

CANOLA HAY AND SILAGE FACT SHEET

GRDC
Grains
Research &
Development
Corporation

SEPTEMBER 2010

WESTERN AND SOUTHERN REGIONS

Making the most of a failed canola crop

Canola crops that fail due to drought, frost, poor pod set or low grain set can be cut as silage or hay. With the correct management a failed grain crop can be salvaged as quality forage.

KEY POINTS

- Canola hay and silage can be made from failed crops to cover production costs and is sometimes a profitable venture.
- The quality of canola hay and silage can vary enormously; quality testing is suggested before feeding to livestock.
- Before cutting, chemical withholding periods must have expired.
- Canola hay is best cut at late flowering and conditioned.
- Markets for canola hay can be unstable.
- Canola hay and silage can be fed to all types of ruminant livestock as long as precautions are taken when introduced to their diet.
- Salvaging calculators can assist growers with failed crops.
- Hay and silage remove more soil nutrients than grain crops.



PHOTO: FELICITY PRITCHARD

A failed canola crop may be salvaged as hay or silage, but good management is essential to produce a quality product and even then the hay market can be volatile.

Failed canola can be cut for hay or silage to cover some costs of growing the crop, and is sometimes profitable, but markets can be volatile. Canola hay and silage can be of very good quality if managed correctly.

Cut crops for hay can be at risk of weather damage. Crops cut for silage have less curing time (24 to 48 hours), reducing exposure to possible weather damage.

Canola silage tends to be higher quality than hay, but is less cost-effective to transport long distances because of its weight, making it less attractive for trading.

Markets for canola hay and silage

Canola hay needs a ready market to be cost-effective. In droughts, fodder can be in high demand. Growers should have a market for hay before cutting their crop,

unless the forage is intended for their own stock. Most hay is sold on nutritional specifications. If sold on contract, growers need to thoroughly understand hay contracts.

The main consideration for hay buyers is cost per megajoule of digestible energy (MJ). Canola hay can be excellent quality. However, its quality can vary considerably and testing is important before feeding to livestock.

Estimating hay yield

To estimate hay yield the following method can be applied.

Step 1: Cut one metre of crop row from five representative sites across the paddock. Cut at the same height the crop will be mowed.

Area cut in square metres = number of rows sampled (five) x row spacing in metres.

Step 2: Record the fresh weight in kilograms.

Step 3: To calculate dry matter percentage cut the sample into pieces roughly a centimetre long, to aid drying. Weigh a subsample of 100 to 500 grams and dry.

To dry in a microwave oven, refer to the 'Microwave oven test' listed in 'Useful resources'.

Dry matter percentage = dry weight ÷ subsample fresh weight x 100.

Step 4: The hay yield can now be calculated. However, about 20 per cent of hay can be lost in baling (Figure 1). Canola hay is typically 12 to 15 per cent moisture.

Assuming 15 per cent moisture and 20 per cent baling loss:
Hay yield in tonnes per hectare = dry matter percentage (step 3) x fresh weight (step 2) x 1.15 x 0.8 x 0.1 ÷ area cut (step 1).

Note: the 1.15 assumes 15 per cent moisture; replace with 1.12 for 12 per cent moisture. The constant 0.8 assumes 20 per cent baling loss. This is 100 minus the percentage baling loss, divided by 100. For example, if you expect 30 per cent loss, replace 0.8 with 0.7. The 0.1 converts the yield into tonnes per hectare.

Example:

Five lots of one metre samples are taken with a row spacing of 25 centimetres (0.25 metres). The fresh weight was 3.26 kilograms. The area sampled is:

5 X 0.25 metre rows = 1.25 square metres.

A 400 gram subsample is dried in a microwave and weighs 44 grams. The dry matter percentage is:
44 grams ÷ 400 grams x 100 = 11 per cent.

The yield of hay at 15 per cent moisture and 20 per cent baling loss is:

(11 per cent dry matter x 3.26 kilograms x 0.115 x 0.8) ÷ 1.25 square metres = 2.64 tonnes per hectare.

To cut or not

The decision to cut a canola crop must be made early. Crops cut after late flowering will be of lower quality and yield.

To determine if canola should be cut, harvested or left standing in the paddock it is first necessary to estimate grain and hay or silage yields.

An informed decision can be made by knowing prices, costs of harvesting versus hay or silage-making and understanding the market. For example, in a trial in the Victorian Wimmera in 2007, the option to cut crops for hay provided a profitable

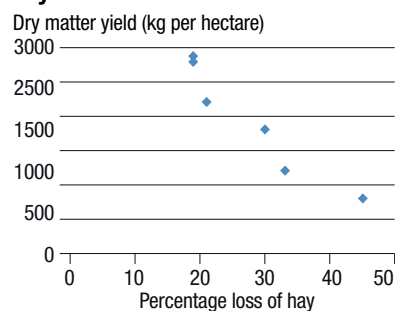
outcome. In contrast, harvesting for grain created a loss of \$26 per hectare (Table 1).

