

Annual Report 2013

Optimization of protein feeding in organic milk production – economy and environment

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Development of an new in vitro method for protein evaluation

During 2012 we started to develop a new *in vitro* method for protein evaluation. Ruminant protein metabolism is complicated due to the recirculation of nitrogen within the animal and the *de novo* synthesis of microbial protein in the rumen. Based on the modelling processes using the mechanistic model, that was developed during the first project year, a novel *in vitro* method for protein evaluation was evaluated. The concept behind the model is to predict the utilisable protein which represents protein (Nitrogen, N) that is not recovered in the ammonia pool in a simple *in vitro* rumen. The new technique estimates the increase in ammonia concentration in an *in vitro* system for each additional unit of feed N added to the system. Initially we estimated the response in soybean meal, which is a well-known feed source. There after we evaluated the same analytical procedure with urea, which represents a natural nitrogen source, which is 100 percent degraded in the rumen, hence all nitrogen that is not recovered as ammonia represents microbial synthesis. Finally we have started to compare the protein value of different protein feeds. The initial results with the new technology are promising and during the coming year we will continue to work with the development of the *in vitro* method for comparison of different organic protein feeds.

Production trials with dairy cows

The organization of the two planned feeding trials with dairy cows is in progress. Both trials cover the subject optimization of protein feeding in organic dairy production. The forages for the first experiment *Reduced protein supplementation due to increased proportion of Red clover (Trifolium pratense, L.)* were cut and conserved during the summer of 2012 in Umeå. The first trial will start in April 2013 with the aim to evaluate the dairy production response of locally produced protein feed and different inclusion of Red clover in the diets. The dairy cows will be fed with low, medium and high inclusion of rapeseed feed in their diet and at the same time we will investigate if we can lower the crude protein content in the diets by feeding great (70 %) proportion of red clover in the forage ration compared to small (30 %) proportion. Thereafter in the second feeding trial *Responses to different protein feeds in dairy production* that will be conducted in the autumn 2013, we will compare the response in milk production by feeding different organic protein feed sources at increasing levels in the diets. The work with the production trials also includes the preparation and analysis of feeds and milk samples followed by statistical calculations and preparation of manuscript for scientific publication.

Communication of results

The initial data analysis (meta-study) of responses to increased protein feeding in dairy production was presented at the forage conference in Umeå the 15 of February 2012. Thereafter we presented the project, preliminary results and experimental designs at the conference for organic farming organised by the Swedish Board of Agriculture in Mjölby the 11 of April 2012. The project were as well presented at the farmers conference (Lantbrukardag) organised by the farmers' cooperative Lantmännen in Lännäs den 15 Augusti 2012.

Changes in research plan

The research is conducted according to plan with only one minor adjustment. The feeding trial with dairy cows elucidating the effects of varying proportion of red clover in the diets in combination with rapeseed has been postponed a few months due to the high occupancy in the research stable in Umeå.

Sammanfattning

En första presentation av projektet gjordes vid Grovfoderkonferensen, Umeå, den 15 februari 2012 där vi redovisade den dataanalys (meta-studie) som utförts för att studera responsen i mjölkproduktionen av ökad proteinutfodring till mjölkkor. Därefter presterades projektet och forskningen vid Jordbruksverkets FOU dag, Forskning och utveckling inom ekologiskt lantbruk i Mjölby den 11 April 2012. Projektet har även presenterats vid Lantmännen Lantbruks Lantbrukardag på Lännäs den 15 Augusti 2012. När det gäller det praktiska arbetet har vi under sommaren 2012 skördat och konserverat flera kvaliteter av vallfoder (ensilage) med hög och låg andel rödklöver för det planerade utfodringsförsöket. Under hösten 2012 har vi utifrån det första årets modellering genomfört ett utvecklingsarbete för att ta fram en ny *in vitro* metod för att värdera proteinfodermedel. Arbetet med har nu övergått i en andra fas där vi jämför värdet av olika fodermedel exempelvis soja, raps och åkerböna. Slutligen har vi påbörjat genomförandet av två utfodringsförsök med mjölkkor, ett experiment för att studera effekter av ökad andel baljväxter (rödklöver) i foderstaten och ett annat experiment för att jämföra responsen av två olika proteinfodermedel (preliminärt raps och åkerböna). Det första utfodringsförsöket genomförs våren 2013 och det andra under hösten 2014.