

# Effect of maize silage and Italian ryegrass silage on nitrogen efficiency of organic milk production

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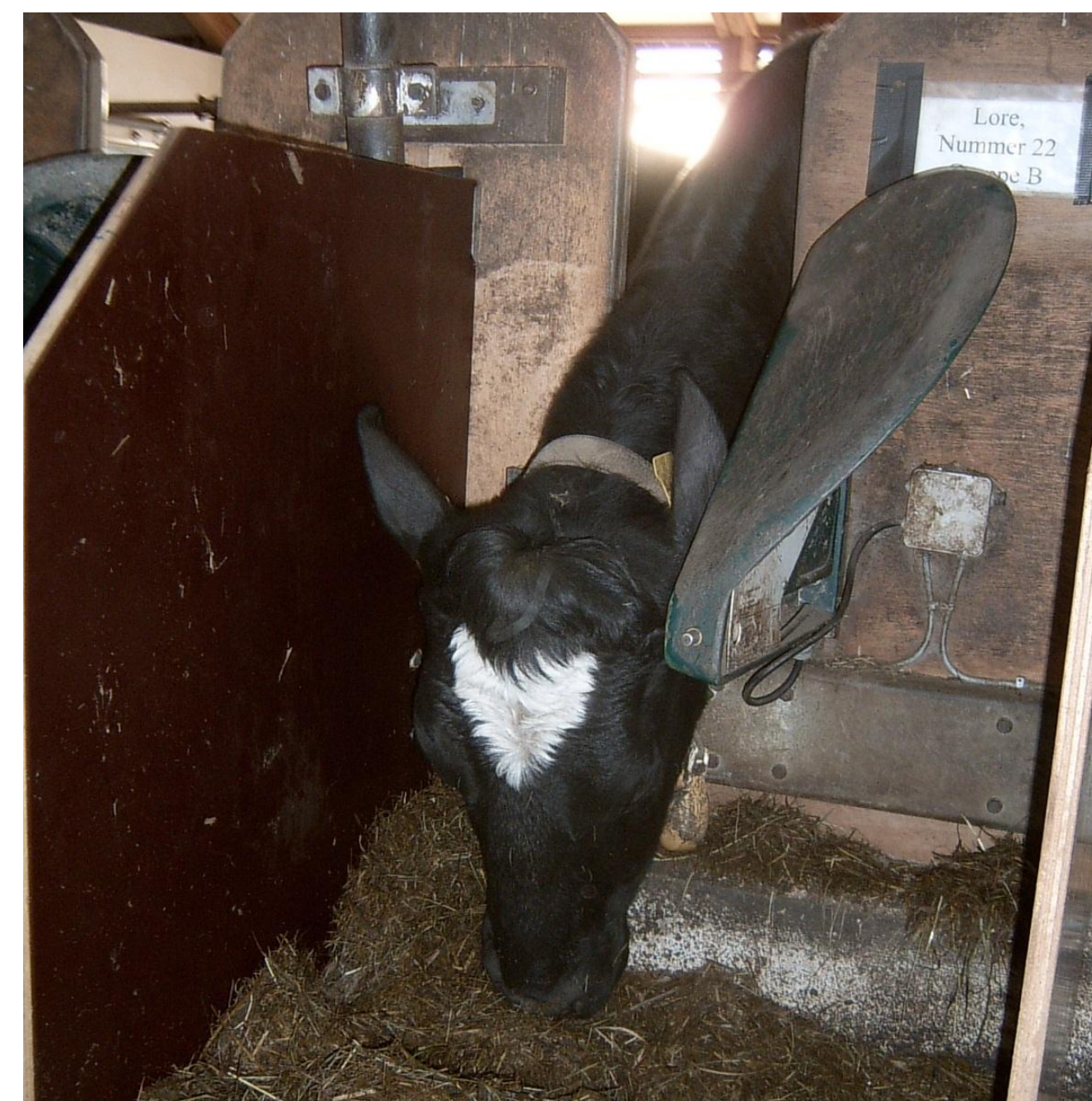
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## Background and aim of work

Organic dairy farmers strive to optimize the use of home-grown feeds to improve sustainability of milk production. Important parameters of production efficiency are:

- Feed efficiency (kg ECM/kg dry matter intake)
- Nitrogen efficiency (Milk N as % of N intake)

In Austrian organic agriculture protein-rich grass and/or grass-clover silage is often combined with maize silage to balance protein and energy supply and thereby increase nitrogen efficiency. However, reports about Italian ryegrass silage (*Lolium multiflorum* Lam.) providing better feed efficiency than maize silage raised the question whether it might improve nitrogen efficiency as well.



