In addition to the quality of the conserved raw materials, two factors contribute to the success of bale silage: the structure and density of the bale and the effectiveness of the airtight cover. Below are some guidelines and tips from Dow, manufacturer of DOWLEX™ Polyethylene Resins, designed to ensure you get the best results in bale silage production.

Modern farming practices involve wrapping bales in multiple layers of plastic film to create a secure airtight cover. The nutritional value of the ensiled crop is preserved and spoilage – an inherent problem of the earlier bagged system – is reduced.

The plastic is stretched, using a stretching unit fixed to a bale wrapper, then wrapped around the bale. The plastic memory – a characteristic that makes the film return to its original dimensions – causes the film to compress around the bale to give a very tight and secure wrap. Good-quality film will better stick together between layers, contributing to a better airtight bale.

**Pre-stretching**

Bale wrapping must be tight to maintain the compression achieved in the baler. Pre-stretching the film helps retain the bale density. Quality films can be pre-stretched by 70-80% before wrapping.

Stretch film shrinks after being wrapped. This reduced film width must be taken into account to ensure a correct overlapping of layers. After stretching, a 750 mm wide film has to be at least 600 mm on the bale. High-quality film guarantees the necessary puncture resistance also when highly pre-stretched.

Wrapping bales tightly helps to make efficient use of the plastic as less wrap is needed for a given weight of dry matter (DM) and reduces transport time and costs as fewer bales per hectare are produced.

**Wrapping time**

Wrapping should be carried out quickly after baling, ideally within 2 hours. Leaving the bales crop unwrapped for too long can lead to aerobic fermentation on the surface.

Wrapping should be carried out in dry conditions. If the film becomes wet during baling, the layers will not adhere to one another sufficiently well to provide a fully airtight seal.
Most modern balers work on the size of the bale instead of its weight. A variable chamber baler provides the densest bales but needs a relatively high DM crop, close to 40%. Achieving exactly 50% overlap of layers contributes to efficient film use combined with good silage quality. More overlap would be a waste of film while applying less will reduce the airtight barrier.

**How many layers?**

A general rule is that the more layers and the better the film quality, the smaller is the risk of air entering the bale and allowing moulds to develop. Trying to save costs by using fewer layers at this stage can undermine all previous efforts. Even though 4 layers are quite commonly used, 6 layers provide a valuable safety margin, particularly when DM content is outside the optimum range.

There is a measurable quality improvement when 6 or 8 layers are applied. The difference is reported to be greater where the DM content is higher, for example with the production of silage and haylage using a crop of more than 40% DM. In fact, haylage for horses is often baled with at least 8 layers of film.

**Calculating the number of wraps**

Research has shown that as the number of layers increases, spoilage and losses decrease, and nutritional content can improve.

Wrapping with 6 layers of film gives the greatest return as benefits outweigh any extra cost. Also, the drier the ensiled crop, the greater the number of layers required to prevent harmful moulds from developing. More layers also means much more resistance to damage – be it from handling or wildlife.

The number of layers per bale needed for each of the film widths can be calculated with a formula based on the following assumptions: for a cylindrical bale of 1.2 metres diameter by 1.1 metres in height, the calculation of layers is as follows:

<table>
<thead>
<tr>
<th>Nº of layers</th>
<th>Nº of wraps per bale when using</th>
<th>Total nº of layers plus 50% overlap</th>
<th>Total film used (approx)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 mm film</td>
<td>750 mm film</td>
<td>1,000 mm film</td>
</tr>
<tr>
<td>4 layers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 layers</td>
<td>27</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>8 layers</td>
<td>33</td>
<td>22</td>
<td>17</td>
</tr>
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<td></td>
<td>44</td>
<td>30</td>
<td>22</td>
</tr>
</tbody>
</table>

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