Printed: August, 1989
Tested at: Portage la Prairie
ISSN 0383-3445
Group: 4 (a)

Evaluation Report 586

Gehl RB 1865 Round Baler

A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

GEHL RB 1865 ROUND BALER

MANUFACTURER AND DISTRIBUTOR:

Gehl Company
West Bend, Wisconsin
53095 USA
Phone: (414) 334-9461

RETAIL PRICE:

$23,296.00 (June 1989, f.o.b. Portage la Prairie. MB) with Auto Wrap, floatation tires and pickup crowder wheels

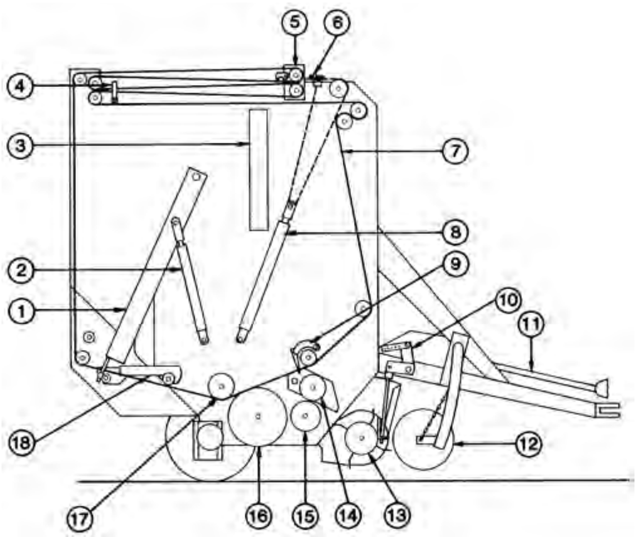

FIGURE 1. Gehl RB 1865 Round Baler: (1) Lifting Link, (2) Gate Cylinder, (3) Reservoir, (4) Overfill Clutch Actuator, (5) Shuttle, (6) Shuttle Stop, (7) Upper Belts, (8) Density Cylinder, (9) Bale Starter, (10) Pickup Adjustment, (11) Drive Shaft, (12) Crowder Wheel, (13) Pickup, (14) Packing Roller, (15) 8in (203 mm) Lower Roller, (16) 16 in (406 mm) Lower Roller, (17) Penetrating Roller, (18) Gate Latch.

SUMMARY AND CONCLUSIONS

Rate of Work: Typical throughput of the Gehl 1865 varied from 2.3 ton/h (2.1 t/h) in flax straw to 12.0 ton/h (10.9 t/h) in slough grass. Throughput was limited by pickup and feeding performance rather than by bale chamber capacity.

Quality of Work: Bale quality was very good, with well formed and durable bales in all crops. The bales were well formed and neat in appearance. Hay bales weighed from 1000 to 2100 lb (450 to 950 kg) and straw bales from 600 to 1200 lb (270 to 540 kg).

Resistance to bale moisture penetration and spoilage was very good after 112 days of weathering. Total leaf loss ranged from 1.9 to 4.1% at 17% MC, which was considered very good.

Ease of Operation: Ease of pickup feeding was excellent; ease of twine wrapping, bale discharging, transporting and hitching was very good; ease of twine threading was good; and ease of bale forming was fair. Constant side-to-side weaving was essential to forming a good bale. If the edges of the pickup were not evenly fed with the centre, the outer forming belts often became slack and tangled with the belts adjacent to them.

The auto-electric wrap system required the operator to stop, once the wrapping operation began. Adjustable bale ramps made backing unnecessary to clear the bale from under the gate. A bale could be wrapped and discharged in about 40 to 60 seconds. A stiff piece of wire was needed to thread the dual twine tubes.

Ease of Adjustment: Ease of adjusting the forming belts, wrap settings, and bale size and density was excellent; and ease of adjusting the compression rollers, bale starter and pickup was good. Ease of lubricating the test machine was good. Most adjustments were fast and simple, and accomplished with common farm tools.

Power Requirements: Peak power requirements were about 25 hp (16 kW) in hay and straw on level fields. A 60 hp (45 kW) tractor was suggested by the manufacturer to fully utilize baler capacity on soft and hilly fields. The specific capacity of the Gehl 1865 was calculated at 0.73 ton/hp-h (0.89 t/kW-h) in alfalfa at an instantaneous workrate of 12.5 ton/h (11.4 t/h).

Operator Safety: Operator safety on the Gehl RB 1865 was very good if normal safety precautions were observed.

Operator's Manual: The operator's manual was very good. It was well written and clearly illustrated.