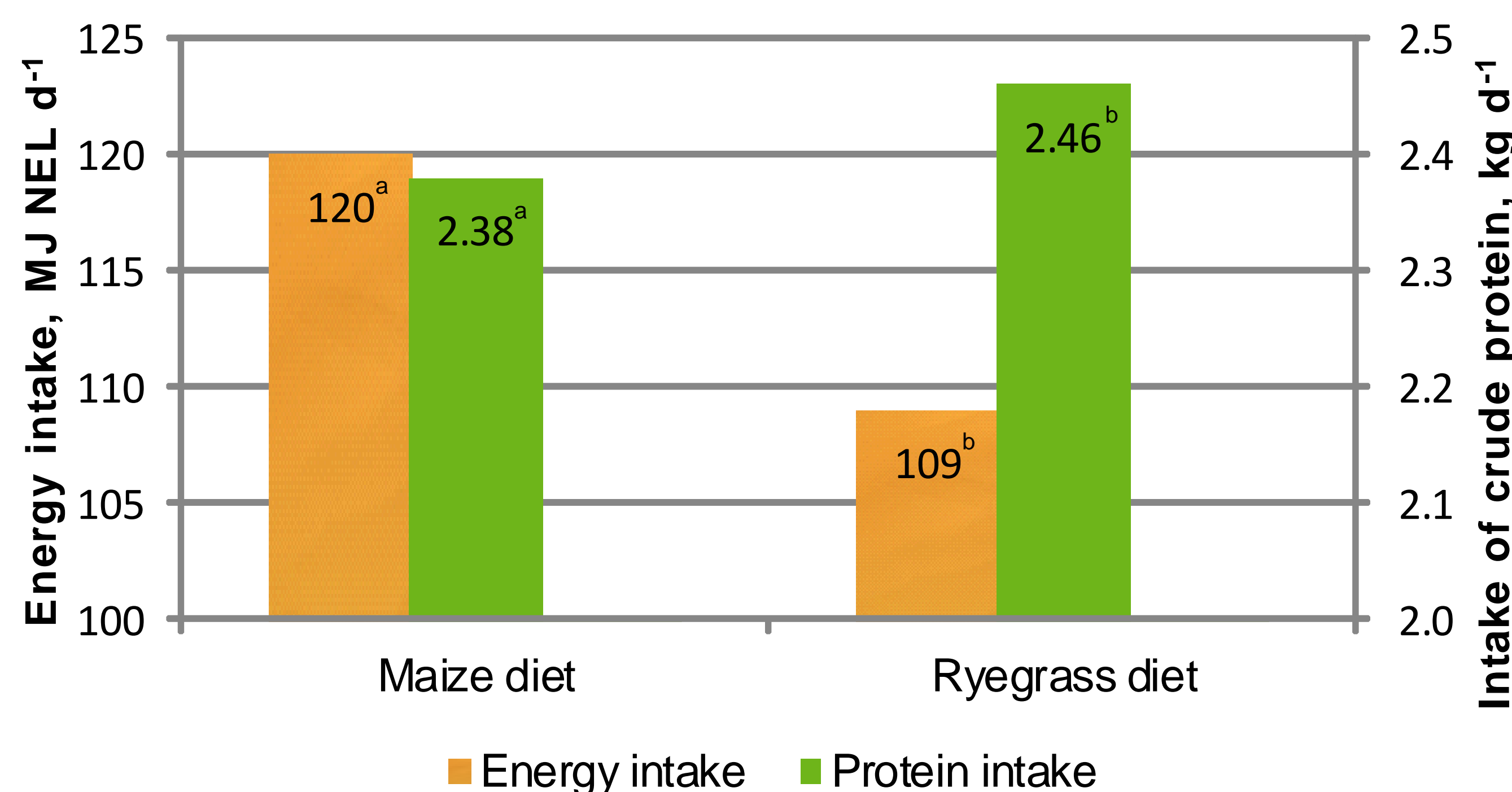
## Methods

- 12-week feeding trial (change over design) during winter 2010/2011
- 2 groups of 11 lactating Holstein cows each
- Comparison of two diets: Both contained 38% grass silage and 10% hay, and when milk yield exceeded 15 kg, additional concentrates were supplemented (0.5 kg per kg additional milk; 166 g CP; 7.8 MJ NEL kg<sup>-1</sup> DM)
- The maize diet contained 40% maize silage (75 g CP; 6.77 MJ NEL kg<sup>-1</sup> DM), the ryegrass diet contained 40% ensiled Italian ryegrass (139 g CP; 5.8 MJ NEL kg<sup>-1</sup> DM). (CP=crude protein; DM=dry matter; % refers to DM)

