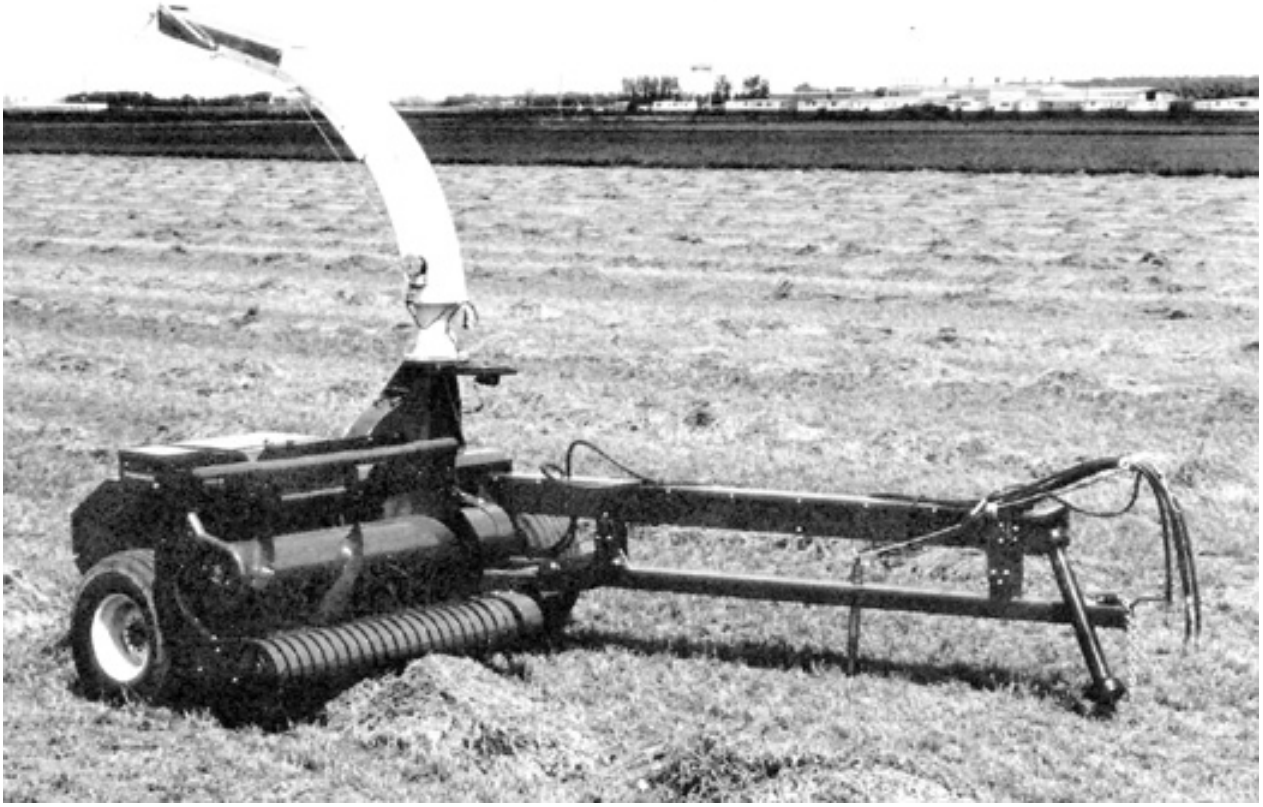
Evaluation Report No. E0179
Printed: August, 1980
Tested at: Portage La Prairie
ISSN 0383-3445

Evaluation Report 158



International Harvester 830 Forage Harvester

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

INTERNATIONAL HARVESTER 830 FORAGE HARVESTER

MANUFACTURER:
International Harvester
401 North Michigan Avenue
Chicago, Illinois
U.S.A. 60611

DISTRIBUTOR:
Interernational Harvester of Canada Limited
- 660 Wall Street
Winnipeg, Manitoba
R3C 2W8

- 2030 First Avenue North
Saskatoon, Saskatchewan
S7K 2A1

RETAIL PRICE: $17,270.00(July, 1980, f.o.b. Portage la Prairie, with electric remote control and bevel knife sharpener, 1.7 meter windrow pickup and 2-row row crop head).

