University of Saskatchewan

Use of Newly Developed Blended Feed Supplement on Rumen Parameters and Milk Fat in Dairy Cows

UMAIR IHSAN

Supervisor: Dr. Peiqiang Yu

Department of Animal and Poultry Science

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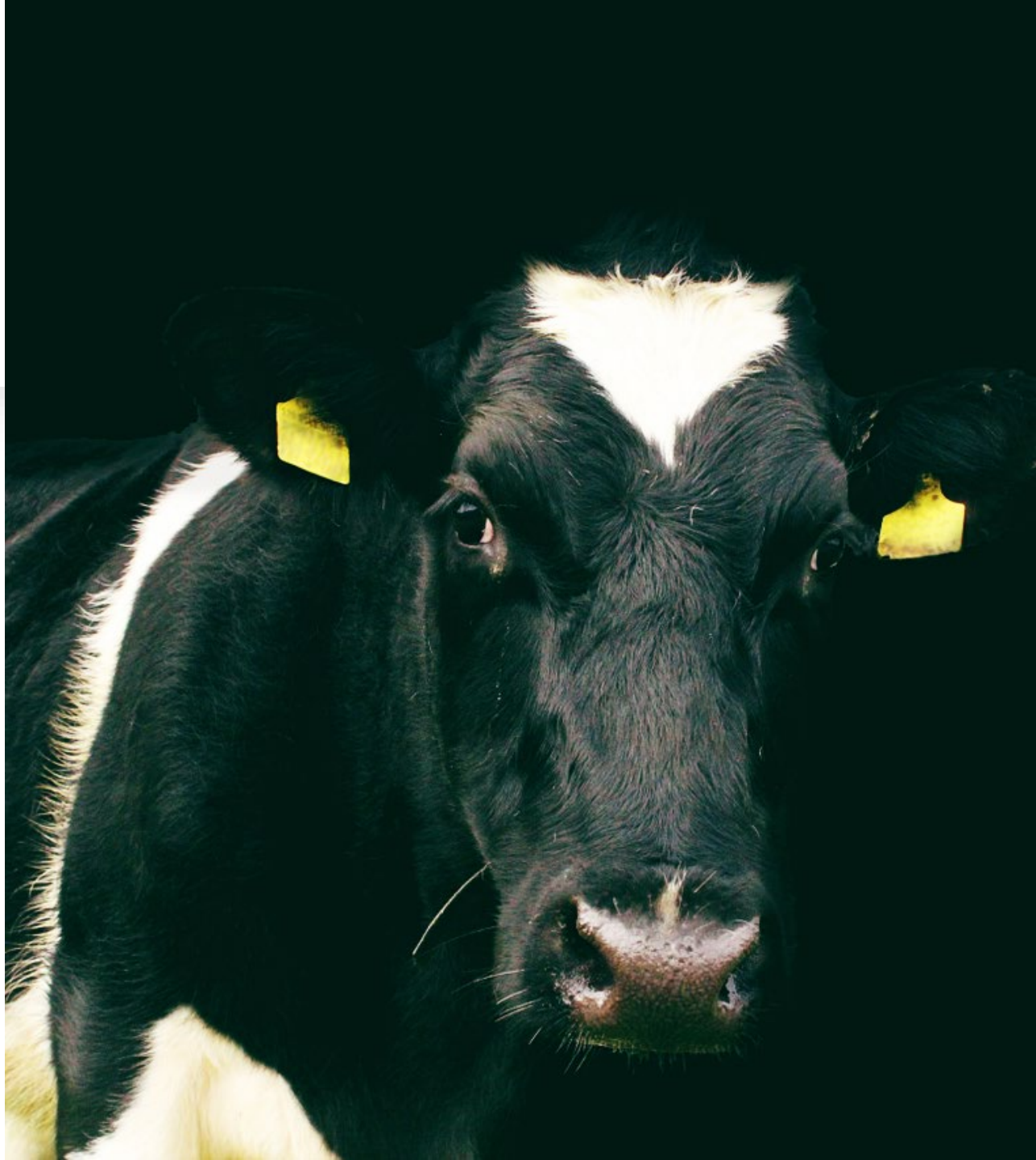
University of Saskatchewan

INTRODUCTION

- Feed typically represents a major part of the dairy operation's total cost (Buza et al., 2014; Zenunović et al., 2021).
- Bypass fat and protein concentrate products are fed to achieve high production in dairy cows.
- These products are expensive and of non-Canadian origin.
- Alternate product: Blended Feed Supplement (BFS), a Canadian-origin product, was developed.



INTRODUCTION

Blended Feed Supplement (BFS)

- A combination of dried distiller's grain, rumen buffers, soluble fiber sources, yeast metabolites, and sugars.
- BFS has been multi-fermented with multi-strain yeast and bacteria, to enrich the product with organic acids, bioavailable minerals, and soluble true protein.

Blended Feed Supplement (BFS)

OBJECTIVES

1. To evaluate the effects of increasing dietary inclusion of Blended Feed Supplement (BFS) as a replacement for canola meal on:

