THE DEVELOPMENT OF HAY HARVESTING
MACHINERY IN THE HIGH HALLows
OF ROCKBRIDGE COUNTY

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The development of techniques and machinery used in the harvesting of hay has been most significant in the last 100 years. Due to the rapid yet recent development it is possible to find individuals who have lived through the changes of tools and equipment needed to cut, rake, and either stack or bale hay. Each area of the country has had a different development, therefore I have concentrated my efforts to the development of hay harvesting machinery in High Hallows area in Rockbridge County. My efforts have been greatly a result of the aid of two very knowledgable local farmers: Clarence Wilhem of Denmark, Virginia and C. W. Spradlin of Stuartsville, Virginia which is just north of Roanoke.

The development has gone through three distinct yet overlapping stages: (1) manual, hand operated tools, (2) horse-drawn equipment, and (3) modern, tractor operated machines. The history of hay harvesting machinery is sitting at our back doors. As shown in the many photographs of actual machinery in this area, many of the old machines have been left out to rust away. By inquiring to these two kind men, I am able to trace the entire history from the manual, hand tools to the latest modern machines of today.

Ever since man began domesticating plants and animals, the need to cut grass and crops existed. The sickle has been proven to be one of the older tools known. This large semi-circular blade is still used today as the main tool in the mowing process
of hay and crops in some areas of the world. Even in the most
developed countries, every farmer has a sickle on hand for some
small jobs. In the High Hallow area, the sickle was used as the
main cutting tool up to the early 1800's. The other tool of great
heritage and significance to harvesting hay is the pitchfork.
Ranging from 2-5 prongs, the pitchfork has been the primary in­
strument for picking up hay. This tool is likely to have de­
veloped from the oldest pick-up tool--the human hand. Together
with the sickle, the basic concept of harvesting hay has been
developed.

This basic oncept can be seen clearly in today's farming
techniques. Historically as well as prehistorically, hay has al­
ways been stored outdoors in haystacks. After the grass has been
cut with the sickle, it is picked up by the use of the pitchfork.
The hay is then stacked around a stationary post and sometimes
tied up. The dried grass is left outdoors year round. Many times
it is fenced off to protect it from cattle. The basic technique
of harvesting hay is cutting the grass, gathering the hay to a
central location (raking), allowing the grass to dry, storing the
hay in such a way and place that it will be both protected from
spoilage and from being eaten by animals.

Near the beginning of the 1800's a new tool was developed
for manual mowing of grass. This tool called a mowing scythe is
a modification of the simple sickle. As demonstrated by Mr.
Wilhem, the body of the scythe is bowed to allow the full motion of the scythe to be closer to the body. This design also allows one to use both hands as well as the whole body instead of just one arm. The cutting edge is on the inside of the blade which allows a "pulling across" motion in order to cut the grass.

Another development was the storage of hay. The pitchfork was still the means of picking up hay, but the method of storing hay indoors in a barn was new. The new barn storage method is rather complicated as compared to the haystacking method. The
hay is transported to the barn area on a horse-drawn wagon which is loaded by a large pitchfork crew of men. Once at the barn the hay is transported inside by use of a trolley system which is mounted to the ceiling of the barn. The trolley extends outside through a high side door. The side door is still seen on many old barns around the state. Connected to the trolley is a vice-like clamp called a hay fork that can hold very large amounts of hay. Once the hay is in the grasp of the hay fork it is raised up and the trolley is walked over to the desired place to drop the hay, and by a pull of a rope, the hay is "tripped" from the hay fork.

A barn would be filled with nothing but hay in the winter-time. The hay could then be used by taking it out when needed from the ground level. In a recent study at Texas A & M, it has
been proven that hay stored indoors has greater nutritional value. Their reasoning being that some strands of bacteria which thrive in humid weather will digest the most nutritious parts of the hay--the sugar and fiber. To combat this problem, hay stored indoors will be protected from the rain and high humidity, therefore the bacteria will not survive.¹

