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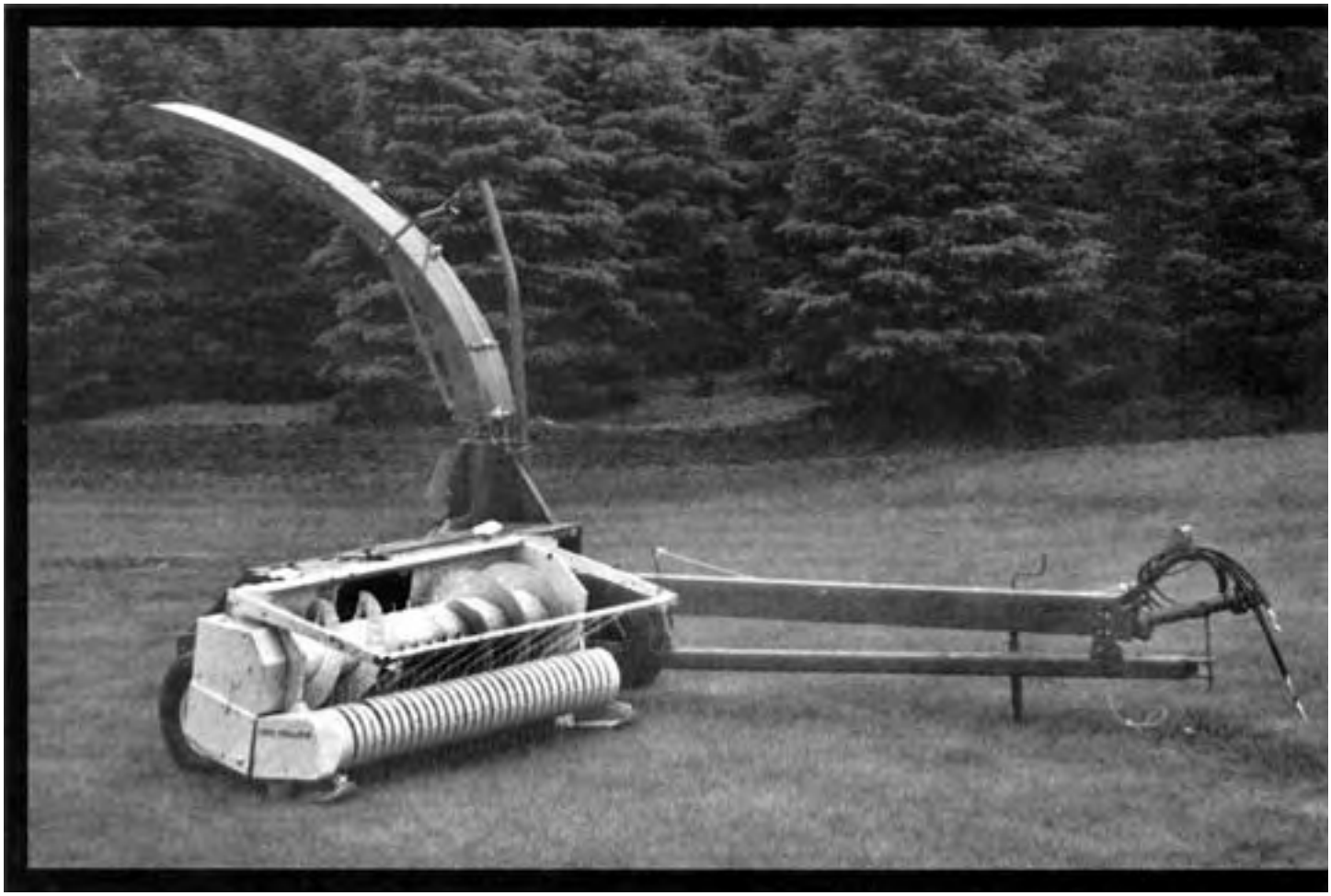
EVALUATION REPORT 330



NEW HOLLAND 892 FORAGE HARVESTER

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

NEW HOLLAND 892 FORAGE HARVESTER

MANUFACTURER:
Sperry New Holland
New Holland, Penn.
17557 U.S.A.

DISTRIBUTOR:
Sperry New Holland
P.O. Box 777
Winnipeg, Manitoba
R3C 2L4

RETAIL PRICE:
$34,146 (October 10, 1983, f.o.b. Portage la Prairie, Man., with electric remote controls, electronic metal detector, auger base, three-row row crop header).

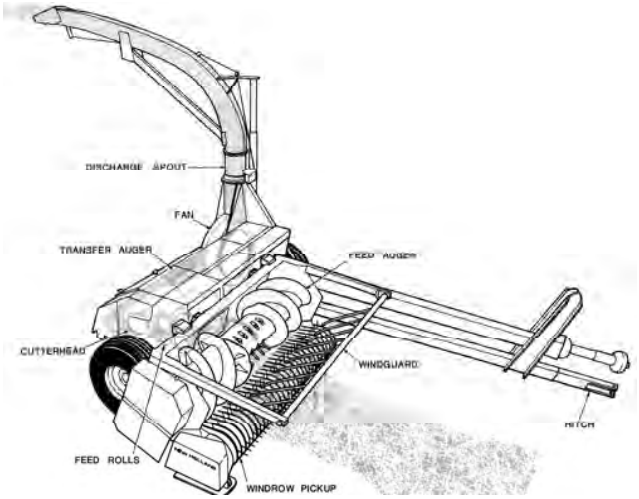


FIGURE 1. New Holland 892.

