PASTURE'S PERFECT PARTNER

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MAIZE SILAGE

High-quality pasture provides a nutritious, cost-effective source of feed. However, high producing cows need more than just pasture to produce milk reliably throughout the season. Maize silage is an ideal feed supplement when pasture covers dip. But that's not all it offers. This booklet explains how maize silage can boost milk production, optimise pasture quality, maintain animal health, improve environmental sustainability, and help maximise farm profitability.

PERFECT FOR BOOSTING PRODUCTIVITY

Fill feed deficits

Feed shortages, especially in early lactation, can increase condition score loss, resulting in an increased risk of metabolic diseases, such as ketosis. There is also a likelihood of lower production and slower cycling. Having maize silage on hand for the times of year when pasture growth or quality doesn't meet expectations or cow requirements makes great sense. Whether the weather is too hot, too cold, too wet or too dry, you can rely on maize silage to provide cost-effective, high-quality drymatter.

Extend lactation

Feed maize silage in the autumn to get more days in milk or use it to fill the feed deficit created by earlier calving. The latter can be particularly effective in summer-dry regions as more of the milk production can be achieved pre-Christmas.

Maintain milk quality

Maize silage is a locally grown forage that contains the perfect balance of fibre and carbohydrates to maintain rumen health. Unlike milk produced from PKE, which can negatively impact Fonterra's Fat Evaluation Index (FEI) and milk returns, milk produced from maize silage is consistently high in quality.

PERFECT FOR PASTURE MANAGEMENT

Reduce the spring pasture peak and its costs

The spring pasture surplus can be difficult to manage. Maintaining pasture quality is critical to ensure a successful mating period and a strong peak milk. Planting maize silage on-farm lifts the stocking rate on the remaining pastoral area making managing pasture growth rates easier. It can also reduce the need to make costly pasture silage to manage spring surpluses.

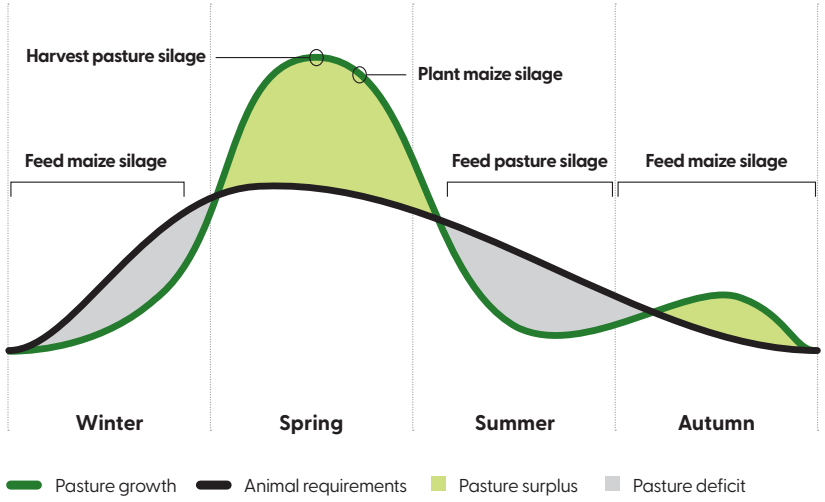


Figure 1: Using maize silage to move a feed wedge

Keep pasture in active growth phase

Maize silage can be used to extend the grazing round length taking the pressure off pasture. Because it is a forage, maize silage feeding levels can be altered to manipulate pasture cover, preventing under or overgrazing and keeping ryegrass in the most active (2½ to 3 leaf stage) phase of its growth curve. Pastures grazed prior to the 2 leaf stage may have lower productivity and persistence and may need regrassing earlier.

