



# Effects of feeding a “zero land use” diet with rumen-protected amino acids to lactating cows

A.S.Bennett, C. S. Takiya, M. J. Davidson and B. J. Bradford



Department of Animal Sciences and Industry, Kansas State University, Manhattan

## Introduction

- As the human population continues to grow, by 2050 it is projected 9+ billion people and food demand would increase up to 100% above the current level of production.
- Land being a finite resource, increased demand for food will augment the competition of forage and concentrate feeds for livestock. On the other hand, increased food production will generate more crop residues and agro-industrial by-products.
- Ruminants can consume and digest feeds that are unsuitable either for humans or monogastric animals; and feeding by-products to dairy cattle can decrease feed costs and improve the environmental sustainability of milk production.

## Objective

The objective of this study was to evaluate a diet composed only by feedstuffs that do not affect land used for production of human food (zero land use [ZLU]) combined with rumen-protected amino acids on feed intake and milk yield of mid-lactating dairy cows.

## Experimental Procedures

Twelve multiparous Holstein cows in mid-lactation were enrolled to a 3x3 Latin square design experiment composed of the following treatments:

- Control (CON): Typical lactation total mixed ration (TMR);
- Zero land use (ZLU): a TMR composed of by-products and winter crop forages (Figure 2); and
- ZLU combined with protected-amino acids (ZLU-AA): ZLU and top dressed lysine (77 g/d Aji-pro-L, Ajinomoto, Chicago, IL) and methionine (45 g/d MetaSmart, Adisseo, Antony, France).

Experimental periods lasted 21 days, where the last 4 days were used for data collection. Cows were housed in a tie-stall barn (Figure 1) and milked twice a day. Feed offered and refusal were weighed daily to determine feed intake, and milk yield was recorded in each milking

Data was submitted to analysis of variance using the Fit Least Squares of JMP (Statistical Software, SAS Institute, Cary, NC) including into the model the random effects of period and cow, and fixed effects of treatment and block.

The experiment is still running, and thus statistical analyses were performed based on the data from the first two periods.

## Experimental Diets

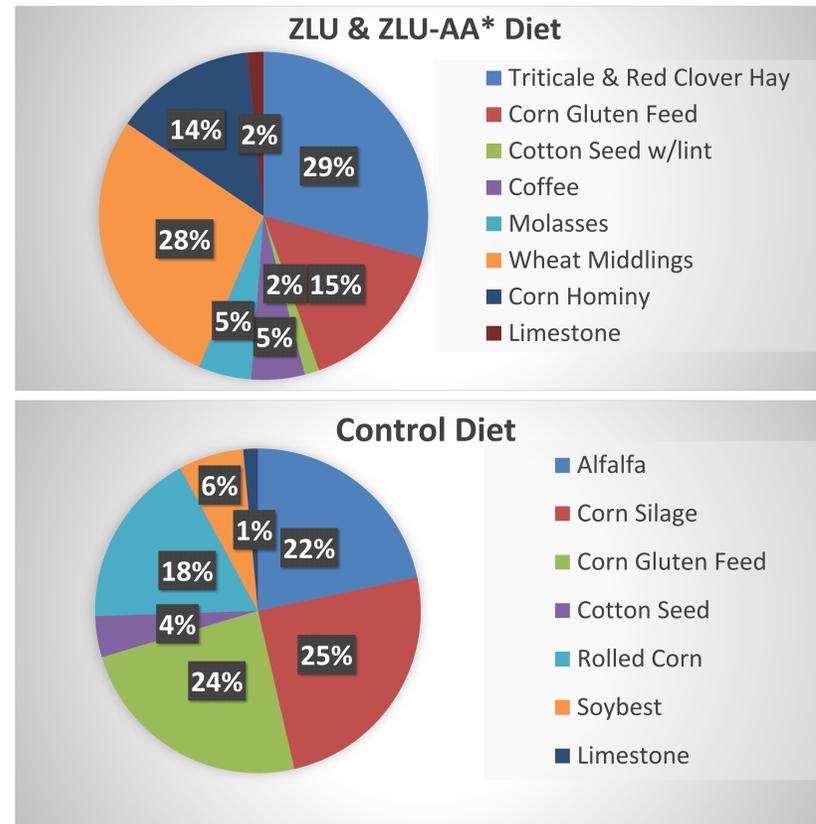


Figure 1. Tie stall barn of Kansas State University Dairy Cattle Teaching and Research Unit.