SUMMARY AND CONCLUSIONS

Overall Performance: The overall performance of the New Holland 892 was very good.[1]

Capacity: Workrates[2] ranged up to 39 ton/h (35 t/h) in standing corn, up to 34 ton/h (31 t/h) in alfalfa and up to 38 ton/h (30 t/h) in clover. Dry-weight workrates ranged up to 15 ton/h (14 t/h) in corn, up to 18 ton/h (17 t/h) in alfalfa and up to 20 ton/h (18 t/h) in clover. The three-row row crop header plugged several times during the test and reduced harvester Capacity. The pickup header performed well at speeds up to 5 mph (8 km/h). The use of a 3 x 6.4 in (7.5 x 160 mm) oval recutter screen reduced workrates by up to 35% in alfalfa.

At 0.25 in (6 mm) cut length setting, 6% of alfalfa particles were longer than 1 in (25 mm) and 2% of the corn particles were longer than 1 in (25 mm).

Power Requirements: A tractor of 180 hp (135 kW) maximum power take-off rating would have sufficient power to operate the New Holland 892 in typical prairie crops.

Operation and Maintenance: The harvester was easy to maintain and service. Operation of the electric remote controls was convenient.

Operator Safety: The New Holland 892 was safe to operate if the manufacturer's safety recommendations were followed.

Operator Manual: The operator manual was concise and clearly written.

Durability: A few minor mechanical problems occurred during the 253 hour test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:
1. Modifications to prevent plugging of the row crop header.
2. Increasing the travel adjustment of the recutter screen.
3. Supplying a more reliable electrical connector to eliminate separation.

Senior Engineer -- G. M. Omichinski
Project Engineer -- C. W. Chapman

THE MANUFACTURER STATES THAT

With regard to recommendation number:
1. We feel the plugging could be eliminated by routine maintenance. With the information provided in this report we would define the plugging as occurring from improperly adjusted rotary cutting discs. Our operator manual makes the following recommendation:
   ROTARY CUTTING DISCS
   The rotary cutting discs must rub tight against each other with interference of 0.015-0.030 in (0.38-0.76 mm) on the front edge for good cutting (especially in grass or weedy conditions). The term "interference" is used here to measure the tightness of the discs to each other.

   ATTENTION
   Failure to maintain the recommended fit between the cutting discs will result in:
   1. Excessive dulling of the cutter discs.
   2. Build-up of grass and leaves in the stalkway, which in turn will cause premature failure of the lower gathering chain.

   Most stalkway plugging, other than that caused by dirt, Is the result of Inadequate sickle "Interference".

2. We have not received complaints that our recutter screens lack sufficient adjustments, so we have not made any corrections to the problems you are addressing. We will investigate your recommendation and make whatever needed corrections are found to our production of 892's.
3. Sperry New Holland made a corrective change and is now providing a more reliable electrical connector.

GENERAL DESCRIPTION

The New Holland 892 is a power take-off driven, pull-type forage harvester. The cylindrical cutterhead is fed by a reversible feedroll assembly. The cut length may be set either by changing feedroll drive sprockets or varying the number of cutterhead knives. Chopped forage is delivered from the cutterhead to the discharge fan, by a transfer auger.

The test machine was equipped with a 7.8 ft (2.4 m) windrow pickup and a three-row row crop header.

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

SCOPE OF TEST[3]

The New Holland 892 was operated in the crops shown in TABLE 1 for 253 hours while harvesting 821 ac (329 ha).

It was evaluated for rate of work, quality of work, power requirements, ease of operation and adjustment, operator safety, and suitability of the operator manual.

TABLE 1. Operating Conditions

Crop	Average Yield at 60% M.C.		Hours	Field Area	
	ton/ac	t/ha		ac	ha
Alfalfa	3.6	8	35	222	89
Clover	2.0	4	24	70	28
Oats	5.0	11	21	20	8
Grass	3.6	8	39	132	53
Corn	4.0 to 5.5	9 to 12	134	377	151
Total			253	821	329

[1] *See Machine Ratings APPENDIX II*
[2] *The actual workrates, which include the moisture in the crop, indicate the total mass of crop harvested, but should not be used for comparing performance of different forage harvesters. The dry-weight workrates, which consider the mass of dry matter harvested, provides a better comparison of performance of different forage harvesters and assessment of the effect of crop variables and machine settings*
[3] *Prairie Agricultural Machinery Institute Detailed Test Procedure for Forage Harvesters.*

Although variation in particle length has little effect on silage palatability, the performance of some silage unloading equipment may be adversely affected if a significant quantity of material is longer than 1.5 in (40 mm). FIGURE 2 and 3 show material length distribution at various cut length settings, with and without recutter screens. A narrow curve with a high peak indicates uniform particle length distribution. The average material length is about that a the peak of the curve. Forage with a wide range of particle lengths has a wide curve with a low peak.