Around 1860, the horse-drawn mower was becoming popular in the High Hallows area. Mowers designed by our neighbor Cyrus McCormick were the first to take over the previously slow process of mowing by hand. Due to the sloping terrain of Virginia, a short cutting blade must be used. A four foot cutting blade is the average size found on horse-drawn mowers throughout the countryside. The development of riding mowers has a profound effect on the number of men needed to harvest hay. Before it was not uncommon to hire a dozen young men to help hand mow a field of grass. This cost time and money. With the horse-drawn mower, all that is needed were two strong work horses and 3 experienced men to aid in the pitchfork aspect of harvesting. The horse-drawn mower had a second virtue as well. The time saved on the harvest could then allow for an additional harvest per year. Using hand scythes, two harvests per year was the maximum. Now it is possible to have three harvests as long as the mid summer crop is healthy enough for a cutting.
In this picture, Mr. Spradlin is riding on a typical horse-drawn mower which has been restored to perfect operating condition. Although difficult to see, the mower blade moves back and forth over a stationary grid to create the cutting surface. It is powered by a gear connected to the axle of the mower. Already set at a certain timing, the turning of the wheel will cause the mower to cut faster or slower. The problem with the early mowers was the speed at which the mowers were set. Depending on the thickness and strength of the grass, different speeds were necessary to adequately cut the different grass. The pictures on the following page are two views of the same horse-drawn side mower.
This mower was one of the later models made by the McCormick-Dearing Company (later known as International). It is roughly a 1920-1930 model mower. This mower, although temporarily missing its wooden tongue, is operable and used today. McCormick and Dearing were the pioneers of horse-drawn mowers. They began as separate competitors until McCormick bought out the Dearing Company.

Very soon after the mower was in wide spread use, the invention of the dump rake arose. The dump rake gets its name from the manner in which the machine must be operated. While raking
the field of cut hay, the rake will become full of hay. In order to clean it out, one must stop and lift up the rake as the hay "dumps" out. In the following two pictures, the first is of a
typical dump rake with the rake down in operating position. The second is pulled up in order to show the position when the hay is "dumped" from the rake.

Later as the development of pick-up baling became popular, so did the side rake. Although the side rake had been invented not too long after the dump rake, there was not a real need for it. The virtue of the side rake is its ability to rake the freshly cut hay into straight windrows which are more simply just rows of hay. It is very rare to find an early model side rake due to the lack of demand at that time.

The next milestone in hay harvesting is the production of the tractor. This is by far the most important piece of farm equipment. The first operable tractors were the side-mounted steam engines. The engine is side mounted so the smoke stack is as far away from the driver as possible. Steam engines were first manufactured in England, but they were never very popular due to two reasons: weight and danger. The tractors are extremely heavy pieces of machinery, and it takes a large horse-power engine for it to be mobile. Steam never made it as a widely popular engine due to its great risk of fire. The principle concept of the engine is based on the high pressure build-up of steam. This is extremely dangerous.

The first gas-engine tractors in High Hallows was around 1925. Some of the first tractors were made by Fordson (trade
name for Ford and Sons). Mr. Wilhem did not buy his Farmall tractor until 1946. He still has the first tractor and says it was running up until 1975, and is still capable of operating with a little work. The following two pictures are of his 1946 Farmall tractor:

These tractors were fairly powerful, but rather lightweight. In order to add some traction to the vehicle, the tires were filled
with water. The early tractors were not equipped to run the farm equipment, they were used merely to pull them just as horses had done for years. This was convenient for the horse-drawn machinery since they could very easily be made to hitch to a tractor. The use of the tractor cleared the way for larger farms. With the new machine a man can now farm large acres of land. This is contrasted with the average 150 acres in which a man could reasonably manage with horse-drawn equipment. Today's equipment allows one to mow half that number in one day!

The greatest breakthrough in farm machinery is the invention of the "power shaft" tractor. The "power shaft" tractor has a rotating shaft in the rear of the tractor which turns in accordance to the RPM's of the engine. Farm equipment has been developed in which a connecting bar adapts to the "power shaft." When the shaft turns it also rotates the connecting bar which in turn rotates the machinery. Now most farm machinery operates on this principle. Later, the most modern concept in tractor power has arisen--hydraulics. This is the use of air pressure as a source of power. Many tractors now have a combination of the "power shaft" and hydraulics.

Around 1900 most farmers were stacking their hay in either the barns or outside. Also at this time the first stationary balers were introduced in the High Hallows area. Then, the only reason to bale hay was to sell it or to trade. A lot of the hay trading
was done with the employees of the Longdale Iron Mines nearby. These men would usually have small farms with some cattle and would not have much time to bale their own hay. Also, due to the lack of wealth in the area, it was common that one person in the area owned a stationary baler and would go from farm to farm and be hired to bale the desired amount for each farmer. In the High Hallows, such a man was Adam Swink. Mr. Swink owned a steam-powered stationary baler. These were the first powered stationary balers. These, like the steam tractors, were quite dangerous. It was common safety practice for a man to stand with a bucket of water at all times to prevent any fire that may occur. The steam powered baler lasted up to the 1920's when it was replaced by the gas-powered stationary baler. By stationary, I am talking about the method in which the baler remains stationary as the hay is fed into the baler. This obviously is not an efficient method to bale all of one's hay.