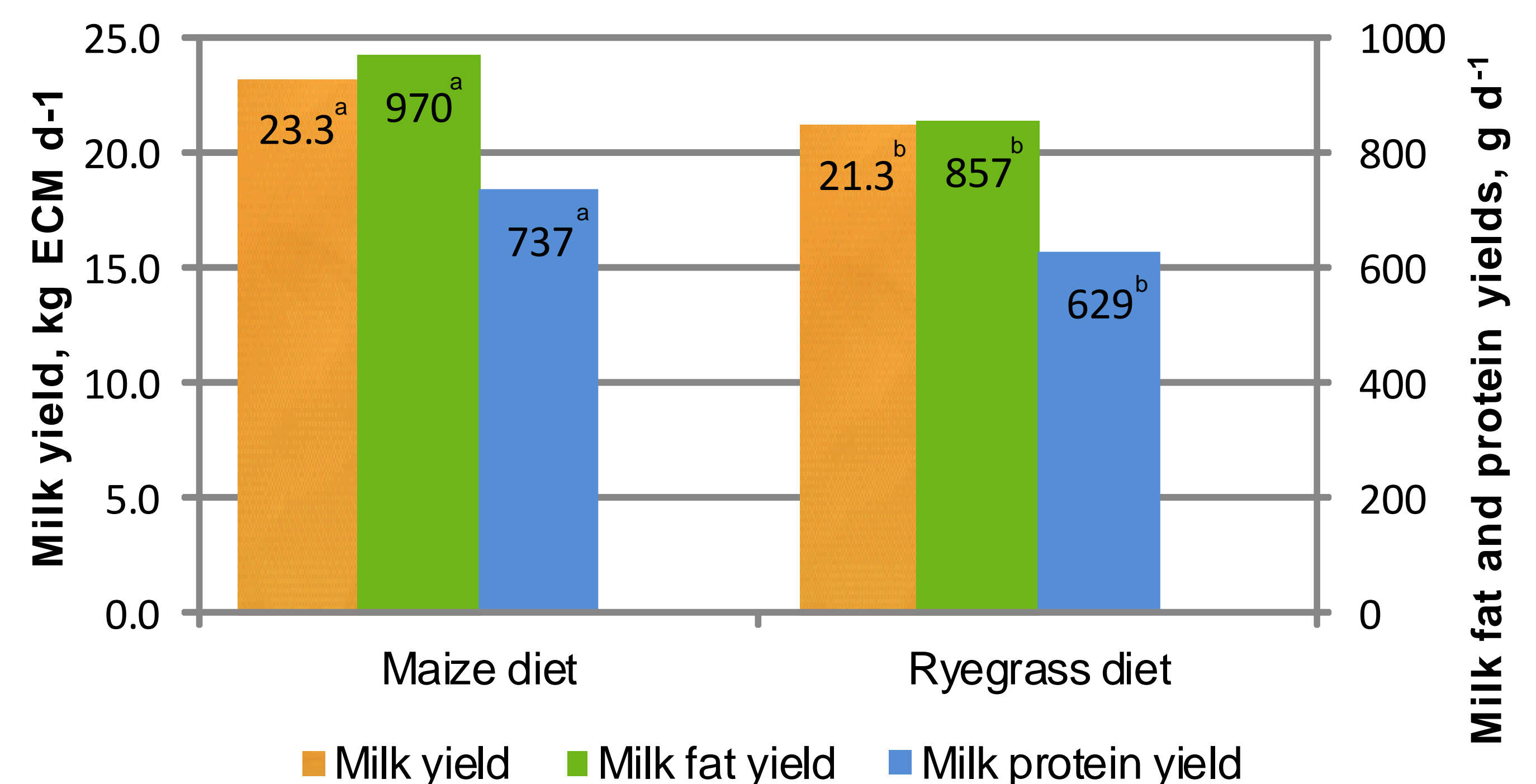
- By adding low amounts of barley and soybean cake mixed basal diets were produced containing similar contents of utilisable CP at the duodenum (uCP; maize diet: 136 g; ryegrass diet: 133 g kg<sup>-1</sup> DM), but differing energy contents (maize diet: 6.33 MJ; ryegrass diet: 6.15 MJ NEL kg<sup>-1</sup> DM).
- Statistical analysis was done using proc mixed of SAS 9.1, with a model including the random effect of cow(order).
- Figures show least-squares means, differing superscripts indicate significant differences between the treatments (p<0.05).