RESULTS AND DISCUSSION

RATE OF WORK

TABLE 2 presents typical workrates for the New Holland 892 in a variety of field conditions. The workrates for alfalfa were measured in crops yielding 3.6 ton/ac (8 t/ha), which had been windrowed with a 14 ft (4.3 m) wide windrower. The workrates in clover were measured in crops yielding 4.9 ton/ac (11 t/ha) and windrowed with a 14 ft (4.6 m) windrower, while the workrates in corn were measured in standing crops yielding 4.0 to 5.5 ton/ac (9 to 12 t/ha) and harvested with the three-row row crop header. The reported values are for average continuous feedrates, with the harvester loaded to optimum levels. They do not include time for maintenance and unloading wagons.

TABLE 2. Average Work Rates

Crop	Moisture Content	Length-of-Cut Setting		Workrates			
				Actual		Dry Weight	
	%	in	mm	ton/ac	t/ha	ton/ac	t/ha
Alfalfa	40	0.25	6	25.3	23.0	15.4	14.0
	45	0.25	6	27.5	25.0	15.5	14.1
	40	0.38	9.5	29.7	27.0	17.8	16.2
	46	0.38	9.5	33.7	30.6	18.2	16.5
	40	0.38*	9.5	20.1	18.3	12.1	11.0
	45	0.38*	9.5	22.2	20.2	12.2	11.1
Clover	40	0.25	6	37.7	29.7	19.6	17.8
	44	0.38*	9.5	19.8	18.0	11.1	10.1
Corn	60	0.25	6	38.5	35.0	15.4	14.0
		0.38*	9.5	35.8	32.5	14.3	13.0

*With 3 x 6.4 in (75 x 160 mm) oval recutter screen.

Both actual workrates and dry-weight workrates are reported in TABLE 2. The actual workrates, which include moisture in the crop, indicate the total mass of the crop harvested, but should not be used for comparing performance of different forage harvesters. The dry-weight workrates, which consider the mass of dry matter harvested, provide a better comparison of performance of different forage harvesters and assessment of the effect of crop variables and machine settings. Actual workrates ranged up to 37.7 ton/h (29.7 t/h) whereas dry-weight workrates ranged up to 19.6 ton/h (17.8 t/h).

Workrates were influenced by crop moisture content, cut length setting, use of a recutter screen and the type of header attachment used. Reducing the cut length setting from 0.38 to 0.25 in (9.5 to 6 mm) decreased the dry-weight workrates by 15% in alfalfa. The use of a recutter screen reduced workrates by 35% in alfalfa.

Plugging of the three-row row crop header reduced the harvester capacity in corn. The pickup header had one speed, which permitted ground speeds up to 5 mph (8 km/h).

QUALITY OF WORK

Uniformity of Cut:[4] FIGURE 2 presents typical particle length distributions in second-cut, full-bloom alfalfa, harvested at 46% moisture content (APPENDIX IV, FIGURE 8). Particle length variations are given for 0.25 and 0.38 in (6 and 9.5 mm) cut settings, with and without the use of a 3 x 6.4 in (75 x 160 mm) oval recutter screen. At a 0.25 in (6 mm) setting, only 6% of the silage had a length greater than 1.0 in (25 mm), while at the 0.38 in (9 mm) setting, 7% had a length greater than 1.0 in (25 mm). The 3 x 6.4 in (75 x 160 mm) oval recutter screen slightly decreased the percentage of longer particles at each cut length setting.

FIGURE 3 presents typical particle length distributions in corn, harvested at 60% moisture content, for 0.25 and 0.38 in (6 and 9.5 mm) settings (APPENDIX IV, FIGURE 8). Only 2% of the corn particles had a length greater than 1 in (25 mm) at a 0.25 in (6 mm) setting while only 1% of the particles were longer than 1 in (25 mm) when using the recutter screen at a 0.38 in (9.5 mm) setting. The smaller percentage of longer particles in corn, compared to alfalfa, was due to perpendicular feeding of the row crop header.

[4]For each cut length setting, a forage harvester produces a range of particle lengths.

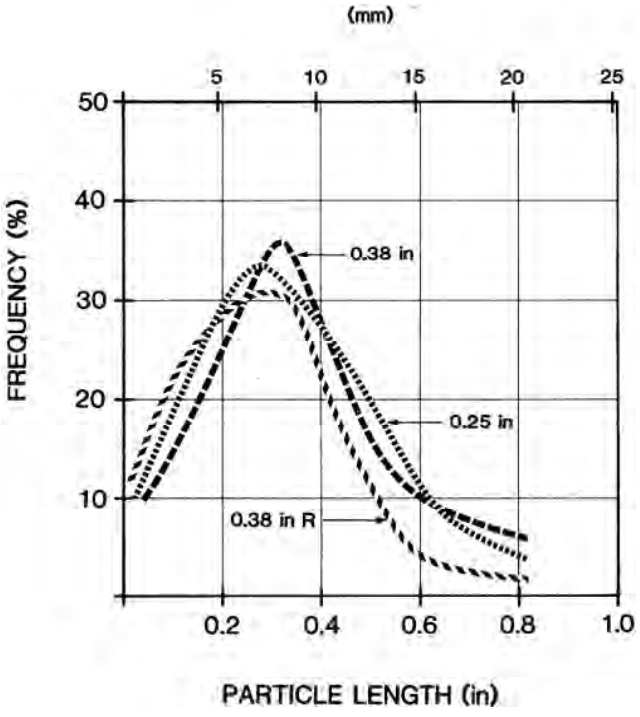


FIGURE 2. Particle Length Distribution in Alfalfa (R: with 3 x 6.4 in (75 x 160 mm) recutter screen).

