**Concentrate feed based on ammoniated barley can replace soymeal in dairy cow diets**

Katrine S. Eikanger, Margrete Eknæs and Alemayehu Kidane

Norwegian University of Life Sciences, Ås, Norway [Presenter’s e-mail: katrinee@nmbu.no]

**Application**  The use of ammoniated cereal grains can replace soymeal in lactating dairy cow diets allowing minimal recourse to imported ingredients.

**Introduction** Cereal grains and their byproducts are ideal sources of energy for milk production. But at higher inclusion levels, the rapidly fermentable carbohydrates of these products pose risks for increased ruminal disorders (e.g., acidosis). Alkalisation (or ammoniation) of grains is expected to increase protein, modulate rumen pH with improved buffering capacity, and improve fibre digestibility due to conducive rumen pH for microbes. Such a product currently being used and tested under different conditions is alkalised barley containing Home n’ Dry pellets (Alkagrain®, Alkasystems; Dugdale Nutrition, LAN, UK). We tested the interactive effects of replacing alkalised barley for soymeal in concentrates for dairy cows fed two contrasting silages differing on organic matter digestibility (**OMD**) on feed intake and milk yield.

**Materials and methods** Forty lactating Norwegian Red dairy cows of mixed parity were allocated to four groups based on parity and initial milk yield. The groups were randomly assigned to one of the four dietary groups using a 2 X 2 factorial design [(2 concentrates: alkalised barley based = **ABB**; and soymeal based= **SMB**); and 2 silage qualities: early cut = **high-OMD** vs. late cut = **low-OMD**)]. For concentrates, ABB replaced SMB quantitatively (i.e., w/w), whereas the low-OMD cows received more of the concentrates (≏1.2 kg DM/d) in compensation for the silage quality. The trial lasted for 63 days: 21 d of adaptation and 42 d of data collection (intake, milk yield and milk composition). Energy corrected milk (**ECM**) was calculated using milk yield and its composition *(1)*. The recorded data were compared using repeated measures ANOVA of Proc Mixed in SAS (SAS 9.4 for windows) with autoregressive (AR1) covariance structure. Statistical significance was declared at P < 0.05.

**Results** No concentrate by grass silage interaction effects were observed except for starch intake (Table 1). Intake of silage and total dry matter did not differ between the concentrate groups. However, silage intake was marginally lower (P = 0.08), and concentrate intake was significantly higher (P < 0.001) for the low-OMD. Milk yield and ECM were not affected by concentrate type, but cows fed low-OMD silage produced lower ( P = 0.045) ECM than cows fed high-OMD.

Table . Feed chemical composition, feed intake and performance.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Concentrate | Grass silages | Effects of (P – values) |
| **Feed composition** | ABB | SMB | low-OMD | high-OMD | s.e. | Concentrate | Grass silage | Conc. x silage |
| Dry matter, g/kg fresh | 873 | 875 | 273 | 225 | - | - | - | - |
| Crude protein, g/kg DM | 171 | 172 | 119 | 151 | - | - | - | - |
| Starch, g/kg DM | 495 | 391 | - | - | - | - | - | - |
| NDF, g/kg DM | 168 | 203 | 519 | 467 | - | - | - | - |
| **Intake; kg DM/day** |
| Grass Silage | 12.3 | 12.3 | 11.9 | 12.7 | 0.31 | ns | 0.08 | ns |
| Concentrate | 7.5 | 7.8 | 8.3 | 7.1 | 0.13 | ns | < 0.001 | ns |
| Total dry matter | 19.8 | 20.1 | 20.1 | 19.7 | 0.35 | ns | ns | ns |
| Starch  | 3.72 | 3.07 | 3.66 | 3.13 | 0.08 | < 0.001 | < 0.001 | 0.031 |
| Crude protein  | 3.03 | 3.07 | 2.91 | 3.20 | 0.07 | < 0.001 | ns | ns |
| **Milk yield and ECM; kg/day** |
| Milk yield | 26.6 | 26.7 | 25.9 | 27.5 | 1.03 | ns | ns | ns |
| ECM | 29.9 | 29.7 | 28.7 | 30.9 | 1.07 | ns | 0.045 | ns |

s.e. = standard error of the interaction term; NDF= neutral detergent fibre; ns = not significant; Conc. x silage = interaction between concentrate & silage

**Conclusion** Ammoniated barley can replace soymeal in concentrates without effects on feed intake, milk yield and ECM. The lower ECM on low-OMD silage, even with more of the concentrates, highlight the importance silage quality.

**Acknowledgment** This work was funded by the Research Council of Norway (NFR; project # 302341).

**References:** ([1.) Sjaunja, L. O., et al (**1991**) A Nordic proposal for an energy corrected milk (ECM) formula. Proceedings of the 27th Biennial Session of the International Committee for Animal Recording (ICAR). (eds. P. Gaillon and Y.Chabert), Paris, France, 2-6 July 1990. Wageningen Academic Publishers, Wageningen, the Netherlands.