    - Dry matter intake.
    - Milk yield and milk components

2. To determine the impact of BFS on rumen fermentation characteristics in mid-lactation dairy cows.

3. To assess nitrogen utilization efficiency and nitrogen excretion when BFS replaces conventional protein sources.

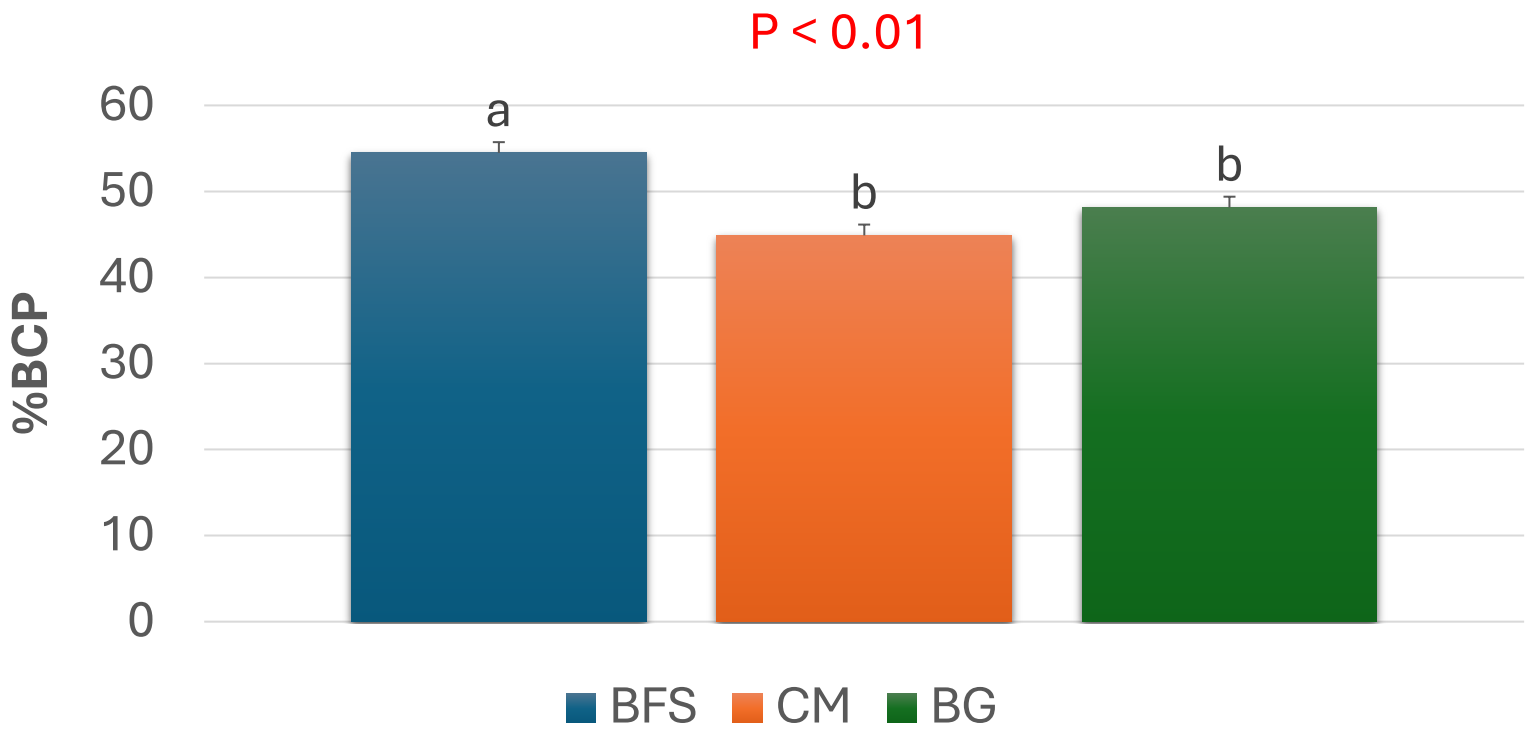
HYPOTHESES

BFS would:

1. Enhance the acetate to propionate ratio.
2. Stabilize rumen conditions.
3. Raise the amount of soluble fiber and true protein.
4. Increase feed metabolizable protein (MP) and feed milk value (FMV).
5. Increase milk output and milk fat.
6. Could replace or reduce the use of protein concentrate to maximize economic return.

IN SITU STUDY

In situ ruminal incubation demonstrated that BFS contains a higher rumen undegradable (bypass) crude protein fraction compared with barley grain and canola meal.



MATERIAL AND METHODS

- Eight multiparous mid-lactation Holstein dairy cows were used for the dairy trial (Days in milk =120 ± 7.8).
- Four of the eight cows were ruminal cannulated to allow ruminal fermentation characteristics studies.
- The experimental period consisted of 25 days with 4 days for diet changeover, 14 days for diet adaptation, and 7 days for sample collection
- The basic diet was a barley silage-based diet.
- 4 treatments :

Treatment 1 = control diet (no addition of BFS)

Treatment 2 = replacing 50% of the CM expeller and CM solvent with BFS

Treatment 3 = replacing 75% of the CM expeller and CM solvent with BFS

Treatment 4 = replacing 100% of the CM expeller and CM solvent with BFS

MATERIAL AND METHODS

Table1. Ingredients of experimental diets fed to lactating Holstein cows as TMR

Items	Diets			
	T1 0%	T2 (50%)	T3 (75%)	T4 (100%)
Ingredient composition, %				
Barley Silage	38.80	38.80	38.80	38.80
Barley Grain	32.10	32.10	32.10	32.10
Beet Pulp	10.60	10.60	10.60	10.60
Energy Supplement	1.88	1.88	1.88	1.88
Lactating Premix	3.26	3.26	3.26	3.26
Expeller Canola Meal	6.80	3.32	1.66	0.00
Canola Meal Solvent	6.48	3.32	1.66	0.00
Blended Feed Supplement	0.00	6.64	9.96	13.30

Note: Energy supplement contained crude fats 98%, total fatty acids 97%, free fatty acids 99%, moisture 1%, unsaponifiable matter 1%, insoluble matter 0.5%, palmitic acid (C16:0) 85% (Energizer RP10, Johor, Malaysia). Lactating premix contained the following ingredients: Ca 15.86% DM, P 1.05% DM, Mg 4.62% DM, K 0.62 % DM, Na 4.54% DM, Cl 0.09% DM, S 0.22% DM, Mn 220 mg/kg, Cu 250 mg/kg, Fe 1995 mg/kg, Zn 658 mg/kg, I 16.28 mg/kg, Co 0.47 mg/kg, Se 4.72 mg/kg; Vitamin A 113000 IU/kg, Vitamin D 35000 IU/kg, Vitamin E 696 IU/kg; Monensin 647 mg/kg.

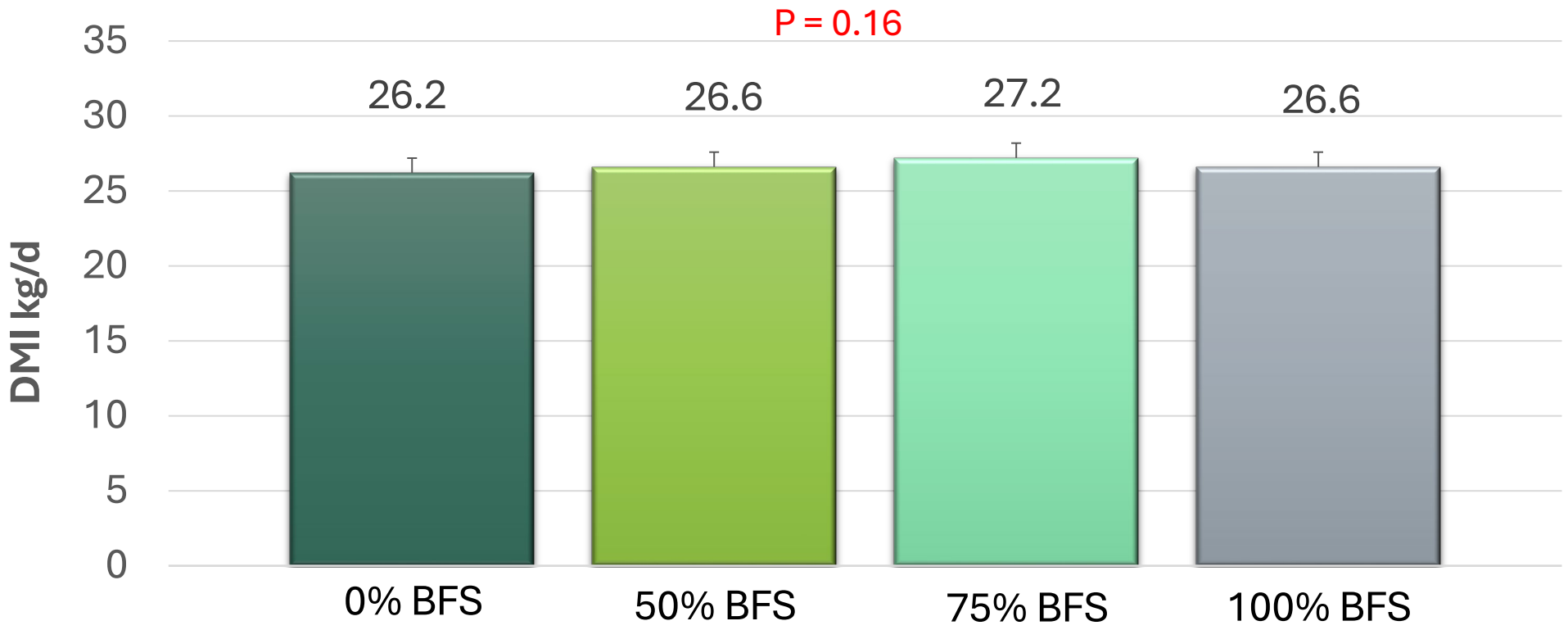
MATERIAL AND METHODS

Table 2. Ingredients composition of experimental diets fed to lactating Holstein cows as TMR