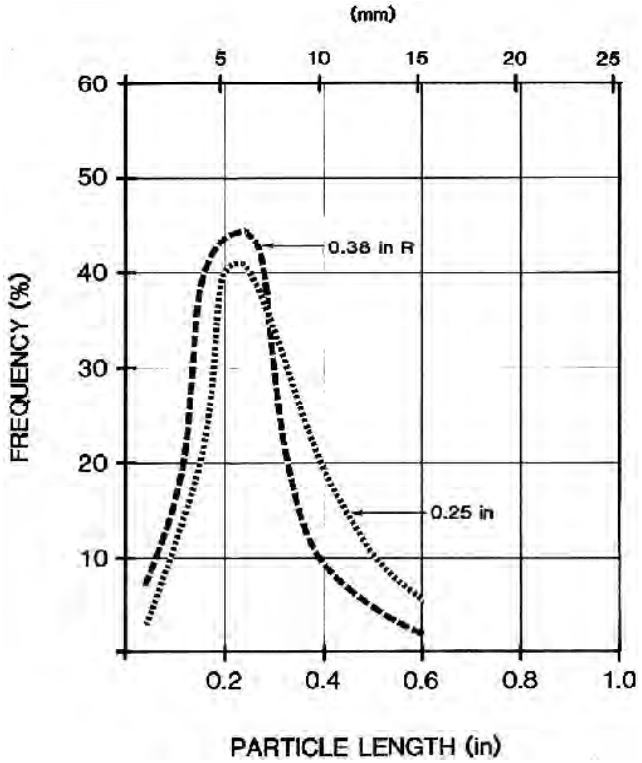


FIGURE 3. Particle Length Distribution in Corn (R: with 3 x 6.4 in (75 x 160 mm) recutter screen).

Windrow Pickup Losses: Pickup losses were insignificant at speeds up to 5 mph (8 km/h), provided that the windrows were not severely wind scattered.

Row Crop Header Losses: Row crop header losses were insignificant at speeds below 5 mph (8 km/h) provided care was taken to keep the divider points centred between the rows. However, the header plugged several times during the test especially in weedy conditions.

POWER REQUIREMENTS

Tractor Size: The peak power take-off requirement, at maximum workrate, was about 186 hp (139 kW) in alfalfa and 188 hp (140 kW) in corn. Corresponding average power requirements were about 110 hp (81 kW) and 125 hp (93 kW) respectively. Power requirements increased with shorter cut settings, higher moisture contents and use of a recutter screen. For example, reducing the cut setting from 0.38 to 0.25 in (9.5 to 6 mm) while harvesting 40% moisture alfalfa yielding 3.6 ton/ac (8 t/ha), increased average power by 5 hp (4 kW). An increase of 10% moisture content in alfalfa increased the power requirements by 8 hp (6 kW). The use of a 3 x 6.4 in (75 x 160 mm) recutter screen increased average power 20 hp (15 kW) in alfalfa.

Total drawbar power requirements on firm, level fields were about 27 hp (20 kW) at 6 mph (10 km/h). This included the draft of the forage harvester and a dump wagon with a 3.3 ton (3 t) load. In soft, hilly fields, drawbar power requirements could be as great as 40 hp (30 kW).

A tractor of 180 hp (135 kW) maximum power take-off rating should have sufficient power to operate the New Holland 892 at optimum workrates, in most field conditions.

Specific Capacity:[5] FIGURE 4 shows the specific capacity of the New Holland 892. Specific capacity is a measure of how efficiently a machine operates. A high specific capacity indicates efficient energy use, while a low specific capacity indicates less efficient operation. As shown in FIGURE 4, a 10% increase in crop moisture content increased the specific capacity by about 5% in alfalfa.

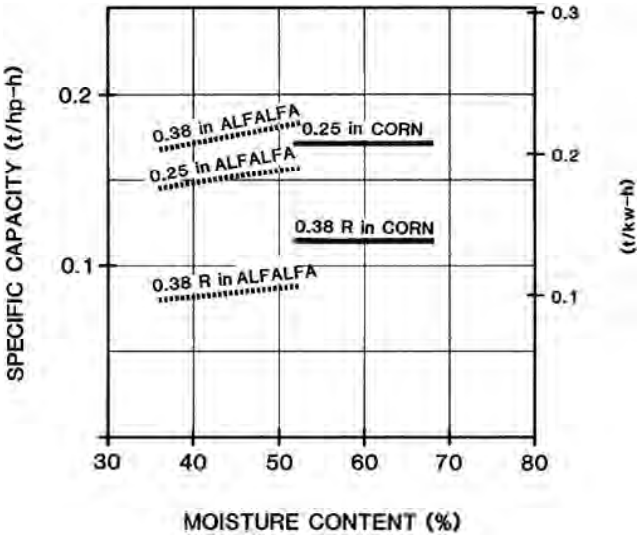


FIGURE 4. Specific Capacity (R: with 3 x 6.4 in (75 x 160 mm recutter screen).