Mechanical Problems: The outer forming belts became slack and twisted throughout the test. On one occasion the twisted belt bent the rear guide. The pickup drive pulley fell off and the overfill clutch cable pulley broke. The centre windguard fingers bent throughout the test due to contact with the twine tube.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to eliminate forming belt slackening and tangling with adjacent belts.
2. Modifications to eliminate interference between the twine guides and the windguard fingers.
3. Increasing the time that the twine guides pause at the centre of the baler.
4. Modifications to the twine cutter to improve reliability.
5. Modifications to the twine tension system to improve reliability.
6. A volume control on the audible alarm.

Station Manager: B. H. Allen

Project Engineer: D. J. May

THE MANUFACTURER STATES THAT

With regard to recommendation:

1. If the operator follows the instructions in the operator's manual, which calls for weaving and holding on each end of the bale, this problem should be eliminated by proper bale technique.
2. The twine arm angle was moved from a horizontal position to a 45 degree position which in turn opened up the clearance between the windguard fingers and the twine arm. This change is part of the update to the RB 1865.
3. The pause has been increased from 1 second to 2 seconds, but also with the new twine system the starting tail is 8 inches longer than before, which in turn doesn't require as long of a pause.
4. With the new twine system, the cut-off has incorporated a twine delay finger, which allows the string to swing into the knife instead of the knife swinging into the string. The string swinging into the knife is a quicker action, which allows for a cleaner cut.
5. New systems are being looked into, but due to the increase in reliability of twine and cutting off, tensioning is not as much of a problem as before.
6. This is being looked into, possibly for future production.

MANUFACTURER'S ADDITIONAL COMMENTS

An automatic chain oiler is now available as optional equipment on the 1865.

GENERAL DESCRIPTION

The Gehl 1865 is a pull type, PTO driven baler with a variable cylindrical baling chamber and a floating drum pickup. The twine wrapping device is automatic. A set of dual twine guides is electronically actuated when the bale reaches a predetermined size. Bale size is adjustable with a maximum size of 5 ft (1.5 m) wide and 6 ft (1.8 m) in diameter. The amount of twine wrap per bale is set at the operator seat with the auto-electric wrap control system.

Material is fed into the baling chamber between a 6 in (152 mm) diameter packing roller and an 8 in (203 mm) diameter ribbed steel lower forming roller. The 8 in (203 mm) diameter bottom roller and 16 in (406 mm) diameter ribbed rear roller, feed material into the belts and onto a 6 in (152 mm) diameter penetrating roller. The bale forming device consists of eight 45.5 ft (13.9 m) long by 6 in (152 mm) wide forming belts that provide uniform pressure to the bale with the "airdraulic" system. The air-draulic system permits infinitely adjustable bale density within a certain range.

Adjustable bale ramps are fitted on to the axle to give the bale an extra push, thus rolling it away from under the gate to permit immediate closing.

The test machine was equipped with the optional auto-electric twine wrap system and optional crowder wheels.

Other options available on the Gehl 1865 but not tested, include electric and hydraulic tying mechanisms, a 1000 rpm PTO conversion kit and a packing roller lagging kit.

Detailed specifications are given in APPENDIX I, while FIGURE 1 shows the location of major components.

SCOPE OF TEST

The Geht RB 1865 was operated in a variety of crops (TABLE 1) for 176 hours, while producing 1677 bales. It was evaluated for rate of work, quality of work, ease of operation, ease of adjustment, power requirements, operator safety, and suitability of the operator's manual. In addition, mechanical problems were monitored throughout the evaluation.

TABLE 1. Operating Conditions

Crop	Hours	Number of Bales	Equivalent Field Area	
			ac	ha
Alfalfa	25	190	165	67
Alfalfa & Grass	69	563	350	142
Native Grass	24	400	130	53
Slough Grass	9	100	32	13
Clover	8	100	70	28
Wheat Straw	17	146	75	30
Oat Straw	7	75	50	20
Rye Straw	4	43	20	8
Flax Straw	6	30	90	36
Barley Straw	5	20	15	6
Pea Straw	2	10	40	16
Total	176	1677	1037	419

RESULTS AND DISCUSSION

RATE OF WORK

Throughput depended on windrow size, uniformity of crop conditions, field surface, available tractor speeds and operator skill. Average throughput for the Gehl RB 1865 (TABLE 2) varied from 2.3 ton/h (2.1 t/h) in flax straw to 12.0 ton/h (10.9 t/h) in slough grass. The values in TABLE 2 are based on average workrates for daily field operation. Peak workrates during any one day were generally 10 to 20% higher.

In most crops, the feedrate was primarily limited by windrow size and pickup/feeding performance. In lighter crops, the ground speed was normally limited to about 8 mph (13 km/h) due to rough ground and pickup performance.

The auto-electric wrap system with the delay knob was convenient. With the dual twine tubes the tying time was relatively fast and thus improved the throughput.