Items	Diets			
	T1 0%	T2 (50%)	T3 (75%)	T4 (100%)
Chemical composition, %DM				
Dry matter	57.60	57.60	57.70	57.70
Crude protein	17.80	17.00	16.40	15.70
Starch	22.90	22.70	24.10	23.70
Ether Extract	4.53	5.00	4.64	5.04
Neutral detergent fiber	31.80	32.60	31.90	32.50
Acid detergent fiber	19.20	19.60	18.90	18.60
NE_L, Mcal/kg of DM	1.63	1.68	1.68	1.70

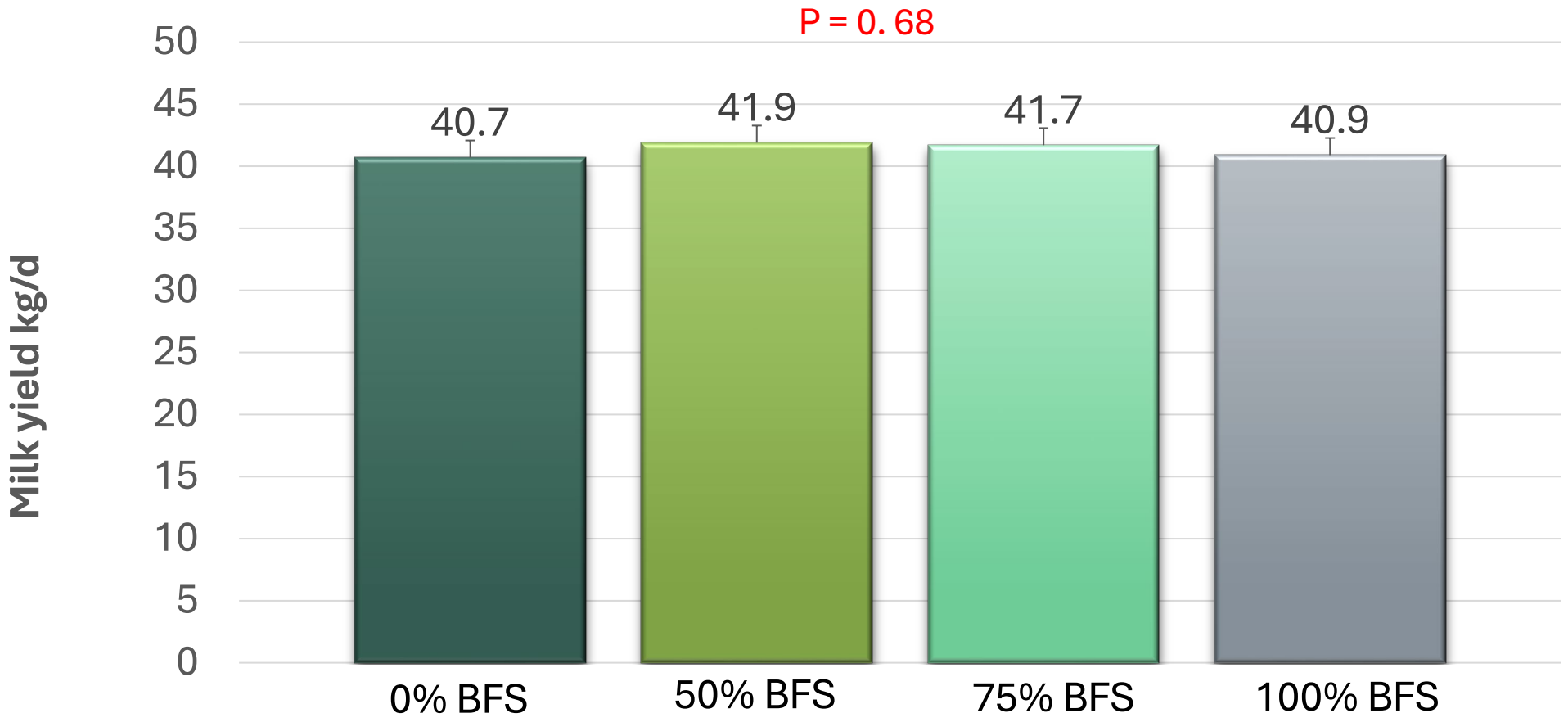
RESULTS

Increasing levels of BFS in the diet do not affect dry matter intake.



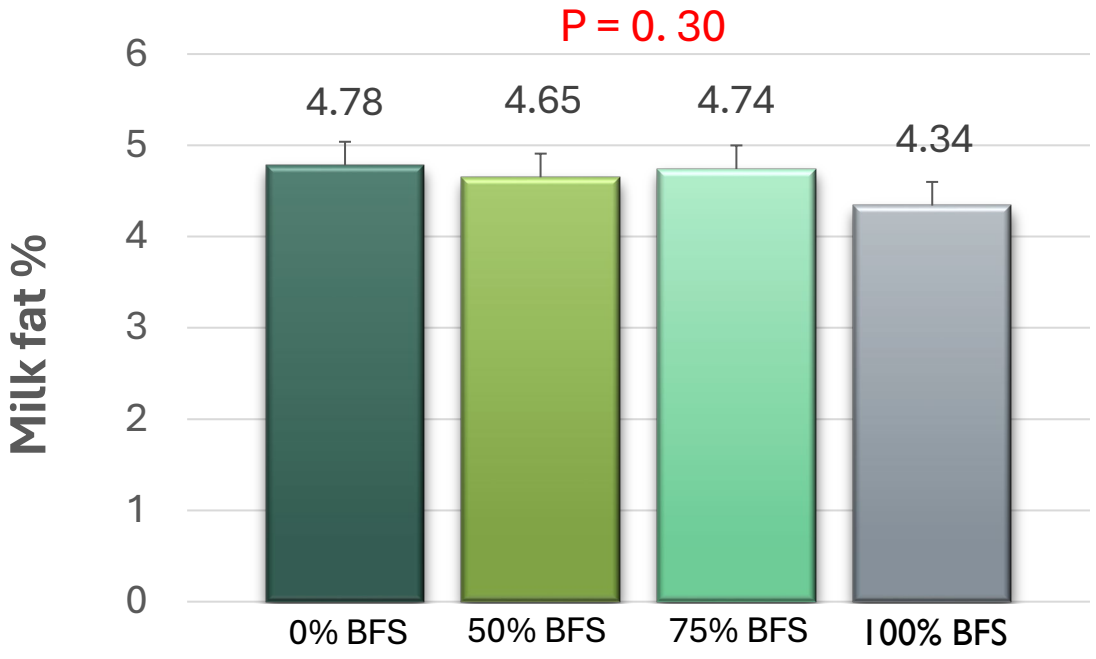
RESULTS

Increasing levels of BFS in the diet do not affect milk yield.