Changing cut length settings from 0.38 to 0.25 in (9.5 to 6 mm) reduced specific capacity by about 15%. The use of a 3 x 6.4 in (75 x 100 mm) recutter screen reduced specific capacity by 53% at 0.38 in (9.5 mm) cut setting.

In corn, specific capacities ranged from 0.115 ton/hp-h (0.140 t/kW-h) at 0.38 in (9.5 mm) cut setting with a 3 x 6.4 in (75 x 160 mm) recutter screen to 0.172 ton/hp-h (0.210 t/kW-h) at 0.375 in (9 mm cut setting.

EASE OF OPERATION AND ADJUSTMENT

Hitching: The manufacturer recommended that the tractor drawbar be 13 to 17 in (325 to 425 mm) above the ground. The driveshaft height was adjustable. The New Holland 892 was equipped with a 1000 rpm power take-off drive.

Remote Controls: The New Holland 892 was equipped with electric remote controls for adjusting discharge spout direction, deflector cap angle, and the forward/reverse feedroll clutch. The electric control console, which mounted in the tractor cab, controlled the individual electric actuators. The controls were effective and convenient to use.

Many times during the test the electrical connector between the tractor and harvester became separated. It is recommended the manufacturer supply a more reliable electrical connector.

Electronic Metal Detector: The test machine was equipped with an optional electronic metal detector. The metal detector was mounted in the front lower feedroll and scanned incoming forage for the presence of metal objects which might result in damage to the cutterhead or “hardware disease” in cattle. If metal objects were detected, the system automatically locked and disengaged the feedroll drive, and signalled the operator with an audible alarm from the tractor mounted control box. The detection system response was quick and effective, stopping the feedrolls and catching ferrous metal objects before they entered the cutterhead.

Windrow Pickup: The pickup header had excellent feeding characteristics in most crops. Pickup losses were insignificant at speeds up to 5 mph (8 km/h). Only one windrow pickup speed was possible. Adjustable skid shoes made it possible to match pick up height to field and windrow conditions.

Three-row Row Crop Header: The three-row row crop header (FIGURE 5) was equipped with lower gripping chains as well as upper gathering chains. Three header chain speeds were possible by changing header drive sprockets. This matched gathering chain speed to ground speed.

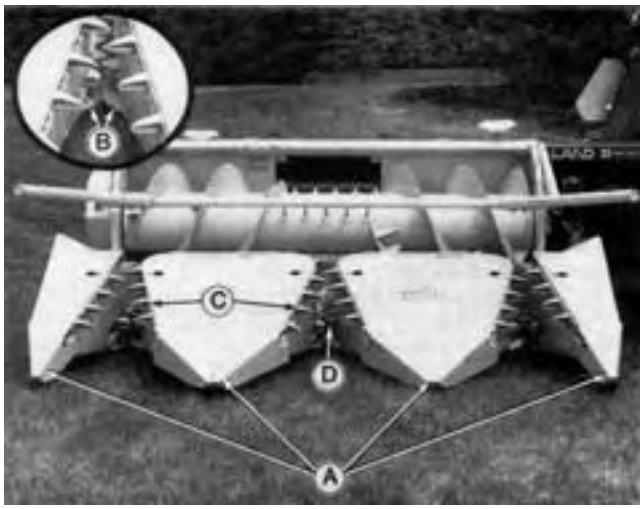


FIGURE 5. Three-row Row Crop Header: (A) Divider Points, (B) Rotary Sickles, (C) Upper Gathering Chains, (D) Lower Gripping Chains.

The three-row row crop header plugged several times during the test and this reduced harvester capacity in corn. The rotary sickles and gathering chains continually plugged with material, especially in weedy conditions. It is recommended the manufacturer modify the three-row row crop header to alleviate these problems.

Feedrolls: The feedrolls were very aggressive in all crops. Occasional plugging occurred in bunchy windrows. Unplugging was possible from the tractor seat by reversing the feedroll drive. It was necessary to reduce PTO speed before reversing the feed-rolls to avoid breaking feedroll shear pins.

The smooth lower feedroll was equipped with an adjustable scraper. Scraper clearance was easily inspected and adjusted by raising the upper feedrolls using a crank mechanism at the rear of the machine.

Cutterhead Plugging: Cutterhead plugging occurred infrequently and usually resulted in shearing the shear bolts. Plugging was usually caused by failure to allow all forage to pass through the harvester before disengaging the power take-off clutch. Access to the cutterhead and shear bolts was very good.

