Kernel processed Maize, now Shredlage®

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Shredlage® has been on the increase in the world of maize silage in Australia since about 2013. Greenfeed maize, maize earlage, maize stover, and processed maize kernels are various forms of treatment for maize produced for many years now. Researchers, agronomists, ruminant nutritionist and farmers have sussed out many of the pros and cons of these variations of maize when feeding animals. Gone are the days when maize is known to put condition on cows and not produce as much milk as expected.

However, the recent innovation of Shredlage® appears to have more pros than cons at this stage. Shredlage® is a trademarked, patented technology from Shredlage® L.L.C and now distributed by CLAAS globally since 2016. Other companies, such as John Deere, are also developing processors to better process the maize kernel and longer chop for maize silage.

However, what is Shredlage®? How is it made? Do I need specialised equipment? How do dairy cattle perform with Shredlage® in the ration? Is it economical?

What is maize Shredlage®?

Shredlage® is a recent advance on maize-silage processing but first things first. For the odd person who may not know, maize processing was introduced to ensure more of the kernels were cracked than occurred with traditional maize forage harvesters. Cracking the maize kernels is achieved with a kernel processor (Figure 1) using a maize cracker (called corn cracker in the USA) system employing a standardised cracker housing unit and a set of rapidly replaced specific maize cracker processing rollers.

This maize processor aims to crack the maize kernels into several small sections/pieces during the normal forage harvesting of the entire maize plant. This is achieved by cross-grooved rollers set at a 2 to 3 mm roller gap and has a speed differential between the rollers of about 21 per cent. The theoretical length of cut (TLOC) is about 19 mm, in practice a bit longer.

This kernel processed maize silage (Figure 2) increases the speed and effectiveness of maize digestion by cattle by allowing the rumen microbes to gain access to the starch in the kernel. However, this often resulted in a maize silage product with even less effective fibre length than unprocessed maize silage and often required an extra fibre source to be included. Kernel cracking was not very effective with the original self-propelled forage harvesters without the kernel cracker.

However, Shredlage®(Figure 3) is the next step in maize processing with a new system, the Multi Crop Cracker (MCC) Shredlage®. The Loren Cut™ rollers (Figure 1) have either 110 or 145 teeth and 50 per cent speed conditions cob fragments completely and crack the kernels to split them into half, or smaller when set correctly. The Shredlage® processing unit also shreds the stalk fragments longitudinally with rind material peeled off. The recommended roller gap is 1.75 to 2.25 mm (1.5 to 1.75 mm if material is drier). Recommended TLOC of this system is 26 to 28 mm but reduced to 21 to 23 mm if material is drier.

Compared to normally processed maize, Shredlage® has a number of extra benefits including:

- The intensive processing substantially increases the exposed surface area of the chopped material, resulting in significantly improved fermentation during ensiling.
- For the same reason digestion in the cow's rumen is significantly enhanced.
- More physical effective fibre (peNDF) which is needed to slow the rate of movement of the feed through the rumen and provides more rumen scratch.
- Allows farmers to replace other sources of fibre (hay, whole cottonseed, straw) in the diet, potentially reducing costs.
- A more consistent fibre source compared to alternatives such as cereal fodder, lucerne, etc. which can vary widely in dry matter content, nutritive value and possibly length between cuts or purchased lots.
- Makes diet balancing simpler.

These advantages have been proven on many farms in the USA and increasingly, on Australian dairy farms. Some US nutritionists measure faecal starch levels aiming for less than one to two per cent, often surpassed by traditionally processed maize. These nutritionists view higher levels as wasted energy.

How well does Shredlage® compact in stacks?

An initial worry by Silage Specialists who see stack density as being important to reduce air inclusion, was that the longer fibre may reduce the density in maize silage stacks. Packing density in the bunker/stack has been no different and occasionally, even more densely compacted. However, USA and Australian experience has been that differences in silage nutritive value are due to improved compacting techniques, not in how the forage was processed. It should be noted that as the material becomes drier at harvest, Shredlage® may be more difficult to compact due to its longer length, hence the recommended shorter TLOC. Correctly made Shredlage®actually compacts very well due to the shredding of the stem components if harvested at the correct LOC for the DM and compaction equipment ensures dense compaction

Does harvesting as Shredlage® affect harvesting in any way?

Harvesting maize as Shredlage® is slightly slower than then kernel processing maize, requiring more slightly more power and fuel. Most important is to manage the silage outcomes to meet maize silage targets, simply having a Shredlage® processor does not mean you are making Shredlage® if crop harvest conditions and harvester settings are not correct or fine-tuned to produce Shredlage®. Simply changing paddocks or different DM content at harvest will affect the effectiveness of Shredlage® changes occur much quicker when working at these longer lengths of cut 22mm to 30mm compared to the more traditional shorter cuts 12mm to 21mm.

How do dairy cattle perform with Shredlage® in the ration?

Although research is short on the ground, one USA experiment showed

- Increased intakes for Shredlage® of 0.7 kg/day,
- Milk production up by about 1.3 kg/day (3.5 per centfat corrected milk) after several weeks
- Feed conversion efficiency (FCE) averaged 1.78 for both groups
- Neutral Detergent Fibre (NDF) digestibility was four per cent higher for Shredlage®

- Starch digestibility was 1.9 per cent for Shredlage®

Other recent research has recorded increased milk production of about 1.0 to 1.13 kg/day for Shredlage® over kernel processed maize silage.

Is Shredlage® economical?

Early days yet in Australia to put a definite cost on producing Shredlage® as contractors are still trying to assess the extra fuel and time for different situations but the USA experience so far is only a slight increase in cost. However, successful USA producers think that the extra cost is more than offset by ration adjustments and the improved processing of the fibre fractions for improved digestion, rumen health and animal production /or gains in production.

Having said all this, putting my extension farmer-biased hat on, many farms have much room for improvement in the basics of making maze silage. Such improvements are harvesting at the right DM content, setting and maintaining existing kernel processors as required to satisfactorily process the kernel, better compaction, better sealing of stacks, using appropriate silage additives for better ensiling and to delay heating at feed out, and better feed out management, etc.

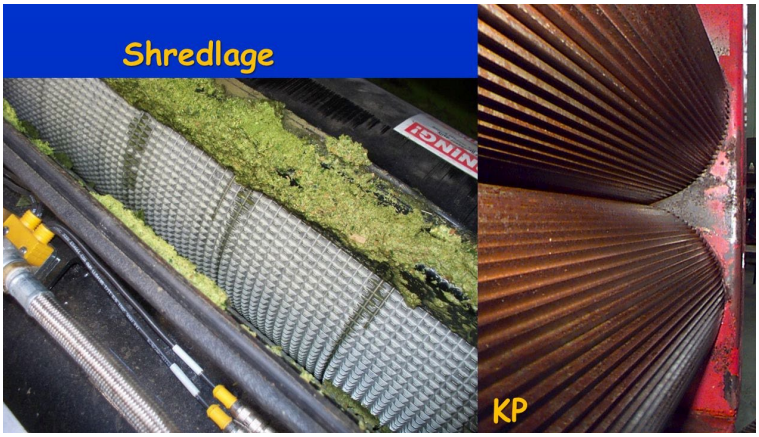

Figure 1. Roller design for Shredlage®(LHS) and Kernel Processing (RHS)
Source: Kevin J Shinners University of Wisconsin

Figure 2. Conventional kernel processed (KP) maize

Figure 3. Maize Shredlage®

Source: Kevin J Shinners University of Wisconsin