Harvesting silage

Silage Note No. 8

The objective of an efficient silage harvesting system is to minimise costs and losses of DM and quality. Plan and prepare well before harvest – harvesting delays increase silage DM and quality losses.

Consider the silage system from crop selection through to feedout. Decide which harvesting system best suits your farm operation. The chosen system will depend on a number of factors such as the existing farming operation, economics, future plans (either to extend or reduce the size or scope of operations) and lifestyle choices.

Many producers begin on a small scale to gauge how silage fits in with their existing enterprise. Often this is individually wrapped round bales produced and handled using existing hay equipment, with only the wrapping operation being contracted out.

Harvesting options

Most harvesting systems and equipment will produce well-preserved, high-quality silage. However, to maximise production and profitability from silage it is essential that the form of silage produced is suitable for the class of stock to be fed and the feedout equipment and feeding system available.

Before harvesting begins:

- Decide which silage system to use, e.g. chopped or baled, bulk storage or wrapped.
- Decide if you are going to use contractors and/or if new equipment has to be purchased.
- Monitor weather forecasts.
- Harvest the crop or pasture at the correct growth stage for optimum quality and yield.

When harvest begins:

- Wilt the mown crop to the target DM content.
- Harvest as soon as the target DM content is achieved, preferably within 48 hours of mowing.
- Compact well for high silage density.
- Seal stacks immediately harvest is completed. Use a temporary seal if there is a break in filling.
- Seal bales as soon as possible after baling.
- Seal stacks and bales effectively, airtight.
- Inspect silage storages often and repair holes immediately with recommended tape.

Harvesting equipment

There is a wide range of equipment (forage harvesters and balers) and systems available for making chopped and/or baled silage, with contractors usually using the higher-capacity equipment.

Goals for Successful Silage

- Choose a harvesting system that matches your farm operation.
- Plan and prepare well ahead to minimise quality and DM losses caused by harvesting delays.
- Harvest at the target DM content and appropriate chop length.

A checklist of points to consider before buying equipment includes:

- Cost – will usage justify the purchase of expensive equipment?
- Possibility of contract work to offset cost;
- Dealer proximity and service;
- Resale value;
- Ease of use and maintenance;
- Labour requirement;
- Operating cost; and
- Is using a contractor a better option?

Forage harvesters - Most forage harvesters on the Australian market are either fine chop or precision chop machines. Depending on the front attachment, these machines either direct harvest or pick up mown forage, delivering it to a chopping chamber where the forage is chopped to a uniform and adjustable length.

Forage wagons - are self-loading machines that pick up the forage from a windrow, chop and harvest into an attached wagon. The chop length is longer and more variable compared to forage harvesters. They have the advantage of a lower labour and equipment requirement, but work rate is slow because harvesting stops when the wagon is being unloaded.

Balers – are available as variable or fixed-chamber round balers or big square balers. Most large square bales produced by current model machines have the advantage of being denser than round bales, but do require more power to make.

Individually wrapped bale silage is relatively expensive to produce per tonne of DM stored. However, some farmers choose this system because it often matches their farm operations and they can use existing hay baling and handling equipment.

The shape of square bales is more suited to a range of storage systems, with better utilisation of space and ease of creating an effective sealing (see Silage Note 10).

Both round and square balers are available with a series of knives that chop the forage just after pick-up and before entering the bale chamber. These balers can be operated with or without engaging the knives.

Factors affecting harvesting efficiency
DM content of the forage and length of chop can affect the efficiency, and therefore the cost, of silage making with both forage harvesters and balers. This is demonstrated in Tables 1 and 2.

Decreasing chop length and increasing DM content (to the upper level in the target DM range for a crop or pasture) increases the amount of material that can be packaged and transported. The end result is a cost saving for chopped silage with lower transportation costs and reduced storage capacity required. The situation is similar for baled silage, with chopping resulting in less bale handling and lower plastics costs.

Table 1. Effect of harvesting equipment and crop DM content on the quantity (tonnes) of chopped forage transported in each trailer load.*

Crop DM content (%)	Harvester Type	Dry weight (t)	Relative capacity (%)	Number of loads per ha
Direct cut (20%)	Flail	0.43	100	14.0
	Double chop	0.71	165	8.5
Wilted (30%)	Flail	0.64	149	9.4
	Double chop	0.96	223	6.3
	Precision chop	1.07	249	5.6
Wilted (40%)	Precision chop	1.00	233	6.0

* Trailer capacity of 14.2 cubic m^3; assumes yield of 6t/ha.

Source: Adapted from MAFF (1976)

Table 2. Effect of chopping on the weight of bales produced from ryegrass pasture with a DM content of 41%.*

	Unchopped	Chopped
Average bale weight (kg DM)	206	228
Density (kg DM/cu.m)	151	168
Number of bales/ha	24.3	21.8

* Mean of five experiments. Bales produced with a Deutz Fahr fixed-chamber, roller-type baler.

Source: Adapted from O'Kiely *et al*. (1999)

Although there is a greater power requirement for shorter chop length there are additional benefits that contribute to improved silage fermentation quality and animal production.

Harvesting losses
Physical loss of DM during harvesting usually falls into one or more of three categories:

- Pick-up losses - forage that is not picked up from the windrow or, in the case of direct-harvested crops, is not cut and is left in the paddock;
- Chamber and ejection losses - applies to baled systems only; and
- Drift losses – forage-harvested material may overshoot during the filling of transport vehicles - applies to forage harvester systems only.

Mechanical losses at harvest increase with DM content, particularly as the content increases above 35-40% (see Silage Note 6). Legume crops are more prone to mechanical loss, especially if they are over-dried and the leaf fraction becomes brittle.

Contamination
Contamination of forage with soil, dead animals, straw and/or rank grass during harvest should be avoided. Undesirable bacteria may be introduced that will adversely affect the silage fermentation, aerobic stability of the silage at opening, and the health of animals fed the silage.

The information in this Silage Note is taken from the *Successful Silage* manual

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