Maize

Maize has become an important part of home-grown feed for ruminants.

Forage maize is an extremely valuable feed but considerable interest has also been shown in harvesting with a forager/combine and either ensiling it as ‘grain ear maize’ or ‘crimped maize’.

Forage Maize

With the advent of new maize genetics and new technology such as maize ‘under plastic’ it is now possible to grow maize in a wide range of farm conditions.

From a single late season cut, providing it is grown and managed correctly, forage maize produces a high yield of relatively high dry matter silage with a good energy but relatively low protein (approximately 8%CP).

Correct stage of harvest

Many years ago we used to harvest maize at 28-30% Dry Matter. Now we are aiming for 34% DM for optimum feed. In a good year a rough rule of thumb is that whatever the DM will be, the starch percentage will be the same....so ideally 34% DM will have 34% starch. Care must be taken not to go too dry as intakes can be reduced and digestion of the grain is harder.

Near to harvesting you should check the crop starting with looking at the cob. Remember that there will be variable stages of ripeness within the crop so several cobs from different parts of the field need to be looked at. Walk into the field as cobs on the perimeter can be riper.

First look at the colour of the cob when you have peeled back the sheaf. The cob should be a deep yellow colour. Now break open the cob and remove a grain. The most effective tool is your taste. Put the grain in your mouth and chew. If there is an almond sweetness especially in the part of the grain nearest the pith, you are too early as the sweetness is plant sugars that need to set into starch. Harvesting at this stage will reduce the energy of the crops as these sugars are lost in the fermentation. Starch is stable, sugars are not! The grain should taste grainy but not sweet. There are other methods such as ascertaining the

‘milk line’ which should be 2/3 down the grain but this can be hard to see. Remember there is a variation of ripeness within the grains in the cob.

Early (26%DM)

Near correct harvest stage (32-34%DM)

***Near correct harvest stage* (32-34%DM)**

Getting the correct harvest time is not just about the cob. You will also need to assess the plant material. Sometimes the cob can be ready and the plant material is still green and sappy. If harvested too green maize can become acidic and cause digestive upsets such as acidosis. The plant material should move beyond the upright leave stage and show a degree of sag in the leaves. It’s a good idea to cut stems at above the first node and bend the plant between the second and third node and twist the stem. Count the number of drips that come out is a good indicator for forage dry matter. Ideally the stem should not express more than 3-5 drips. Beware of maize under plastic. Although potentially it ripens earlier in the cob, the stem material can be much thicker and therefore holds more moisture.

Maize under plastic

Thicker stem of Maize under plastic

Another way to access the dry matter of the crop is use a Koster Tester, air-fryer or **The Microwave Test**. Cut a representative plant and cut up whole plant to same chop length as a forager would achieve. Place in bucket and take a representative sample and weigh. Spread forage on a plate and place in a microwave with a small glass of water in back corner to avoid burning. Microwave on 'high' for about 15 minutes. Weigh and mix forage up and repeat for 5 minutes. Now weigh and this procedure should now be repeated until no more weight loss occurs...perhaps every 2 minutes. When forage is dry and weight doesn't change, calculate dry matter by ***Final weight(g)/Initial weight(g) x 100 = DM%***

When you have gained your dry matter reading this allows you to estimate harvest date. On an average (and there are no such things as averages!) maize will lose approximately 2% DM a week. Watch out for frost as it could lose 2% DM in a day!

Eyespot

Over the last decade there have been increasing incidences of eyespot in maize especially in the south of the UK and during wetter years .It starts by leaf dieback in the top of the plant and can spread through the crop. A mild infestation near to harvest can reduce the DM of maize and is not overly detrimental to the crop. A bad infestation kills all the plant material and without chlorophyll there will never be a successful grain maturing. This would lead you into a remedial harvest as a damage limitation. Do not wait for the cops to ripen as they will only rot! I don't intend to cover agronomy (talk to your agronomist!) but please think about spraying against eyespot. I would argue the spray is worth a lot to you in reducing the mycotoxin loading alone. Another subject!

Early onset of eyespot

Early signs of eyespot on maize leaf

A bad infestation of eyespot

Harvesting and Clamping

Good face management ***-Capped with grass silage***

Contractors favour shorter chopped maize as you fit more in a trailer and you get better clamp compaction. A typical chop length of 10-12 mm is normally achieved. There is a case for longer chopped maize circa 17-20mm where maize is fed at over 50% diet but maize doesn't feed fibrously so another source of long fibre should be included in your diet. Maize is particularly prone to aerobic instability being a higher dry matter, high energy crop. The use of an additive is recommended and **BioStabil MZ** contains the correct bacteria for reducing dry matter losses, maintaining energy and giving face and trough stability at feed out.

Your clamp should be clean and side sheeted. Maize should be deposited at different positions across the clamp face to give the buck rake ample opportunity to compact the forage evenly and in thin layers across the whole clamp (Dorset Wedge).Fill the clamp in a saucer shape compacting the sides .The use of a silage compactor is a useful tool and chop length can be reduced in the final layers to aid consolidation. Ideally clamps should be sheeted with a cling film to reduce air penetration through the top sheet, which can cause spoilage in the top layers. Weight the clamp. Keep an eye on any holes that appear in the top sheet and repair. Birds are the usual culprits so netting can be placed as a deterrent. Make sure this netting is distanced from the top sheet as birds can bounce! Clamps should be left sealed for at least 4 weeks. This allows the clamp to 'settle' and grains to soften allowing for better feed out.

