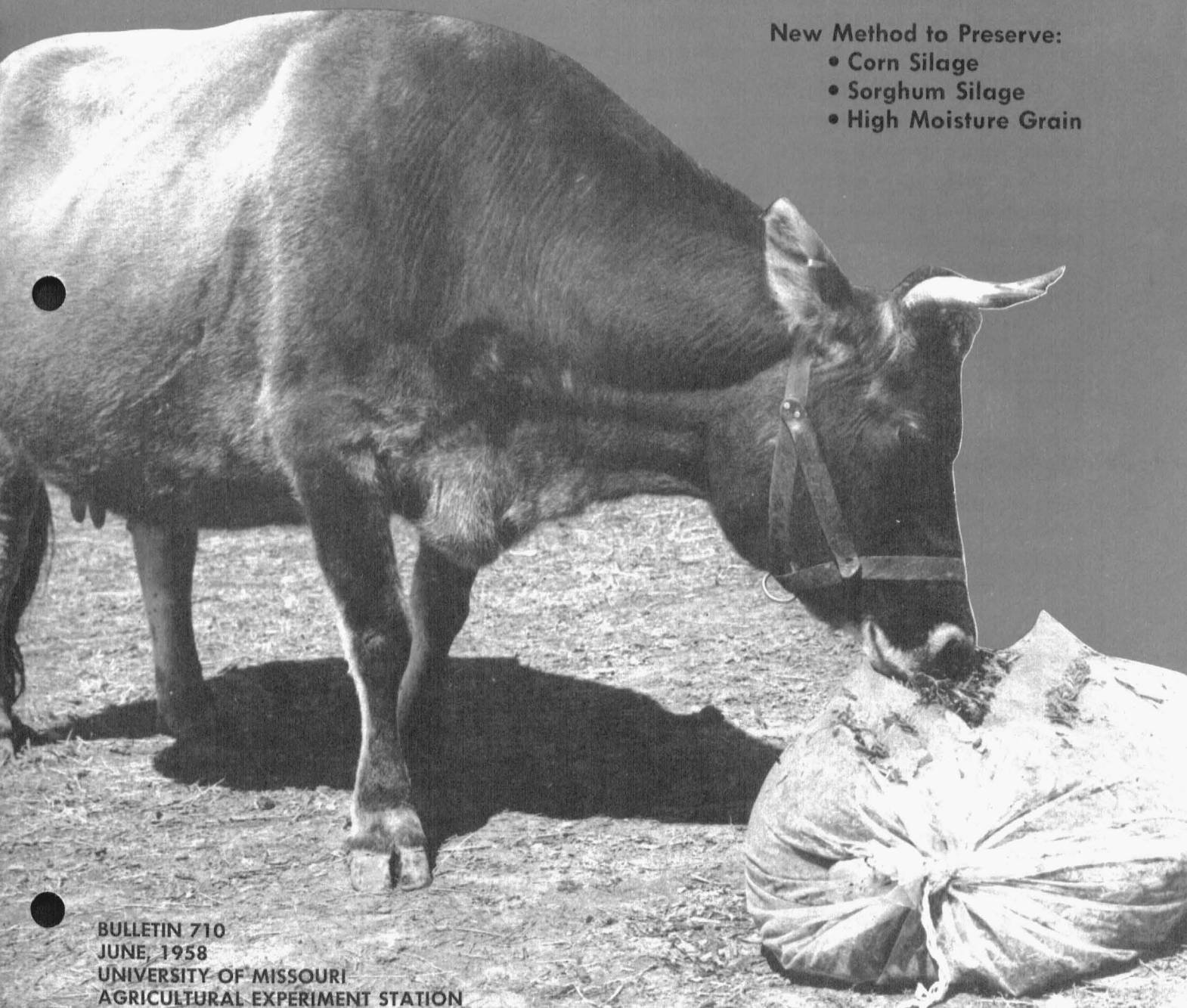


Storing High Moisture Crops, Including . . .

Silage in Plastic Bags

New Method to Preserve:

- Corn Silage
- Sorghum Silage
- High Moisture Grain



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Storing High Moisture Crops, Including . . .

Silage in Plastic Bags

Research Shows Plastic Bags Will Preserve Corn Silage, Sorghum Silage or High Moisture Grain

R. A. BLOOMFIELD AND M. E. MUHRER

Polyethylene* plastic bags offer a practical small scale silage-preserving method for the farmer. High moisture grains can also be preserved in plastic bags.

