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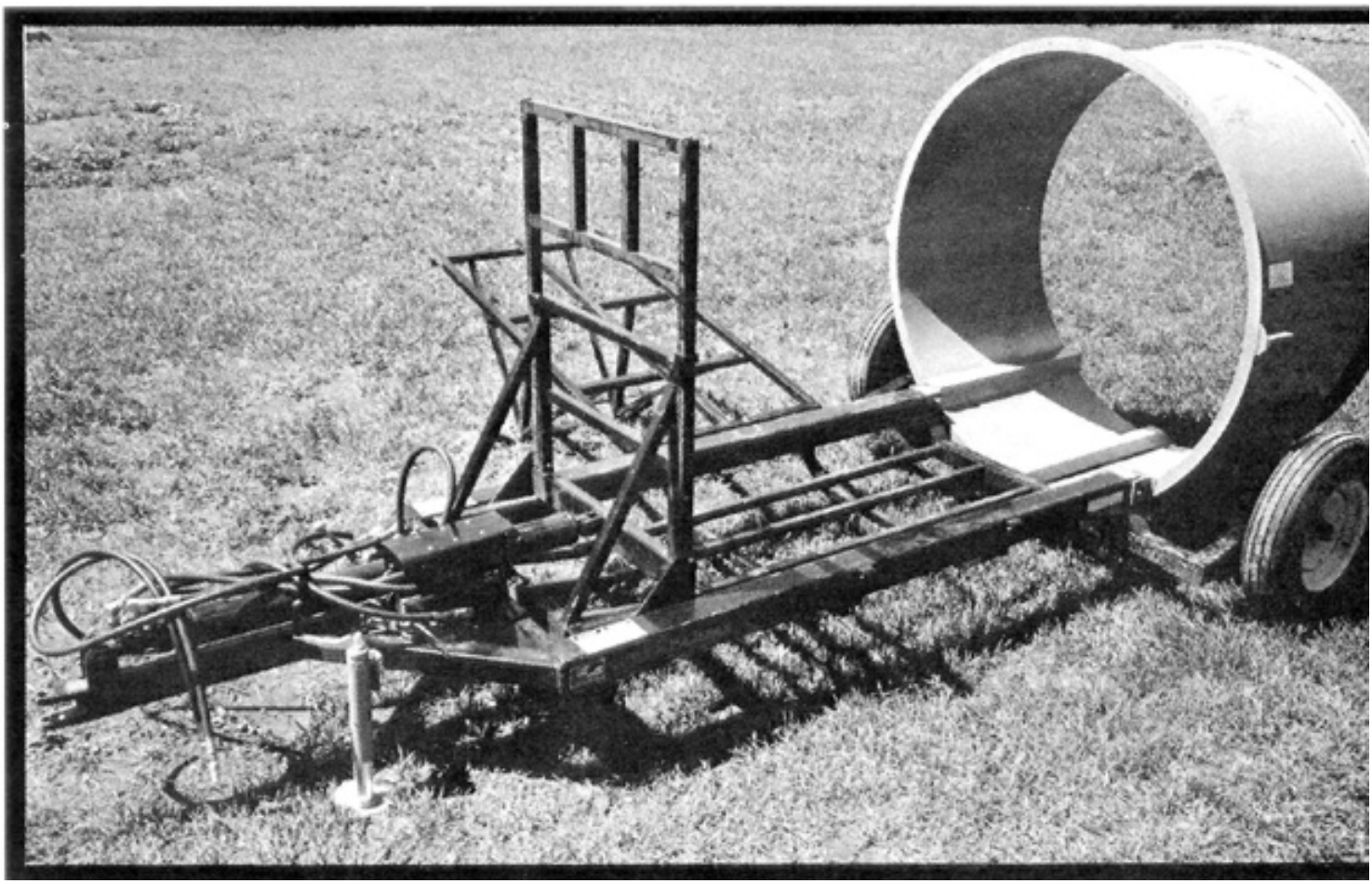
Evaluation Report 601



Rampak Silage Bagger

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

RAMPAK SILAGE BAGGER

MANUFACTURER:

Hurst Equipment Ltd.
Bloomingdale, Ontario
N0B 1K0

RETAIL PRICE:

$4,903.00 (January 1989, f.o.b. Portage la Prairie, Manitoba; with optional remote control). 100 ft (30 m) poly tubing: $126 on the roll and $143 folded, (f.o.b. Portage la Prairie, Manitoba)

DISTRIBUTORS:

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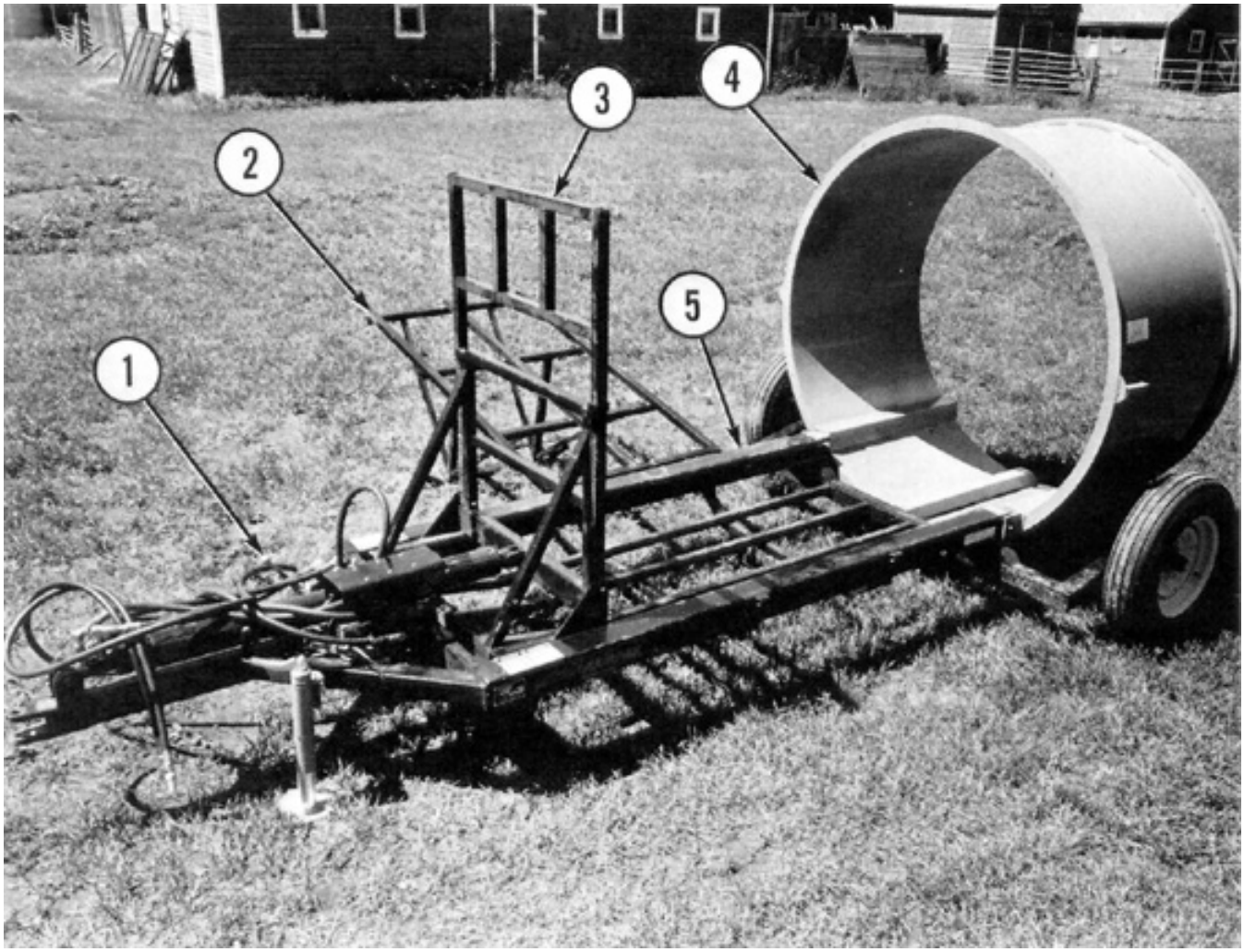

FIGURE 1. Rampak Silage Bagger: (1) Hydraulic Lever, (2) Ramp, (3) Bale Ram, (4) Drum, (5) Carriage.