Caution! Keep an eye out for a yellow brown gas on opening, especially in an indoor clamp. This gas is heavier than air and can be present for a short while after opening and smells like bleach. It can turn silage bright yellow-orange and is highly toxic. It is formed by nitric oxide (NO) formation in the fermentation which reacts with oxygen forming nitrogen dioxide which with the addition of moisture becomes **nitric acid (highly toxic!).**

Maize turning orange

Bad face management

Once open the face needs to be kept clean. Badly cut maize can bring heating into your clamp with resultant losses in feed value. If your clamp face is attacked by birds (starlings?) pull netting over the face letting air onto the maize.

Do not pull top sheet down as this will create a greenhouse effect and create heating and losses.

Grain Ear Maize

This is also known as Ground Ear Maize (GEM). Corn Cob Mix (CCM), Earlage and in USA as Snaplage.

Harvesting GEM ***Long stubble***

This is a concentrate forage produced by ensiling maize cobs (leaves, husks and grains) plucked/snapped from the plant by a grain maize header (cob picker header) mounted on the front of a forage harvester. The forager, fitted with a corn cracker, chops the cob, processes the grain and applies an additive to minimise aerobic spoilage in the clamp. The maize plant Stover's (stems) are chopped and spread over the soil.

Yields are typically 6-7 tonnes/acre. The rest of the maize plant is expelled out of the back of the forager and a long stubble left. GEM consists of 70% grain, 15% cob and 15% husk and shank.

Time of harvest

The harvesting is done approximately 2-3 weeks after conventional maize. The grain is at the hard cheddar cheese stage and possibly showing pitting. Strip the husk off the cob and grab with both hands and turn in opposite directions. The grains will rattle with this movement.

Cob maturity at harvest

Clamping

An additive should be used to stop spoilage in this nutrient rich forage. **BioStabil HiDry** should be applied at a stronger rate to ensure stability.

Along the principle of a crimp clamp you should make a small face and long clamp to allow removal of GEM across the face regularly. Clamps should be side sheeted with enough top sheet to reach the opposite shoulder making a double airproof wrap. The use of a cling film under sheet would also be beneficial. Consider weighting the clamp for extra consolidation. Particular attention needs to be taken weighing the shoulders of the clamp. If weighting indoors with straw put a small dusting of Hydraulic lime on top of the final layers of sheet and sit the bales on this. This is the cheapest and most effective mouse proofer. A mouse has no eyelashes and will burn his eyes if he attempts to nibble the top sheet!

Weighted clamp of GEM

A fibrous high starch sample

Ground ear maize makes a superb concentrate feed which is high in energy and fibre. Typical analysis would be 55-65% DM, Starch 45-50%, ME 13, Crude Protein 9%.

Crimped Maize

Combining maize

Grain maturity for combining

The maize grain is combined at 30% moisture and crimped through a crimping machine which adds an additive for stability. The crimped maize is then clamped, ag bagged or baled.

Crimping maize is a good way to maximise grain yield and has a better dry matter yield than conventional harvest. You avoid drying costs (£20/T?) and produce a moist and more digestible feed with slower rumen breakdown and higher by-pass starch. This 'concentrate' feed improves milk quality and yield as well as increasing daily live weight gain in beef & sheep.

Stage of harvest

Maize is combined approximately 5- 6 weeks after the foraging stage. It's a late harvest so will only suit areas where early maturing can be achieved. It is important to get the grain to the right stage as the peak nutrition in the grain is only achieved at 30% moisture and below. Combine at 40% moisture and you might just as well have crimped wheat with a starch of 60-65%, ME 13 MJ/kg as opposed to 72% starch and ME 14 MJ/kg.

30% moisture grain

40% moisture Grain

The grain at this stage will be at the hard cheese stage and will just give with a hard squeeze between finger and thumb.

Crimping

Crimp within 48 hrs of combining. The maize grain is flattened and seed coat broken. Add water through the crimping machine to ensile dry samples in the clamp at 65% DM. Use and effective additive such as **BioStabil HiDry** at the correct application rate. A good contractor will be constantly monitoring the output of the machine and adjusting additive application.

Crimped Maize sample

Crimping machine

Ensiling

Crimped maize can be clamped, bagged or baled. With clamping you will need approximately 1 cubic metre for every tonne ensiled. Try and design a clamp to present a small face and length so that the crimp can be extracted a little and often. The grain should be rolled into the clamp in layers (Dorset Wedge). Make sure you make the clamp airtight by side sheets touching the opposite wall (double wrap). The use of cling film as an under sheet is recommended and if possible weight the clamp –especially the shoulders where spoilage is most likely to occur.

Ag bag

Weighted clamp-long and narrow face

SILAGESENSE
Forage Fermentation