

Ensiling Potatoes

April, 2007

Les Halliday, Beef Development Officer
Department of Agriculture, Fisheries and Aquaculture

Potatoes are a good source of energy for cattle and the protein is considered to have a high biological value possessing a favourable amino acid composition. There are various ways of using potatoes as an animal feed either in the raw (*Figure 1*) or cooked form.

On PEI, potatoes mainly in the form of culls have been fed to cattle for many years. When supply outstrips demand, especially in the spring, farmers can be faced with a number of problems. Cull piles will begin to breakdown as the temperature rises leading to heavy run-off which has environmental implications. The potatoes also become soft and constitute a choking hazard therefore, feedbunk management is critical. Fresh culls at this time of year are very responsive to sunlight and will sprout and turn green very quickly which results in elevated levels of the alkaloid, **solanin** which is poisonous to cattle.



Figure 1. Cull potatoes

One way to deal with excess potatoes is to ensile them either on their own or with forage but **soil**, **green tubers** and **sprouts** particularly if they have turned green should be removed. In the past, potatoes have been used either raw or cooked, chopped or whole with each having a number of advantages and disadvantages.

Potatoes & Fresh Cut Forage:

Fresh cut forage material can be used with chopped or whole potatoes to produce very good silage. When chopped potatoes are used, effluent can be a problem and the amount of potatoes used and/or the wilting time of the forage may need to be adjusted to control effluent production. The resulting silage should have a dry matter content greater than 25 %. **Table 1** shows the inclusion rate of potatoes for each 2.5 tonnes of fresh cut forage at different dry matter levels or when using dry hay. The disadvantage with fresh cut forage is that it is only available in early and late summer when potato supplies are usually at their lowest.

Ensiling Methods:

There are a number of techniques used to ensile potatoes with fresh cut forage. The most critical factor in ensuring the success of the fermentation is to thoroughly wash the potatoes to remove soil - **very important**.

For tower silos, chopped potatoes are usually added at the blower along with the fresh forage at a predetermined rate.

With 'Ag-Bag' type silos (*Figure 2*) chopped or whole potatoes are added at the loading chute.

For bunker (*Figure 3*) silos a common technique called the 'Sandwich' method can be used where whole or chopped potatoes are placed in alternate layers between 1- 2 feet of forage. The heat generated during fermentation effectively cooks the potatoes and with good compaction at silo filling the potatoes tend to flatten out (*Figure 4*) which reduces the choking risk when fed out.

This method is relatively simple but the fermentation can occur in distinctive bands in the silo especially if unwashed potatoes are used which if not properly mixed at the time of feeding can lead to feed refusal problems. Ideally potatoes should be chopped and mixed with the forage prior to ensiling to promote a more consistent fermentation leading to higher feed value.



Figure 2. 'Ag-Bag' Type silo



Figure 3. Layering potatoes in a bunker silo



Figure 4. Fermented whole potatoes in a bunker silo

Potatoes & Hay or Straw:

The practice of using hay and to some extent straw with potatoes offers greater flexibility with timing of the operation and with dry forage the inclusion rate of potatoes can be increased to 67% (Table 1) on a fresh weight basis without running into effluent problems. The forage should be chopped prior to ensiling to ensure adequate packing of the material, either in a bunker silo or pile to exclude air and aid in effluent absorption. The quality of the forage used will have a major impact on the feeding value and for this reason a grass/legume hay is preferred to straw. An inoculant should be used to help ensure a rapid fermentation especially if the forage is dusty, indicating the presence of mold spores which could dominate the fermentation and not only reduce the feed value but also produce a range of mycotoxins that effect the health of the animals.

100% Potato Silage:

Work in many European countries has shown that raw cull potato silage is not as reliable as cooked potato silage. The inconsistency of the fermentation of was traced to soil contamination which can contain high levels of clostridia bacteria that tend to cause extensive breakdown of the potatoes resulting in lower feed value. Therefore, potatoes should be washed prior to ensiling. Chopping and application of a suitable silage inoculant would also be desirable to help promote a rapid fermentation to conserve feed value. Raw potato silage also produces a significant amount of effluent, up to 600 litres/tonne of potatoes which represents a significant loss of nutrients that must be collected and disposed of.

Table 1. Inclusion rate of potatoes for different levels of forage dry matter.

| Forage Dry Matter (%) | Cull Potatoes (tonnes) | Forage (tonnes) | Resulting Silage DM (%) | % Inclusion of potatoes (fresh weight basis) |
|------------------------------|-------------------------------|------------------------|--------------------------------|---|
| 25 | 0.5 | 2.5 | 25 | 17 |
| 30 | 1.0 | 2.5 | 28 | 29 |
| 35 | 1.5 | 2.5 | 31 | 38 |
| 40 | 2.5 | 2.5 | 32 | 50 |
| 45 | 3.5 | 2.5 | 32 | 58 |
| 50 | 5.0 | 2.5 | 32 | 67 |
| 85 | 5.0 | 2.5 | 44 | 67 |