Decision support software is available to help with these calculations (see Useful resources).

Raking and baling losses are highest in very dry hay: working at night after dew reduces losses in such crops. A greater proportion of biomass is lost in baling crops with less than two tonnes per hectare of dry matter (Figure 1). The quality is also lower, as the leaves and pods are lost first.

Hybrids usually produce more dry matter than open pollinated canola types.

FIGURE 1 A higher proportion of canola hay is lost during raking and baling in crops with less dry matter



SOURCE: Nigel Phillips, I&I NSW

TABLE 1 Gross margins – in dollars per hectare – of a failed canola crop, Longerenong, Victoria, 2007. The trial was cut at early and late flowering and harvested for grain. Two prices were compared for canola hay. Prices were inflated due to heavy demand. The energy cost to a buyer is also shown.

End product	Yield (t/ha)	Oil (%)	Price (dollars per tonne)	Gross income (\$/ha)	Variable costs (\$/ha)	Gross margin (\$/ha)	Energy cost to buyer (c/MJ)
Grain	0.4	35.3	535	214	240	-26	–
Hay cut at mid-flowering	3.1	Not applicable	270 200	837 620	362 360	476 260	2.4 1.8
Hay cut at late flowering	3.9	Not applicable	270 200	1053 780	392 390	661 390	2.7 2.0

Costs included \$162/ha for haymaking at 3.1t/ha and \$192/ha at 3.9t/ha; \$200/ha production costs. Hay contains 13 per cent moisture at mid-flowering, 9 per cent moisture at late flowering. \$40/ha windrowing and harvesting costs. Grain prices, Marma Lake, December 2007.

SOURCE: Better Oilseeds



PHOTOS: FELICITY PRITCHARD, PAGE AND CHRIS SMITH, LONGERENONG COLLEGE.

Cutting canola at the later flowering stage is important for the production of quality forage. Left to right: mid-flowering, late flowering, and mid pod-fill (refer to Table 3).

Source: Canola at Better Oilseeds Longereng trial site.

Before cutting a failed canola crop for hay or silage the withholding period (WHP) and approval for use on forage crops must be checked on the labels of all chemicals used on the crop. All WHP must have expired before cutting.

Growers also need to ensure the crop has not been sprayed with a chemical product that carries a label warning or prohibitive statement that treated crops are not to be grazed or fed to livestock.

Failing to comply with a WHP can lead to unacceptable chemical residues in products such as milk, meat and eggs.

Producers can check any chemical listed on the Vendor Declarations to assess their residue risk exposure.

TABLE 2 Nutrients present in canola products in kilograms per tonne. Values for potassium vary from paddock to paddock.

Crop	Nitrogen	Phosphorus	Sulfur	Potassium
Grain	30	5	5	10
Straw	4	3	1	3
Hay or silage (cut at end of flowering)	30	3	8	25

SOURCE: Rob Norton, International Plant Nutrition Institute

Nutrient export from a hay crop

Nutrient export in hay and silage crops can be very high and needs to be considered when planning the crop. A soil test in autumn is essential in paddocks where crops were cut for hay or silage the previous season. Attention should be given to the replacement of potassium and sulfur (Table 2).

TABLE 3 Effect of cutting time on canola hay quality, Longereng, 2007. Cutting at late flowering gave the best compromise between quality and yield.

Time of cutting	Date	Dry matter (t/ha)	Residual dry matter (%)	Crude protein (%)	Neutral detergent Fibre (%)	Dry matter digestibility (%)	Metabolisable energy of dry matter (MJ/kg DM)
Mid-flowering	6 Sep	3.1	87	28	24	86	13
Late flowering	27 Sep	3.9	91	18	33	74	11
Mid pod-fill	17 Oct	4.0	91	15	38	68	10
LSD (p<0.05)		0.6		2.7	3	4	1

LSD is the least significant difference. For example, where comparing the effect of time of cutting, the difference between dry matter yields must be 0.6 tonnes per hectare or more to be significant.

SOURCE: Better Oilseeds

Optimising yield and quality

Crop nutrition

The nutrition of the crop will affect the hay quality. Adequate nitrogen will lead to higher protein levels than deficient crops. **However, stressed crops with high soil nitrogen levels are at higher risk of causing nitrate poisoning in livestock if precautions are not taken.**

When to cut canola crops for hay or silage

The most profitable time to cut canola for hay is late flowering. Yields are higher than hay cut earlier and the quality remains good. Canola hay cut too early in spring will take longer to dry down if not conditioned and is more at risk of weather damage.

