Drought Storage of Silage for Sheep and Beef

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Many areas of Victoria have experienced drought or extended dry periods over the last decade. Unfortunately these periods usually exhaust the fodder reserves on farms and if the drought is prolonged, farmers must purchases large quantities of fodder to supply fibre for their stock. The cost of this purchased fodder is generally very high, and its quality is often low in nutritive value, more so as fodder supplies become scarce.

Generally, following most drought and extended dry periods, pasture growth can be above the long term average and because stock numbers have often been reduced, pasture is usually well in excess to requirements. Even in normal seasons on many farms, there are also often periods of pasture growth which far exceeds the requirements of animals. These are the occasions when many farmers try to restock their fodder (silage and hay) storages, finances permitting. This should be the source of your next year's supply of fodder and, if possible, next drought reserve. Rather than wasting it, put it into a clamp, pit or bales for the next long dry period or drought.

Although the drought or extended dry period may have left you pinched for $$$ for this good pasture growth season, think carefully about the high cost you paid for extra hay of poor quality last drought. It will have cost you 1.5 to 3 times the cost of the pasture you may be allowing to go to waste if not harvested.

Why store silage as a drought reserve rather than hay? Unless your climate is suitable for making good quality hay and these hays are legume based such as lucerne, vetch, balansa or sub clover, most drought reserves are usually hay of average to poor quality.

Because climatic conditions suitable to make hay dictates that harvesting is done when the pasture is usually going to head its quality is often below about 8.5 megajoules of metabolisable energy per kilogram dry matter (MJ ME/kg DM). This is suitable for maintaining animals or for low liveweight gains but it is insufficient for high milk or meat production. Feeds must be well above 10 MJ ME/kg DM and 15% to 16 % of DM for crude protein for high production.

Many farmers argue that poorer quality fodder is sufficient for drought feeding and they would rather have the increased bulk of feed than less feed of higher quality. The late Alan Kaiser of Wagga Wagga Agricultural Research Institute and others estimated the total cost of conserving, storing and feeding out silages of different quality to feed 100 dry beef cows for 6 months so that both groups maintained liveweight (Table 1). These costs also included an estimate for losses and interest for drought storage. The total cost of feeding the cows for 6 months with silages with energy qualities of 7, 8.5 and 10 MJ ME/kg DM were $12,688, $9,990 and $8,160 respectively.

Even when made with no weather damage and shedded, hay will lose 4 percent to 8 percent of its dry matter within the first 12 months, and a further 2 percent to 5 percent in the second year. Its quality will also drop over several years and this is without substantial

damage caused by rodents, fire, leaking rooves, etc. Hay left in the open in will lose 25 to 30 percent of dry matter in moderate rainfall areas. However silage can overcome these issues.

Table 1. Effect of silage quality on drought feeding costs[1] for a 100 dry cows for 6 months

Measurement	Silage Quality (MJ ME/kg DM[2]		
	7	8.5	10
ME requirement (MJ/cow/day)	53	51	49
Daily DM requirement (kg DM/cow/day)	7.6	6	4.9
Total silage requirement (kg DM/cow/day)	136	107	87
Total forage to be harvested (t DM)[3]	160	126	103
Silage production costs ($/t DM @50% DM)	8,800	6,930	5,665
Interest on silage cost ($ @ 7% p.a. for 3 yrs)[a]	1,848	1,455	1,190
Feedout costs (@ $15/t DM)	2,040	1,605	1,305
Total production & feeding costs ($)	12,688	9,990	8,160

Source: Kaiser et al, 1996

[1] All costs as at 196

[2] Protein supply is assumed to be adequate. Cows on very low quality silage may not consume sufficient DM to maintain lievweight[2]

[3] Assuming 15% total conservation (including feedout) losses

[a] It is assumed that producers will regularly replace their forage reserves every 3 years

Pasture silage has the potential to be of high quality (above 10.5 MJ ME/kg DM) if it is harvested early and quickly in the season, cut before seed heads start to emerge and sealed airtight quickly. Silage for drought storage can be successfully stored as chopped silage in pits or stacks or in square baled form. If air and water does not enter the drought storage during the storage period only a small unavoidable loss of dry matter and quality due to the initial fermentation process will occur.

Pit or stack silage must be sealed airtight, preferably with plastic sheet and then covered with at least 0.4m to 1m of soil for long term storage **(Figure 1).** The soil will prevent plastic breakdown from the sun's solar radiation. Place a layer of approximately 150 mm depth of straw/old hay immediately above the plastic before adding the soil. This produces a clean break between the plastic sheet and the soil and avoids plastic contamination of the soil **(Figure 2)** as it is removed.

Figure 1. 0.8 m soil removed from stack top

Figure 2. Soil contaminated with plastic

It is possible to use soil on its own as the seal but this may result in some contamination at the interface of the silage and the soil. Also if animals burrow some distance into the soil, a plastic sheet will stop water seeping into the silage if it's not holed. This will result in large quantities of silage deteriorating in the silage stack. Water can also infiltrate into the stack via the soil profile of from surface flow.

