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Machines to Chop Newspaper for Bedding

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In 1988, Governor Robert P. Casey signed Act 101 into effect, establishing a statewide goal to recycle at least 25% of Pennsylvania's waste by 1997. Many farmers are helping the state reach that goal by removing newspaper from the waste stream and using it to bed livestock.

Newspaper makes an excellent bedding material; it's absorbent, generally less expensive than straw or sawdust, and biodegradable. Before it can be thrown under animals, though, it has to be chopped or shredded. There are several machines available to process newspaper, each one with its own strengths and weaknesses.

Portable Machines

There are two kinds of portable machines for chopping or shredding newspaper: hand-pushed, self-contained machines and tractor-carried, or tractor-powered, machines.

The hand-pushed machines are suitable for use in tie stall barns, where access is limited. These machines are usually used for chopping and distributing small, square bales of straw or hay, but they can also process whole or baled newspaper. They are typically equipped with straight or helical rotocore cutting devices. (See page 3 for information on cutting devices.) The main advantage of hand-pushed machines is that they process newspaper while simultaneously distributing it under the animals.

Tractor-carried machines can be divided into two categories according to size. The first category includes small, square-bale choppers. Because these machines are tractor-carried, they are convenient in free stall barns. They're more powerful than the hand-pushed machines, and can have either a rotocore or counter shear cutting device. To process enough paper for large free stall barns, these machines require more frequent loading because of the small-sized bale chamber. Several users have added platforms to carry extra paper into the barn for shredding.

To process large amounts of newspaper, tractor-carried machines with large bale hoppers are available. They're typically equipped with counter shear cutting devices and can bed two aisles in a single pass. The tractor's size, not engine power, is important when using these machines. The weight of the tractor is necessary to keep the bale chopper stable. One operational problem associated with large bale choppers is that when the hopper is filled to capacity, it tends to overflow when the machine starts chopping. Also, these machines are large, making them hard to see behind when being carried by a tractor. They might also catch on narrow or low-hanging doorways.

Stationary Machines

Stationary machines can be used to chop large quantities of newspaper for storing, baling or bagging. Included in the stationary machines are brush chippers, mobile grinder-mixers, forage harvesters, tub grinders, and industrial shredders and choppers.

A brush chipper is convenient because farmers don't have to buy one—they can rent a chipper, and often hire an operator, when needed. Cutting devices on these machines vary, but generally they're equipped with a flywheel, or cylindrical flywheel, and shear bar. The effectiveness and efficiency of chippers also varies widely. Feeding paper into these machines can be very labor-intensive and might also present safety problems. Farmers may have to experiment with several machines to find one that works well.

If farmers want to try newspaper as a bedding material and have a mobile grinder-mixer already on the farm, they can use the hammermill on the grinder-mixer, with a large bar screen or no screen, to chop

paper. The limiting factor on grinder-mixers seems to be the discharge auger. When operating at high feed-rates, the auger sometimes becomes clogged, which limits the paper-chopping ability of the hammermills. Because they are somewhat inefficient when used to chop paper, grinder-mixers shouldn't be purchased just for processing newspaper.

Forage harvesters have been used to process newspaper, but to use them safely a factory-approved feed mechanism for newspaper *must* be available. Without the proper mechanism, the operator's exposure to feed rolls and knives is very hazardous. It is also difficult for the operator to maintain a continuous feed of paper into the machine. In general, most manufacturers don't provide special newspaper mechanisms, so forage harvesters are *not* recommended from a safety standpoint.

Like mobile grinder-mixers, tub grinders will process paper but they're too expensive and powerful to use just for paper. They are generally equipped with hammermill cutting devices. One disadvantage to tub grinders is that, when used outdoors, units with blowers could cause litter problems if the shredded paper isn't immediately contained.

The last category of newspaper-chopping machines includes industrial shredders and choppers. These machines are typically used in recycling centers to chop paper for baling. Because they're expensive, they may not be suitable for farm use. However, a nearby recycling center equipped with an industrial chopper might be a cheap, plentiful source of pre-processed paper.

Safety First

No matter which machine you decide to use to chop newspaper for bedding, there are certain precautions you should take to avoid injuries and accidents.

- Become familiar with manufacturer's warnings and safety procedures and follow them at all times.
- Foreign objects, such as rocks, metal cans, and other garbage, are often mixed in with newspaper (especially if it comes directly from a recycling facility). Always wear eye protection in case the machine throws debris into the air.
- If a machine becomes clogged, turn it off and wait until the motor is completely stopped before trying to unclog it. Never risk trying to unclog it with a broom handle or stick while the machine is running.
- Wear heavy gloves when unclogging machines—the cutting mechanisms are sharp!
- Do not allow casual observers nearby while a machine is running.
- If carrying a machine behind a tractor, watch out for narrow or low-hanging doorways.
- Never remove safety guards from any of the machines.
- To keep machines operating smoothly, clean them often.
- Wear a particle mask to filter out paper dust, which could cause severe respiratory problems.
- One final note—like other bedding materials, newspaper can burn very quickly! When using it in a barn, be extremely careful. It only takes one spark to create a disaster. In any case, be prepared. Make sure there are fire extinguishers and/or a water source inside the barn.