TABLE 2. Typical ThroughputS

Crop		Crop Yield		Daily Average Throughput	
		ton/ac	t/ha	ton/h	t/h
Alfalfa:	Field A	1.1	2.5	6.5	5.9
	Field B	0.8	1.8	8.0	7.3
Alfalfa & Grass:	Field A	0.9	2.0	6.5	5.9
	Field B	1.2	2.7	8.8	8.0
Slough Grass:	Field A	2.0	4.5	4.0	3.6
	Field B	1.8	4.0	12.0	10.9
Wheat Straw		0.9	2.0	4.7	4.3
Flax Straw		0.2	0.4	2.3	2.1
Pea Straw		0.2	0.4	4.0	3.6

QUALITY OF WORK

Bale Quality: Bale quality was generally very good. The Gehl RB 1865 produced firm, durable bales with flat ends and uniform diameter in all hay crops (FIGURE 2). Short straw generally resulted in a less durable bale, however, the automatic twine tying mechanism with dual twine tubes made a good bale for handling. Generally, bale quality depended greatly on operator experience. Failure of the operator to evenly feed both sides of the baler in light windrows resulted in barrel or cone-shaped bales.

A typical hay or straw bale averaged 5.0 ft (1.5 m) in width, and could be made any diameter up to 6.0 ft (1.8 m). Bales usually settled to about 92% of their original height after 100 days. Typical hay bales weighed from 1000 to 2100 lb (450 to 950 kg) with average densities ranging from 9.4 to 14.6 lb/ft³ (150 to 234 kg/m³). Typical straw bales weighed from 600 to 1200 lb (270 to 540 kg) with densities ranging from 6.1 to 9.1 lb/ft³ (100 to 150 kg/m³. This wide variance in the density was made possible with the "Total Density Control" of the Gehl baler.

Bale Weathering: Bale weathering was very good. During a period of 112 days, over which total rainfall was measured at 6.5 in (164 mm), moisture penetrated to a maximum of 1.0 in (25 mm) in the area where the bale touched the ground. Spoilage also occurred to a depth of 1.0 in (25 mm) on top of the bale.

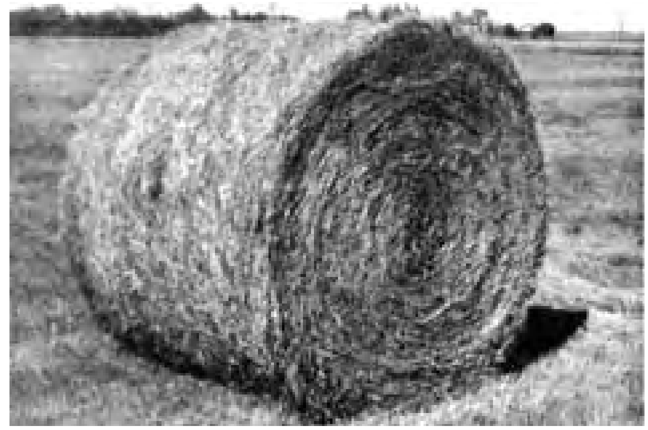

FIGURE 2. Typical Hay Bale.

Leaf Loss: Leaf and stem loss on the Gehl 1865 was very good. It was tested for leaf and stem loss in an average crop of alfalfa, which had been cut with a 14 ft (4.3 m) mower conditioner. Average crop yield was about 1.8 ton/ac (4.0 t/ha). Total material loss ranged from 1.9% to 4.1% at a 17% moisture content.

The importance of baling at a high moisture content on losses can be noted in FIGURE 3. This figure represents an accumulation of previous data for several round balers showing the total measured leaf and stem loss over a range of moisture contents, in fields of mixed alfalfa, crested wheatgrass and bromegrass. Although the Gehl 1865 was tested in a different crop, its performance was above that presented in the figure.

FIGURE 3 does not include relative effects of baling unconditioned or light windrows. Heavy, conditioned windrows were important to minimize losses.

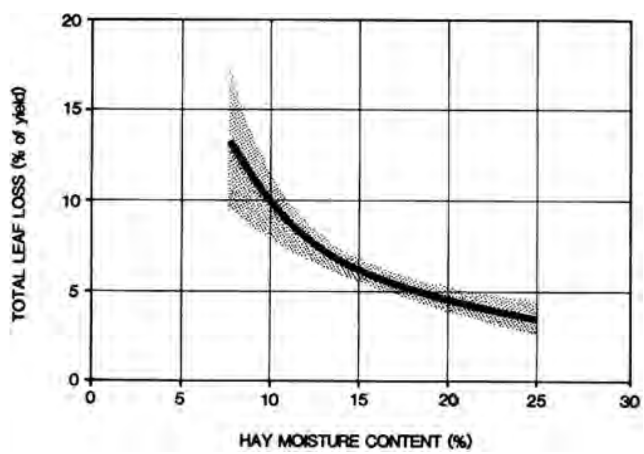

FIGURE 3. Typical Round Baler Leaf and Stem Loss in Mixed Alfalfa, Crested Wheatgrass and Bromegrass.