Surface water should be prevented from entering the stack via diversion drains. Water can also enter soil pits from the upper slope at some depth under the soil surface. Most soils where pits have nearly vertical sides usually contain a high proportion of clay. This results in water seeping down from the upper slope above the deeper more impermeable soil and into the pit/stack. To intercept this ground water, dig a 100 mm wide trench above the pit to well below the impermeable subsoil, lay slotted PVC or slotted plastic pipe on the bottom, then fill with small aggregate or pea gravel to near the surface **(Figure 3).**

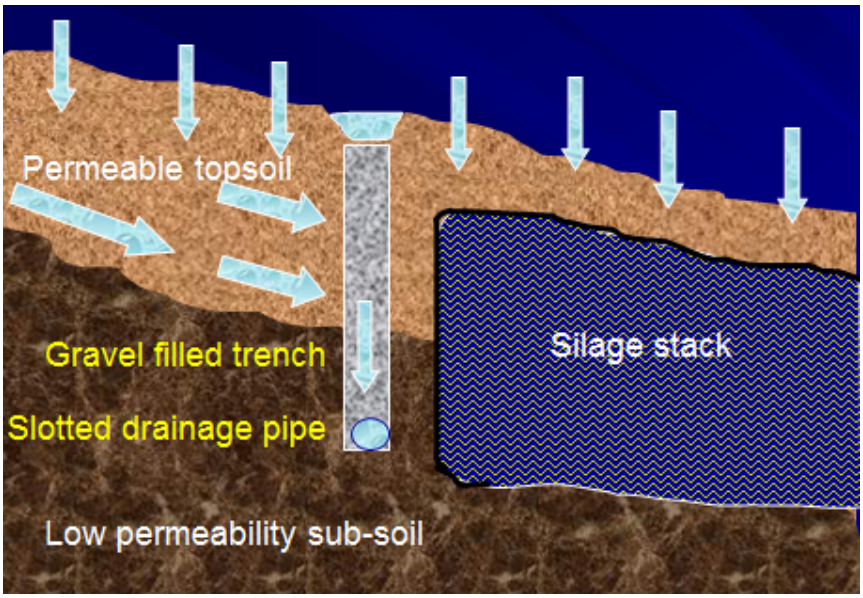

Figure 3. Surface and interception drains to prevent water entering the silage pit

Round baled silage can be stored in pits in the ground but should be wrapped in four layers of stretchwrap plastic, placed in the pit in the ground without holing the film and covered with soil, as above. Unwrapped bales in a pit covered with plastic will store satisfactorily. However they will sustain large losses if the soil cover is holed during the storage period. If the bales are wrapped the air ingress won't be such an issue unless the film is exposed to sunlight and breaks down or water enters over time. Caution: there have been too many stacks of compost made storing round bales without plastic wrap!

Once the stack of bales is uncovered for feeding out, air will move back between the bales and commence secondary fermentation and rapid decomposition. If storing unwrapped bales in a pit, stack enough bales for about six days feed in each group and seal each section completely airtight. Wrapping the individual bales greatly reduces any problems of air (and water) entering the stack at feedout.

Square baled silage is more suited to being stored in compartments in pits without the need for individual wrapping of the bales **(Figure 4).** This is due to their high density and

shape which allows tighter stacking so less air intrusion between bales. Store enough bales for about 2 weeks feed in compartments in the pit **(Figure 5).** When the stack is opened, air can only move back to the plastic seal of the next compartment. The drought storage pit should still be covered with soil to protect the plastic from ultra violet light break down.

Treating the forage at baling with an aerobic spoilage inhibitor will delay heating and spoilage when the storage stack is opened.

Finally, if your drought storage site is not obvious, mark where it is located. During the last drought many farmers, or new farm owners lost track of where their drought storage reserves were located. This drought reserve will have a high value so if the farm is sold you need to know where it is and how much silage is in the pit.

Figure 4. Large square bales in compartments and sealed with soil

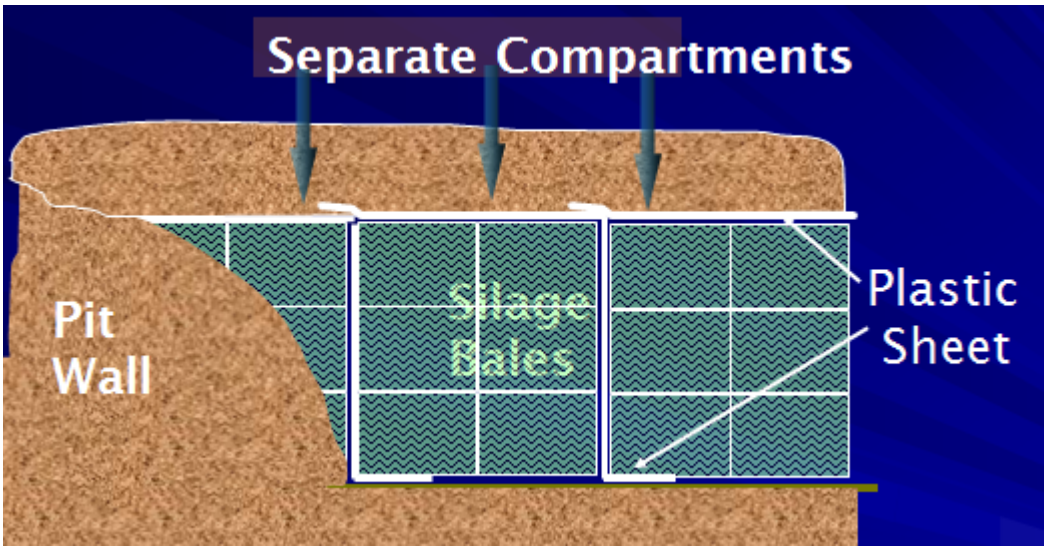

Figure 5. Large square bales in compartments and sealed with soil