As stated before, the people of High Hallows stacked their hay in barns or outdoors up to the 1940's. Around this time when the tractor is just beginning to be popular, a mobile, pick-up baler was developed. New Holland came out with the first pick-up baler that would automatically tie up the bale. It is designed with an automatic trip that causes the packing of the hay to cease for a full motion as the bale is automatically tied off. The machine is called the New Holland Automoton. This stimulated
great competition for a new and better square baler. The popularity led farmers to see the benefit of storing hay in a compact, orderly fashion. Also, the amount of hay normally lost while stacking is cut down considerably. One other benefit is the fact that fewer men are needed to bale square hay. Usually one drives the tractor while one throws up the bales to the last guy who stacks the hay while in the wagon.

Square bales have the unfortunate problem of spoiling if the grass is wet. After cutting the grass, it must sit for a few days in order to dry out. If exposed to the rain for a long period of time, the grass will not dry out. If baled while wet, it does not take long for hay to rot. Even after being baled it is important that they do not get rained upon. They will still rot if wet.

Getting back to the basic concept that haystacks can survive outside, a small round baler was also developed in the early 1940's. The concept that haystacks survive is due to the fact that rain will run off the sides. Round balers use this concept by making a tied up round baler. In 1953, Mr. Wilhem bought his first baler. It is an Allis-Chalmers round bale model. Although not quite as good for storage, they withstand the rain perfectly well due to their round shape. They could even be left outside if necessary, although the smaller the round bale, the less nutritional value of the hay since there is always an outer layer that is ruined by the weather, so the lesser amount of thickness
on the inside of a bale results in a decrease of good hay.

In the first picture on page 14 the most apparent characteristic of the baler is the ramp leading into the two black rollers. This is a conveyer belt which rotates in a circular motion in the direction which enables it to pick up the hay and roll it up to the rollers. Although difficult to see in the second picture, the hay is led in between the black straps. The hay is being rolled tightly while between the straps. As the bale gets larger the straps will spread apart, but still wrapped around the bale. When the bale is at a certain size, a device will automatically tie the bale with either twine or wire, then it is spit out and the process begins again.

Square balers work on a different concept. They will usually pick up hay from the front and pound it into a square-like mold. When enough hay has been added to reach a certain length then a trip will activate, stop the pounding of the new hay and allow the bale to be tied. Once the bale has been tossed out the process begins again. The early models which came out had their own motor. The tractor is necessary not to run the baler, but to pull such a heavy baler. The contraption in the picture on the following page is an early 1960's New Holland square baler which Mr. Wilhem bought second hand in the early 1970's.

Nowadays the tractor is necessary to operate the balers. This 1983 New Holland square baler is hooked up to a "power
shaft" as well as a hydraulic system. The "power shaft" usually operates the rotation movement of the hay pounder as well as the device that picks up the hay off the ground. The hydraulics usually push the bales out of the pounding chamber.

The latest and evidently a rather permanent baler is the large round baler. These huge pieces of machinery put out a bale that is just as indicative of its size--huge. The reasoning for such large bales is once again the basis for the original stacking of hay. When the hay is stacked or baled round, it can adequately withstand the weather since the rain runs off the sides rather than penetrates into the middle. Of course there is some wasted hay on the outer parts of the bale, but the majority of the inner hay remains fresh. By baling a large bale, the manpower
is cut down to a single person. They can be transported by using a fork lift device which attaches to the tractor. Less hay is lost in this process, less time is required to bale it and there are fewer bales to handle. In the following picture notice the
dark outer layer on the bale that seems to have been exposed to the rain more than the others.

The larger round balers work on the same principle as the small round baler described earlier. These pictures were taken during the actual baling process. The baler is hitched to the "power shaft" and four hydraulic cable connections. Notice the shiny silver hydraulic arms in the picture. It is obvious that hydraulics are used more to open and close than continual power.

The second picture contrasted to the first gives a clear
The rake has been the most unchanged hay harvesting tool since the first dump rake. The main improvement has been the strength of its structure and the side rake. The side rake is still needed since baling with the large round balers need larger windrows. Therefore, three normal sizes are side raked into one large windrow.
The last piece of hay harvesting machinery is the developing of the conveyor belt. In the picture below this large, long belt is used to transport square bales of hay. These are sometimes taken into the field and the belt will transport the bale up to the hay wagon, thus taking place of the lower back which usually takes the brunt when one throws up a bale into the hay wagon.
In conclusion one must step away and quickly review the gap which has been filled from the mowing scythe to the New Holland round baler. All this advancement in just over 100 years. I have been extremely fortunate to find two very kind and interesting men in Mr. Wilhem and Mr. Spradin. It is very fascinating to visualize how it was when these men were young. Everything was so different and primitive when compared to our present day standards. Besides learning a great deal about farming and equipment, I have grown to appreciate the gold mine which exists in the minds of our elders. Much of what I have collected concerning the development of hayharvesting machinery in the High Hallows of Rockbridge County could not have been found in the library. We need to tap this valuable source of information among our elders. They are the true historians.

Pledged in full.

[Signature]
End Notes


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