

Rye whole crop silage for biogas plants – key properties

Thanks to its specific properties, rye is used as a sample crop to demonstrate the versatile use of whole crop silage.

The main regions of rye production are located in the east of Germany and in Lower Saxony. This crop is known for its early start of growth, which of course depends on the local conditions and a high biomass yields per hectare. In addition, it requires only minimal fertiliser input and plant protection treatment. Rye whole crop silage is an ideal biomass crop as its dry substance yield per hectare and its fat content are relatively high.

Best harvesting time

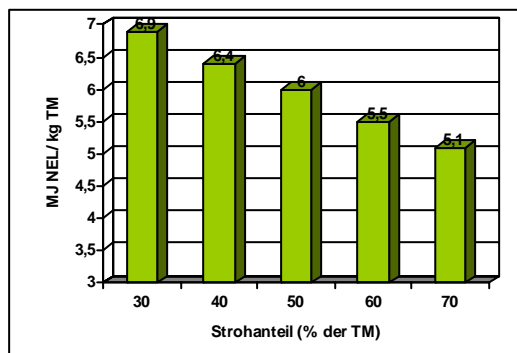
State of plant:	late milk ripeness to early dough ripeness
Dry substance content:	32-38% (max. 40%)
Grain-straw ratio:	1:1
Theoretical shredder chip length:	6 to max.10 mm

As the crop must be harvested at relatively high temperatures, the optimum time window is very small. As a rule of thumb, it is generally recommended starting the harvest rather early than late.

Grain-straw ratio

In order to estimate the dry substance yield of whole crop silage rye in a specific region, we recommend multiplying the usual local grain yield with factor 1.8. The grain-straw ratio should be 1:1, which can be achieved by adjusting the cutting height accordingly.

Fig. 1: Feeding value of rye whole crop silage with different straw content



Mechanical preparation of the crop material

The crop should be harvested with precision shredders equipped with friction bases or friction bars. In order to achieve optimum mechanical shredding of the whole crop material, modern shredders are equipped with corn crackers whose rollers can be operated at different speeds (up to 60%). Crop surfaces with exposed fibres provide a favourable substrate to lactic acid bacteria enabling them to propagate rapidly. This is particularly beneficial in connection with the addition of ensiling agents as their effectiveness is enhanced.

Chip length and compaction

As the crop stalks are essentially hollow, a lot of air and thus oxygen is brought into the silage. For this reason, it is highly recommended to adhere to a theoretical particle length of 6 to maximum 10 mm! This is necessary to achieve a bulk density of more than 230 kg of dry substances per m³ after intensive compacting.

Risk of fouling

During the short harvest window, cereal whole crop material is prone to fouling. For whole crop silage, this risk is mainly due to the relatively low nitrate content and the high content of oxygen in the organic material. These conditions can result in the growth of a number of microorganisms that have a negative effect on the silage. They can cause high energy loss during storage and might also lead to the accumulation of toxic by-products in the material.

Use of ensiling agents

At the time of harvest of whole crop silage, outdoor temperatures tend to be rather high, which reduces the natural growth of lactic acid bacteria in the plants. It is therefore of great benefit to add a suitable ensiling agent at the correct concentration.

	Forage cereal	Cereal whole crop silage
Dry substance content (%)	21–30%	32–38%
Conditions susceptible to fouling	anaerobic	aerobic
Animal feed	BONSILAGE FORTE	BONSILAGE MAIS
Biogas production	SILASIL ENERGY.G	SILASIL ENERGY