

# Feed additives in dairy diets

## Introduction

The 'FEED EARN' project has the objective to develop a novel feeding concept for dairy cattle with beneficial effects on rumen health, digestive efficiency and immune response; boosting the animals feed efficiency and robustness. The concept is based on the use of novel yeast, novel types of phytogenic, and combinations of the former. Biomin-Holding GmbH (Austria), Wageningen Livestock Research and Dairy Campus worked together to discover the effect of application of Biomin products and the feeding concept on dairy production and health.

## Material & Methods

For this trial, 48 dairy cows (Dutch Holstein-Friesian type) were divided in sixteen blocks, based on actual milk production and lactation stage. Cows from each block were randomly distributed over three dietary treatments. Treatments were: a control diet (YO), a diet with yeast as an additive (YA) and a diet with yeast combined with a phytogenic product (YP). The composition of the rations and composition of the experimental premixes is presented in table 1.

Next to the PMR, cows received 1 kg/d of a commercial compound feed divided over two meals during milking. PMR rations were fed ad libitum, once a day feed rests were removed before feeding the PMR rations. The experiment lasted 8 weeks, in the first week cows had to adapt to the stall, their group and the new rations. The measurements prior to the change of the treatment diets, were used as covariates. Throughout the experiment, individual feed intake and milk yield were recorded daily. Each week, milk was sampled and concentrations of fat, protein, lactose and urea were determined. In 15 cows rumen pH was measured continuously by a rumen pH bolus.

Results of statistical analyses are presented in tables as 'effect of yeast' and as an 'effect of phytogenic'. The 'effect of yeast' shows the effect of yeast treatments YA and YP compared to the control treatment YO, whereas the 'effect of phytogenic' shows the (extra) effect of the phytogenic additive in treatment YP compared to only yeast in treatment YA.

Table 1 *Composition of experimental partially mixed rations, g/kg dry matter.*

Ration component	Treatment rations (PMR)		
	PMR-YO	PMR-YA	PMR-YP
Grass silage	303	303	303
Maize silage	232	232	232
Soybean meal	122	122	122
Maize meal	96	96	96
Minerals	25.2	25.2	25.2
Concentrates	212	212	212
Mix-YO	10.1	-	-
Mix-YA	-	10.1	-
Mix-YP	-	-	10.1

Composition of premixes Mix-YO, Mix-YA, Mix-YP: Vinasses, autolysed yeast, and phytogenic additive, respectively for Mix-YO; Mix-YA; Mix-YP: 1000/0/0; 940/60/0; 928/60/12 in g/kg.

## Results

On average, total feed intake did not differ between treatment, however feed intake on the YP treatment tended to be lower compared to YA. Cows realised a high milk production due to their stage of lactation, on average 54 days post partum at the start of the trial. No treatment effects on milk production were found. However, due to a slightly lower feed intake and a slightly higher milk yield on treatment YP, feed efficiency increased as an effect of phytogenic product (Figure 1).



This research is a cooperation between Wageningen Livestock Research, Dairy Campus and Biomin-Holding GmbH, Austria with a financial contribution from SNN (Samenwerkingsverband Noord-Nederland). The title of the project is 'FEED EARN' which means: Feed Efficiency And Robustness Novum.

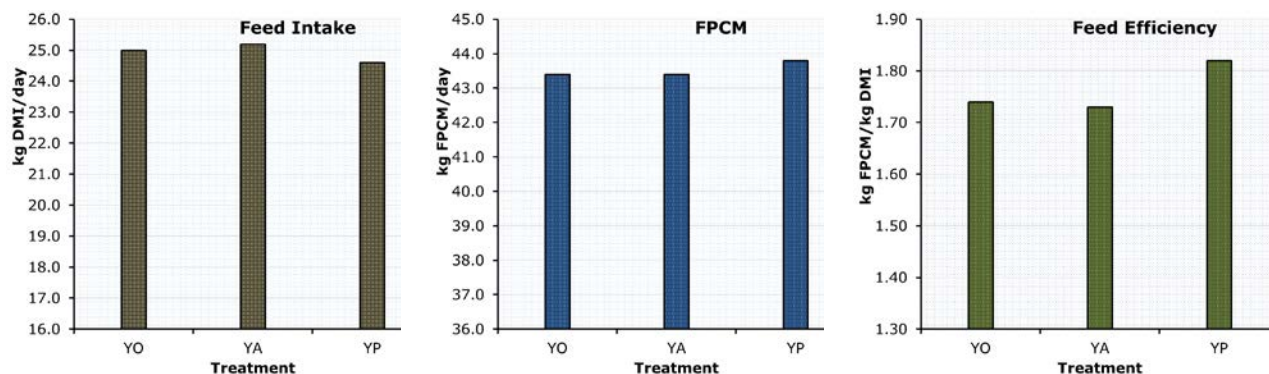


Figure 1. Average Feed intake, FPCM production and Feed Efficiency during the experimental period.

Average rumen pH increased as an effect of yeast, whereas phylogenics tended to have an extra enhancing effect (Table 2). The total time below pH 5.8 in cows with treatment YO was longer than for treatments YA and YP, suggesting that YO cows may have been a higher risk for SARA and reduced fibre degradation. Total rumination time was not different between groups but increased on average with 10% for all groups during the experimental period.

Table 2 Effect of treatments (by ANOVA, adjusted voor covariate) on rumen pH, rumen temperature and rumination activity during the experimental period (week 2-8).

		treatment			effect	
		YO	YA	YP	YO<>(YA&YP)	YA<>YP
Rumen pH (day 1)	covariate	6.04	6.06	6.24		
Rumen pH (Smaxtec, 15 cows)		6.05 <sup>a</sup>	6.16 <sup>b</sup>	6.29 <sup>b</sup>	*	t.
Rumen temp.		38.9	38.9	38.8	n.s.	n.s.
pH below 5.8 (minutes/day; day 1)	covariate	150	272	93		
pH below 5.8 (minutes/day)		254 <sup>b</sup>	125 <sup>a</sup>	60 <sup>a</sup>	*	n.s.
Rumination activity (minutes/hour)		18.4	18.5	17.8	n.s.	n.s.

<sup>†</sup> n.s.: not significant, t.(tendency): P<0.1, \*:P<0.05, \*\*:P<0.01, \*\*\*: P<0.001

<sup>a,b,c</sup> Figures within a row with different superscript characters differ significantly (P < 0.05)

### Conclusions:

- Total feed intake was high for all groups but did not differ between the three treatments, however a tendency was found between the addition of the phylogenetic additive (diet YP) relative to the treatment with yeast (YA).
- Milk production did not differ between treatments. Only numerical improvements were seen for the YP treatment group.
- Feed efficiency was higher on diet YP.
- Rumen pH was higher on treatments with yeast, and the addition of the phylogenetic additive tended to be an extra-enhancing effect.
- The threshold 'time below pH 5.8' was affected by yeast, cows with treatment YA and YP had a shorter period with pH below 5.8 compared to control diet (treatment YO).

From this study it was concluded that addition of this yeast cultures had an effect on rumen fermentation which was observed in a higher pH, which lowers the risk on SARA and can increase the fermentation of fibres in the rumen. However no effects on feed intake and milk production was observed, adding a phylogenetic product had a positive effect on feed efficiency .