EASE OF OPERATION

Bale Forming: Ease of bale forming was fair. Feeding hay across the full width of the bale chamber by weaving throughout the formation of the bale was essential. If the edges of the bale chamber were not packed evenly with the centre, the two outer forming belts had a tendency to slip off of the corners of the bale and down along the edge of the bale chamber. This produced excess slack in the belt and caused it to tangle with the belt adjacent to it. The tangled belts jammed the drive rollers and broke the shear bolt. A high degree of operator alertness was required to keep the baler filling evenly on both sides. It is recommended that the manufacturer consider modifications to reduce forming belt slackening and tangling with adjacent belts.

Two ribbed steel rollers fed hay into the forming chamber. These rollers performed very well. Good visibility into the forming chamber made it easy to judge bale uniformity and size. The operator could then feed the bale chamber accordingly to produce bales of uniform diameter. FIGURE 4 shows stages of bale formation for the Gehl RB 1865.

The bale starter aided the operator in starting a new bale. The bale starter is a set of fingers that deflect material away from, and thereby prevent wrapping on the packing roller. The fingers are a part of a movable assembly held by pivoting links and positioned by a 3 in (75 mm) roller. The roller was positioned so that the fingers moved out of the way just after the bale core started to roll.

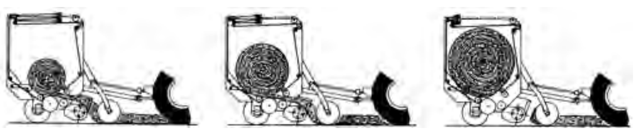

FIGURE 4. Stages of Bale Formation: (Left) Starting Bale, (Centre) Partially Completed Bale, (Right) Completed Bale.

Twine Wrapping: Ease of twine wrapping on the Gehl 1865 was very good since it was automatic. An audible alarm on the control box (FIGURE 5) alerted the operator, informing him that the bale had reached a predetermined size. An electric actuator, automatically swung the dual twine guides to the centre of the pickup. The operator then stopped the forward motion of the tractor and allowed the control box to complete the tying cycle. The twine tubes swung quickly to the left side of the baler, then automatically across the width of the bale chamber at the predetermined speed as set at the control box. The recommended PTO speed had to be maintained during the entire tying cycle. The twine was then cut on the right side with a twine cutting knife. On quiet tractors the audible alarm was too loud and irritated the operator. It is recommended that the manufacturer consider a volume control on the audible alarm.

The number of twine wraps was adjustable with a delay time potentiometer at the control box. The potentiometer dial sets the speed at which the twine tubes travel across the width of the bale chamber. The stop time on the ends was also set at the control box. The end wraps of twine could be placed at about 4 to 7 in (100 to 180 mm) from the end of the bale.

Twine requirements did not vary much with the type of crop or conditions. With the delay knob at its minimum and maximum settings the twine consumption varied from 420 to 2450 ft/ton (140 to 820 m/t) respectively. Most operators preferred a wrap cycle, which consumed about 690 ft/ton (230 m/t). Little operator skill was required for this tying operation.

The auto-electric wrap system could be overridden by switching the control box to the manual mode. The ‘Extend/Retract’ switch was then operated to move the twine guides as desired. This was convenient when finishing a field with less than a full size bale in the chamber. The control box had a wrapper ‘in Cycle’ indicator light, a ‘Recycle’ start button to start the preset tying cycle at any time, and a ‘Tailgate’ open indicator light (FIGURE 5).

FIGURE 5. Control Box.

Twine tension was provided by a flat steel bar lying across the two strands of twine at the end of the twine tube. This method of twine tension was insufficient in that a strong wind would pull the ends of the twine from under the steel bar, and there would be no twine to start tying the next bale. However, if any weight or spring tension was added to the steel bar, there was too much tension on the twine and it could not be drawn out of the twine tubes. It is recommended that the manufacturer consider modifications to the twine tension system to improve reliability. The twine tube is protected with a shear bolt.

The tying sequence took from 24 to 140 seconds to complete depending on the time delay interval setting. Most operators preferred a tying sequence, which lasted about 40 seconds.

Bale Discharging: Ease of bale discharging was very good. Once the twine was cut, the PTO had to be shut off to prevent the belts from catching on the bale and/or twisting. The bale was ejected by simply activating the tractor hydraulics to open the rear gate. There was no requirement to back up prior to discharging the bale. It was necessary to adjust the axle height to its lowest position for the discharge ramps to work effectively. It was sometimes necessary to engage the PTO at a very low rpm to get the bale to roll off the lower rollers. The bale could be wrapped and discharged in 40 to 50 seconds.

