USE OF PRO-SIL-TREATED CORN SILAGE AND FABABEAN SILAGE IN RATIONS FOR LACTATING DAIRY COWS

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by
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DEDICATED TO MY PARENTS

ABSTRACT

USE OF PRO-SIL-TREATED CORN SILAGE AND FABABEAN SILAGE IN RATIONS FOR LACTATING DAIRY COWS

Felix Budara Bareeba

In two experiments, corn silages were treated at harvest with urea (0.5% wet basis) or Pro-Sil (1.3 to 2.2% wet basis). Recoveries of added nitrogen (N) from silage ranged from 95 to 100%. Water insoluble N and lactic acid contents were higher in the NPN-treated corn silages compared to untreated corn silage.

Three wethers were fed grass-legume (GL) silage (38% DM), urea-treated corn silage (31% DM) and Pro-Sil-treated (2.2%) corn silage (32% DM) in a digestibility and N balance trial. No significant ($P > .05$) differences were observed for silage dry matter (DM) consumption and N utilization among treatments.

Eight lactating Holstein cows were fed four diets in a change-over design. Diets were GL silage + medium grain (MG); urea-treated corn (UC) silage + MG; Pro-Sil-treated (2.2%) corn (PC) silage + MG and PC silage + low grain (LG). Cows received GL, UC and PC silages ad lib plus MG in a 60:40 (DM) ratio and PC silage plus LG in a 70:30 (DM) ratio. No significant ($P > .05$) differences were noted among treatments for silage DM consumption, milk yield and milk composition. The apparent digestibilities of DM and energy were lower ($P < .05$) for the GL silage + MG diets compared to the other

diets. Cows fed the GL silage + MG diet had higher ($P < .05$) blood urea-N levels than those fed the PC silage-containing diets.

Four wethers were fed untreated corn (C) silage (38% DM), UC silage (32% DM), PC (1.3%) silage (42% DM) and PC (1.7%) silage (32% DM) in a digestibility and N balance trial. Silage DM consumption was lower ($P < .05$) for the UC silage compared to the other silages. The apparent digestibility of crude protein (CP) was lower ($P < .05$) for the C silage compared to the other silages as expected with differences in protein content of the silages. The apparent digestibility of acid-detergent fibre (ADF) was higher ($P < .05$) for the PC (1.7%) silage than for the other silages. Although sheep fed the C silage consumed less ($P < .05$) N, N retention (% of N intake) was not different ($P > .05$) among treatments. Rumen ammonia ($P < .01$) and blood urea-N ($P < .05$) were lower for sheep fed the C silage than for those fed the other silages.

Eight lactating Holstein cows were fed two corn silages (C and PC, 1.3%) and four grain mixtures containing either 6.4% SBM (#1), 12.5% SBM + 1.3% urea (#2), 40% fababeans (FB) + 0.6 encapsulated methionine (#3) or 42% FB (#4) in a 45:55 (DM) ratio as a complete feed in a change-over design. Diets were Pro-Sil (PC silage + grain #1); Urea (C silage + grain #2); Fababean + methionine (C silage + grain #3) and Fababeans (C silage + grain #4). Silage DM consumption was lower ($P < .05$) for cows fed the Pro-Sil diet than for those fed

the fababean-containing diets. Milk and FCM yields, protein and solids-not-fat contents were not different ($P > .05$) among treatments. Milk fat test was lower ($P < .05$) for cows fed the Pro-Sil diet than for those fed the Fababean diet. Substituting SBM with fababeans decreased ($P < .05$) ration DM digestibility. The apparent digestibility of energy was lower ($P < .05$) for cows fed the Fababean + methionine diet than for cows fed the Urea diet. Methionine supplementation (15g Met/day) had little effect on feed consumption, milk yield, milk composition, plasma free methionine levels and Met/Val ratios.

In two other experiments, the conservation of whole plant fababean as untreated direct-cut (FB), untreated wilted (WFB) and formaldehyde-treated (1.2% DM) (FFB) silage was studied. Wilting and formaldehyde treatment did not restrict silage fermentation. All silages had high acid-detergent insoluble N (ADIN) in the dry matter indicative of heat damage.

Twelve lactating Holstein cows were fed four diets, GL silage (35% DM) + high grain (HG), FB silage (33% DM) + HG, WFB silage (37% DM) + HG and WFB silage + medium grain (MG) in a Lucas design. Consumption of the FB silage was higher ($P < .05$) than that of the GL silage, and reducing the level of grain feeding from 56 to 43% of the diet resulted in an increase ($P < .01$) in the WFB silage consumption. Milk and FCM yields and milk composition were not different ($P > .05$) among treatments.

Eight lactating Holstein cows were fed either FB (33% DM) or FFB (31% DM) silage plus a dairy concentrate in a 45:55 (DM) ratio as a complete feed in a change-over design. The cows were supplemented with or without 13g/day methionine in the form of encapsulated methionine. Silage DM and total DM consumption, milk yield and milk composition were not different ($P > .05$) among treatments. Formaldehyde treatment decreased ($P < .05$) the apparent digestibilities of ADF and energy. Methionine supplementation had little effect on feed consumption, milk yield, milk composition, plasma free methionine levels and Met/Val ratios.

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LIST OF ABBREVIATIONS

α	Alpha
ad lib.	Ad Libitum
ADIN	Acid-detergent insoluble nitrogen
β	Beta
BUN	Blood plasma urea-nitrogen
DAP	Diaminopimelic acid
DM	Dry matter
DMI	Dry matter intake
ε	Epsilon
FB	Fababean silage
FCM	Fat-corrected milk
FFB	Formaldehyde-treated fababean silage
γ	Gamma
g	gram
GL	Grass-legume silage
Kg	Kilogram
l	liter
μM	Micromoles
M	Molar
m	meter
Met	Methionine
MHA (M-analog)	Methionine hydroxy analog
mg	Milligram
Ml	Milliliter
mM	Millimoles

N	Nitrogen
NPN	Non-protein nitrogen
NH_3-N	Ammonia-nitrogen
WSN	Water-soluble nitrogen
NGR	Non-glucogenic ratio
OM	Organic matter
%	Percent
PC	Pro-Sil-treated corn silage
RAN	Rumen ammonia-nitrogen
NaCl	Sodium chloride
SNF	Solids-not-fat
SBM	Soybean meal
C	Untreated corn silage
UC	Urea-treated corn silage
Val	Valine
VFA	Volatile fatty acids
$W^{3/4}$	Metabolic body weight
WFB	Wilted fababean silage
WSC	Water soluble carbohydrates