

Improving the quality of corn silage with high chop corn

The Queensland Government's C4Milk project team, in partnership with Dairy Australia and the University of Queensland recently completed the High Milk from Forage Developmental Trial with extremely promising results.

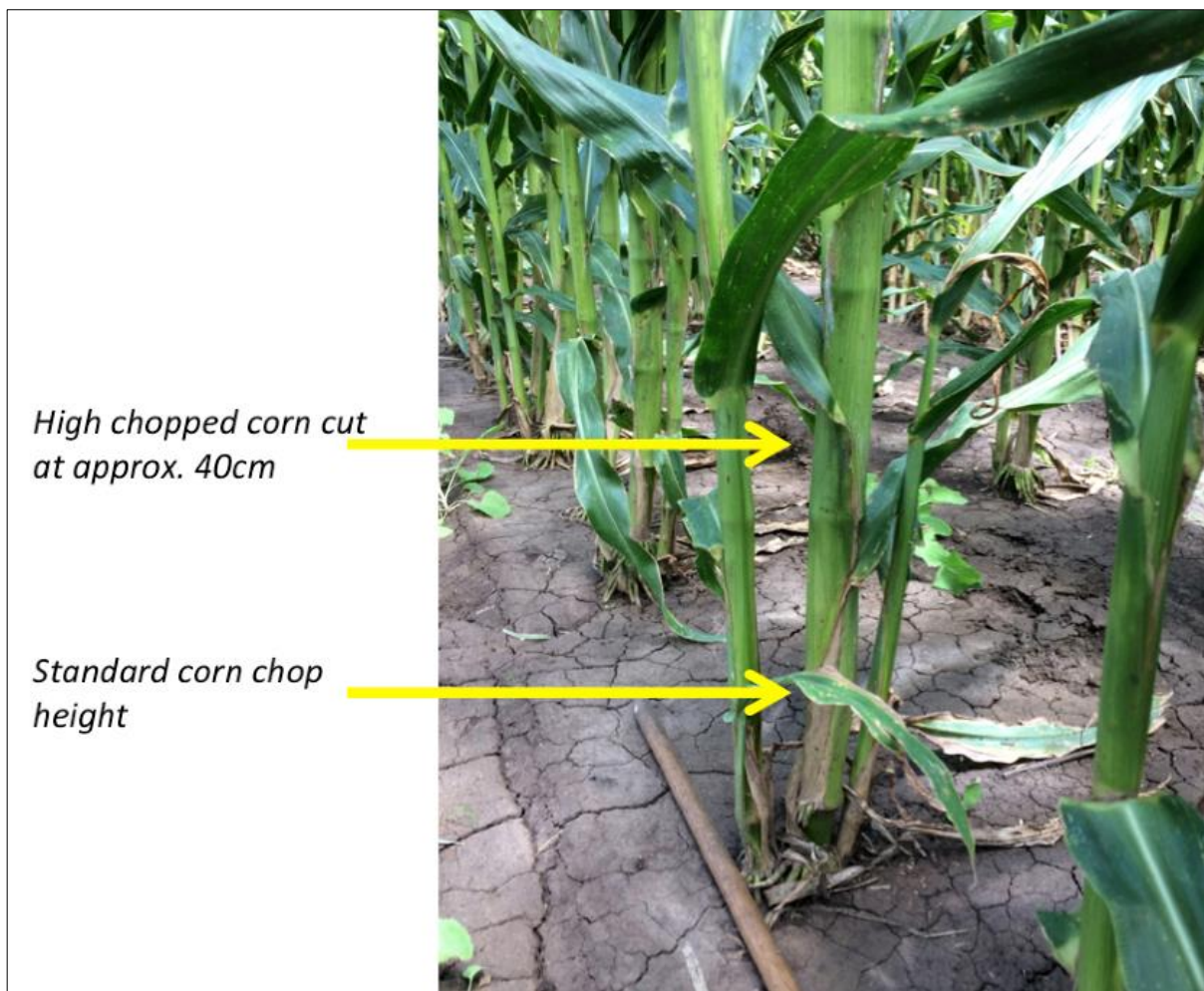
The trial showed that with a total mixed ration (TMR) or partial mixed ration (PMR) diet, if the silages and pastures are high quality, cows could consume 90% forage in a diet with little grain or protein meal with intakes recorded between 18 – 24 kg DM/cow/day.



Corn harvesting at the normal chop height.

High-chop corn was a significant proportion of the diets in phase 1 of the Developmental Trial, both within the TMR and PMR rations. The improved forage quality of high chop corn relative to normal corn silage, which was seen as a reduction in fibre and an increase in starch content, gave each diet the ability for grain to be removed completely without compromising production.