Figure 2. “Zero land use” TMR and rumen-protected amino acids in a feed bunk.

## Effects on Productive Performance

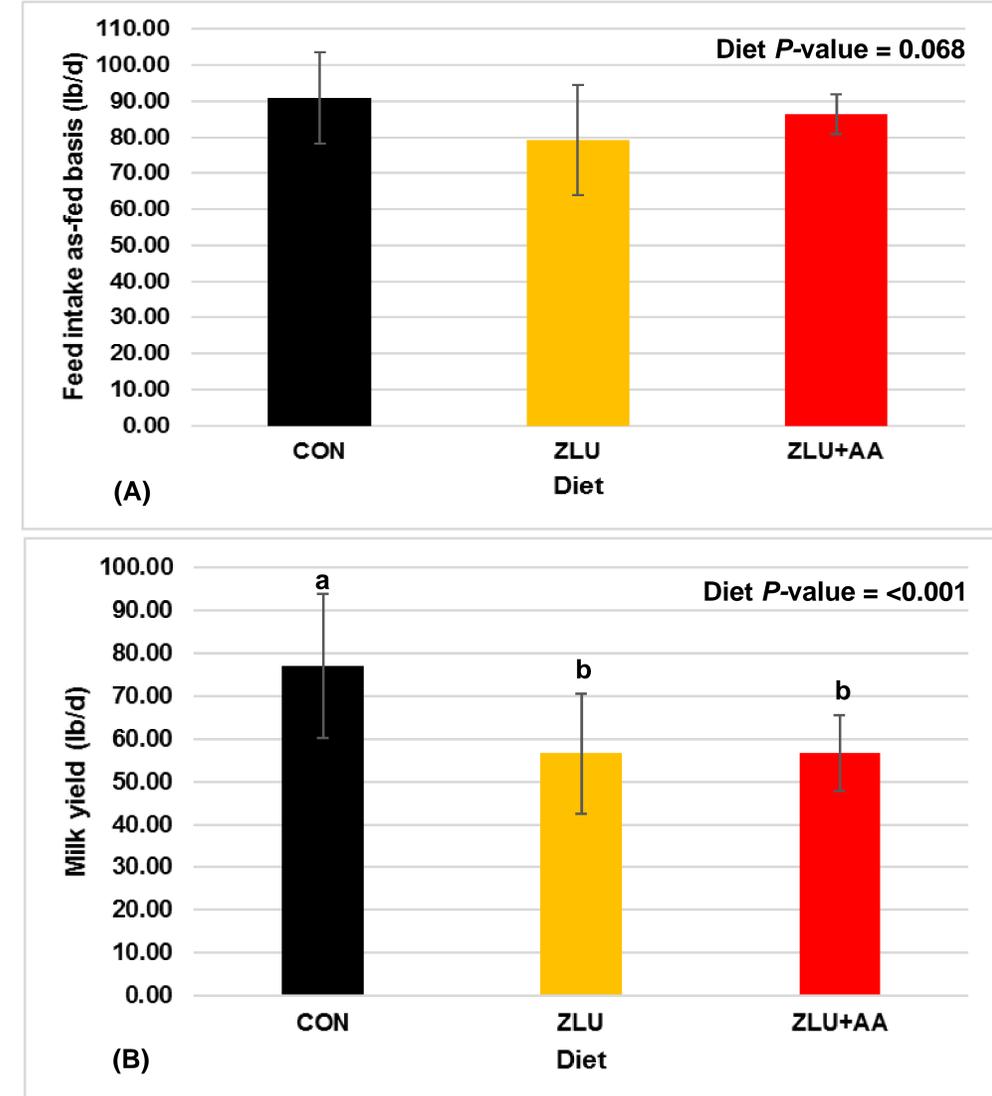


Figure 3. Feed intake (A) and milk yield (B) responses of mid-lactating dairy cows to a “zero land use” diet with rumen-protected amino acids.

## Conclusions

So far, both ZLU and ZLU-AA diets had a negative impact on productive performance of mid-lactating cows. However, we are unable to state a conclusion before the experiment has been done.

## Support

Authors acknowledge Ajinomoto for partial financial support and donation of Aji-pro-L, and Adisseo for donated MetaSmart. Authors also thank Mike Scheffel and staff from the KSU Dairy Cattle Teaching and Research Unit for all support and care with cows. We appreciate the help of Benjamin Saylor, Katie Olagaray, Sarah Sivinski, and Caroline Yloja with logistics.