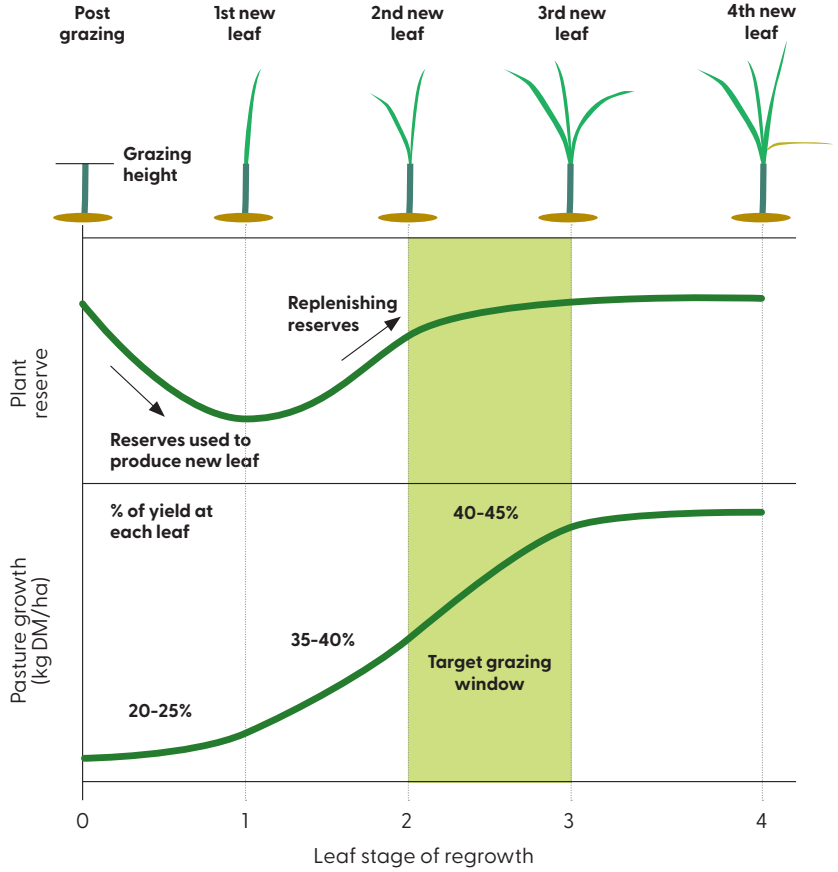


Figure 2: Impact of grazing height on pasture growth rate and plant reserves[1]

[1]Barenburg, 2024. Pasture Manual 2024, Regrow, energy reserves & yield per leaf.

PERFECT FOR HIGH PRODUCING DAIRY COWS

Cows love maize

Whether you are feeding maize silage in the paddock or on a feed pad or maize grain through an in-shed feeding system, cows enjoy eating maize. It's palatable and large amounts of maize silage can be consumed relatively quickly.

Improving cow condition

Meeting cow condition score targets of 5.5 for first and second calvers or 5.0 for mature cows is a fundamental driver of production and profit. Cows that are in better condition at calving produce more milk and cycle faster, meaning improved reproductive performance and a tighter calving spread. The energy in maize silage is used 20% more efficiently than the energy in autumn pasture for gaining cow condition[2].

		Jersey (400kg)	Holstein/Friesian (450kg)	Friesian (500kg)
Feed	Energy (MJME/kgDM)	kgDM/cow		
Pasture	11.5	165	185	205
Maize silage	**10.5**	**130**	**145**	**160**

Table 1: Quantity of feed required to put on one body condition score in autumn[2]

Maintain animal health

Lush, rapidly growing pasture contains excessive levels of potassium, which can increase the incidence of milk fever. The problem is usually greater in paddocks that have a history of effluent application. Growing maize utilises excess soil potassium whilst feeding maize silage (a low potassium feed) to dry cows as part of a springer diet can help reduce milk fever risk.

[2]DairyNZ, 2021. DairyNZ body condition scoring. The reference guide for New Zealand dairy farmers.

PERFECT FOR THE ENVIRONMENT

Mine soil nitrogen that pasture can't reach

Provided soil conditions are suitable maize can grow roots twice as deep as the plant is tall. This allows it to access groundwater and nitrogen that pasture roots may not reach, resulting in significant environmental benefits.

Recent research conducted by the Pioneer research team shows that maize can greatly reduce nitrogen leaching due to its ability to access nitrogen at depths of 1.2 m.[3]

Maize is a great solution for reducing nitrogen loss in dairy-shed effluent paddocks. It grows a lot of dry matter and requires a lot of nutrients, particularly nitrogen and potassium, which matches the nutrients supplied by typical dairy-shed effluent.

