
NDF	46.5	38.1	36.9	28.7
NE _L , Mcal/lb	0.59	0.72	0.73	0.80

Table 2. Dry matter intake, energy balance, milk yield, and serum components for multiparous Holstein cows given different far-off and close-up dietary treatments.

Variable	Far-off treatments			Close-up treatments	
	Low energy, ad libitum intake	Moderate energy, ad libitum intake	Moderate energy, restricted intake	Ad libitum intake	Restricted intake
# of cows	25	25	24	38	36
1 to 10 DIM					
DMI, % BW	2.46 ^{abx}	2.16 ^{by}	2.50 ^{ax}	2.38	2.37
DMI, lb	35.0	31.0	34.8	33.4	33.7
Energy balance ³ , %	88 ^{abx}	80 ^{by}	93 ^{ax}	85	90
Milk, lb	65.3	57.2	58.1	60.9	59.4
Serum BHBA, mg/dl	8.13 ^{abx}	9.05 ^{ax}	6.61 ^{by}	8.06	7.80
Serum NEFA, μ Eq/L	787 ^a	792 ^a	627 ^b	783	688
1 to 56 DIM					
DMI, % BW	3.47	3.26	3.49	3.40	3.41
DMI, lb	48.0	45.1	47.1	46.4	47.1
Energy balance ⁴ , %	105	102	108	102 ^y	107 ^x
Milk, lb	86.9	81.2	81.4	83.6	82.7
Serum BHBA, mg/dl	5.80	5.82	4.97	5.63	5.44
Serum NEFA, μ Eq/L	336 ^{ab}	376 ^a	296 ^b	356	316

¹ Percent of NE_L requirement. ^{a,b} Subcolumn means within row and treatment category with different superscripts differ ($P < 0.05$). ^{x,y} Subcolumn means within row and treatment category with different superscripts differ ($P < 0.10$).