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Practical application of fungal treatment of lignocellulosic biomass to feed ruminants in the Netherlands

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Lignocellulosic biomass, mainly by- or waste-products from agriculture and forestry, can be used as an energy source by ruminants who have a unique digestive system where the rumen microbes can degrade carbohydrates, such as cellulose and hemicellulose. However, the presence of lignin blocks the contact of rumen microorganisms with the carbohydrates, causing a decreased digestibility, hence a low feeding value. Experiments on a laboratory scale demonstrated that white-rot fungi can selectively degrade lignin and leave a large part of the cellulose undegraded, therefore improve the nutrition value of the low-quality biomass. This project aims to solve several challenges associated with the upscaling of the fungal treatment of high lignin biomass and contribute to making the technology suitable for large scale practical application. Four experiments will be conducted: (I) Investigate the suitability of lignocellulosic biomass available in the Netherlands to be converted into valuable feed for ruminants using white-rot fungi; (II) Determine if previous colonized substrate can be used as spawn and its optimum amount, and examine how many times it can be transferred from one batch to a next one; (III) Investigate the possibilities to replace autoclaving by simple and inexpensive methods to prevent undesired contamination; (IV) Examine the effects of the metabolites generated by the fungal treatment process on the performance, health and product quality of ruminants. Fungal biotechnology is economically and environmentally-friendly and has great potential to alleviate the food and feed competition as well as to reduce air pollution by reducing the burning of lignocellulosic biomass.