Greater water use efficiency

The maize plant produces more drymatter from every drop of water it receives. Its extensive rooting system allows it to capture water at depths up to three times greater than perennial ryegrass[4].

Figure 3:
Ryegrass vs maize water use efficiency[4]

Ryegrass
24 kgDM produced per mm of water

Maize
47 kgDM produced per mm of water

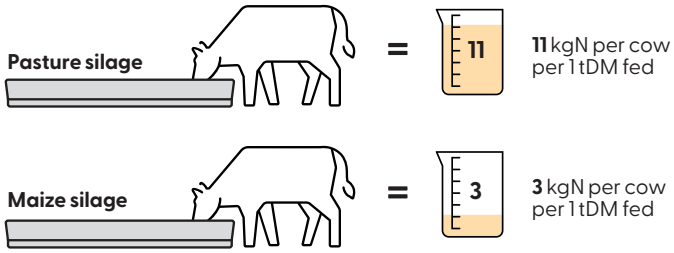
[3]Tsimba et al 2021. Quantification and mitigation of nitrogen leaching in a maize silage cropping system. Journal of New Zealand Grasslands 83:163-170.

[4]Williams et al. 2010. Using maize silage to reduce the impact of dairy farm systems on water use and quality in New Zealand: A review. Proceedings of the 4th Australasian Science Symposium.

Lower urinary N levels

For most of the year the protein content of pasture is higher than cow requirements. Surplus dietary protein is excreted in the urine and is a major source of nitrogen in waterways. Maize silage contains excellent levels of carbohydrate in the form of starch, but low levels of protein. It can be used to decrease the amount of nitrogen in cow urine by more than 70%.

Figure 4:
Urinary nitrogen output of cows eating high protein pasture silage vs maize silage[5]



Lower your Scope 3 emissions

Conscious consumers and the companies who purchase New Zealand's dairy products are also concerned about Scope 3 or "value chain" greenhouse gas emissions. This includes the embedded (e.g. from transport, cultivation, processing etc) emissions of supplementary feed. Maize silage has greenhouse gas emissions similar to pasture silage, while information published by Fonterra shows that palm kernel has an emission factor 5.8 times that of pasture[6].

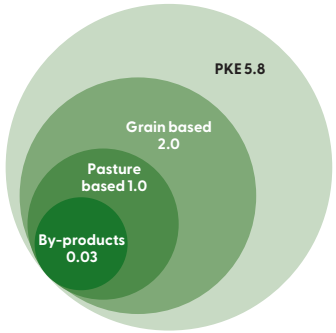


Figure 5: Relative greenhouse gas emissions associated with supplementary feed

[5]Ledgard, 2006. Nitrogen management – why is it important and what can we do about it? Pp22-31 In Proceedings of the 2006 Dairy3 Conference 4.

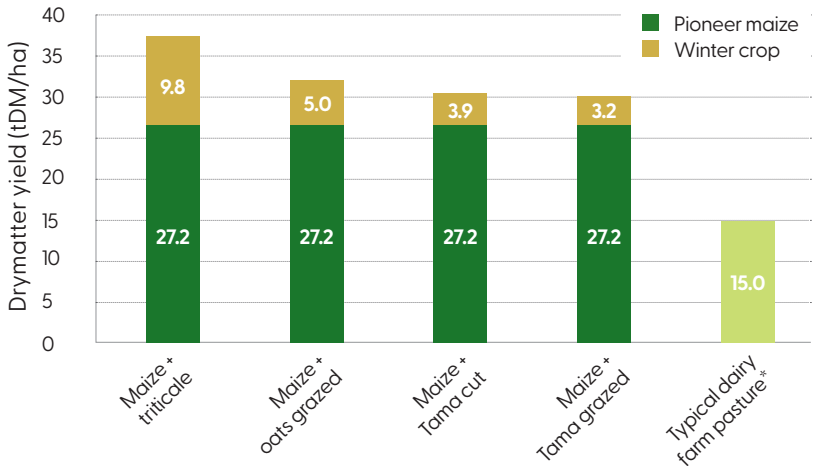
[6]Fonterra, 2023. Our approach to on-farm emissions.