Transporting: Ease of transporting was very good. Ground clearance was adequate and there was ample hitch clearance for turning sharp corners. Backing up the baler was not a problem because visibility through the belts was good. However, caution was still required. The baler could easily be towed behind a tractor or suitably sized truck. The operator had to dismount from the tractor to lift the pickup.

Hitching: Ease of hitching the Gehl RB 1865 to a tractor was very good. The hitch jack was convenient for raising and lowering the A-frame hitch. After hitching, the jack was raised off the ground, then removed and stored on the inside of the hitch. Full retraction of the jack was not required.

Feeding: Feeding performance was excellent. Feeding was positive and aggressive in all crops with only infrequent plugging. Overloading of the windrow pickup caused the driveline shearbolt to break. The operator was required to grease the shear flange plate to prevent the pilot shaft from seizing before installing a new shear bolt.

Material was compressed between the packing roller and the front lower ribbed roller and then fed into the chamber by the rear lower ribbed roller (FIGURE 1). In very dry straw or hay, the packing roller would not adequately grab the incoming material and it would stop moving just in front of the rollers, thus plugging the pickup. In these conditions a lagging kit was installed on the packing roller to improve feeding. The lagging kit consisted of rubber belting riveted directly to the packing roller.

A scraper and packing roller at the top of the feeding area and ribbed steel rollers facilitated aggressive feeding into the bale chamber. A bale starter located above the scraper roller (FIGURE 1) prevented material from feeding between belts while the bale was starting to form. There was good clearance between the hitch and pickup.

Ground driven crowder wheels located on either side of the pickup were effective in wedging the crop into the pickup when baling wide windrows. They also helped minimize losses when alternating side-to-side feeding and during turns.

Twine Threading: Ease of twine threading was good. Threading the twine through the twine projection tube required the use of a wire.

The twine cutter performed well, although it did miss cutting the twine occasionally. This usually occurred because the twine knife arm was not set properly to catch both strands of twine as they traveled across. In this case only one twine would be cut and the other would continue to wrap on the bale until the PTO was disengaged. It is recommended that the manufacturer consider modifications to the twine cutter to improve reliability. When performing properly, the cutter left a length of twine protruding out the end of the twine guides for starting the wrap on the next bale.

EASE OF ADJUSTMENT

Forming Belts: Ease of adjusting the upper belt tension was excellent. The upper belt tension and subsequent bale density was controlled by the total density control (TDC) system (FIGURE 6), This system is self contained and independent from the tractor hydraulics. Air pressure in the reservoir was preset and no adjustments were required during the test. Upper belt tension was varied by changing the relief valve pressure setting. The shaded areas in FIGURE 6 indicate the position of the TDC System when the bale reached its full size.

The forming belts were all driven by the 4 in (100 mm) upper rubber roller. The forming belts were easily replaced without disassembly of the baler. No belts were changed during the test but if required, two people could change a belt in 20 minutes.

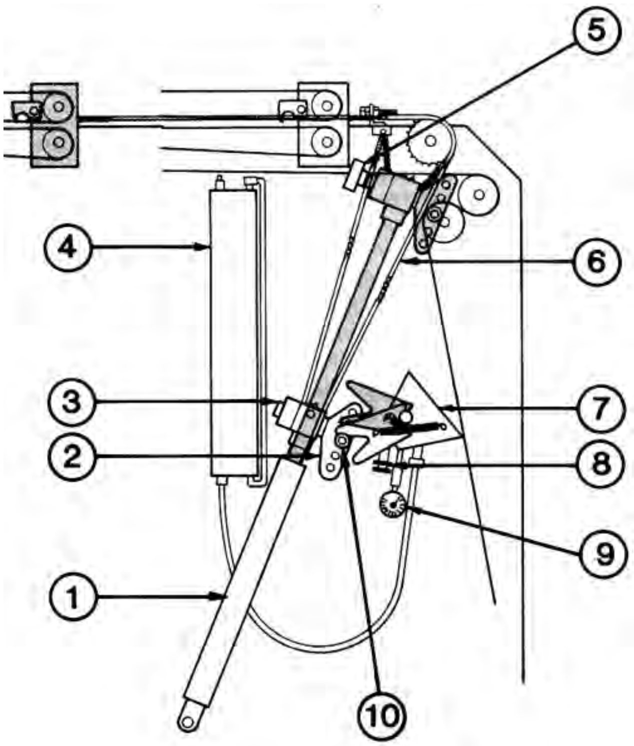

FIGURE 6. Total Density Control System Components: (1) Density Cylinder, (2) Trip Arm, (3) Magnet, (4) Reservoir, (5) Magnetic Sensor, (6) Loading Chain, (7) Valve Trip Mechanism, (8) Adjustable Relief Valve, (9) Pressure Gauge, (10) Trigger.