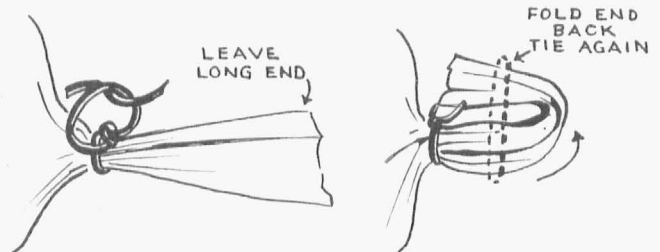
After preliminary research with small plastic bags containing approximately 5 pounds of silage proved successful in 1957, the Missouri Experiment Station tried the larger 100-pound bags pictured on these pages with equally good results.

The requirements for making good silage are mainly a green chopped forage containing a readily fermentable substance and a container that will allow gas to escape and will not allow air to enter. The first requirement is easily met but keeping air out is a greater problem. If silage were put up in the types of bags generally used to package feed, air could get through and complete spoilage would occur in a very short time. But plastic bags, if properly sealed, will keep the air out so the silage will not spoil.

HOW TO FILL AND SEAL BAGS

For our experiments the silage bags were actually a plastic tube made from polyethylene plastic (6 mil. thickness). This plastic tubing is approximately 50 inches in circumference and can be cut to the desired length, depending upon how much silage is to be put into the bags. After cutting the tube to the desired length, one end is tied as shown in the drawings. The silage is placed in the bag and packed;

then the other end is tied. Care must be taken not to puncture the plastic. The ties must be very tight, with the end doubled back and tightly retied. The resulting bag is convenient for stacking and handling; the bags have handles at both ends as a result of the double tying.



Preliminary results indicate that silage made in these plastic bags is highly palatable to all types of farm animals that ordinarily consume silage. A desirable fermentation takes place in the bags with lactic acid being the predominant acid formed. Also, beta-carotene, a substance that is converted into vitamin A by the animal, is preserved in a satisfactory manner.

GOOD RESULTS WITH HIGH MOISTURE GRAIN

Another use for these plastic bags is for storage of high moisture grain crops such as milo. Approximately 800 pounds of 18.3 percent mois-

*Materials for these experiments were supplied by Visking Company, Terre Haute, Indiana.

ture milo grain was stored in 100-pound plastic bags for several months. At the end of this period, there was no evidence of any mold or heating having taken place. This grain was then fed to one lot of 150-pound pigs and compared to lots of pigs fed one of the following: milo dried to 7 percent moisture; dried milo plus water to bring the moisture content up to 18.3 percent; yellow shelled corn. All lots were fed the same supplement to make a balanced ration; all received approximately the same amount of feed on a dry weight basis. The results of this trial are shown in Table 1. The trial was continued for 5 weeks with the pigs gaining on an average of 50 pounds each. Results of this experiment show that the feeding value of the high moisture grain was adequately preserved by the plastic bags.

TABLE 1--RATE OF GAIN IN SWINE FED HIGH MOISTURE MILO STORED IN PLASTIC BAGS AS COMPARED TO OTHER FEEDS

Type of Feed	Accumulative Average Daily Gain
Corn	1.58
Milo (18.3% Moisture--stored in plastic bags)	1.65
Milo (7% Moisture)	1.76
Milo (Added water to 18.3% Moisture)	1.73

FUTURE POSSIBILITIES FOR PLASTIC BAGS

The plastic bag storage method for high moisture crops suggests several possible future uses:

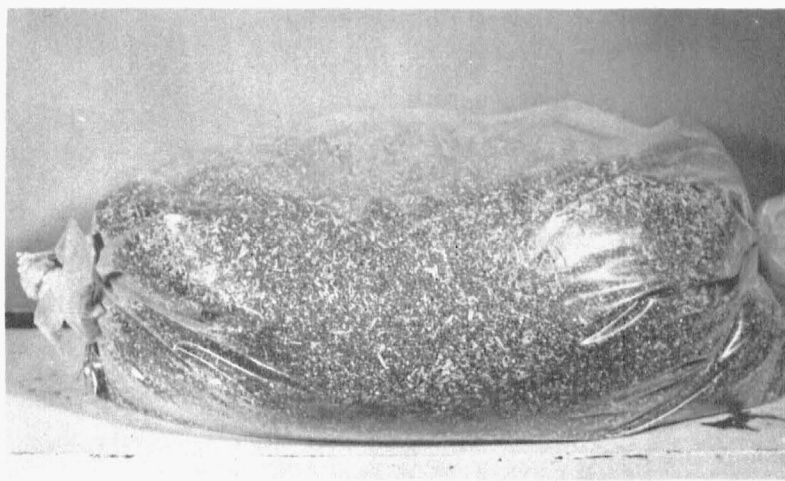
- It could provide a way for forage producers to market products that might otherwise be wasted.
- The bagging method makes silage available to the small scale livestock producer for the first time in quantities that he can afford.
- Silage could be made available for the swine producer in small quantities commensurate with the needs of animals such as brood sows since they do not eat large quantities of silage.
- The plastic bags offer the feed industry a possible means of marketing new packaged products. As mentioned, conventional type bags cannot be used to store silage so the feed industry has not been able to market silage in package form.
- Other markets would include the part time hobby farmer with either one cow, a few rabbits or a milk goat.
- The bags also offer research workers low cost experimental silos to study preservatives and silage supplements.

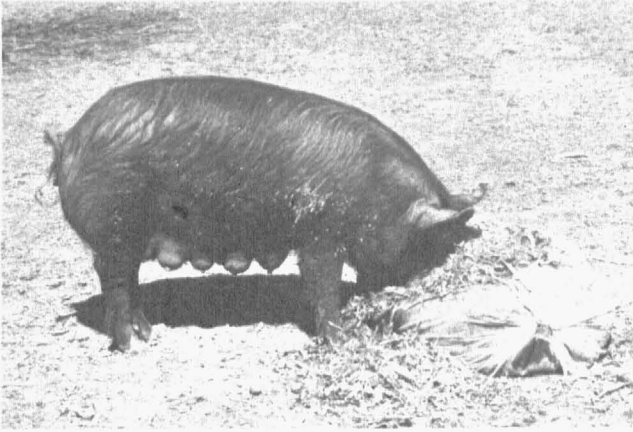
PRECAUTIONS

There are some precautionary measures which must be followed in making silage in plastic bags:

1. Be sure that the ties at both ends of the bag are air tight; this is extremely important.
2. Care must be taken that the plastic isn't punctured during packing by hard sharp material, either inside or outside the bag.
3. If a puncture or tear is found after the silage is in the bag, a strip of pressurized plastic tape should be pressed over the hole to seal it and keep air out. If the puncture is small and goes undetected some molding will result but it will be localized at this point and only a fraction of an inch deep. However, it is safer to seal all the holes that can be detected.
4. If the bags are to be stored inside, the flooring must be smooth with no protruding splinters that will puncture bags.
5. The building must be rodent free. This is important for storage of any bagged material but is essential for high-moisture material in plastic bags.
6. If the bags are stored outside in direct sunlight, some discoloration of the silage will occur. This is not serious and can be prevented by using a black plastic or by covering bags with a material such as straw.
7. Livestock must be fenced away from the storage area.

High moisture grain preserved by this method made excellent feed.





The silage had plenty of taste appeal for hogs, sheep and cattle. This preserving method shows great promise for farmers needing only small quantities of silage.

RECOMMENDATIONS BASED ON OUR FIRST YEAR'S EXPERIENCE:

1. Good silage can be made in thick-walled polyethylene plastic bags. Forage such as whole corn and sorghum plants, when in the stage of maturity usually harvested for conventional silage, can be chopped, packed and sealed in these air-tight bags for good silage.
2. Common silage preservatives such as molasses and sodium meta-bisulfite improve the quality of bagged silage.
3. The bags are easier to handle when made from tubing and tied at both ends. Hundred-pound bags are convenient for two men to handle and are the recommended size.
4. The bags are waterproof and need not be stored inside a building but must be protected from rodents or other animals that would make holes in the bags.
5. The bags will stand handling, dropping, stacking, etc., but are easily punctured by sharp objects.
6. Holes made in the bags must be repaired with plastic tape.

RESEARCH IN PROGRESS

This is a preliminary report. Research is in progress to determine the best methods of handling, the best preservatives to add, the best size and kind of bag to use, the nutritive value, and feeding recommendations for high moisture crops stored in plastic bags.

This bulletin reports on Department of Agricultural Chemistry research project 274.

Punctures result in spoiled spots if not sealed. Use pressurized plastic tape to patch them.