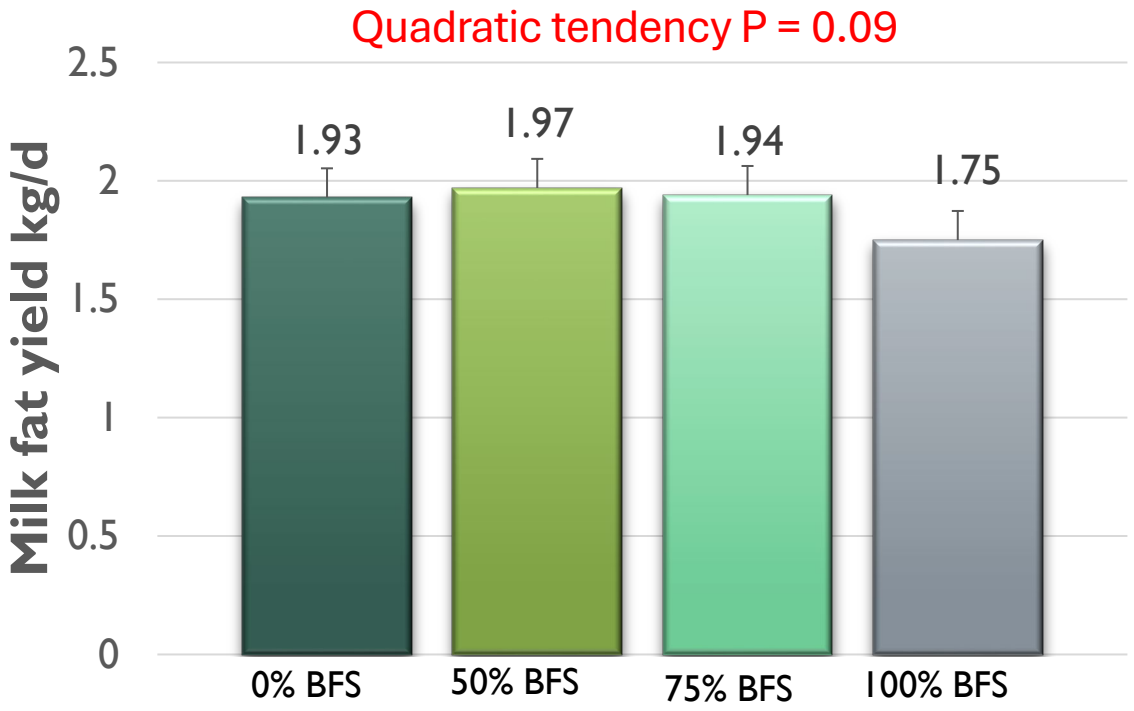


RESULTS

Increasing levels of BFS in the diet have no effect milk fat percentage

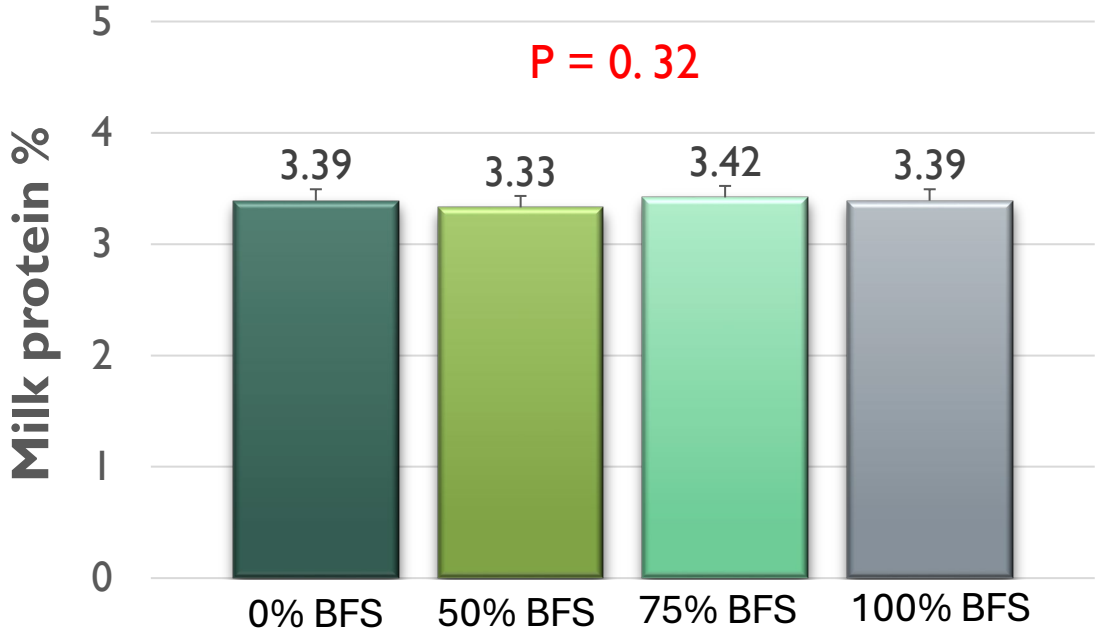


Increasing levels of BFS in the diet shows quadratic tendency in milk fat yield

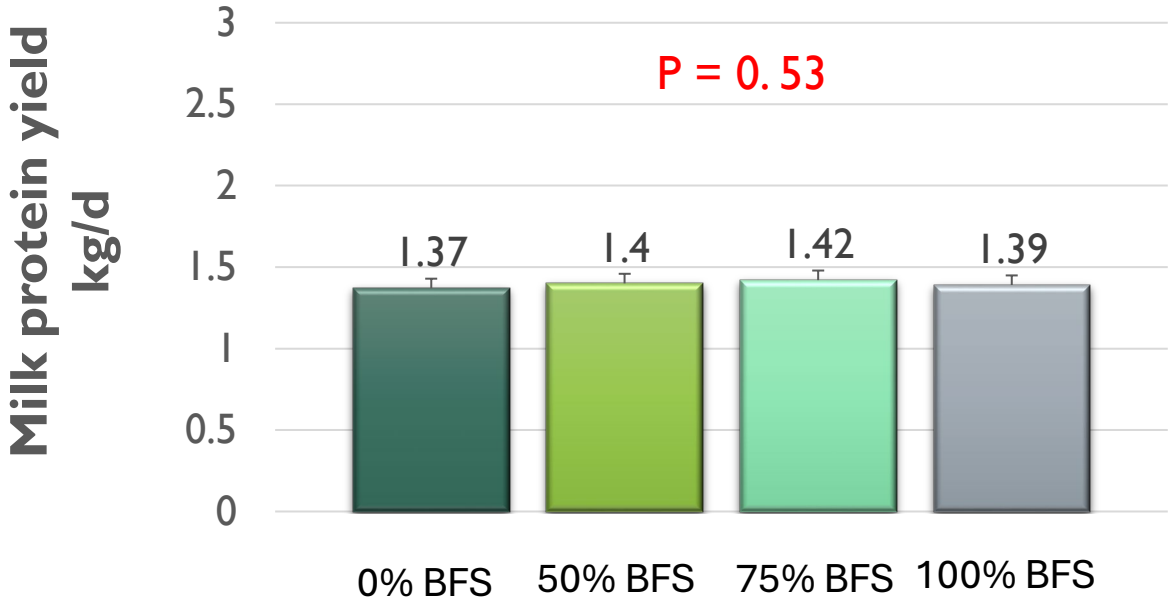


RESULTS

Increasing levels of BFS in the diet do not affect milk protein percentage

