

Harvesting Alfalfa in the Afternoon: A Natural Way of Improving Feeding Value for Lactating Dairy Cows

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The logo for OAC (Ordre des Agronomes et des Agricultrices du Québec) features the letters 'OAC' in a white serif font. A red, wavy line is superimposed over the letters, starting from the left, passing through the 'O' and 'A', and ending under the 'C'.

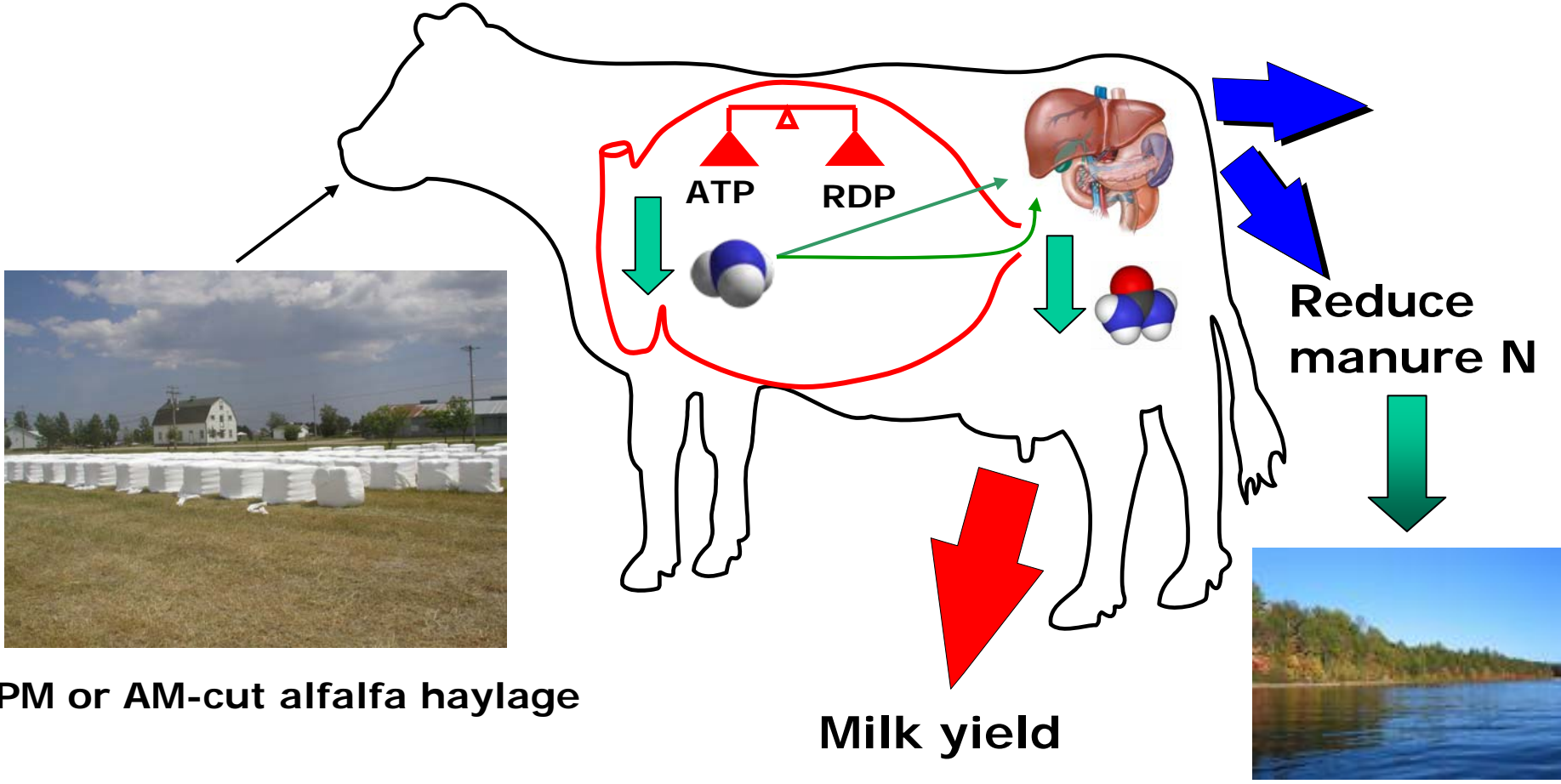
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Introduction