Discharge Spout: The lift and reach of the discharge spout could be adjusted by adding or removing pipe sections as shown in FIGURE 6 or by tilting the spout at its base. The extensions used for testing were 15 in (375 mm) vertical and 72 in (180 mm) horizontal. Other extensions were available. The dimensions in FIGURE 6 were determined at the maximum ground clearance setting of the adjustable axle, which could be positioned to give discharge heights 3 in (75 mm) and 6 in (150 mm)lower than those shown. Tilting the spout would give discharge heights 6 in (15 mm) higher or lower than those shown.

[5] *Specific capacities in FIGURE 4 are based on dry-weight workrates. Direct comparison to specific capacities of haying equipment is not valid. Hay usually has a different moisture content and is not refined to the same degree as silage.*

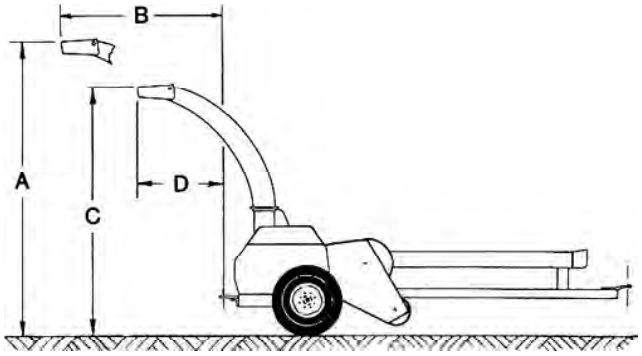


FIGURE 6. Discharge Spout Dimensions: (A) Lift with Extensions 155 in (3875 mm), (B) Reach with Extensions 112 in (2800 mm), (C) Lift 125 in (3125 mm), (D) Reach 40 in (1,000 mm).

The forage discharge direction was controlled by spout rotation and deflector cap angle, which were operated by the remote controls. The range of adjustments was adequate for operation with wagons and trucks.

Recutter Screen: A 3 x 6.4 in (75 x 160 mm) oval recutter screen was used for about 40 hours of field testing. The recutter screen was effective, provided a close tolerance was maintained between the cutterhead knives and the recutter screen.

The clearance was adjusted with eyebolts at the rear of the screen. The screen seated against adjustable stops, which were bolted to the side sheets of the harvester. The stops had limited travel, and necessitated adjusting the cutterhead knives to provide a close tolerance to the screen when the knives become worn. It is recommended that the manufacturer consider increasing the travel adjustment of the recutter screen.

The screen was easy to install and took an experienced operator 30 minutes. Removal of the screen took about 10 minutes.

Knife Sharpening: The New Holland 892 was equipped with a cylindrical sharpening stone and a reversing cutterhead drive for knife sharpening. To reverse the cutterhead, the cutterhead drive shaft was moved to an alternate input shaft. This operation was convenient.

A ratchet mechanism automatically lowered the stone to contact the knives while a lever mechanism was used to draw the stone across the cutterhead. Shear plate clearance was adjusted by loosening two clamp bolts and moving the shear bar with adjusting bolts. Clearance was set with the use of a feeler gauge. It took an experienced operator about 30 minutes to sharpen the knives and set the shear plate.

The average period between knife sharpening was about 10 hours. During the 253 hour test, the knives incurred about 0.25 in (10 mm) of wear, due mainly to sharpening.

One edge of the reversible shear plate was worn and was reversed at 230 hours to provide a new shearing edge.

Adjusting Cut Length: The length of cut could be adjusted either by adding or removing cutterhead knives or by changing the feed roll drive sprockets. Changing or reversing the gears was the easier method and provided a more uniform cut. The sprockets provided 0.13, 0.25 and 0.38 in (3, 6 and 9.5 mm) cut length settings. Changing or reversing gears took only a few minutes. However, when using the 0.13 in (3 mm) cut length setting an additional idler sprocket had to be installed. Access to the idler sprocket was inconvenient.

Exchanging Header Attachments: The same feed auger base was used with either the windrow pickup drum or the row crop head. Two bolts held the attachments in place. It was necessary to exchange one drive sprocket, since the pickup and row-crop attachments used different size drive chains.

Removing either header attachment took one man about 30 minutes. Mounting either of the attachments took two men about 30 minutes.

When using the row crop header it was necessary to install a secondary header floatation spring.

Transporting: The drawpole could be placed in five positions. The extreme right position was used when transporting with either header. The extreme left position was used with both headers during field testing.

The New Holland 892 was easy to maneuver and towed well in transport position. Ground clearance was adequate and there was ample hitch clearance for turning sharp corners. Four hitch positions were provided for towing a wagon.

FIGURE 7. Cutterhead Assembly: (A) Knife Sharpener, (B) Knife.

A spring-loaded drawpole locking arm could be retraced using a rope from the tractor seat. This made changing from field to transport position easy.

Lubrication: The New Holland had 47 pressure grease fittings of which 40 required lubrication at 10 hour intervals. The three-row row crop header had 12 pressure fittings. A total of five chains on the main unit, two on the pickup head and three on the row crop header, required lubrication daily. Complete daily and seasonal lubrication could be completed in 25 minutes.

OPERATOR SAFETY

The New Holland 892 was safe to operate and service, as long as common sense was used and the manufacturer's safety recommendations were followed. A comprehensive safety section was included in the operator manual.