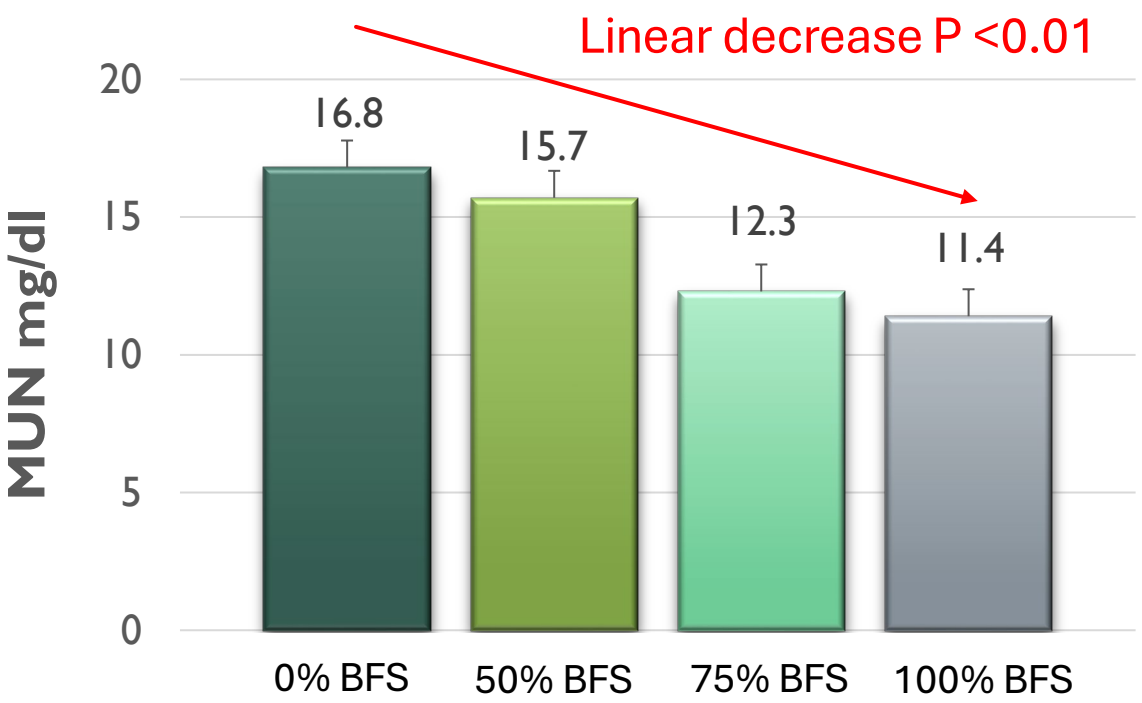


Increasing levels of BFS in the diet do not affect milk protein yield

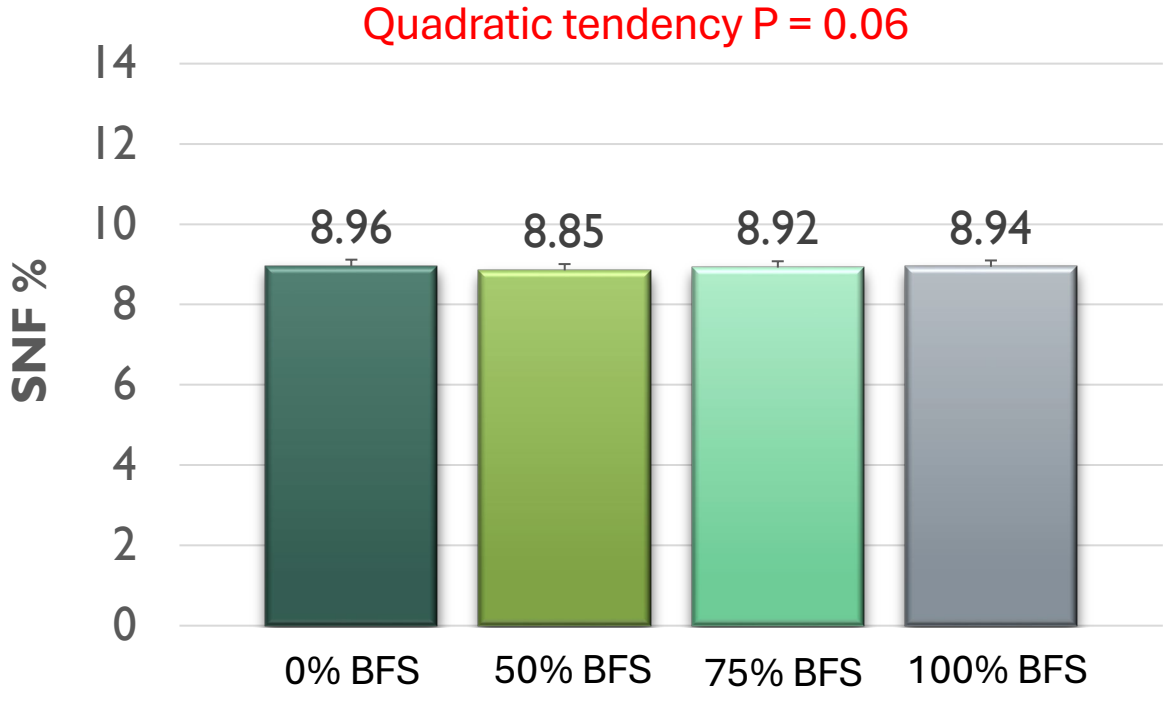


RESULTS

Increasing levels of BFS in the diet decreased milk urea nitrogen



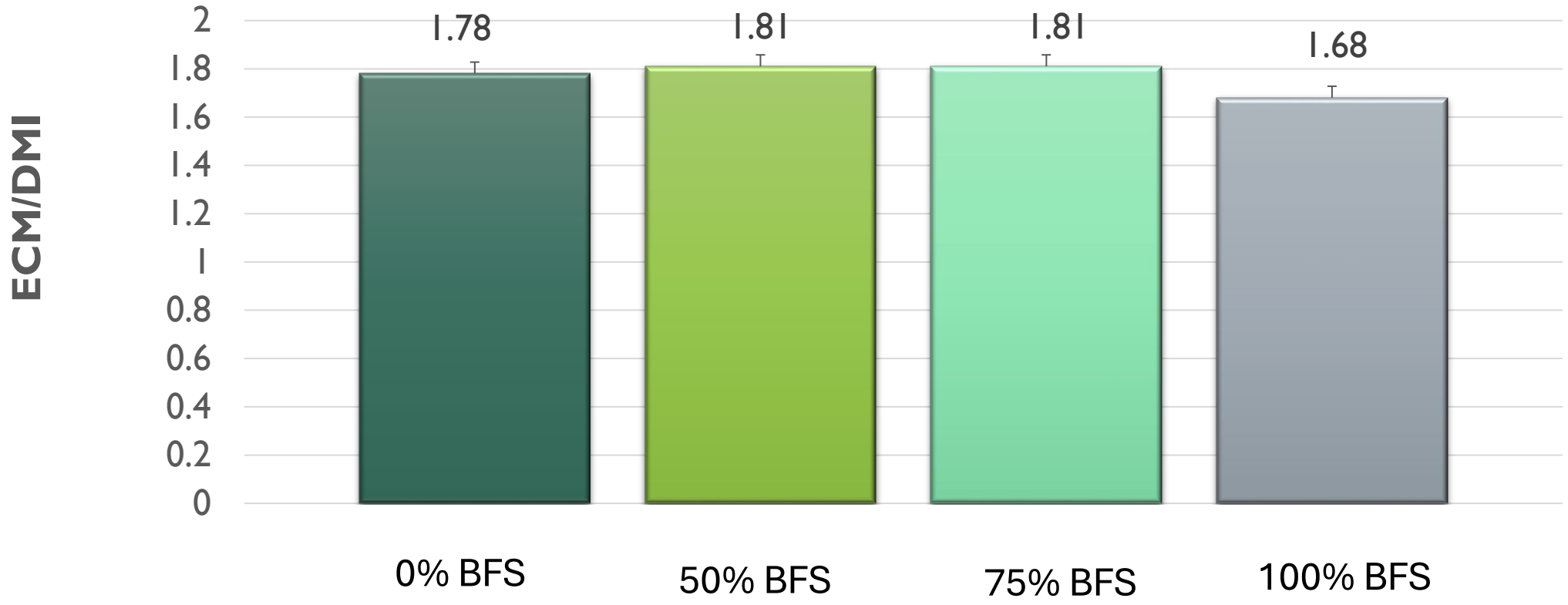
Increasing levels of BFS in the diet showed a quadratic tendency in SNF%



