



*The History of the
Development of the
Large Round
Bale*

*Ohio Agricultural Research
and Development
Center*



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*I*n 1964, R. W. Van Keuren, an Ohio State University professor of agronomy and OARDC forage researcher, initiated a study on pasture for beef cows and calves at OARDC's Southern Branch near Ripley and Southeastern Branch near Carpenter, in cooperation with Ohio State's Department of Animal Science and the OARDC Outlying Branches. Several years later the studies were expanded to OARDC's Eastern Ohio Resource Development Center at Belle Valley. The hill lands of this region appeared to be a good area for beef cow-calf production. Although initially low in pH and phosphorus and low to medium in potash, the soils generally responded well to fertilization and had good forage yield potential.

Because wintering represents two-thirds of the beef cow feed costs, the pasture studies were expanded to include year-round grazing. This all-season system included wintering the cows on small round bales left in the field and on the accumulated summer and fall regrowth. The bales were made with an Allis-Chalmers Rotobaler. The bales weighed about 40 to 50 pounds and kept well when left in the field where dropped. The herds were grazed during the summer pasture season on orchardgrass or bluegrass, with tall fescue used for the wintering portion. The early studies were with grasses fertilized with nitrogen. Later

studies were with grass-legume mixtures. The year-round herds were initially compared with other herds pastured on orchardgrass or bluegrass during the summer and wintered in the barn and drylot with hay. The cattle on the year-round system maintained satisfactory weights, calf birth weights were similar to calves from the barn-wintered cows, and overall herd health was excellent. In addition, labor for feeding was markedly reduced, no bedding was required, and the costs and problems of manure disposal were eliminated. Details on the early findings as well as management of the forages and livestock are discussed in several of the publications listed.

C. F. Parker, a professor of animal science with Ohio State, became interested in researching the use of the year-round forage system for sheep. Wintering ewe flocks on field-saved bales and standing forage regrowth had never been done before. In 1966, a cooperative sheep project with Van Keuren was initiated at the OARDC Sheep Unit in Wooster and at the Eastern Ohio Resource Development Center. With the sheep studies, the first hay crop was removed as hay or silage. The second growth was baled and left in the field to be used with the fall regrowth. This provided forages with somewhat higher quality than with the two harvests used with the beef cow system. Both orchardgrass and tall fescue were used for the wintering program, and the nutritional quality and protein were shown to be adequate for mature pregnant ewes. The ewes remained on this forage until four to five weeks prior to lambing, when they were removed to barn or drylot during the lambing period. Tall fescue was found to be a good grass for wintering because it held its quality well both in the bale and as standing regrowth, as well as providing a good sod. During the winter period, its quality and palatability were very adequate for the ewes.

The Econ Fodder Roller from Australia

In 1970, during a tour of farms in Australia, Van Keuren saw a baler called the Econ Fodder Roller that made a 250- to 400-pound round hay package that could be field-stored. He was interested in its possibilities in the Ohio forage studies. He took photographs of the machine to show to colleagues in Ohio. Dr. Roy M. Kottman, dean of Ohio State's College of Agriculture and director of OARDC, agreed that this machine had potential for the Ohio studies and provided funding to purchase one from the Australian manufacturer, Elder Smith Goldsbrough Mort Limited, Sydney. The machine arrived in time to be used during late summer, 1971. The first bales were made in August 1971 at the Eastern Ohio Resource Development Center and shortly after at the Southern Branch. In early September, bales were also made at the OARDC Sheep Unit. Studies using the field-stored fodder rolls for both beef cows and ewes were undertaken during the winter of 1971-72. Comparisons with the small round bales were subsequently undertaken for the next several years to evaluate the Econ Fodder Roller bales in the wintering programs for both beef cattle and sheep. The bales proved to be satisfactory for field storage of hay and winter feeding under Ohio conditions. Field demonstrations were held, and results were reported during research field days at Wooster and at the branch stations as well as at national and international meetings and in many publications. (See publication list.)

The First Ohio Field Demonstrations

Representatives from hay equipment companies were invited in August 1971 and in subsequent years to field demonstrations of the Econ Fodder Roller. Several companies sent representatives to

these events and expressed interest in this concept of harvesting and feeding large hay bales. One company soon came out with a version of the Fodder Roller, called the Hawkbilt. Vermeer followed with a machine that incorporated making a large bale using a chamber patterned after the Allis-Chalmers Roto Baler. New Holland and other companies subsequently came out with similar machines. As an indication of the interest in the new methods of hay harvesting, handling, and utilization, the 1972 Sheep Field Day at the Eastern Ohio Resource Development Center was attended by more than 1,200 people.