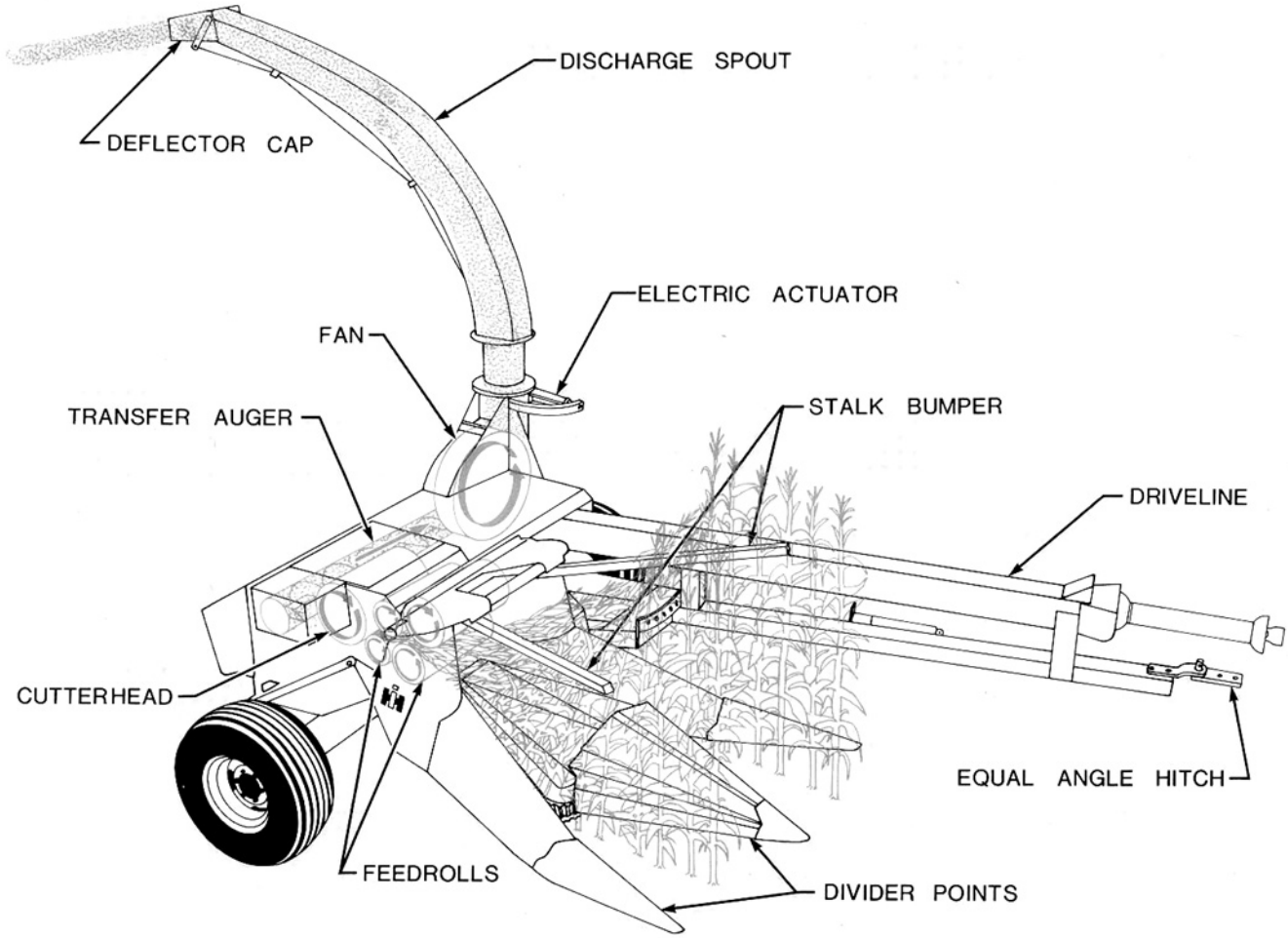


FIGURE 1. International Harvester 830 Schematic.

SUMMARY AND CONCLUSIONS

Overall functional performance of the International Harvester 830 was *very good.* Ease of operation and adjustment was *good.*

Workrates ranged up to 54 t/h (59 ton/h) in standing corn, up to 71 t/h (78 ton/h) in alfalfa, and up to 44 t/h (48 ton/h) in barley. Dry-weight workrates ranged up to 13 t/h (14 ton/h) in corn, up to 24 t/h (26 ton/h) in alfalfa, and up to 23 t/h (25 ton/h) in barley. In windrowed crops, capacity was limited by performance of the windrow pickup, which usually limited ground speed to less than 8 km/h (5 mph).