RESULTS

Increasing levels of BFS in the diet showed quadratic tendency in ECM/DMI

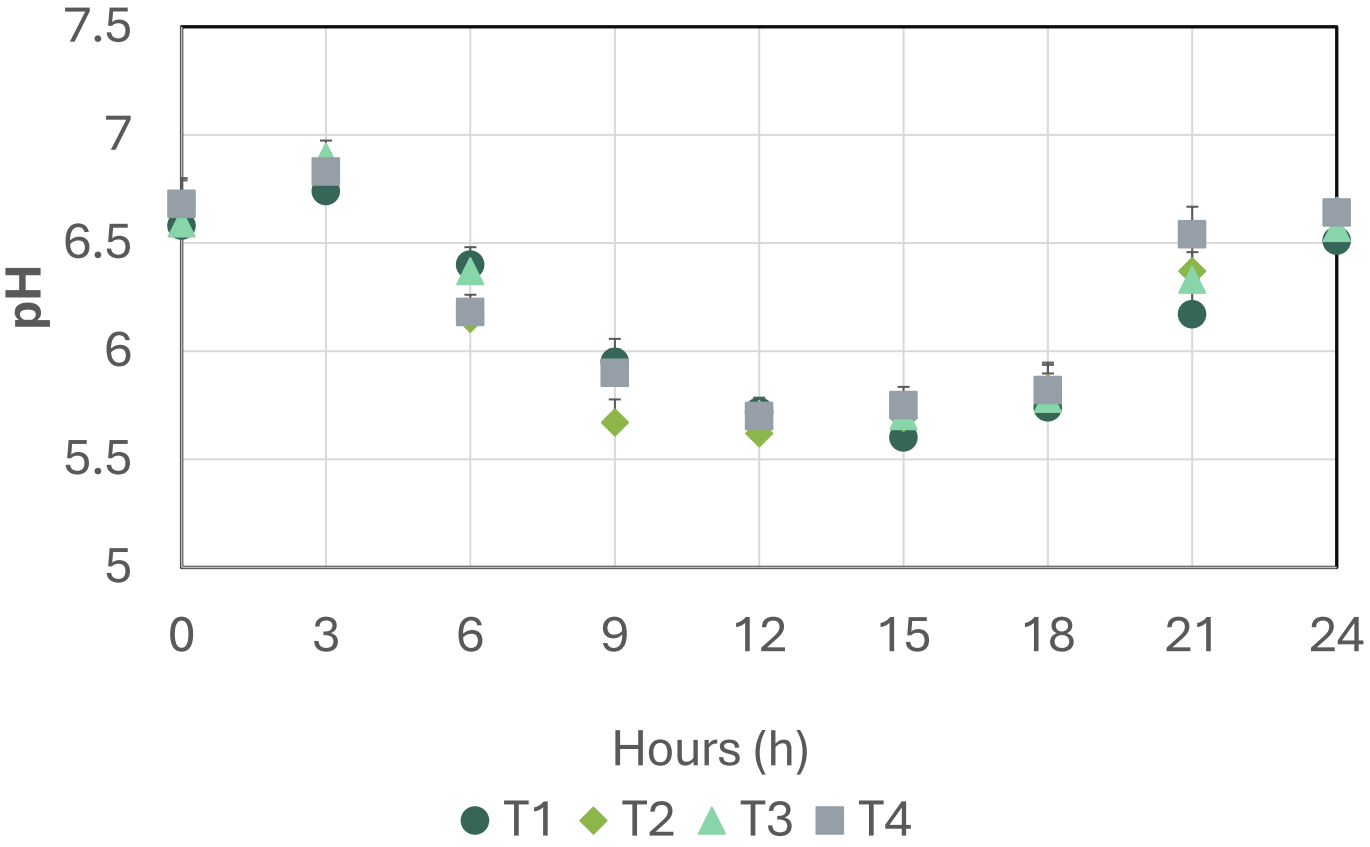
Quadratic tendency P = 0.09



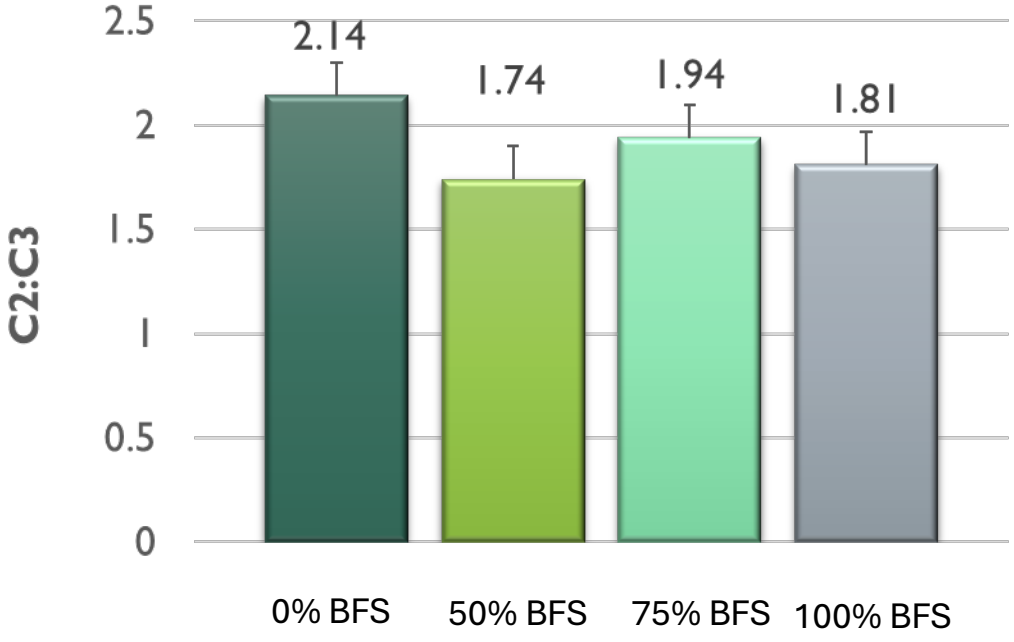
RESULTS

P values > 0.05
L = 0.45
Q = 0.59
C = 0.45