Compression Rollers: Ease of adjusting the packing roller was good. The packing roller was spring loaded and driven at the left side of the machine. Clearance between the packing roller and the lower roller was set at 0.25 in (6 mm) at the factory and only required adjustment once during the test. This adjustment required the operator to lock the gate open and get inside the machine to adequately check the clearance.

Pickup: Ease of adjusting the pickup was good. Pickup floatation was provided by an adjustable floatation spring. After the initial setting of the floatation was determined, no further adjustments were required during the test. Adjusting the pickup height was performed with the aid of a wrench provided with the baler. Lowering or raising the pickup was difficult because of the limited space between the optional crowder wheel brackets and baler side housing. With the optional crowder wheels installed, the pickup had to be lowered in several small steps so as not to catch one's hand between the wrench and baler side housing.

The pickup was driven by a V-belt from the 8 in (203 mm) lower roller. This belt slipped in the event of an overload. Belt tension was increased by increasing spring tension on the idler. Adjustment of the belt tension was required once during the test due to a large amount of residue from previous cuts of slough grass lying under the swath.

A convenient unplugging device at the main gearbox allowed for manually reversing the drive in the event of plugging. The same wrench, provided for lowering the pickup, was used to reverse the drive. Plugged material in the packing roller area was easily removed, once free of the rollers.

Bale Size and Density: Ease of adjusting the bale size and density was excellent. Bale size was adjusted by simply repositioning the magnet sensor (FIGURE 6) until the desired size of bale was reached. When the magnet located on the yoke of the density cylinder crossed the sensor, the automatic twine tying system would start. There was also a bale size indicator located near the top of the baler that was visible from the operator's seat.

The Gehl RB 1865 came equipped with an overfill clutch mechanism linked to the pickup. If the bale became too large in the chamber, a cable disengaged the clutch and stopped the pickup. The manufacturer recommended against overfilling the bale chamber since in some cases, it may not be possible to wrap the bale with twine. Readjustment of the overfill clutch cable was not required during the test.

Bale density was controlled by the forming belt tension. It was varied by adjusting the relief valve pressure setting. Turning the valve cartridge end disc clockwise, into the cartridge, increased belt tension and therefore the density of the bale. The size of the soft inner core of the bale was also adjustable. It was controlled by moving a trigger up or down to trip the density core formation mechanism (FIGURE 6), sooner for hard core formation and later for a larger soft core.

Wrap Settings: Ease of adjusting the bale wrap settings was excellent. The auto-electric wrap system with the manual override permitted tying the bales at a preset, uniform size or manually tying the bale in the event of finishing a field with a partial bale. The magnetic sensor was appropriately positioned by the operator for the desired bale size.

The number of wraps was adjustable at the tractor seat, using the delay time control knobs on the auto-electric control box (FIGURE 5). One knob controlled how much twine was placed on the outsides of the bale, while the other knob controlled the amount of twine across the full bale width.

The control box was preset at the factory to swing the twine guides to the centre of the bale chamber, pause briefly, then swing to the extreme left side of the chamber to begin the wrapping sequence as determined by the position of the control knobs. The preset pause at the centre of the bale chamber was often too short for the twine to be drawn into the chamber. It is recommended that the manufacturer consider increasing the time that the twine guides pause at the centre of the baler.

Lubricating: Ease of lubricating the test machine was good. The Gehl RB 1865 had 5 drive chains, 32 grease fittings and one gearbox. The operator's manual recommended using motor oil every 10 hours on the drive chains, servicing 22 grease fittings every 10 hours, 4 grease fittings every 50 hours, and 6 grease fittings every 100 hours. The fixed length drive shear flange was greased every time a bolt was sheared. The operator's manual suggested checking the gearbox fluid every 200 hours and repacking the wheel bearings every season.

POWER CONSUMPTION

Power Requirements: FIGURE 7 shows the PTO and drawbar power requirements for the Gehl RB 1865 for the two extreme settings of the total density control system, hard centre and soft centre. The power input is plotted against the bale weight to show the power requirements while each bale is formed. PTO input varied from 6 to 11 hp (4 to 8 kW) at no load to a maximum of 20 hp (15 kW) in alfalfa for full sized bales. Drawbar requirements at about 3 mph (5 km/h) were 2.0 hp (1.5 kW) for full sized bales. Tests were performed on a flat firm field. Although maximum horsepower requirements did not exceed 25 hp (19 kW), additional power was required to suit other field conditions, especially in soft, hilly fields. The manufacturer suggested a 60 hp (45 kW) tractor to fully utilize baler capacity.

