



HARNESSING THE POTENTIAL OF MAIZE VARIETIES FOR MILK PRODUCTION

The production of locally grown and high-quality forage for a healthy animal feed from sustainable sources is becoming increasingly important for many farmers and consumers. As milk producers must strike a balance between achieving these goals and maintaining their productivity, the following article explores how this can be achieved by selecting the proper maize variety.

One maize variety is not like another, as every farmer may have learned during decades of growing maize for different purposes. The large choice of varieties that are available to farmers and the potential offered by taking the right choice is therefore a frequently discussed topic. Choosing the proper variety can be an important move towards better profitability especially for dairy farmers, because high milk yields from the basic ration translate into reduced costs for concentrate feed. This means that a modern and adapted variety suggests not only high crop yields per hectare but also specific concentrations of nutrients and digestibility aspects that

meet the requirements of ruminants. This has been achieved by innovative breeds.

Criteria for selecting maize varieties for dairy cows the following parameters should be considered when selecting maize varieties that are fed to dairy cows:

- The energy content in the silage is important (expressed in MJ NEL/ kg DM), because it can help increase the cow's feed intake. A high-energy feed is easier to digest and spends less time in the rumen; consequently it may lead to a higher feed intake. The math is simple: the higher the energy content in the maize silage,

the higher the feed intake and milk yields. The intake is also down to other factors including body weight, age and lactation stage as well as dry matter content, energy and crude fibre content of the forage.

- For maize silage to obtain a high energy content, the starch level in the variety must be high. The starch is stored in the cob. With some of the starch being broken down in the rumen, starch is easier to digest than the other parts of the plant.
- Yet, it should be noted that if starch is broken down too quickly, the pH value in the rumen may drop to a critical level of less than 5.5 which involves the risk of rumen acidosis in dairy cows. This risk can be

reduced by the crude fibres in the silage, because these lead to intensive rumination and salivation, thereby buffering low pH values that result from starch being broken down to shorter glucose chains. Roughages that are rich in crude fibre, such as the fibre-rich parts of the maize plant as well as grass or straw, encourage thorough rumination. The various maize varieties differ in crude fibre contents. Crude fibres are elements such as cellulose and hemicellulose that form the cell walls. As such, they differ in digestibility.

- Therefore, high digestibility of the stover is another major criterion for selecting a proper maize variety for feeding dairy cows. This is expressed by the so-called ELOS value (enzyme-soluble organic substance). ELOS is an indicator of the overall digestibility and thus also of the energy content of a maize variety. A relatively high ELOS value at a low starch level offers excellent digestibility. Vice versa, digestibility is poorer when the starch levels are low whilst the ELOS value is more or less the same

The maize variety must complement the ration.

A healthy cow diet that promotes high milk yields must strike the balance between a high energy content and sufficient structure in the feed ration.

- In a grass-based ration, the maize variety should be rich in starch to add value to the ration, because the necessary structure is provided by the grass whereas the maize supplies the energy in the form of starch.



Milk Index – The quality mark for a high feeding quality



For many years, the breeders of Deutsche Saatveredelung AG (DSV) have been selecting new forage plants not only by applying the criteria high yield levels and good tolerance to diseases and abiotic stress factors but also with a special focus on forage quality. The aim has been to select forage plants that offer an excellent digestibility for high milk yields. DSV is a leading breeder of high-quality forage plants. Our varieties with the best properties are awarded the Milk Index seal of quality. These crops include grass, maize, and other forage crops such as sorghum and legumes, provided these are particularly suitable for increasing yields and/or the milk quality. Milk Index varieties stand for excellent digestibility and high nutrient levels. As such they lead to higher feed intakes which in turn improve the consistent supply of energy to the animal for a better milk performance and animal health.

Forage grasses:

At the maturity stage that is best for harvesting, Milk Index varieties contain less lignin which is the indigestible component of the cell wall. This sets the new varieties apart from traditional varieties. The cell wall which consists of cellulose and hemicellulose (dNDF) is digested faster so that the nutrients are more readily available to

the ruminant and more energy is produced from the basic feed.

Maize and sorghum:

DSV also offers high-quality varieties of these crops that make excellent animal feeds. Containing easily digestible starch, the maize stover also offers a particularly good breeding potential for an even better digestibility. High starch levels in maize allow high energy contents to be achieved in the maize silage for higher milk yields. An easily digestible stover that is rich in structure becomes especially important in maize-based rations, because the fibre-rich

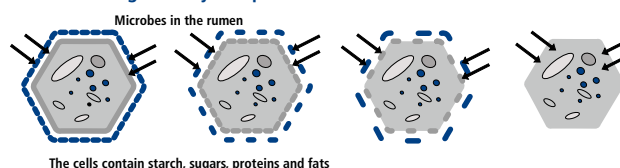
components of the maize plant encourage rumination which leads to improved animal health.