Rumen pH in 24 hours



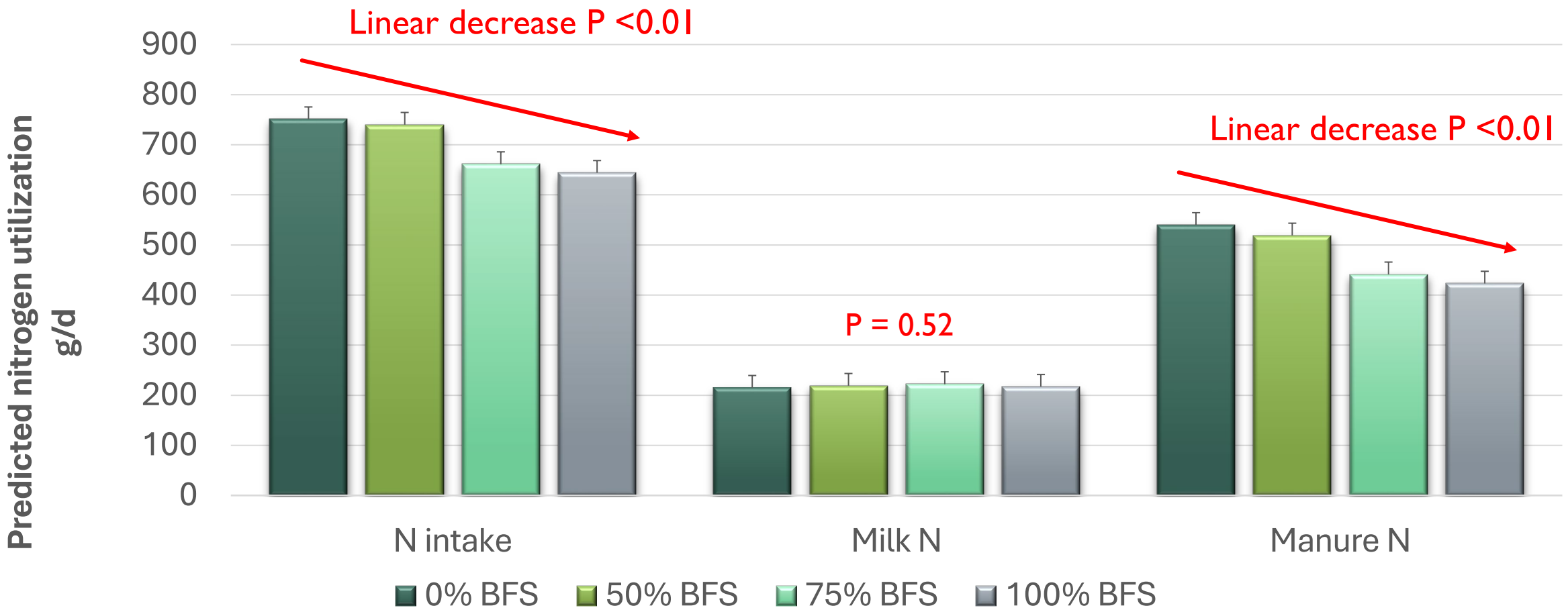
Cubic trend P < 0.01



Acetate : Propionate

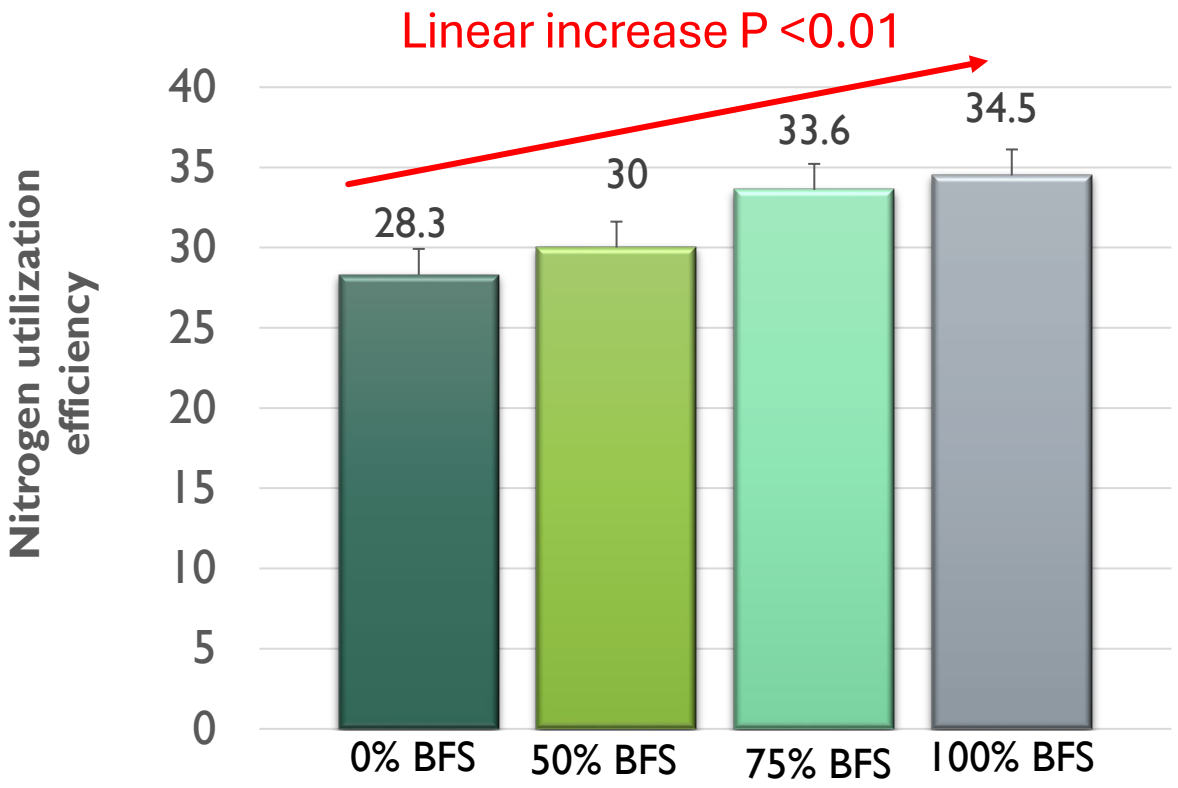
RESULTS

Increasing levels of BFS in the diet decreased predicted nitrogen intake and manure nitrogen