Protective shields were opened easily for service.

The New Holland 892 was equipped with a slow moving vehicle sign bracket.

OPERATOR MANUAL

The operator manual was concise and clearly written, containing much useful information on operation, adjustment, servicing and safety.

DURABILITY RESULTS

TABLE 3 outlines the mechanical history of the New Holland 892 during 253 hours of operation while harvesting 444 ac (178 ha) of windrowed crop and 377 ac (151 ha) of corn. The intent of the test was evaluation of functional performance. An extended durability test was not conducted.

TABLE 3. Mechanical History

Item	Operating Hours	Equivalent Field Area	
		ac	ha
-Adjusted cutterhead knives	115	430	172
-Adjusted the clearance between the rotary sickles on the row crop header	51, 71, 91	228, 263, 313	91, 105, 125
-Adjusted sharpening stone	247	760	304

DISCUSSION OF MECHANICAL PROBLEMS

Cutterhead Knives: The knives had worn to where the recutter screen could no longer be adjusted to maintain a close tolerance between the screen and the knives. The knives were therefore adjusted. This took an experienced operator 1 hour.

APPENDIX I

MAKE:	New Holland
MODEL:	892
SERIAL NUMBER:	475524
OVERALL DIMENSIONS:	
-- height (discharge spout removed)	5.3 ft (1.6 m)
-- length	17.8 ft (5.4 m)
-- width	
-with attachments	11.8 ft (3.5 m)
-with windrow pickup	12.9 ft (3.9 m)
-with three-row row crop header	13.4 ft (4.0 m)
-- ground clearance (adjustable)	8 - 14 in (200 - 350 mm)
WINDROW PICKUP:	
-- model	890W
-- serial number	395120
-- type	floating cylindrical drum
-- height adjustment	adjustable skid shoes
-- working width	82 in (2050 mm)
-- overall width	98 in (2450 mm)
-- tooth spacing	2.5 m (65 mm)
-- number of tooth bars	4
-- pickup speed	90 rpm
-- auger diameter	25 in (610 mm)
-- auger length	84 in (2080 mm)
-- auger speed	67 rpm
THREE-ROW CROP HEADER:	
-- model	890 R3
-- serial number	34976
-- distance between rows	36, 38, 40 in (915, 965, 1015 mm)
-- type of cutter	rotary sickle
-- cutter speed	145 rpm
-- type of stalk gatherer	chain (upper & lower)
-- gathering chain/ground synchronization speed	upper: 1.6, 1.8, 2.0 mph (2.5, 2.8, 3.3 km/h) lower: 1.7, 1.9, 2.3 mph (2.8, 3.0, 3.6 km/h)
FEEDROLL ASSEMBLY:	
-- throat opening	22 x 6 in (550 x 140 mm)
-- roll width	21 in (525 mm)
-- front roll diameter	
-upper	10.2 in (255 mm)
-lower	8.8 in (215 mm)
-- rear roll diameter	
-upper	5.8 in (145 mm)
-lower	4.6 in (115 mm)
-- front roll speed (rpm) at 0.25 in (6 mm) cut length setting	
-upper	65 rpm
-lower	103 rpm
-- rear roll speed	
-upper	158 rpm
-lower	220 rpm
CUTTERHEAD:	
-- type	cylindrical
-- number of knives	12
-- width	22.6 in (565 mm)
-- diameter	19 in (475 mm)
-- speed	850 rpm
RECUTTER SCREEN:	
-- width	23.2 in (580 mm)
-- arc length	22.4 in (560 mm)
-- opening size	3 x 6.4 in (75 x 160 mm)
KNIFE SHARPENER:	
-- type	cylindrical stone
-- size (diameter)	1.5 in (38 mm)
CONVEYING ASSEMBLY:	
-- Transfer Auger	
-diameter	10 in (250 mm)
-length	75 in (1880 mm)
-speed	565 rpm
-- Fan	
-diameter	31 in (780 mm)
-blade width	6.4 in (160 mm)
-discharge spout (diameter)	9 in (225 mm)
-speed	1000 rpm
TIRES:	two, 31 x 13.5 - 15, 6-ply implement

WEIGHTS:	With windrow pickup	With row crop header
-- left wheels	1914 lb (870 kg)	1764 lb (802 kg)
-- right wheels	2666 lb (1212 kg)	3348 lb (1522 kg)
-- hitch	440 lb (200 kg)	739 lb (336 kg)
TOTAL	5020 lb (2282 kg)	5851 lb (2660 kg)

LUBRICATION:	
-- Main Unit	
-grease fittings	47 (40 @ 10 hours, 7 @ 25 hrs)
-chains	5 (5 @ 10 hrs)
-wheel bearings	2 (annually)
-gear boxes	2 (annually)
-- Windrow pickup	
-grease fittings	0
-chains	3 (3 @ 10 hrs)
-- Three-row row crop header	
-grease fittings	12 (12 @ 10 hrs)
-chains	3 (3 @ 10 hrs)
OPTIONAL EQUIPMENT:	
-- Auxiliary header lift spring	
-- spout extensions:	24 in (610 mm), 72 in (1800 mm) horizontal 15 in (375 mm), vertical spout rotation
-- hydraulic controls	6
-- recutter screens	
-- stationary feeder attachment axle extensions	