A Revolution in Haying

The Ohio researchers can be credited for introducing the concept of the large round bale to the United States and for conducting the first research on the bale in this country. This introduction and subsequent research, together with development by farm equipment companies, led to the large round balers that are now in common use. The large round hay baler has revolutionized the harvesting, handling, storage, and feeding of hay. This technology has spread throughout the United States and the world. It has been the major development in haying during the past several decades.

Participants in the Research

In addition to R. W. Van Keuren and C. F. Parker, other Ohio State and OARDC individuals who were involved in the early research included E. W. Klosterman, professor of animal science; W. E. Gill, Department of Agricultural Engineering; T. F. Wonderling and R. L. Eby, superintendents of Outlying Branches;

C. B. Boyles and J. D. Wells, branch managers; C. H. Bradford, manager of OARDC Sheep Operations; and others.

Findings: 'Greater Flexibility' and More

Starting in 1971, Ohio research on all-season forage systems incorporated the use of large round bales. This provided greater flexibility than the small round bales. The large bales could be easily moved to the edge of the fields following harvest to allow for subsequent harvests, winter feeding, moving to a feeding area, or barn storage. The large bales had a lower percentage of outdoor storage losses compared to the small bales. The large bales could be stored close together and covered with long sheets of black plastic to reduce storage losses from the weather.

Later, plastic sleeves became available to protect the individual bales. Eventually, balers came on the market that could plastic-wrap the bales in the machine. Early in the research, bales were wrapped in plastic to try to make silage. This was not successful because an airtight wrap couldn't be achieved. Subsequently, plastic bags became available that made round bale silage possible. Bale silage was studied at several of the branches, and the feasibility of this method of storage and feeding was shown.

Wintering Programs

It was found that for wintering programs, the fall-saved forage should be utilized first while its quality was the highest, followed by feeding the bales. There is a decline in dry matter digestibility and in total dry matter of the standing regrowth as the winter season advances. The winter-grazing areas under study were divided into smaller fenced pastures, usually four or more, or the usage was controlled with electric fencing or with feeding racks. This provides for best utilization of the forage. A wintering area

should be selected that has good drainage and protection from winter weather.

In early studies, the large round bales were left in place where dropped by the baler. In later studies, the bales were stored along the edge of the fields and protected from the animals with an electric fence. This allowed for several hay harvests to be made. After the fall regrowth had been grazed, the bales were then fed. Producers have many options. Following the summer grazing, the herd was moved to the wintering fields sometime in October, depending on the season. The fall regrowth was grazed by moving the herd through the fields in sequence, then going back through and feeding the bales on the second go-round. Grazing the fall regrowth first was found to be especially important for the legumes because of the leaf loss that occurred if left late into the winter. Grasses, especially tall fescue, retain their quality better than the legumes. But even the grasses are best used earlier in the wintering period. The fall regrowth usually carried the herd until about the first of the year, depending on the amount of fall growth. Ohio normally doesn't get much if any snow before then, so this early grazing generally works well. It was learned that it was best to plan on moving the herd from the winter pastures to a feeding area for a few weeks during the spring breakup. This reduced damage to the fields. Also, the large round bales were used to supplement the summer pastures in years of less production because of drought. It is easy to move these bales into the summer pastures as needed.

Effect of Winter Grazing

There was concern about the effect of winter grazing on the forages. It was thought that winter grazing might shorten the longevity and yield of the stands. This did not prove to be true. Perhaps taking the first harvests on the wintering areas as hay

allowed the plants to recover from the winter usage and trampling.

Summary: 'Now a Common Sight'

In summary, the development of the large round bale system has revolutionized the harvesting, handling, storage, and feeding of hay for all kinds of livestock. The Ohio researchers played an important role in the development of this system. Many innovations have come about, such as racks for feeding the bales, plastic sleeves for outdoor storage, plastic bags for using the bales as silage, and balers that wrap the bales in plastic as they are baled. Large round bales are now a common sight across the United States and in other countries.