The use of a 76 mm (3 in) recutter screen reduced workrates as much as 25% for the same power input. The recutter screen significantly reduced the forage particle size but resulted in increased power consumption and red uced workrates.

At both the 5 and 9.5 mm (0.2 and 0.4 in) cut length settings, only 1% of alfalfa silage had a length greater than 100 mm (4 in), and 1% of corn silage had a length greater than 26 mm (1 in).

A tractor with 120 kW (160 hp) maximum power take-off rating would have sufficient power reserve to operate the International Harvester 830 in most field conditions. Power consumption was about 25% higher at the 5 mm (0.2 in) cut length setting than at the 9.5 mm (0.4 in) setting.

The electric remote controls were convenient. Changing from the windrow pickup to the row crop head was relatively easy. Cutterhead knife sharpening and shear plate adjustment were both easy.

The International Harvester 830 was safe to operate if the manufacturer's safety recommendations were followed.

Only minor mechanical problems occurred during the 245 hour test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to the windrow pickup to eliminate wrapping of crop around the feed auger.
2. Modifications to the row crop head to improve the convenience of adjusting the gathering belts.

3. Modifications to the feedroll throat to prevent crop buildup behind the header carriage throat guides.
4. Modifications to the cutterhead cut-off plate to permit its use with the recutter screen.
5. Revising the operator's manual to include instructions on removing header attachments and advice on replacement of the cutterhead cut-off plate.

Chief Engineer -- E. O. Nyborg
Senior Engineer -- J. C. Thauberger
Project Engineer -- R. R. Hochstein

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Modifications to the pickup unit auger and retracting fingers to prevent wrapping have been included in current machines, and a service bulletin issued to cover modification of machines in service or inventory.
2. Modification to improve adjustment of row crop belts is under current consideration.
3. Modifications to the feedroll throat area to prevent material buildup have been included in current machines, and a service bulletin issued to cover modification of machines in service or inventory.
4. The cutterhead cutoff plate attaching holes have been slotted to permit retraction for use with recutter screens.
5. The operator's manuals are currently being totally updated to include information previously provided in supplements. The specific areas mentioned will be reviewed and amended as required.

MANUFACTURER'S ADDITIONAL COMMENTS

The manufacturer considers this a fair and accurate representation of the performance of the International Harvester 830 Forage Harvester in the crops and conditions described herein, and subject to the following comment:

Exchange of header attachments has typically been accomplished by an unassisted individual in 35 minutes or less when using the prescribed mounting procedure. The operator's manual will be reviewed to assure that complete, concise instructions are provided for mounting and removing header attachments.

This report has been prepared using SI units of measurement. A Conversion Table is given in APPENDIX III.

GENERAL DESCRIPTION

The International Harvester 830 (FIGURE 1) is a power take-off driven, pull-type, forage harvester with cylindrical cutterhead. It is available either with a windrow pickup or a row crop head.

The cutterhead is fed by a reversible feedroll assembly. Cut length may be set, either by changing the feedroll drive sprockets, or by varying the number of cutterhead knives. Chopped forage is carried from the cutterhead to the discharge fan by a transfer auger. The adjustable discharge spout and the feedroll clutch are electrically controlled from the tractor seat.

The test machine was equipped with a 1.8 m windrow pickup, a two-row row crop head and optional lift and reach extensions for the discharge spout. Detailed specifications are given in APPENDIX I, while FIGURE 1 shows the location of major components.

SCOPE OF TEST

The International Harvester 830 was operated in the crops shown in TABLE 1 for 245 hours while harvesting about 255 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's manual.

TABLE 1. Operating Conditions

CROP	AVERAGE YIELD (t/ha at 60% Moisture Content)	HOURS	FIELD AREA (ha)
Alfalfa	12	83	76
Sanfoin	11	10	12
Grass	10	7	6
Clover	7 to 11	35	40
Green Barley	12	15	26
Corn (row crop head)	25 to 32	95	95
	TOTAL	245	255

RESULTS AND DISCUSSION

RATE OF WORK

TABLE 2 presents typical workrates for the International 830 in a variety of field conditions. The workrates for alfalfa and green barley were measured in crops yielding above 10 t/ha which had been windrowed with 5 to 5.5 m wide windrowers, while the workrates in corn were measured in standing crops yielding more than 30 t/ha, harvested with the two-row row crop head at a 900 mm row spacing. The reported values are for average continuous feedrates, with the harvester loaded to optimum levels, which were usually governed by pickup or row crop head performance. Daily workrates would be lower than those in TABLE 2, since the reported values do not include time for maintenance and unloading of wagons.