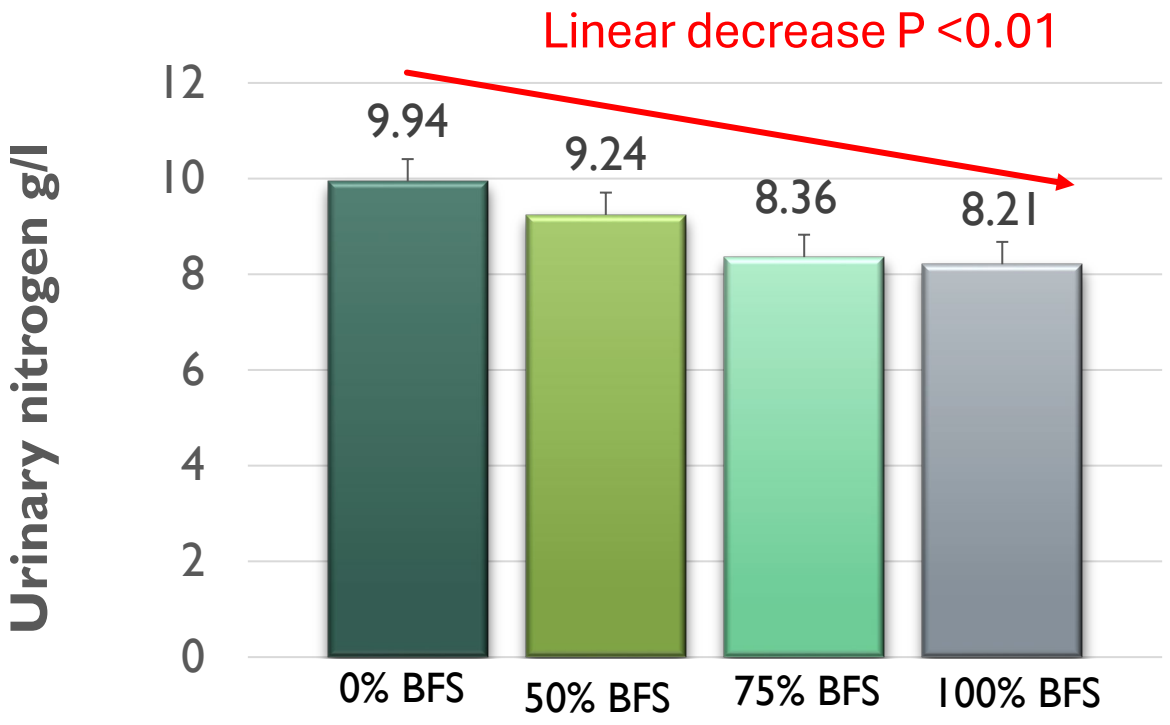


RESULTS

Increasing levels of BFS in the diet increased nitrogen utilization efficiency

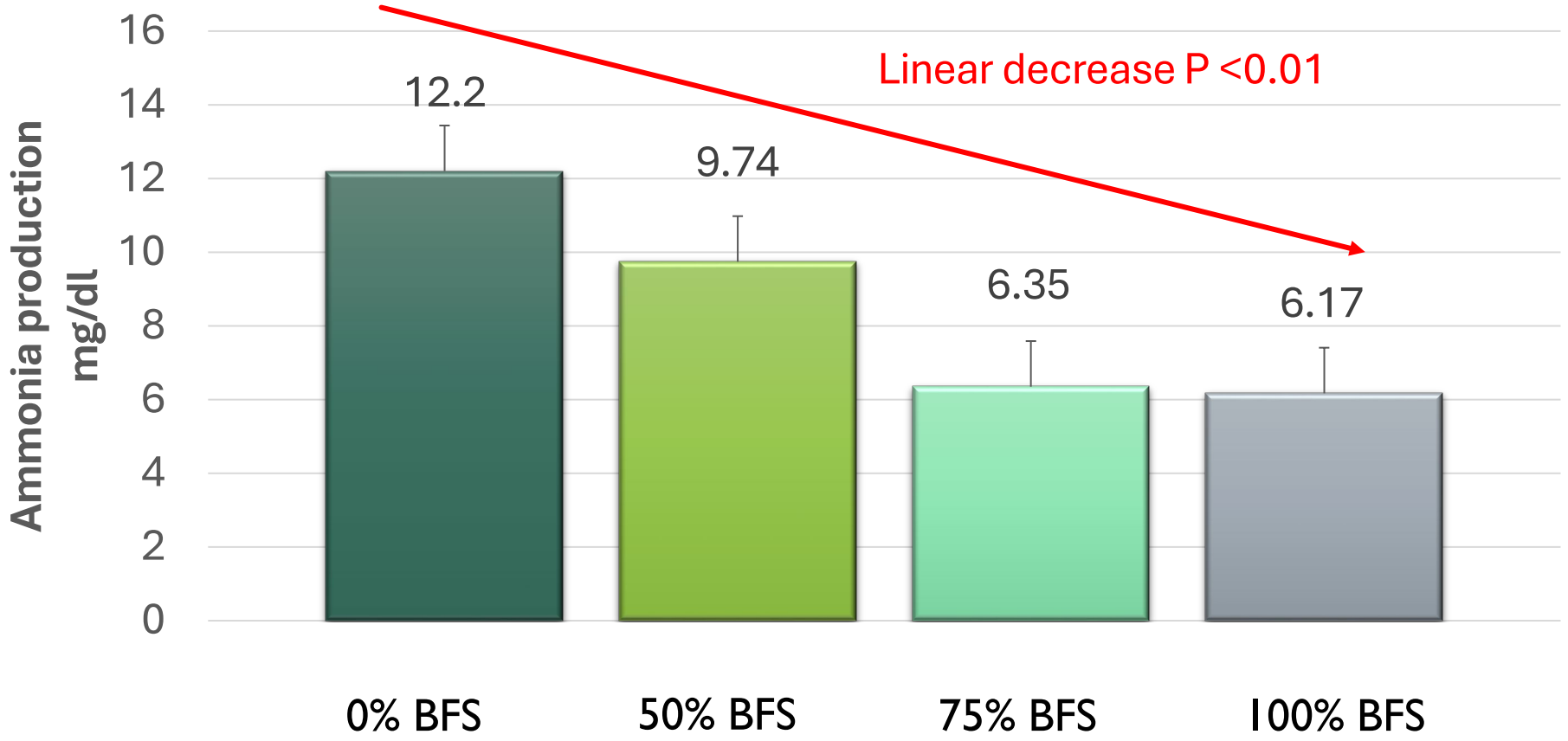


Increasing levels of BFS in the diet decreased the actual urinary nitrogen



RESULTS

Increasing levels of BFS in the diet decreased ammonia production



TAKE HOME MESSAGES

- BFS was higher in rumen bypass crude protein (RUP).
- BFS did not affect DM intake, milk yield, or milk components.
- BFS reduced milk urea nitrogen (MUN) and nitrogen excretion, improving nitrogen utilization efficiency. It could be due to lower CP in the experimental diets or to BFS itself.
- Rumen pH was unchanged; acetate: propionate showed a cubic response.

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Saskatchewan NSERC CRSNG Alberta milk Sask milk PROVETA Nutrition Ltd. University of Saskatchewan

QUESTIONS?