- Total non-structural carbohydrates (**TNC**) accumulate during the daylight
- Photoperiod: more TNC is produced than metabolized for plant growth and maintenance
- Shifting alfalfa hay cut from early morning (**AM**) to late afternoon (**PM**)
- Increased forage preference (DMI) and nutrient digestibility in ruminants (Fisher et al., 2002; Burns et al., 2005)

Hypothesis



PM or AM-cut alfalfa haylage

Milk yield

Reduce manure N



Objectives

- ✓ **Compare the effects of increasing TNC content of alfalfa haylage through daytime cut management on:**
 - **Dairy cows performance**
 - **Ruminal metabolism**
 - **Nitrogen utilization**

Materials and Methods

- 16 mid-late lactating dairy cows (8 RC cows): **crossover design** with 24 d-periods
- Alfalfa was cut late in the afternoon (**PM**) after a sunny day or early in the morning (**AM**) of the next day
- Alfalfa was field-dried and conserved as haylage into individually wrapped large rectangular bales
- PM and AM-alfalfa haylages were offered once daily

Materials and Methods

- Orts were collected and recorded daily
- DMI was computed based on 55°C DM of feeds and Orts
- Milk yield was recorded at all daily AM and PM milkings
- Milk was sampled during the last 5 d of each period: **protein, fat, lactose, and MUN** by infrared analysis
- Fresh samples of milk: **total N** by Kjeldhal

Materials and Methods

- Ruminal contents were collected from the 8 RC cows at 0, 1, 2, 3, 4, 6, 8, 12, and 24 h after feeding: **pH, VFA, and NH₃**
- Blood was collected from all cows: **BUN**
- Total collection of feces and urine using the 8 RC cows
- Fresh samples of feces and urine: **total N**
- Statistical analysis: **Proc Mixed in SAS**