High chop corn requires the plant to be harvested slightly higher at 40 cm compared to the normal 10 cm above ground level, leaving behind more of the woody fibrous stem. Cutting the corn higher reduced the yield by 1.5tDM/ha, but the starch increased by 8% (or 3 percentage units) compared to the same crop harvested as normal corn silage. The Neutral Detergent Fibre (NDF%) was also lower, which means the cow can consume more feed, hence potentially produce more milk. See table 2 for more details on the quality differences between high chop and normal chop corn silage.



High chop corn harvest height compared to normal chop harvest height.

The first step in producing high-chop corn is to reduce the seeding rate from 100,000 seeds/ha to 80,000 seeds/ha. Research conducted by Pacific Seeds and the Queensland Department of Agriculture and Fisheries on three common corn varieties demonstrated that the best yield with higher starch levels were achieved at 80,000 seeds/ha.

Table 1: Average yield, starch and neutral detergent fibre (NDF) concentrations of three varieties of corn (PAC606, PAC607IT, PAC624) identified as feed silage varieties within the cattle feeding industry.

Seeding rate ('000 seeds/ha)	Yield (t DM/ha)	Starch (% DM)	NDF (% DM)
40	20.13	33.1	38.2
60	22.62	34.3	39.6
80	26.55	33.8	40.1
100	24.70	28.4	41.5

The second step in achieving high-chop corn is to harvest at the right time, that is, when the starch line is half way down the corn kernel. This should result in the most effective processing of the corn kernel, ensure the best availability of starch and the ideal dry matter of 32–33% for silage.

At the point of harvest you need to have the fortitude to direct the silage contractor to harvest at 40 cm. The contractor will clearly want to harvest lower as the more they harvest per hectare the greater the benefit to them. However, the results in table 2 clearly demonstrate the benefit to you by harvesting at 40 cm.

Table 2: Comparison of normal chop vs high chop corn

	Normal chop	High-chop (40 cm)
Dry matter yield (tDM/ha)	18.5	17
Dry matter (%)	40.37	41.4
Starch (%DM)	38.7	41.7
Starch harvested (t/ha)	7.16	7.09
NDF (DM%)	37.2	32.2
Crude protein (%DM)	8.9	8.9
Energy (MJ/kg DM)	10.8	11.3

The results demonstrates the following:

1. Yield was reduced by 1.5tDM/ha when you high-chop.
2. The starch was 3 percentage units higher, meaning more energy for milk.
3. The NDF is 5 percentage units lower, meaning if corn is 30 to 50% of the cow's daily intake, then it has a substantial effect on the cow's ability to consume a lot more feed in a 24 hour period.
4. No difference was seen in crude protein%
5. The energy was higher in high-chop corn by 0.5 MJ ME/kg DM, so if a cow is eating 10kg DM/day (~30kg as-fed) of high-chop corn, it would equate to an extra 1.0 litre of milk per cow per day.

The cost of high-chop corn is comparable to normal chop, but the real benefit of high chop corn is hidden in the detail.

Table 3: Normal chop vs high chop corn on a value basis

	Normal chop	High-chop (40cm)
Cost \$/t wet in the pit	\$61	\$64
Cost \$/t DM	\$151	\$154
Cost cents/kg starch	39.0 cents	36.9 cents

Table 3 shows that there is little difference in the cost of the silage or the starch within the two silages. The cost of including starch from purchased corn grain would be 53c/kg if the corn was purchased at \$335/t. Clearly either corn silage is an alternative to purchased grain with a potential saving of up to 16 cents/kg starch.

However, high-chop corn has one very important advantage over the normal chop corn silage – it is lower in NDF%, thus allowing a cow to eat more forage (it is widely known that a cow can consume one percent of her body weight as NDF per day).

Table 4: The milk potential of normal and high chop corn

	Normal chop	High-chop (40cm)
Dry matter intake (1% NDF for 600kg cow)	16.13	18.63
Starch consumed if 1% BWt	6.24	7.77
Potential milk yield modelled (L/c/day)	18.13	26.17

In the most basic terms, high-chop corn is superior silage as it allows the cow to consume greater amounts of feed(s), potentially leading to more milk production, which highlights the key message that forage quality is the key driver of profitable milk production (table 4).

The C4Milk project is investigating ways of increasing the amount of quality forage a cow can eat to reduce the reliance on purchased concentrates. The high-chop corn is an excellent example of how tweaking the sowing rate and the chop height could result in silage that costs the same as normal chop corn, but with more milk potential.

Consider what impact this management strategy may have on your business and join other farmers who are going to make these changes to their normal regime this year.

Over the next few months, DAF will run a series of field days in the Subtropical region. The first field days will be focussed on forages that farmers can grow for silage or graze this summer.

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