APPENDIX II
MACHINE RATINGS

The following rating scale is used in Machinery Institute Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

APPENDIX III
CONVERSION TABLE

Acre (ac) x 0.405	= Hectare (ha)
Foot (ft) x 0.305	= Metre (m)
Inches (in) x 25.4	= Millimetres (mm)
Horsepower (hp) x 0.746	= Kilowatt (kW)
Miles/Hour (mph) x 1.61	= Kilometre/Hour (km/h)
Pounds Force (lb) x 4.45	= Newton (N)
Pounds Mass (lb) x 0.454	= Kilogram (kg)
Ton (ton) x 0.91	= Tonne (t)
Ton/Horsepower Hour (ton/hp-h) x 1.21	= Tonne/Kilowatt hour (t/kW-h)
Ton/hour (ton/h) x 0.91	= Tonne/hour (t/h)
Ton/acre (ton/ac) x 2.25	= Tonne/hectare (t/ha)

APPENDIX IV

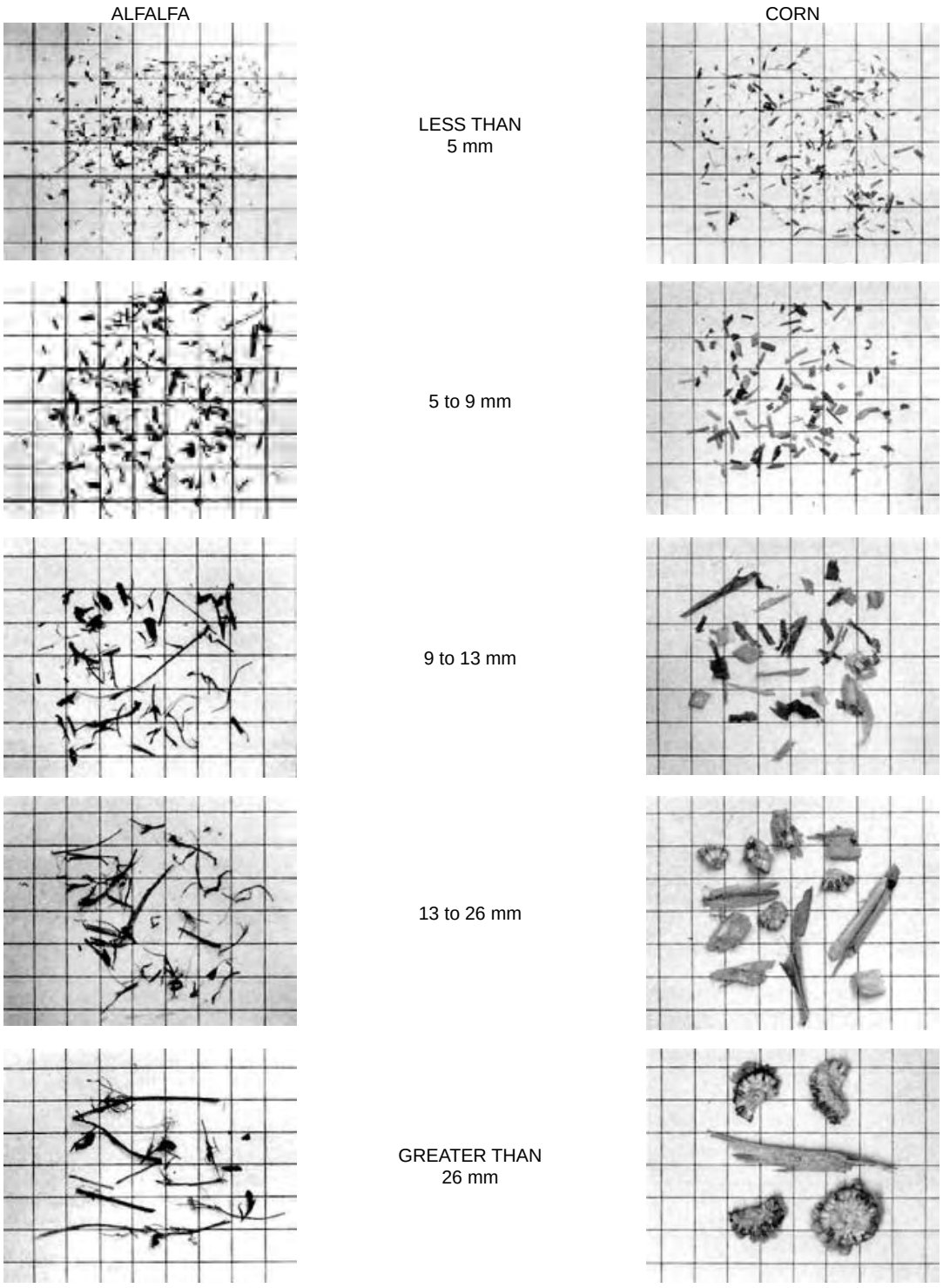


FIGURE 8. Distribution of Particle Lengths (20 mm grid).

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