SUMMARY AND CONCLUSIONS

Rate of Work: When the bales were within 100 ft (30 m) of the storage site, it took about 30 minutes to fill the bag. Installation of the roiled poly tubing required 25 minutes, while the folded plastic took 10 minutes.

Quality of Work: Quality of work was very good. Performance of the Rampak depended on the shape of the bale. Bales from expanding chamber balers were best suited to the Rampak. Bale weight ranged from 1400 to 1700 lb (635 to 770 kg) at the 40 to 50% recommended moisture content.

Ease of Operation: Ease of hitching was good. Installing the poly tubing onto the drum took two men 20 minutes for the poly tubing sleeve on the roll and one man about five minutes to install the folded poly tubing sleeve. It took one man an additional five minutes to tie the bag.

Loading bales onto the carriage of the Rampak was convenient for most front-end loaders. The carriage was convenient for loading directly with grapples or the ramp could be used with loaders having bale forks. Ovated (oval shaped) bales had to be rotated so that the larger diameter was vertical.

Shear bolts protected the Rampak when misaligned or oversized bales caught the sides of the drum. Replacing shear bolts was very difficult and required two men.

The drop extension rail stop had failed near the beginning of the test. The rail had to be held up against the bale to properly engage it.

No adjustment was required through the duration of the test. The ram guide wheels required occasional lubrication.

Power Requirements: A 30 to 50 hp (22 to 37 kW) tractor with a single hydraulic outlet was sufficient.

Operator Safety: The Rampak was safe to operate if normal safety precautions were followed.

Operator's Manual: The operator's manual was good. It was clearly written and contained some useful information on operation. It lacked information on lubrication and shear bolt replacement procedure.

Mechanical History: The drop extension rail stops caused the rail tubing to deform twice.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Improving the ease of shear bolt replacement or alternately provide the safeguard device at the bale ram instead of at the drum.

   Providing a more durable method of holding the drop extension rail up when discharging the final bale from the drum.
3. Adding information in the operator's manual on lubrication and shearbolt replacement and include a more comprehensive operator safety section.
4. Providing a convenient alternate location for the jack, when supplying the remote control option.
5. Providing an easier method of lifting the poly tubing roll into place to install onto the drum.

Station Manager: B. H. Allen

Project Engineer: R. R. Hochstein

THE MANUFACTURER STATES THAT

With regard to recommendation (1-5):

1. Subsequent to your tests, we are considering various design alternatives to improve ease of shearbolt replacement and reduce the frequency of shearbolt shearing.
2. We feel that your recommendation with regard to the drop extension rail is a valid point and we will be looking at a design modification to solve this problem on future units.
3. We agree with the addition of certain information to the owner's manual and we will be looking into the necessary revisions.
4. We are no longer supplying the remote control option for operator safety reasons.
5. The general trend has been for farmers to use the more convenient folded poly tubing, despite the $17 additional charge. Presently, there are no plans to improve the convenience of installation of the poly tubing rolls.

MANUFACTURER'S ADDITIONAL COMMENTS:

1. We feel that the tool you made (FIGURE 4) to ease the mounting of the folded bag has merit and we will look at it further.
2. We have designed an optional bumper rail to mount on the frame opposite the loading ramp to assist in proper alignment of the 5 and 6 ft (1.5 m and 1.8 m) bales. This should **cut** down the instances of shearbolt replacement.

GENERAL DESCRIPTION

The Rampak Silage Bagger (FIGURE 1) is a hydraulically driven round bale bagging system mounted on atwo wheel trailer. A 3 ft (0.91 m) long by 5.5 ft (1.68 m) diameter drum holds the 100 to 125 ft (30.5 to 38.1 m) poly tubing sleeve. The plastic is held tight by a tension ring which slips over the plastic sleeve and drum.