Specific Capacity: Specific capacity is a measure of how efficiently a machine performs a task. A large specific capacity indicates efficient energy use. The specific capacity of the Gehl 1865 was 0.73 ton/hp-h (0.89 t/kW-h) in alfalfa at an instantaneous workrate of 12.5 ton/h (11.4 t/h) with the baler set for hard core bales. This specific capacity was greatly influenced by the workrate. The typical range of specific capacities for small square balers in alfalfa is 0.6 to 1.2 ton/hp-h (0.7 to 1.4 t/ kW-h).

OPERATOR SAFETY

Overall operator safety on the Gehl RB 1865 was very good if normal safety precautions were observed. The operator is cautioned that a round baler is potentially a very dangerous farm implement.

The operator must disengage the PTO and stop the tractor engine to clear blockages or to make adjustments. Many serious and fatal accidents have occurred with round balers. Most of these are caused by operators dismounting from the tractor while leaving the baler running.

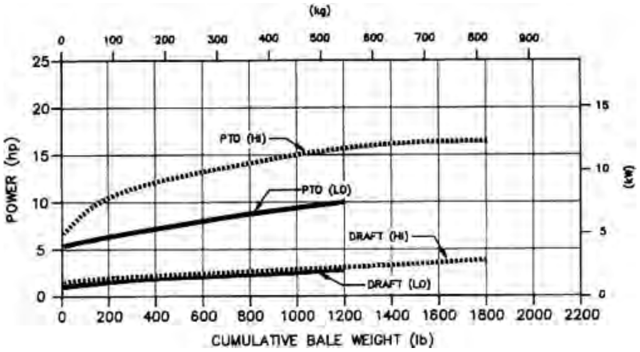

FIGURE 7. Power Consumption During Bale Formation in Alfalfa-Bromegrass (HI)Hard Core - High Density Bale, (LO) Soft Core - Low Density Bale.

The Gehl RB 1865 was safe to operate and to service as long as common sense was used and the manufacturer's safety recommendations were followed. Rotating parts were well shielded. The pickup and feeding area were well guarded to discourage operators from attempting to clear blockages with the baler in operation. The safety shields were conveniently hinged so they did not have to be completely removed. Rear gate cylinder locks were provided to permit safe servicing with the rear gate open. A slow moving vehicle sign was not provided with the baler but a mounting bracket was.

OPERATOR'S MANUAL

The operator's manual was very good. It was well written and contained much useful information on warranty, operation, adjustments, lubrication, servicing, assembly, optional equipment and safety procedures.

MECHANICAL HISTORY

The Gehl 1865 was operated for 176 hours while baling 1677 bales. The intent of the test was an evaluation of functional performance and an extended durability evaluation was not conducted. TABLE 3 outlines those problems, which occurred during functional testing.

TABLE 3. Mechanical History

Item	Operating Hours	Equivalent Field Area	
		ac	ha
-Pickup drive pulley fell off and was replaced at	12	66	27
-The overfill clutch cable lower pulley broke and was replaced at	12	66	27
-Rear belt guide bent and was replaced at	60	310	125
-Centre windguard fingers bent and were straightened	throughout the test		

DISCUSSION OF MECHANICAL PROBLEMS

Drive Pulley: The pickup drive pulley fell off due to the setscrews coming loose. The key was replaced with a new one, the pulley was put back on and the setscrews were retightened. This repair took one person about 15 minutes.

Overfill Cable Pulley: The lower pulley which the overfill clutch cable wraps around broke. It was repaired with a new one supplied by the manufacturer. This was not a serious problem and was repaired by one person in about 15 minutes.

Rear Belt Guide: The rear belt guide bent and had to be replaced. This was probably due to the left side forming belt sliding down along the left wall of the bale chamber during wrapping. The belt then became slack and twisted. Once the twist reached the belt guide it could not slide through smoothly and thus bent the guide. The guide was replaced with a new one and took one person about one hour to replace.

Windguard Fingers: The centre two windguard fingers occasionally bent due to interference with the twine guides as they moved across the bale chamber. If a large wad of material was entering the bale chamber as the twine guides were moving across, the guides would catch on the fingers and bend them to one side. They were simply pulled the opposite direction to straighten them. Usually the tying sequence would have to be restarted when this interference took place. It is recommended that the manufacturer consider modifications to eliminate interference between the twine guides and the windguard fingers.

