URGENT NEWS

No 178: Early Season Maize Silage Averages

Impact on rationing and cow performance

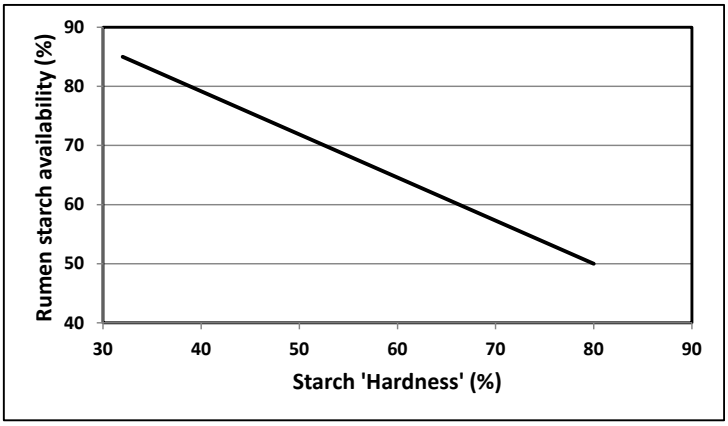
Expectations were low for the maize silage crop this year. Growing conditions were very variable and often poor with low sunlight, which is required to lay down carbohydrates to starch, and little late summer sunshine. The crop yield is reportedly very variable on many farms and generally well below normal. Maize silage stocks must be carefully evaluated, including consideration of the dry matter content, and will require careful management through the winter to target feeding for best effect.

The FWTNI laboratory has now analysed nearly 700 maize silages. The headline results are surprisingly good, albeit with a very wide range in the samples submitted, but it is important to look a little deeper into the analyses to maximise performance from maize silage this winter.

Average dry matter is lower at 29.5% this year compared to 33.1% in 2011-12. In contrast, the average ME is only 0.2MJ/kg DM below that of 2011-12 (11.2 vs 11.4 MJ/kg DM). This is associated with an average starch content of 27.6% which is only 0.9% below last year; with smaller and more double cobs than usual, these levels were expected to be far lower. There is only a small increase in the average NDF and lignin (ADL) this year compared to 2011-12 which will have a small negative impact on ME compared to last year. On the face of it, these averages may be unexpected, but with a lower crop yield and the cob to plant ratio perhaps being the same or even higher than usual, the nutrient density (ME) of the crop has remained proportionately almost the same.

Impact of crop maturity on rumen energy supply

The maturity of the crop, and particularly this year when many crops were harvested late, could impact on feeding value, not least upon rumen fermentation associated with nutrient degradability. Maize starch is a complex structure. As the crop matures, the starch located in the endosperm of the seed changes from floury (soft) to hard (vitreous) and becomes more tightly bound in a starch:protein matrix. The published studies of Philippeau et al (1997) and Correa et al (2002) clearly showed a significant reduction (r^2 - 0.86 and -0.92 respectively) in ruminal starch availability with increasing starch “hardness”.



In practice this means a potential reduction in the rumen energy supply when feeding a more mature maize silage crop, as will be the case this winter. At this stage, however, we are unable to specifically analyse starch degradability of mazie silage, but interpretation of the DM degradability figures (S abc) measured using in vitro gas production does give an indication of starch degradability and hence rationing needs to optimise rumen health and performance.

Using the Orskov equation*, the average rumen dry matter degradability of maize silage can be calculated as 0.54 (54%) in 2011-12, but only 0.48 (48%) in 2012-13.

*Degradability = a + ((b x c)/(c + r)) where r = 0.08

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This means that this year's maize silage crops average nearly 12% lower rumen dry matter degradability, and hence rumen energy, than last year. Given that there is only a small increase in NDF and lignin this year it may suggested that the reduction in degradability is largely from starch and not fibre. However an increased lignin level will inevitably mean a slightly lower rumen degradability of fibre in particular.

Winter rationing

This being the case, there is an important message when formulating winter diets. That is, it is critical to ensure an adequate and balanced supply of rumen energy to fuel essential rumen digestion.

The microbial yield from energy, as calculated by MPE – MPB, was 57.9g/kg DM in 2011-12 but is only 52.8 g/kg DM this year ie 9% reduction on average. It is particularly important to ensure adequate rumen energy this winter as the supply from grass silage is also generally low whilst the surfeit of low bushel weight cereal will further compromise starch and rumen energy supply.

Of course, the addition of rumen energy, whether it be from sugars or starch can put rumen health at risk, so particular care must be taken in all aspects of ration balance.

In summary

It will come as a relief to find that the analysis of the average maize silage this winter is similar to last year. However, attention must be paid to balancing the supply of nutrients for the rumen microbes to work to maximum efficiency. Whenever possible, use the forage degradability fractions when rationing and pay particular to the balance of MPN and MPE. Monitor excess MPN and be ready to supply additional rumen available energy such as starch and sugars to feed the rumen bugs and utilise excess protein. In doing so, pay very careful attention to rumen health, ensuring adequate effective fibre intake whilst controlling acid load.

Finally, monitor forage stocks to ensure winter supplies are adequate.

		2011 - 2012	2012 - 2013	Min	Max
Dry Matter	%	33.1	29.5	13.4	51.8
Crude Protein	%	8.3	8.5	5	13.7
D-Value	%	71.7	70.8	61.9	77
ME	Mj/kg	11.4	11.2	9.5	12.3
Starch	%	28.5	27.6	6.1	45.7
NDF	%	49.4	50.7	38.1	71.6
ADF	%	22.2	23.4	17.2	34.8
ADL	%	1.7	2.19	0.05	7.12
RSV		284	283	236	376
PAL	mEq/kg	927	1008	494.4	1381.5
FIP	g/kg $^{0.75}$	106.6	101.5	75	131.9
pH		3.9	3.9	3.5	5.9
Ash	%	3.6	3.3	1.7	7.6
MPB	g/kg	21.5	24.3	13.3	45.1
MPN	g/kg	54.9	56.7	31.3	96.1
MPE	g/kg	79.4	77.1	58.4	97.6
Lactic Acid	g/kg	50.2	43.8	0.2	92.7

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