The high moisture bales are either set directly onto the carriage or set onto the bale ramp and allowed to roll onto the carriage. A hydraulic lever near the front of the Rampak operates the telescoping hydraulic cylinder to push the bale into the drum. The Rampak and tractor are pushed forward as successive bales are pushed through the drum and into the plastic tubing. Adrop extension rail is used to push the last bale clear of the drum. Oneplasticsleeve will accommodate eighteen 5.0 ft (1.5 m) bales or twenty-three 4.0 ft (1.2 m) bales.

Shear bolts located on the drum protected the drum from damage in the event a bale catches on the edge of the drum. Detailed specifications are given in Appendix I.

SCOPE OF TEST

The Rampak Silage Bagger was operated for approximately 15 hours, while bagging 280 bales of high moisture (40% to 50% MC) alfalfa and mixed hay. It was evaluated for rate of work, quality of work, ease of operation, tractor requirements, operator safety and suitability of the operator's manual. Although extended durability testing was not conducted, the mechanical failures which occurred during the test were recorded.

RESULTS AND DISCUSSION

RATE OF WORK

Rate of work was highly dependent upon the proximity of the hay to the storage site. The Rampak was best operated with one person operating the front-end loader to load bales onto the ramp or carriage and one to operate the hydraulic lever. Once the silage poly-tubing was installed, one could fill the bag in about 30 minutes with 18 large bales provided all the bales were within 100 feet (30 m) of the site. It took less than 50 seconds for the rail to push a bale onto the drum and return, preparing the carriage to accept the next bale.

Setting up the Rampak with the poly-tubing about the drum, took two men 25 minutes for the rolled plastic tubing and one man about ten minutes for the folded plastic. This included tying the poly tubing sleeve.

QUALITY OF WORK

The Rampak performance was very good. Bales of the proper size, 5 ft (1.5 m) average diameter, were easily pushed into the drum. Caution had to be exercised to ensure proper bale size as well as to ensure that bale formation was good. Larger round balers had to be reset to form a 5 ft (1.5 m) bale. This usually coincided with the baler manufacturer's recommended weight capacity of the baler. The weight of the heavier 40% to 50% moisture content, 5 ft (1.5 m) diameter hay bales was 1400 to 1700 lb (635 to 770 kg) when using an expanding chamber (hard core) round baler.

Expanding chamber balers produced suitable well-formed bales for the Rampak. 'Round' bales, as opposed to ovated bales, were desired to optimize the capacity of the drum (FIGURE 2). Generally, operators would attempt to make bales very close to the diameter of the drum to effectively fill the bag. This aided in the bag weathering durability by helping to reduce air cavities within the bag and also provided a better return on the dollar invested per amount of hay stored.

FIGURE 2. Bale from Expanding Chamber Baler being Set onto the Ramp.

EASE OF OPERATION

Hitching: Ease of hitching the Rampak was good. A jack was helpful to adjust for the height of the tractor drawbar. The hitch jack could be rotated to store alongside the hitch frame. The clevis type hitch accommodated a 0.88 in (22 mm) diameter pin. The location of the remote control option interfered with the jack handle operation. It is recommended that the manufacturer consider providing a convenient alternate location for the jack when supplying the remote control option.

Poly Tubing: Ease of installation of the poly tubing bags was fair for the rolls and very good for the folded tubing. Poly tubing sleeves were supplied either on rolls or prefolded. The poly tubing on the roll required using the tubing roll supports which fitted into the support holders at either side of the drum. The roll of poly tubing was lifted into place and then pulled down over the turned up drum until the entire roll was in place around the drum (FIGURE 3). The drum was moved into the operating position and the end of the tubing was tied securely. The roll holder supports were then removed and the retaining ring was fitted around the poly tubing. It took two men to lift the cumbersome 70 lb (32 kg) roll into place on the drum. It is recommended that the manufacturer consider providing an easier method of lifting the poly tubing roll into place to install onto the drum. It took two men about 20 minutes to pull the poly tubing sleeve over the drum, provided there was little wind. Wind above 10 mph (16 km/h) caused the tubing to flap and unroll too quickly off the roll. During such windy conditions, the Rampak had to be taken into a shelter or a third person would have to hold the roll from unrolling too quickly or help pull the poly sleeve onto the drum.

FIGURE 3. Installing Poly Tubing from Roll onto Drum.