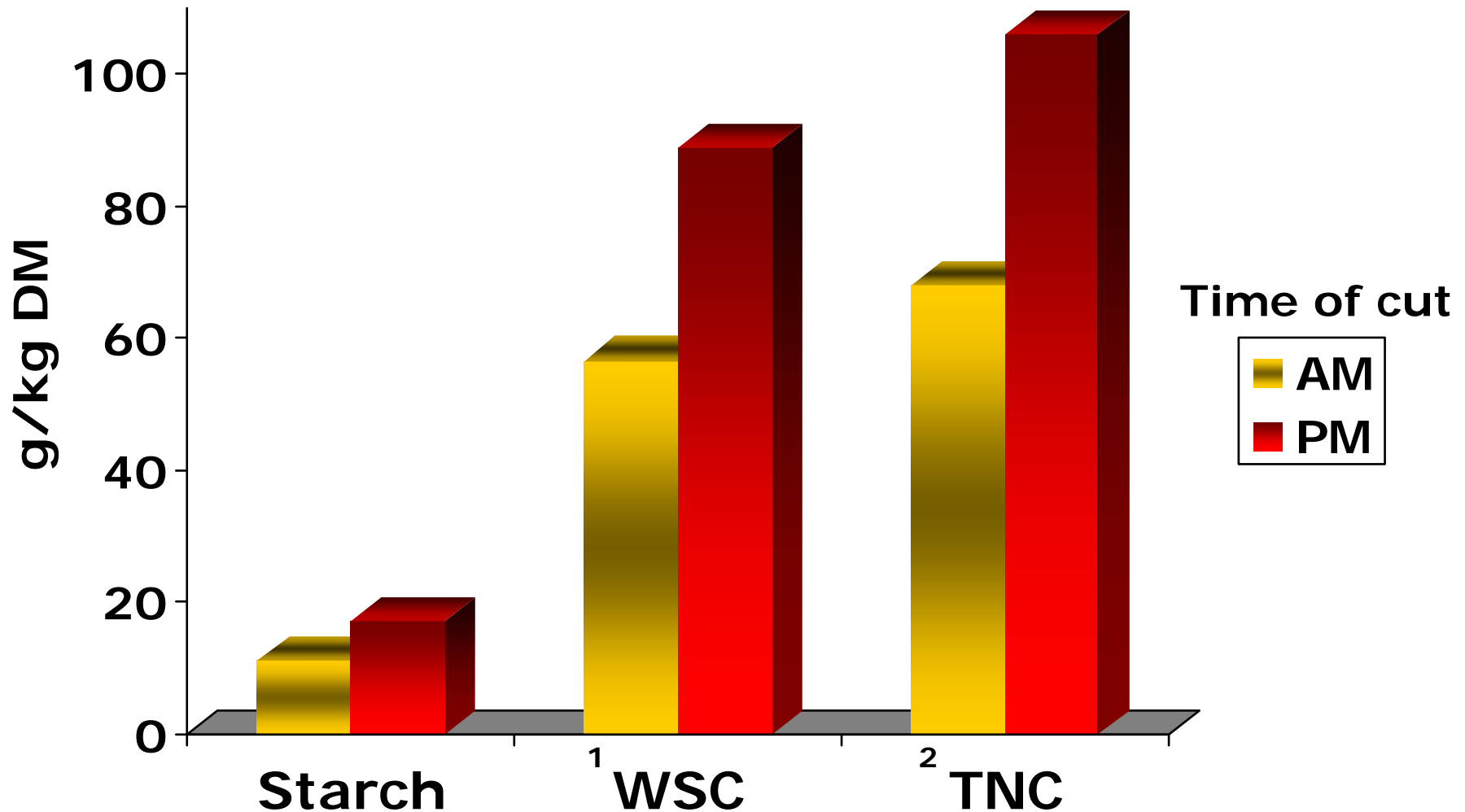
A close-up photograph of a cow's face, focusing on its large, pinkish nose and white fur. The cow has brown ears and small horns. A white speech bubble with a black border is positioned in the upper right corner, containing the word "Results" in bold black text. The background shows a green field with yellow flowers and a blue sky.

Results

Chemical Composition of Haylages

Item	Haylages	
	AM	PM
DM, g/kg	527	535
CP, g/kg DM	204	193
NDF, g/kg DM	406	389
ADF, g/kg DM	367	349
Ash, g/kg DM	117	113