Legumes:

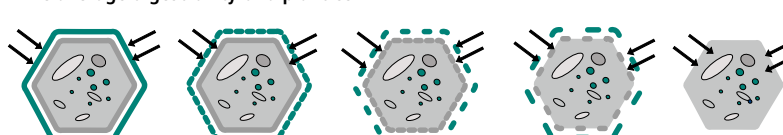
Clover and lucerne grasses are domestically grown sources of protein that cover the protein requirements of ruminants particularly well. The Milk Index varieties are characterised by particularly high crude protein contents and can help increase the supply of protein in the feed.

Milk Index varieties help achieve production goals

Milk Index digestibility of a plant cell



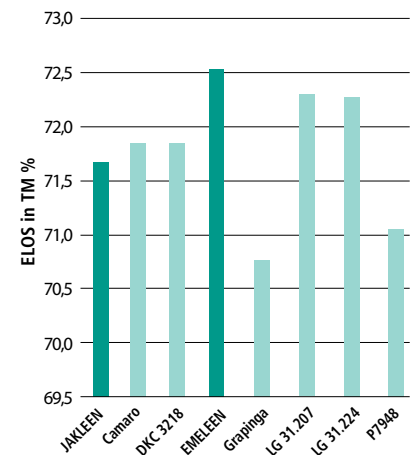
The average digestibility of a plant cell





An EMELEEN cob in autumn 2020. The variety forms red kernels, depending on site conditions.

FIG. 1: EMELEEN HAS A HIGH ELOS VALUE



Varieties tested at early maturity in the 2020 EU silage variety survey which was carried out on 16 sites across Germany
ELOS in TM % = ELOS levels at dry matter percentages

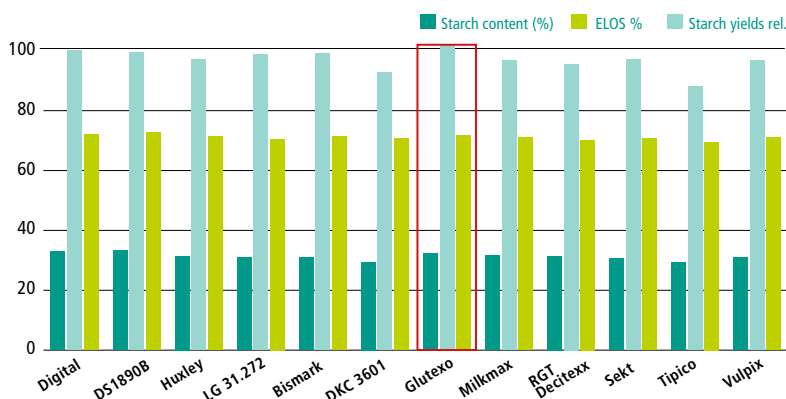
- In a maize-based ration, it makes sense to feed varieties with lower starch levels, because their high energy content is supplied by easily digestible cell walls. Here, the lower starch level is important for avoiding rumen acidosis and for having enough structure in the ration which in turn is provided by the stover.

Great progress has been made in maize breeding with regard to meeting milk production requirements. New varieties offer good agronomic properties such as an excellent health and good tolerance to stress and drought; at the same time, they have been developed to best meet the requirements of ruminants. At Deutsche

Saatveredelung AG (DSV), these varieties are marked by the Milk Index symbol. One of these varieties is GLUTEXO (approx. S 250). This combines all quality parameters that are essential for ruminants and such agronomic qualities like an excellent health status and good tolerance to stress and drought. In the 2020 European variety survey that was conducted on 18 sites, GLUTEXO was found to produce high starch yields of rel. 102.2 and a high 32.3% starch level in the medium-early maturity stage. These results make the variety particularly suitable for feeding in grass-based rations.

The individual parameters serve to mark-up maize varieties in terms of their suitability for feeding animals. The variety recommended for feeding if harvested in its early maturity stage is EMELEEN (S 210), because its stover offers good digestibility and high starch contents. EMELEEN has an ELOS value of 72.5% and a starch content of 31.6% (EUP Silo early, 2020, see Fig. 1). This translates into an excellent stover digestibility, which is in fact a requirement in a maize-based ration. Due to its very fast early growth, the variety is also recommended for organic farming schemes. The new Milk Index portfolio is complemented by KIMMICH (S 240) – the maize variety for milk and biogas production, which is currently being grown in countrywide trials for the first time.

FIGURE 2: GLUTEXO SHOWS THE BEST FEEDING PARAMETERS FOR GRASS-BASED RATIIONS



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