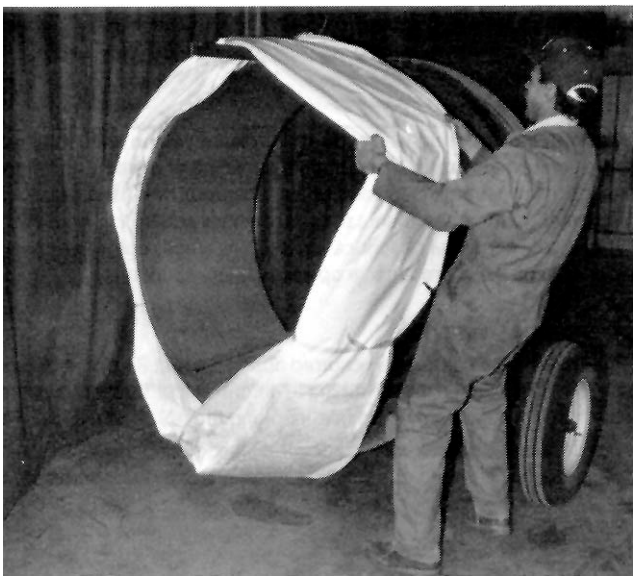

FIGURE 4. Installing Folded Poly Tubing onto the Drum.

The folded poly tubing, on the other hand, was considerably easier to place onto the drum. One person could lift the bag from the box and slip it over the drum in about five minutes. A support bar was made to assist installing the poly tubing. Without this bar, two men were required to install the poly tubing onto the drum. The drum did not have to be dropped down onto the carriage (FIGURE 4).

Final preparation of the Rampak, which included sliding the tension ring over the drum and poly tubing and tying off the end of the poly tubing, took one man about 5 minutes. Bale twine wrapped several times and tied provided a sufficient seal against spoiling (FIGURE 5).

FIGURE 5. Poly Tubing Sleeve End Wrapped and Tied after Installation on Drum; (1) Tension Ring.

Loading: Ease of loading was very good. Round bales were loaded onto the carriage or placed onto the ramp with a front-end loader. Bale forks were adequate when the ramp was used while grapples allowed setting the bale directly onto the carriage. When using the bale ramp (FIGURE 2) the Rampak operator was occasionally required to assist the bale down the ramp. The ramp could be attached to either side of the Rampak to suit storage site access limitations.

Using the grapples to drop slightly orated bales onto the carriage, allowed the bales to roll off the loader one quarter turn into the carriage and permitted matching the bale shape with the circular drum. Bales which had settled slightly were then easily pushed into the drum without catching on the sides (FIGURE 2).

Shear Bolts: Ease of shear bolt replacement was fair. Two shear bolts located at the drum pivot protected the drum against damage in the event that a bale was oversized or misaligned with the carriage. There were five occurrences of shear bolt shearing due to misaligned bales catching the side of the drum.

Misalignment usually occurred because the bale had rolled askew off the ramp and caught either the bale ram or the end of the bale in the drum as it rolled onto the carriage or because the bale had settled and did not fit the circular drum.

Generally, the occurrence of misaligned bales only applied to the 5 to 6 ft (1.5 to 1.8 m) wide bales being accommodated by the 6.37 ft (1.94 m) long carriage. Ovated bales, on the other hand, were rolled off the front-end loader grapple or set on the ramp so that the larger dimension of the oval shape bale sat into the carriage. This allowed the bale to settle in the opposing orientation.

Replacing the broken shear bolts took two men about 15 to 30 minutes, depending on how far the bale had gone into the drum. Bales that were wedged into the drum had to be cut away at the edges to permit pushing the bale through and clear of the drum. Then the drum could be lifted into place to replace the shear bolt. Bales catching on the side were, in most cases, lifted out with the loader to allow replacing the shear bolt. In this latter case, however, there would still be part of the previous bale in the drum.