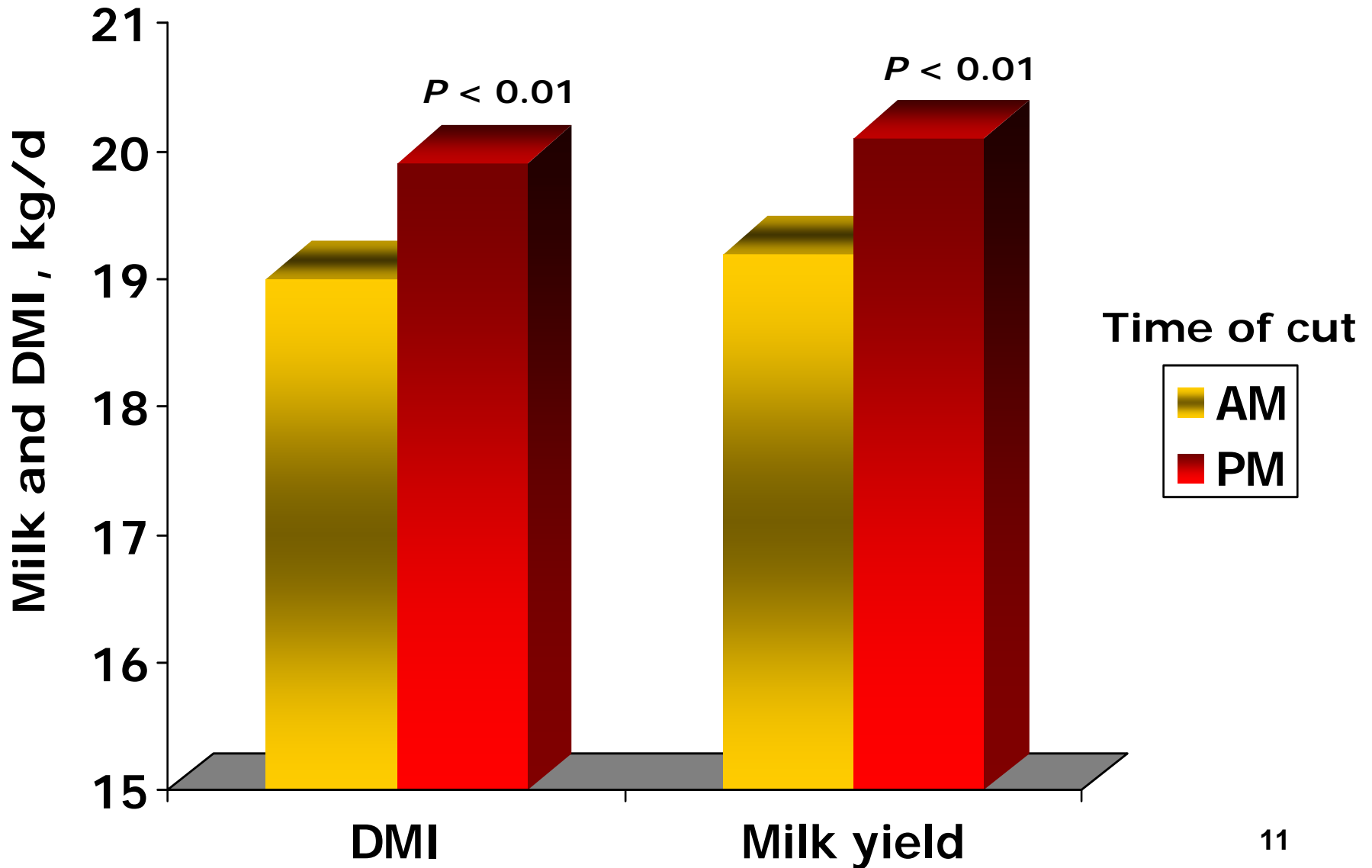
PM-Cutting Increased Alfalfa Haylage TNC