Summary

Of all the machines available to chop newspaper for bedding, no one machine is better than all the rest. Each machine mentioned in this fact sheet has its own benefits and drawbacks in different situations. If farmers wish to start using newspaper and need a machine to process it, the best thing to do is shop around. Visit farmers who are already using newspaper, examine the different available machines, and then decide which machine is best for your particular farm.

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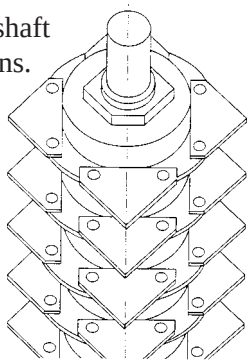
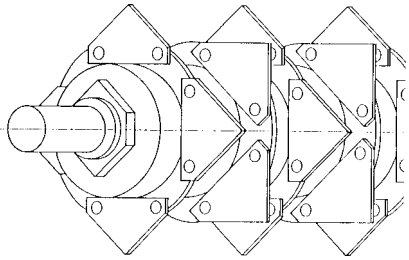
CUTTING MECHANISMS USED IN MACHINES FOR CHOPPING NEWSPAPER

Rotocore—Straight Configuration



A straight rotocore has a rotating shaft equipped with mower knife sections. The knives are mounted perpendicularly to the shaft in a straight configuration. The knives cut the material as it is held above a finger grate. These mechanisms are most common on hand-pushed cutting machines.

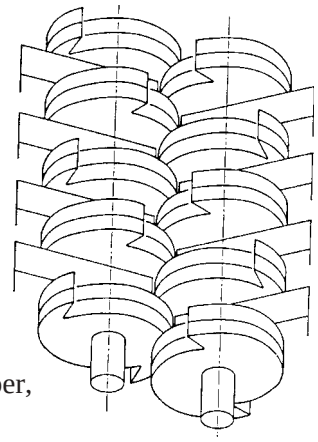
Rotocore—Helical Configuration



Helical rotocores are similar to straight rotocores, except that they have rotating shafts with knives mounted perpendicularly to the shafts in a helical configuration. They appear to be more power efficient than straight rotocores.

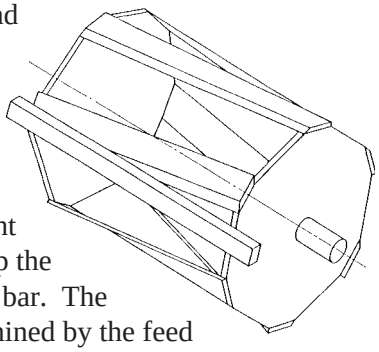
Counter Shears

There are two types of counter shears. The first type has two discs with knives mounted perpendicularly around the edges. One disc rotates, the other is stationary. The knives on the fixed disc hold the paper as the rotating knives cut it. These are often found on tractor-mounted bale choppers.



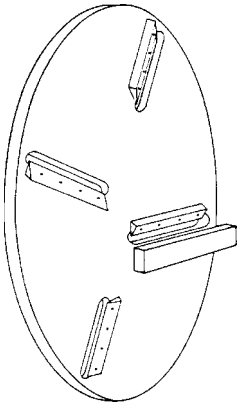
The second type of counter shear has one row of sharpened discs rotating clockwise and one row rotating counter-clockwise. The paper is torn as it is forced through the space between the discs. These are found on stationary machines that are mostly used for processing light metal, scrap wood, tires, paper, and cardboard.

Cylindrical Flywheel with Knives and a Shear Bar



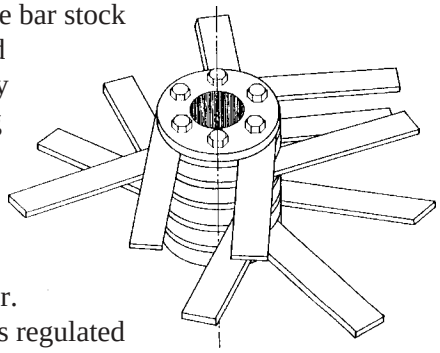
Cylindrical flywheel and shear bar machines have a rotating barrel with knives extending horizontally across the entire cylinder. The knives are either straight or helical and they chop the paper against the shear bar. The cutting length is determined by the feed rate and the speed of the flywheel.

Flywheel with Knives and a Shear Bar



Flywheels with knives have heavy rotating discs with cutting knives mounted horizontally on the discs. As the flywheel spins in front of a stationary shear bar, it shears the paper between the knives and shear bar. Clearance between the knives and shear bar regulates the size of the cut. These flywheels are commonly found on older cut-and-throw forage choppers.

Hammermill



Hammermills have bar stock hammers mounted between stationary discs on a rotating shaft. The hammers swing freely via centrifugal force and chop the paper. The particle size is regulated by screens or rows of parallel bars through which the paper passes to escape the hammers. These devices are found in various agricultural and industrial cutting and shredding machines.