APPENDIX I
SPECIFICATIONS

MAKE:	Gehl
MODEL:	RB 1865
SERIAL NUMBER:	13346
MANUFACTURER:	Gehl Company, West Bend, Wisconsin
DIMENSIONS:	
-- width	8.5 ft (2.6 m)
-- height	9.4 ft (2.9 m)
-- length	14.2 ft (4.3 m)
-- ground clearance	9.0 in (230 mm)
TIRES:	Two. 31 x 13.50 - 15 NHS
WEIGHT:	
-- left wheel	2024 lb (918 kg)
-- right wheel	1935 lb (878 kg)
-- hitch point	860 lb (390 kg)
Total	4819 lb (2186 kg)
BALE CHAMBER:	
-- width	5.1 ft (1.6 m)
-- bale density control	self contained air and hydraulics
-- bale peripheral speed	4.8 mph (7.7 km/h) at 540 PTO rpm
FORMING BELTS:	
-- number of belts	eight
-- belt width	6 in (150 mm)
-- thickness	3/16 in (5 mm)
-- spacing (centre to centre)	7.3 in (185 mm)
-- belt speed (at 540 PTO rpm)	430 ft/min (131 m/min)
-- belt length	45.5 ft (13.9 m)
ROLLERS:	
-- Packing Roller	
-type	steel
-length	5.0 ft (1.5 m)
-diameter	6 in (152 mm)
-speed	207 rpm
-peripheral speed	3.7 mph (5.9 km/h)
-- Lower Rollers	
-number	two
-roller surface	ribbed steel
-length	5.0 ft (1.5 m)
	Front Back
-diameter	8 in (203 mm) 16 in (406 mm)
-speed	149 rpm 81 rpm
BALE SIZE INDICATOR TYPE:	mechanical to shuttle movement and audible alarm on the electric wrap system
PICKUP:	
-- type	fully floating, cylindrical drum with spring teeth
-- height adjustment	wrench and transport arm with stop settings
-- width	6.0 ft (1.8 m)
-- diameter	22 in (559 mm)
-- number of tooth bars	four, 18 teeth per bar
-- speed (at 540 PTO rpm)	163 rpm
-- tooth tip speed (at 540 rpm)	10.7 mph (17.2 km/h)
TWINE SYSTEM:	
-- capacity	6 balls
-- type	automatic electric wrap with manual override switch
-- recommended twine	sisal or plastic
-- twine feed	automatic dual twine guides
-- twine cutter	pivoting knife against twine
DRIVES:	
-- number of belt drives	one
-- number of chain drives	five
-- number of gear drives	one
-- number of universal joints	three

SAFETY DEVICES:
- -- main drive shearbolt
- -- overfill clutch, disengages pickup when chamber is over loaded
- -- rear gate cylinder locks
- -- hinged safety shields
- -- crossbars and movable restraint bars over pickup
- -- tailgate latch indicator

SERVICING:	10h	50h	100h
-- grease	22	4	6
-- oil	7		2

TRACTOR HOOK-UP:	
-- connections	double action hydraulic hose, electrical connection for auto-electric wrap system
-- hitch height	14 to 18 in (356 to 457 m)

APPENDIX II
MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

excellent	fair
very good	poor
good	unsatisfactory

SUMMARY CHART
GEHL RB 1865 ROUND BALER

RETAIL PRICE:	$23,296.00 (January, 1989 f.o.b. Portage la Prairie, MB) with Auto Wrap, floatation tires and pickup crowder wheels
RATE OF WORK:	2.3 to 12.0 ton/h (2.1 to 10.9 t/h)
QUALITY OF WORK:	
Bale Quality	**Very Good;** tight wrap
Weatherability	**Very Good;** about 1.0 in (25 mm) spoilage
Leaf Loss	**Very Good;** 1.9% to 4.1% in 17% moisture alfalfa
EASE OF OPERATION:	
Bale Forming	**Fair;** outer forming belts tangled occasionally
Twine Wrapping	**Very Good;** automatic electric wrap
Bale Discharging	**Very Good;** fast and simple
Transporting	**Very Good;** some visibility to the rear
Hitching	**Very Good;** convenient
Feeding	**Excellent;** optional crowder wheels helped make square corners on bales
Twine Threading	**Good;** stiff wire required to thread tubes
EASE OF ADJUSTMENT:	
Forming Belts	**Excellent;** simple relief valve
Compression Rollers	**Good;** simple for one person
Bale Starter	**Good;** set at factory
Pickup	**Good;** special wrench supplied with baler
Bale Size and Density	**Excellent;** fast simple adjustments
Wrap Settings	**Excellent;** two knobs on control box
Lubrication	**Good;** about 20 minutes
POWER REQUIREMENTS:	
Tractor Size	60 hp (45 kW) suggested by manufacturer
Specific Capacity	0.73 ton/hp-h (0.89 t/kW-h) at a workrate of 12.5 ton/h (11.4 t/h)
OPERATOR SAFETY:	**Very Good;** well shielded and accessible
OPERATOR'S MANUAL:	**Very Good;** very well written
MECHANICAL HISTORY:	Pickup drive pulley fell off, overfill clutch cable pulley broke, rear belt guide was bent and the centre windguard fingers bent throughout the test

ALBERTA FARM MACHINERY RESEARCH CENTRE

3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html

Prairie Agricultural Machinery Institute
Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:
P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080