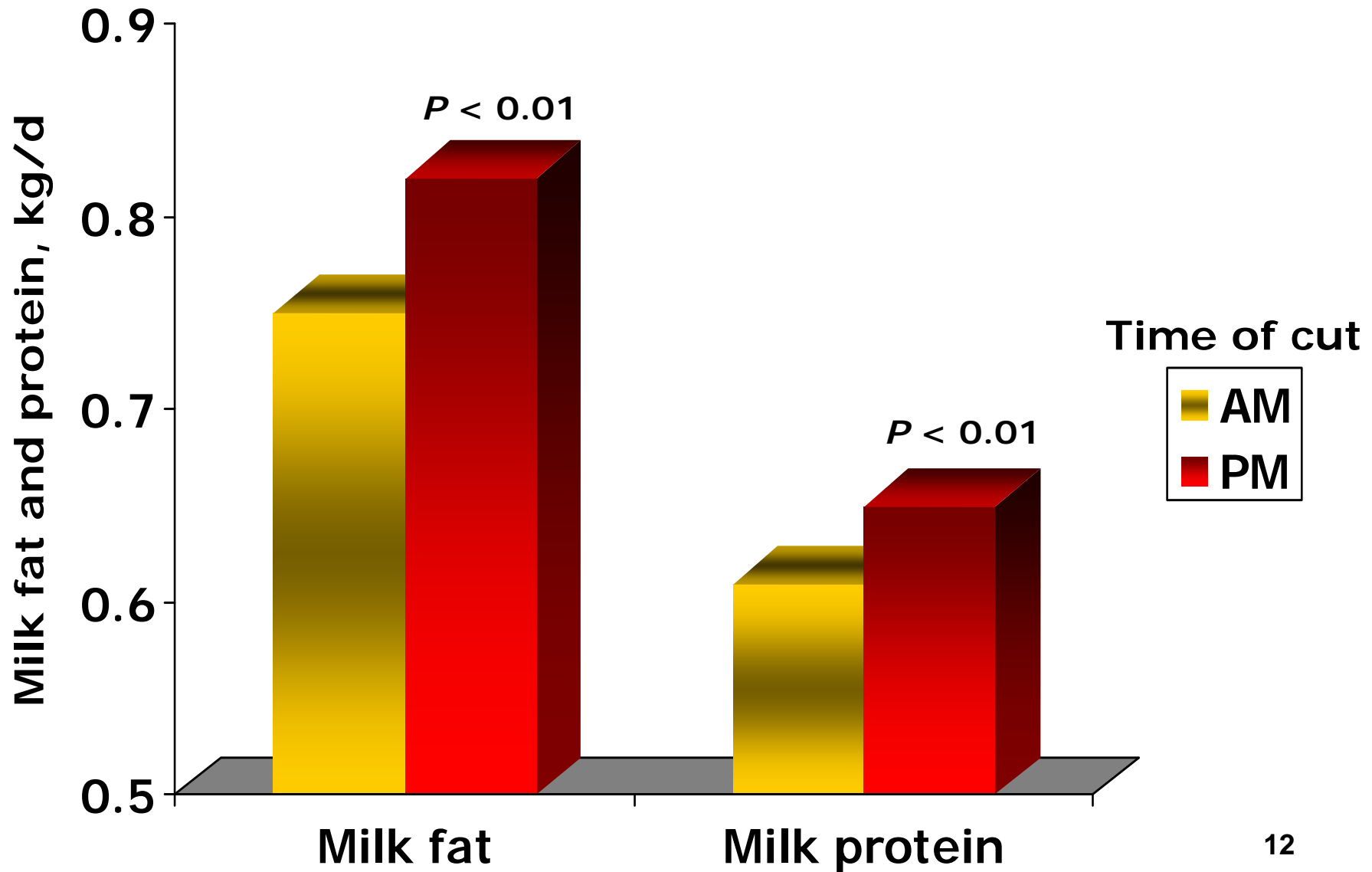
¹WSC = water soluble carbohydrates

²TNC = Total non-structural carbohydrates = WSC + starch

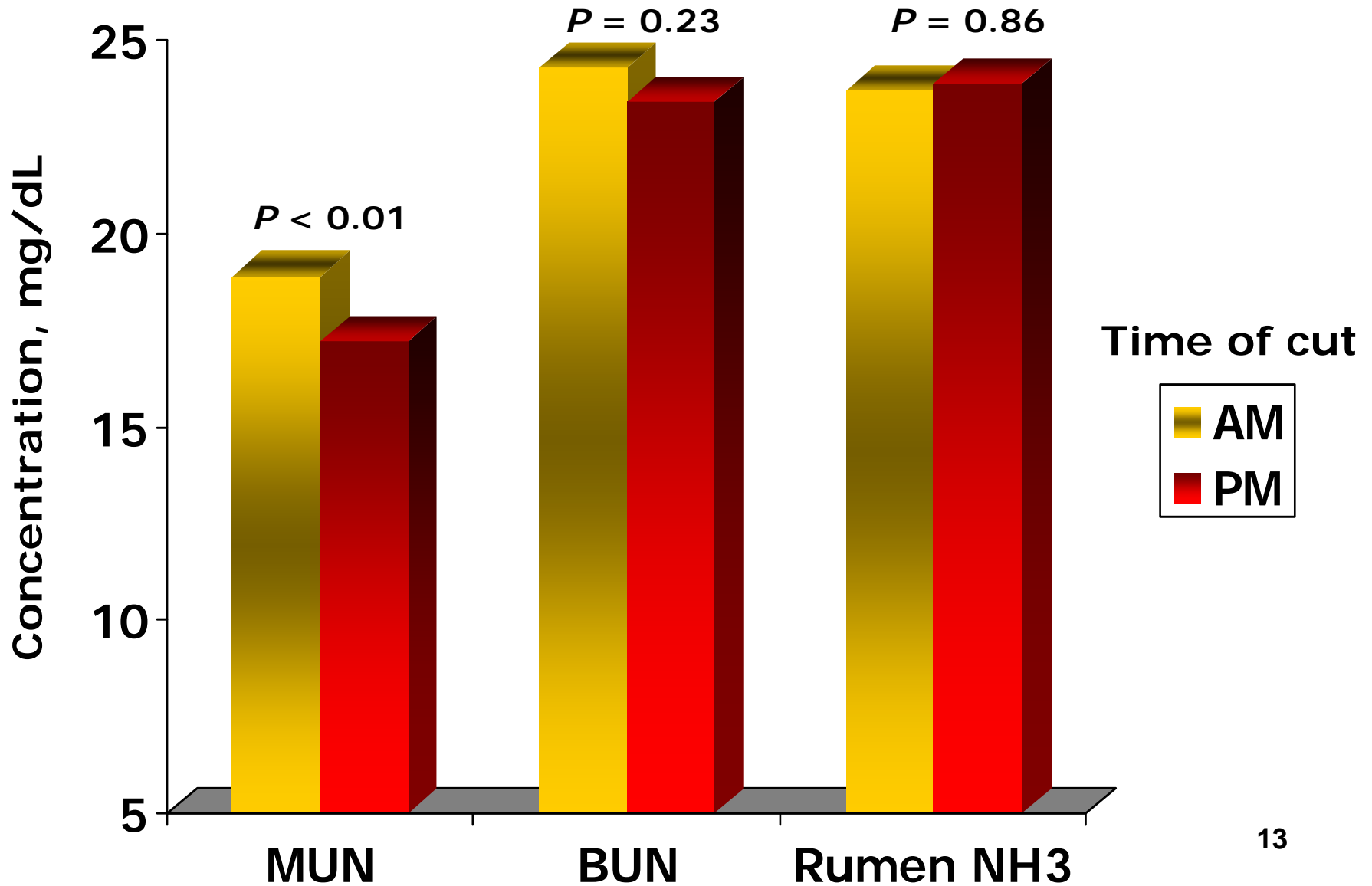
PM-Cutting Improved DMI and Milk Yield



PM-Cutting Improved Milk Fat and Protein Yields



Urea and Rumen NH₃ Metabolism



Ruminal Metabolism

Item	Haylages			
	AM	PM	SEM	P-value
pH	6.34	6.41	0.04	0.09
Total VFA, mM	91.6	87.9	1.27	0.02
VFA, mol/100 mol				
Acetate (A)	72.8	72.2	0.16	0.02
Propionate (P)	17.2	17.4	0.15	0.15
Butyrate (B)	6.89	6.95	0.10	0.61
A:P	4.27	4.17	0.04	0.05
P/(A+B)	0.21	0.22	0.002	0.08

Nitrogen Balance¹

Haylages				
Item	AM	PM	SEM	P-value
N intake	610	598	12.3	0.36
	---% N intake---			
Milk N	15.7	16.9	0.30	<0.01
Urinary N	43.1	44.4	1.29	0.36
Fecal N	28.0	29.1	0.43	0.04
Manure N	71.1	73.5	1.42	0.15
Retained N	13.2	9.62	1.55	0.06

¹Data from ruminally-cannulated cows only

Summary

- **Production and milk-N efficiency improved**
- **MUN reduced with no change in BUN, ruminal NH₃, and urinary N excretion**
- **N utilization improved or maintained with no compromise in production**

PROJET DE LA FORÊT MODÈLE
DE L'EST DE L'ONTARIO
EASTERN ONTARIO MODEL FOREST PROJECT



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