Canola cut at mid pod-fill is poorer quality and lower yielding (Table 3).

Canola hay cut at late flowering has similar energy, protein and neutral detergent fibre to good quality vetch hay.

Height of cutting

Canola hay has a thicker stem than many other hay crops, which may affect the palatability. Cutting the crop higher, for example 15 to 20cm rather than 5cm improves its quality, as there will be less thick stems. However, hay yields will be reduced. See section on 'mixing'.

Conditioning

Conditioning of hay improves its quality in three ways.

- Curing time is reduced as conditioning cracks the stem allowing moisture to escape more rapidly.
- Reducing the period from cutting to bailing means less dry matter is lost, particularly the high quality leaves and pods.
- Cracking of canola stems makes them more palatable and easily chewed by livestock.

When making silage, bale and transport the canola to the storage site before wrapping to avoid damage to the plastic wrap. Wrap canola silage with at least four layers of 'netwrap' for less chance of puncture. Monitor the wrap for signs of deterioration.

Buying and using canola hay

The quality of canola hay depends on a range of factors, so undertaking a feed test will provide an accurate analysis to help determine feed rations. Droughted crops can also be tested for nitrate to avoid nitrate poisoning.

On average, canola has the following nutrient analysis:

- 18 to 21 per cent crude protein;
- 63 to 69 per cent dry mater digestibility;
- 28 to 30 per cent neutral detergent fibre; and
- 9 to 10 megajoules per kilogram of dry matter of energy.

Silage generally produces better quality feed than hay. The feed quality of canola hay and silage is generally adequate in maintenance rations for sheep and cattle in drought years (Table 4).

Safely feeding canola hay and silage

Canola hay or silage can be fed to all types of ruminant livestock, provided necessary precautions are taken when introducing these feeds to the diet.

Animals generally find canola hay and silage palatable and waste very little, but can take one or two days to become accustomed to the taste.

Feeding canola hay and silage is safer than grazing a standing crop. It has caused very few problems – especially considering the large quantities of canola hay and silage consumed over recent years. However, farmers must exercise care at all times to minimise risks to stock health.

Managing animal health issues

Most potential health issues can be overcome by undertaking the guidelines for introducing a new feed into the animals' diet:

- test the nitrate level in hay or silage. The level at which nitrate causes toxicity in ruminants depends on a number of factors. Generally, hay or silage with less than 5000 parts per million (ppm) nitrate on a dry matter basis is safe; 5000 to 10,000ppm is potentially toxic when provided as the only feed. Forage above 10,000ppm nitrate is considered dangerous but can often be fed safely if diluted with other feedstuffs and supplemented with energy. Stock can sometimes gradually adapt to feed with raised nitrate levels;
- never offer large amounts of canola hay or silage to hungry stock. Introduce it slowly by replacing part of the diet and increase the proportion of canola hay over a number of days. For contained stock, try to offer a mixture of fodder types, at least for the first two weeks of using canola;
- introduce the feed to only a few animals, as described above, monitoring them closely for several days before introducing the canola hay or silage to the other animals; and
- never feed livestock 'silage' before complete fermentation, as it can lead to nitrate poisoning.

TABLE 4 'Rule of thumb' minimum maintenance requirements for sheep.

Production	Size	Crude protein (%)	Total energy requirement (MJ per day)
Maintenance – dry sheep	Medium framed (40kg)	6	6
	Large framed or crossbred (60kg)	6	8
Ewes in late pregnancy	Large framed or crossbred	8	12
Ewes with lambs at foot	Large framed or crossbred	10	17
Weaned lambs	Above 15kg	10	5

Source: Victorian DPI.

Other considerations to avoid health complications are:

- including another fodder source so up to 60 per cent of the ration is canola hay or silage. Stock should only be fed canola hay as the sole ration as a short-term option. Some dairy farmers limit canola hay or silage to one-third of the ration to ensure no drop in production;
- conditioning canola hay aggressively to remove any sharp stalk ends; and
- livestock will consume canola hay with thicker stems more readily if it is chopped. The length of the fibre can affect the digestibility of hay for ruminants. Feed mixer wagons that chop the straw into consistent lengths are considered to improve the nutrient availability to the animal through better presentation and consistency in the ration.

PHOTO: EMMA LEONARD



Canola hay and silage should be introduced slowly replacing part of the ration; it is best to feed in a mixed diet limiting canola hay or silage to 60 per cent of the ration.

Milk and meat quality

No reports have occurred of tainted milk from cows or tainted meat of lot-fed lambs fed canola hay or silage. This is possibly due to low levels of glucosinolates in canola.

Vendor declarations

Livestock producers should request vendor declarations from forage suppliers, to ensure chemicals are used appropriately and the stockfeed is suitable for stock consumption.

