Delicious mouldy straw

In many developing countries cows are fed on straw, which is not very digestible. Professor Wouter Hendriks makes use of fungi to turn it into nutritious animal feed. There is a lot of interest in what he is doing.

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Globally, farmers produce 2000 million tons of straw per year. In the Netherlands, the main use for this straw is as stable bedding for horses, but in many developing countries it is fed to goats and cows. But because straw contains a lot of lignin, ruminants cannot extract the carbohydrates from it very well. To remedy this, professor of Animal Nutrition Wouter Hendriks and his colleagues have taken a leaf out of nature's book.

There are several kinds of fungi, such as oyster mushrooms, which are capable of breaking down lignin. They colonize straw and other plant matter with a network of fungal threads, thus breaking down the lignin and making the valuable carbohydrates available for the growth of the fungus. By adding these fungi to straw and stopping the process just before the fungi appear, feed is obtained that is more digestible in the rumens of the ruminants.

PERFECTLY EDIBLE

Laboratory research reveals an 85 percent increase in the digestibility of wheat straw. 'Actually, in nutritional terms, we are turning it into grass. We are upgrading low-value biomass into a highly usable animal feed,' says Hendriks. 'Goats find it perfectly edible, at any rate.' Hendriks hasn't tried the mouldy straw on cows yet. 'They eat a lot more. We don't have the capacity for that level of production in Wageningen. In the Netherlands you have to make major investments: we do our tests indoors, at 24 degrees and high humidity. In Asia you can just do them outdoors, as the fungi are more in their element at high temperatures. What is more, there is plenty of rice straw available there.'

> 'We upgrade low-value biomass to get usable animal feed'

The process is easy for small farmers to carry out too. Once the fungi have done their work after four to six weeks, the

farmer can store the processed straw in a closed, airtight barrel. 'The fungi produce acids that conserve the product. Pack the barrel, stamp it down, put the lid on it, and you can keep it for years if you need to,' says Hendriks. And a farmer can use the fungi from the previous batch for another portion of mouldy straw.

INDONESIA AND VIETNAM

Hendriks' colleague John Cone is currently doing tests in Indonesia, applying the technique in rice cultivation on a small scale. And in September, with support from the Victam Foundation, a PhD student will start research on semi-commercial application of the method in Vietnam. Part of his research will be to test an alternative to the processing method Hendriks uses in Wageningen. 'Before we let our fungi loose on the straw, we sterilize it to get rid of competing fungi,' explains Hendriks. 'That is probably overkill. He is going to see whether you can also disinfect the straw adequately in water in an oil drum that you paint black and that heats up in the sun.'

There is interest in using the Wageningen fungi in other countries too, and even on completely different waste products. In Thailand there have been experiments with the waste from sugar cane. And two Iranian researchers brought their own research material with them to Wageningen: leaves and other waste from the date palm. 'Our fungi were up to that too,' says Hendriks. 'The Iranians took the fungi with them to do further research, and they are now working on two publications.'

Hendriks sees plenty of scope for improving the breakdown of lignin. Adding extra substances that the fungus needs to make enzymes speeds up the process by 30 percent. He also hopes to introduce genetic improvements in collaboration with fungus researchers at Wageningen Plant Research. 'Next autumn Nazri Nayan will graduate with a PhD for a thesis on the enormous variation in the capacity to break down lignin in one of our species of fungus. That suggests that there are is a lot of potential for breeding the fungi and making the process faster and even more efficient.' ■

www.wur.eu/yummystraw

FUNDS FOR GROUND-BREAKING RESEARCH

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The University Fund facilitates socially relevant, multidisciplinary research projects which are out of the ordinary and therefore do not so easily get funding through other channels. It is precisely these projects that have the potential for ground-breaking results.

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