To free a wedged bale the drum had to be chained to the frame at the shear bolt retainer. This retainer, which was sometimes 6 to 8 in (150 to 200 mm) away from the back edge of the carriage, had to be pulled up to the back of the carriage. The wedged bale which was freed up around the edges was then pushed clear of the drum. A pry bar and blocks under the drum were helpful to position the drum in place and to facilitate replacing the shear bolt by the two men. On three occasions the bag had ripped at the bottom. It is recommended that the manufacturer consider improving the ease of shear bolt replacement or alternately provide the safeguard device at the bale ram instead of at the drum.

Drop Extension Rail: When the bag was filled to its capacity, the final bale was pushed clear of the drum with the drop extension rail. A stop on the rail was used to hold the extension rail about 12 in (300 mm) up on the bale. The stop caused the rail tubing to deform when used the first time. The bale pulled the extension rail down as the bale dropped to the ground from the drum (FIGURE 6). Repairs were made to the stop, however, the tubing again deformed (FIGURE 7). Eventually, tarp straps were used on the rail to permit it to spring back into its held up position after the bale was pushed through (FIGURE 8). It is recommended that the manufacturer consider providing a more durable method of holding the drop extension rail up when discharging the final bale from the drum.

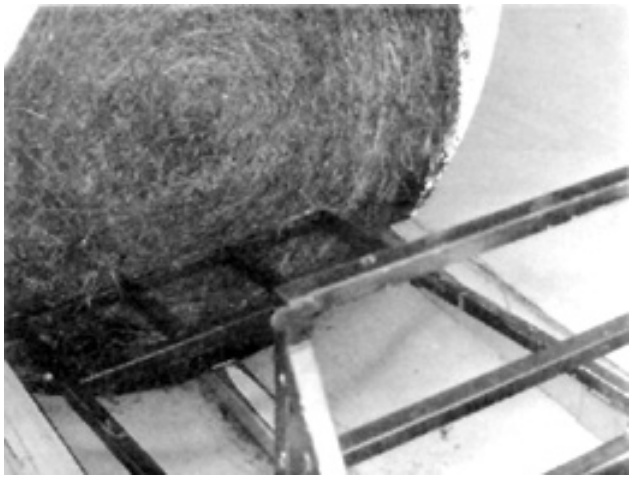

FIGURE 6. Bale Wedged Against Drop Extension Rail.

FIGURE 7. Reinforced Drop Extension Rail.

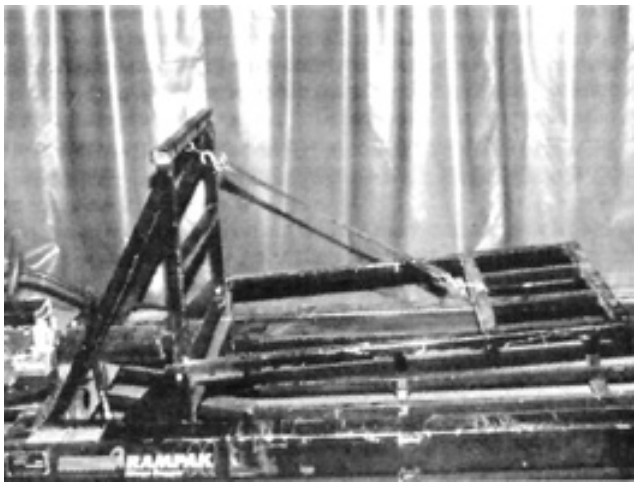

FIGURE 8. Drop Extension Rail Held Up With Tarp Straps.

Transporting: Ease of transporting the Rampak was very good. It was not equipped with a safety chain. The tire rating permitted speeds only up to 25 mph (40 km/h). The tires were adequate for the Rampak.

Adjustments and Servicing: Ease of servicing was excellent. The Rampak required no adjusting throughout the duration of the test. Lubrication was required only on the ram guide wheels before operation. The manufacturer did not include any information on a recommended lubrication schedule.

POWER REQUIREMENTS

The Rampak was operated with several tractors, as well as with a pickup truck with hydraulic outlets. The manufacturer recommended operating the Rampak with a 25 to 70 hp (19 to 52 kW) tractor with single hydraulic outlets. The Rampak operated well with tractors of about 30 to 50 hp (22 to 37 kW). Since the hydraulic requirements were low, the pickup truck was also quite suitable for operating the Rampak. The tractor or truck was moved forward as successive bales were pushed through the drum.