Vendor declarations include:

- 'Commodity Vendor Declarations', used for primary feeds such as grain, available from Meat and Livestock Australia's website; and
- 'Fodder Vendor Declarations', used for hay and silage available from the Australian Fodder Industry Association website.

PHOTO: FELICITY PRITCHARD



Conserved rather than harvested canola crops remove more nutrients. An autumn soil test is essential with particular attention paid to levels of potassium and sulfur.

Rotational impacts of hay cutting

Nutrient export from a hay crop

Nutrient export in hay and silage crops can be very high and needs to be considered when planning the following crop. A soil test in autumn

is essential in paddocks where crops were cut for hay or silage the previous season. Growers need to ensure potassium and sulfur are replaced.

Weeds

Hay production is beneficial in reducing the 'weed seed bank' and useful for managing herbicide resistant weeds.

However, movement of hay poses a risk of weeds spreading into new areas. Hay buyers should:

- aim to source local hay;

- ask for written certification on any potential weed content;
- feed stock in a confined area;
- record details of purchased hay;
- monitor feeding areas for up to two years for unfamiliar plants; and
- purchase silage cut early in the season which will reduce the chance of introducing new weeds.

Hay trucks should be cleaned in a designated area after deliveries.



Frequently asked questions

How do I decide what to do with a failed canola crop?

Some state government departments have internet-based calculators to help you decide what to do with a failed crop. Two of these are listed below.

You will need to estimate your likely grain yield and hay yield and know the prices of the respective products.

If you delay making the decision and cut the crop for hay when it is mature, the hay quality will be low.

Who will buy canola forage?

Canola hay and silage can be fed to all ruminant livestock. Growers should ensure they have a market for hay or silage before cutting their crop, unless they intend to feed it to their own stock.

Is canola hay and silage good quality?

Canola hay and silage can be very good quality if cut by late flowering at a height that minimises hard woody stem content and conditioned. Levels of protein, energy and digestibility can be high but testing the feed quality is important.

Is canola hay and silage dangerous for animals?

Health problems in animals can occur with all types of feed if precautions are not taken. Health problems from canola or silage are uncommon. Nearly all of these have occurred when hungry stock have been given unlimited access to canola hay or silage. In the long term, canola hay or silage should comprise no more than 50 to 60 per cent of an animal's diet.

Useful resources:

■ Paul Parker, I&I NSW	02 6380 1706
■ Nick McClelland, Australian Fodder Industry Association	03 9530 2199
■ Nigel Phillips, I&I NSW	0427 102 707
■ Australian Fodder Industry Association	www.afia.org.au
■ Meat and Livestock Australia	www.mla.com.au
■ FeedTest, Werribee	1300 655 474 (toll free)
■ Feed Quality Service, I&I NSW Wagga	1800 675 623
■ Jo Robinson, Chemical Standards Officer, Victorian DPI	03 5355 0522
■ Salvaging crops for fodder, grain or grazing – costs and income calculator	www.dpi.nsw.gov.au/agriculture/field/field-crops/crop-salvage-calculator
■ Hay vs grain calculator	www.ruralsolutions.sa.gov.au
■ Microwave oven test, Duncan Handley	www.afia.org.au/information/technical_notes/Microwave%20moisture%20test.pdf
■ Canola best practice management guide for south-eastern Australia	Ground Cover Direct 1800 11 00 44
■ Raising the bar with better canola agronomy	Ground Cover Direct 1800 11 00 44
■ Fodder vendor declaration form	www.afia.org.au/organisation/forms/Vendor%20Declaration%20Form.pdf
■ Drought Feeding and Management of Sheep: A guide for farmers and land managers, Victorian DPI.	images.wool.com/pub/drought_feeding_vic_dpi_1007.pdf

DISCLAIMER

Any recommendations, suggestions or opinions contained in this publication do not necessarily represent the policy or views of the Grains Research and Development Corporation. No person should act on the basis of the contents of this publication without first obtaining specific, independent professional advice. The GRDC and contributors to this Fact Sheet may identify products by proprietary or trade names to help readers identify particular types of products. We do not endorse or recommend the products of any manufacturer referred to. Other products may perform as well as or better than those specifically referred to. The GRDC will not be liable for any loss, damage, cost or expense incurred

or arising by reason of any person using or relying on the information in this publication.

CAUTION: RESEARCH ON UNREGISTERED PESTICIDE USE

Any research with unregistered pesticides or of unregistered products reported in this document does not constitute a recommendation for that particular use by the authors or the authors' organisations.

All pesticide applications must accord with the currently registered label for that particular pesticide, crop, pest and region.

Acknowledgements: Paul Parker and Nigel Phillips, I&I NSW; Nick McClelland, Australian Fodder Industry Association; Garry Hallam, Vic DPI.