## Results

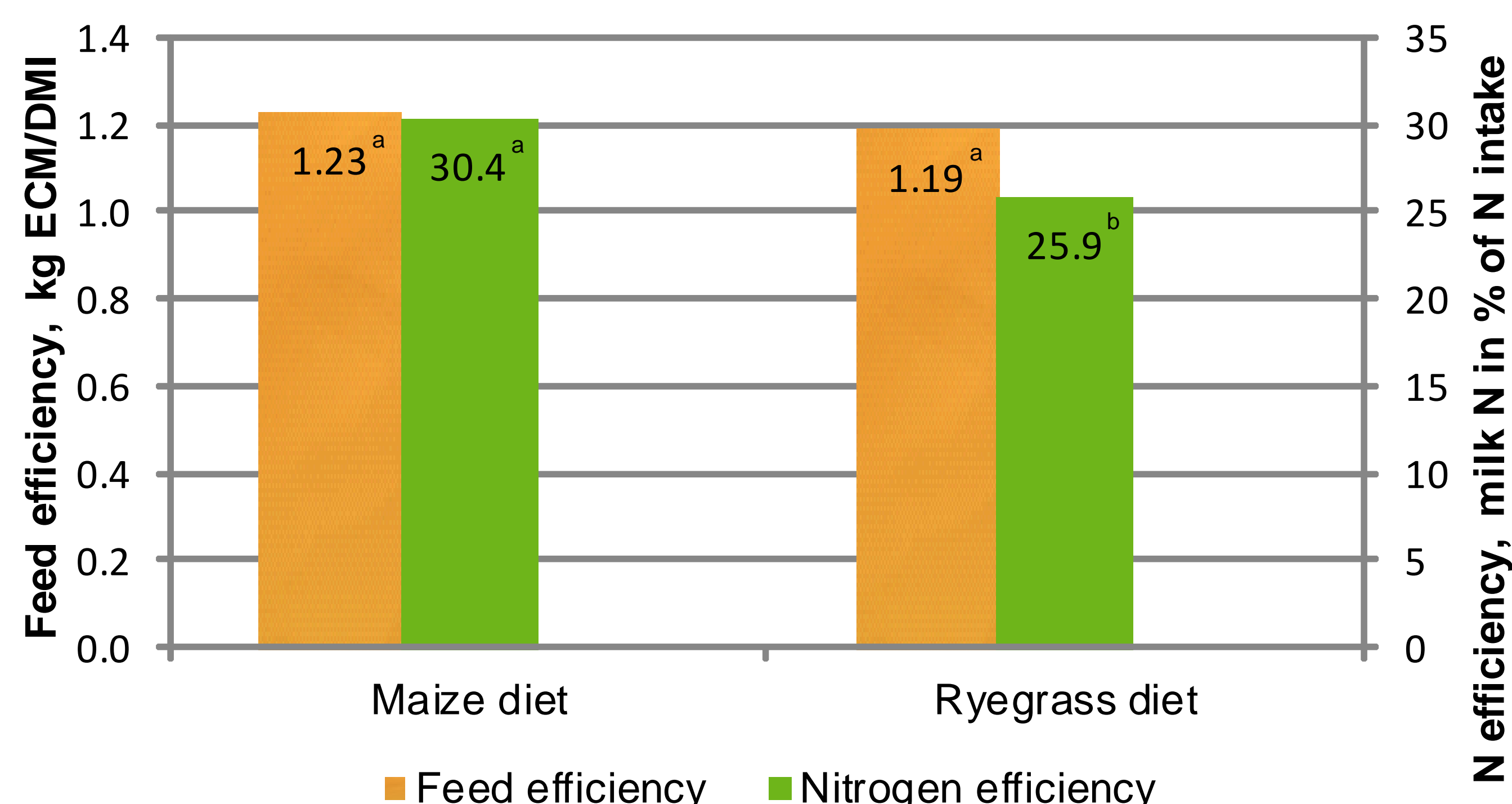
### Intake of energy and protein



### Milk production



### Production efficiency



## Conclusions

When feeding the maize diet...

- ...energy intake was significantly higher, but protein intake was significantly lower
- ...milk yield as well as milk protein yield were significantly higher
- ...no significant difference in feed efficiency was found
- ...nitrogen efficiency was significantly increased

→ When including Italian ryegrass in the diet a feed efficiency similar to maize silage could be achieved, but the nitrogen efficiency was significantly and considerably higher when the maize diet was fed, due to the lower crude protein intake combined with a higher milk protein yield. Therefore maize silage upholds its reputation as an ideal energy-rich component in grass-silage based diets, and as long as it can be easily incorporated into the crop rotation its cultivation is recommended.