Early Publications on Year-Round Forage Systems for Beef Cows and Sheep

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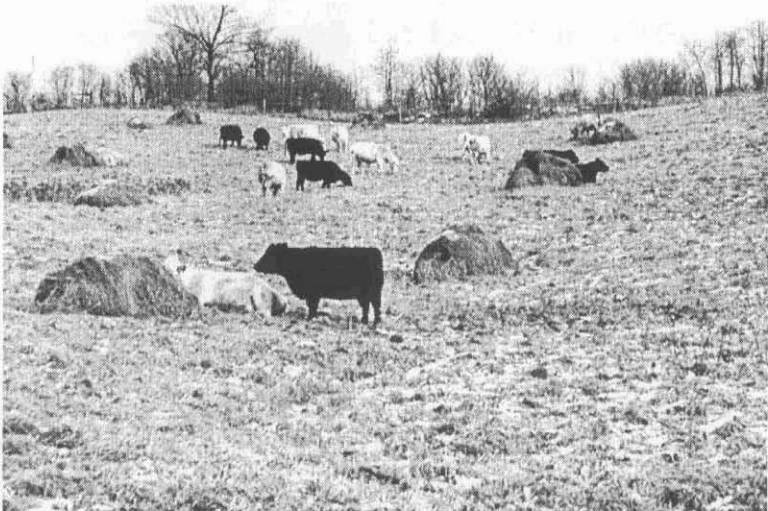
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The first large round bales made in the United States—at OARDC's Eastern Ohio Resource Development Center, Belle Valley, August 1971.



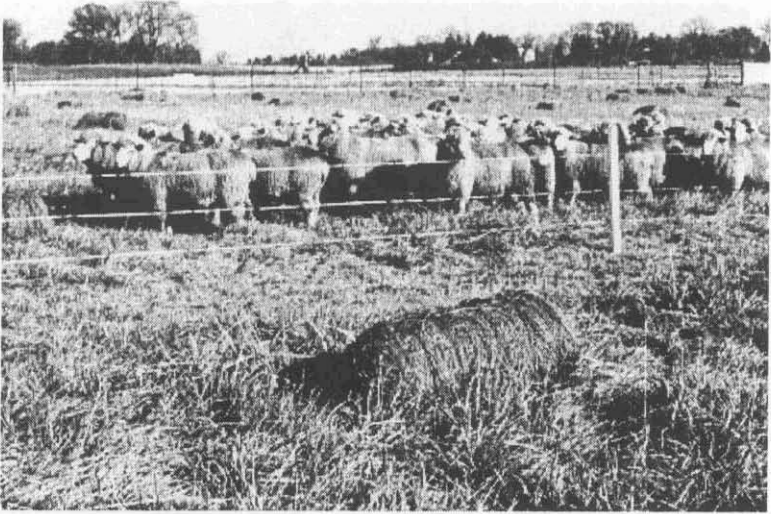
A beef cow herd wintering on fodder rolls and fall-saved regrowth at the Eastern Ohio Resource Development Center, winter 1971–72.



An early large round baler, manufactured by Vermeer, at OARDC's Southern Branch at Ripley.



A fodder roll being weighed. Typically, these rolls weighed 250 to 400 pounds. The photograph shows how easily the rolls were moved.



Ewes on small round bales and fall regrowth, OARDC Sheep Unit, Wooster.



Ewes wintered on fodder rolls and fall regrowth, OARDC Sheep Unit, Wooster, winter 1971-72.

The History of the Development of the Large Round Bale



An AC Rotobaler in the foreground and an Econ Fodder Roller in the background, Southern Branch.



Charlie Boyles, manager, Eastern Ohio Resource Development Center, and a Hawkbilt large untied bale, 1973.

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The OARDC History Series

The OARDC History Series looks back at significant accomplishments of OARDC scientists—achievements that continue to benefit agriculture today.

OARDC is part of The Ohio State University College of Food, Agricultural, and Environmental Sciences. The Ohio General Assembly established OARDC as the Ohio Agricultural Experiment Station in 1882. The station was first located on Ohio State's Columbus campus. In 1892, the station was moved to Wooster. In 1965, the station's name was changed to the Ohio Agricultural Research and Development Center to more accurately reflect its function and programs. OARDC formally merged with Ohio State in 1982. Today, OARDC faculty, staff and graduate students work at the main campus in Wooster as well as at Columbus, Piketon and OARDC's Outlying Branches.



OARDC