The oxygen passing through intact plastic sheet is usually insignificant compared to that entering actual holes in the plastic. However, tests were conducted to determine whether there was any difference in the permeability of polyethylenes offered by various manufacturers (Table 4).

Table 4. The rate that oxygen passes through various 1 mil (0.001" thick) polyethylene plastic.

Manufacturer	Color	Oxygen Permeability[a,b] (cc/100 in^2/24 hr)
AEP	White	505
Bonar	White	590
Borden	White	571
Linear	White	571
Linear	Clear	515
Dow	White	633
Union Carbide	White	500

[a] Permeability tested on a Mocon Oxtran 1000 at the CREC, Lake Alfred, FL.
[b] Plastic initially stretched 50%, then allowed to retract to some unloaded length before being mounted on the permeability testing equipment.

Tests showed there was some difference in permeability, and anyone purchasing plastic might consider relative permeability. However, this should be a secondary consideration to the plastic's ability to endure long term exposure to sunlight.

Oxygen Entering Between Layers of Plastic

The stretch plastic used to make round-bale silage is "tacky" to the touch and should form a good seal when one layer of plastic overlaps another. These layers must seal sufficiently to keep oxygen from leaking through and causing the bale to spoil. It has not been proved conclusively that overlapped sheets form a tight seal, but the good quality of bales without obvious holes in the plastic indicates that very little oxygen enters between the plastic layers.

Wrapping bales in the rain causes water to be trapped between the plastic layers, providing a pathway for air entry and subsequent spoilage. Therefore, wrapping bales in the rain is not recommended.

CONCLUSION

The plastic used to make round-bale silage must be carefully selected: it serves as the barrier between the wet bale and oxygen in the air that can cause the bale to spoil. It is virtually impossible to totally exclude oxygen from the bale, but it is possible to keep the oxygen crossing the plastic barrier to an acceptable level that minimizes mold in the silage.

Good quality round-bale silage can be made. The following suggestions about plastic selection and bale handling, moving, and storage should increase your chances for success.

Plastic Selection

- Choose a plastic that can withstand the ultraviolet radiation of the sun without disintegrating. The ability of a plastic to withstand UV radiation depends on two factors: the plastic's containing sufficient UV inhibitors and those inhibitors being uniformly mixed in the batch of plastic resin by the manufacturer. No forage producer can tell by looking at a plastic sample whether it will hold up when stored outdoors. Your recourse is choosing plastic from a manufacturer whose product has a reputation for lasting outdoors. While this publication gives some information about the lasting ability of several plastics, stretch plastics offered in the future may be superior to any tested. Ask other forage producers in <u>your area</u> (plastic that lasts outdoors in Canada will not necessarily last in the southern United States due to the differing intensity of the sun's rays) about their experiences with different plastics. Buy a small amount of the plastic for a trial run to see how it works for you.

Bale Wrapping

- Handle wrapped bales as gently as possible to avoid splitting or puncturing the plastic. Some bale wrappers are designed to set the bale gently on the ground after the wrapping operation -- a desirable feature of this type of bale wrapper. (Most of the machines just dump the wrapped bale from the wrapping platform with the help of a hydraulic cylinder.) Wrappers that dump are sometimes equipped with an attached landing mat that helps reduce the impact loads generated during the dumping operation. Such a mat lessens chances of punctures in the plastic caused by crop