OPERATOR SAFETY

Operator safety was very good. The Rampak was safe to operate when normal safety precautions were practiced by the operator. Some precautions are listed in the operator's manual. No permanently affixed slow moving vehicle (SMV) sign was provided, however, the tractor SMV was usually visible. Since the Rampak was occasionally transported with a tractor at speeds below 25 mph (40 km/h), the operator is advised to ensure adequate visibility of the tractor SMV sign.

OPERATOR'S MANUAL

The operator's manual was good. It was clearly written and contained some useful information on operation, servicing and safety. It did not provide information on lubrication or shearbolt replacement. It is recommended that the manufacturer consider adding information in the operator's manual on lubrication and shearbolt replacement and include a more comprehensive operator safety section.

MECHANICAL HISTORY

Few mechanical problems occurred during the test. The drop extension rail stops caused the rail tubing to deform twice. Tarp straps were found to be a suitable method of supporting the rail (FIGURE 8).

Shearbolts had to be replaced several times during the test. Shear bolts generally sheared due to either misaligned or oversize bales.

APPENDIX I

SPECIFICATIONS

MAKE:	Hurst Equipment Limited	
MODEL:	Rampak RP1	
SERIAL NUMBER:	R137	
OVERALL DIMENSIONS:	Transport Position (without ramp)	Working Position (with ramp)
- width	7.42 ft (2.26 m)	11.42 ft (3.47 m)
- height	5.68 ft (1.73 m)	6.12 ft (1.87 m)
- length	14.04 ft (4.28 m)	14.75 ft (4.50 m)
WEIGHT:		
- hitch	503 lb (228 kg)	407 lb (185 kg)
- at wheels	714 lb (324 kg)	810 lb (367 kg)
- TOTAL:	1217 lb (552 kg)	1217 lb (552 kg)
- ramp	84 lb (34 kg)	
HITCH:		
- height, carriage horizontal	16.3 in (415 mm)	
- pin diameter	0.87 in (22 mm)	
DRUM SIZE:		
- length	3.0 ft (0.914 m)	
- inside diameter	5.5 ft (1.680 m)	
CARRIAGE:		
- length, push rail to drum	6.37 ft (1.94 m)	
- width	3.71 ft (1.13 m)	
- push rail extender length	3.80 ft (1.16 m)	
RAMP:		
- description	detachable, with skid to slide along ground	
- length	5.83 ft (1.78 m)	
- width	3.00 ft (.915 m)	
- slope	13°	
HYDRAULIC CYLINDER STROKE:	6.12 ft (1.87 m)	
TIRES:	two, 6.70 - 15, 4 ply	
TREAD WIDTH:	6.80 ft (2.07 m)	
NUMBER OF LUBRICATION POINTS:		
- two wheel bearings		
- two push rail slots		

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

RAMPAK SILAGE BAGGER

RETAIL PRICE:	$4903.00 (f.o.b. Portage la Prairie, Manitoba)
Cost of poly tubing	$126, roll; $143, folded
RATE OF WORK:	30 minutes to fill 100 ft (30m) bag
QUALITY OF WORK:	**Very Good;** generally depended on bale form
EASE OF OPERATION:	
Hitching	**Good**; remote control feature interferes with jack operation
Poly tubing installation	
-roll	**Fair**; roll was difficult to place onto supports
-folded bags	**Very Good**; bar had to be made to hang the tubing
Loading	**Very Good**; ramp was provided when using forks while grapples were convenient for setting bales directly onto carriage
Shear bolts	**Fair**; poly tubing occasionally ripped when repositioning the drum
Transporting	**Very Good**; easy to transport
Adjustments and Servicing	**Excellen**t; only two lubrication points; No adjustments were necessary
POWER REQUIREMENTS:	
Tractor Size	30 to 50 hp (22 to 37 kW) was sufficient
OPERATOR SAFETY:	**Very Good**; if normal safety precautions were observed
OPERATOR'S MANUAL:	**Good;** was clear and concise, information was lacking on lubrication and shear bolt replacement
MECHANICAL HISTORY:	Drop extension rail stops failed

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