PERFECT FOR FARM PROFITABILITY

Increase feed production per hectare

Maize silage yields are high and increasing as a result of improved management practices and genetic gain. Growing a maize silage crop is a great way to harvest more drymatter from your lowest-producing pasture paddocks. Alternatively, dedicate an area of your farm to forage production, and you will find that the combination of maize silage plus a winter annual crop can produce more than double the yield of a typical pasture paddock.

Figure 6: Annual drymatter yields from maize silage followed by a winter crop[7]



* Trial did not include a pasture treatment

[7]Densley et al, 2006. Maize silage and winter crop options to maximise drymatter and energy for NZ dairy Systems. Proceedings of the NZ Grassland Association 68:193-197.

Boost milk production

While controlling costs is an important part of a profitable dairy farm system, keeping production up is also important because it dilutes fixed costs (e.g. labour and debt servicing). Maize silage can be used to increase milk production throughout the season by extending lactation, filling feed deficits and improving cow condition.

Control feed costs

Whether you are growing a crop on the milking platform or run-off or buying it in, maize silage is a great way to control your supplementary feed costs.

Maize produces high drymatter yields, and this means plenty of feed at a cost-effective price. Most dairy farmers can grow maize silage on-farm without the need for additional fertiliser, making the cost even lower.

Most traded maize silage is sold as a standing crop and is contracted prior to planting in the spring. While the cost of buying in maize silage varies slightly between regions, it is typically in the range of 30 to 40 c/kgDM in the stack. This compares favourably with the cost per kgDM of many brought in concentrates.

Maize silage provides feed security

Increasingly challenging pasture growing seasons have seen Dave and Hollie England become even more reliant on maize silage as an energy source for their herd.

Dave and Hollie England are 50:50 sharemilkers at Ngaere, 7 km south of Stratford in central Taranaki. They milk 950 cows on 315 ha owned by the O'Neil Family Trust. The couple has been sharemilking on the property for the past 10 years. In the 2022-23 season their Friesian cross herd produced 485,000 kgMS (510 kgMS/cow and 1,540 kgMS/ha).

Wet winters and springs are the farm's key challenge, and the last couple of seasons have been tougher than usual. The couple has been feeding maize silage to their cows as it's an essential part of their management system.

Each season, Dave and Hollie grow around 25-30 ha of maize on the farm and buy about 500 tDM from a local contract grower. On-farm crops are fertilised mainly with effluent solids from the farm's 400-cow feedpad and weeping wall.

Growing maize this way allows them to reduce excess soil nutrients, especially nitrogen and potassium, and get a large amount of feed at a cost-effective price. Over the past five seasons, the farm's maize silage usage has increased from 600 to 1,000 kgDM per cow. Crops are stacked and fed immediately after harvest, and maize silage feeding continues until the supply runs out, usually sometime in January.

"We use maize silage to help extend lactation, put weight on cows, and build pasture cover levels in the autumn and early winter," says Dave. "It's an excellent energy source for the milking herd, and we plan to have enough on hand to get right through the mating period." About three weeks before calving, cows are drafted into a transition cow mob and fed a diet that contains high amounts of maize silage plus anionic salts to help reduce the incidence of milk fever. "Feeding a springer diet works really well for us," says Dave. "It's a lot simpler and less stressful than dealing with cows with milk fever." The weather over the last few seasons has been challenging for the farm, as it has been for so many others around the country. "I don't think the frequently challenging weather will change going forward, so we are making sure we have more maize silage in the stack," says Dave. "If we've got maize in the stack, we know we can feed our cows well regardless of what the weather brings."

Is maize the perfect partner for your pasture?

Find out by talking to one of our Farm Systems Specialists. Matt and Wade are working with dairy and other livestock farmers to maximise their productivity in profitable and sustainable ways. By applying their expertise and knowledge, Matt and Wade can help you work out if maize can support your pasture based system.

If you're interested in any of the points raised in the booklet, feel free to get in touch. Here are their details (left to right as pictured):

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