TABLE 2. Average Workrates

CROP	MOISTURE CONTENT %	CUT LENGTH SETTING (mm)	WORKRATES (t/h) ACTUAL	WORKRATES (t/h) DRY-WEIGHT
Alfalfa	68		50.4	16.1
	66		50.0	17.0
	65	5	40.5	14.2
	59		40.3	16.5
	49		28.8	14.7
	68		50.4	16.1
	66		71.0	24.1
	65	9.5	41.1	14.4
	59		51.2	22.4
	49		36.2	18.5
(76 x 135 mm		5	36.4	12.6
Recutter Screen)	65	9.5	51.8	15.0
		5	40.5	20.7
Green Barley	49	9.5	44.5	22.7
		5	53.0	12.8
Corn	76	9.5	54.0	13.0

Both actual workrates and dry-weight workrates are reported in TABLE 2. The actual workrates, which include the crop moisture content, indicate the total weight of forage being harvested, but should not be used for comparing performance of different forage harvesters. The dry-weight workrates, which indicate the weight of dry matter being harvested, provide a better comparison of performance of different forage harvesters, and assessment of the effect of crop variables and machine settings.

Actual werkrates ranged up to 71 t/h whereas dry-weight workrates ranged up to only 24 t/h. Workrates were primarily influenced by cut length setting, use of a recutter screen, and the type of header attachment used. Changing the cut length setting in alfalfa from 9.5 to 5 mm decreased the dry-weight workrate by 17%. Using a recutter screen reduced workrates only slightly, however a significant power increase resulted. In alfalfa, a 76 mm recutter screen reduced the dry-weight workrate by 10% at the 5 mm cut setting, and by 8% at the 9.5 mm cut setting.

In most crops, workrates were limited by performance of the windrow pickup or the two-row row crop head, and not by the cutterhead capacity. This limited the ground speed to 8 km/h in alfalfa and green barley, and 9 km/h in corn. Heavy windrows or tall row crop stands were desirable, to fully utilize cutterhead capacity. Higher workrates could be expected in corn, if a three-row row crop head were used.

QUALITY OF WORK

Uniformity of Cut:[1] TABLE 3 presents typical particle size distributions in second-cut, full-bloom alfalfa, harvested at 60% moisture content. Particle size variations are given for 5 and 9.5 mm cut settings, with and without the 76 mm recutter screen. At the 5 mm cut setting (APPENDIX IV, FIGURE 9) 2% of the silage had a length greater than 26 mm. The 76 mm recutter screen significantly reduced the particle lengths throughout the sample.

TABLE 3. Particle Size Distribution in Alfalfa

PARTICLE LENGTH	PERCENT OF TOTAL SAMPLE WEIGHT			
	WITHOUT RECUTTER SCREEN		WITH 76 mm RECUTTER SCREEN	
	5 mm CUT SETTING	9.5 mm CUT SETTING	5 mm CUT SETTING	9.5 mm CUT SETTING
Less than 4 mm	28 (Fig. 9a)	22	49	34
4 to 9 mm	40 (Fig. 9b)	38	30	31
9 to 13 mm	28 (Fig. 9c)	32	18	29
13 to 26 mm	2 (Fig. 9d)	6	2	4
26 to 100 mm	1 (Fig. 9e)	3	1	2
Greater than 100 mm	1 (Fig. 9f)	1	none	none

TABLE 4 presents typical particle length distributions in corn, harvested at 76% moisture content, for 5 and 9.5 mm cut settings.

TABLE 4. Particle Size Distribution in Corn

PARTICLE LENGTH	PERCENT OF TOTAL SAMPLE WEIGHT	
	5 mm CUT SETTING	9.5 mm CUT SETTING
Less than 5 mm	13 (Fig. 10a)	10
5 to 7 mm	24 (Fig. 10b)	14
7 to 9 mm	51 (Fig. 10c)	62
9 to 13 mm	9 (Fig. 10d)	10
13 to 26 mm	2 (Fig. 10e)	3
Greater than 26 mm	1 (Fig. 10f)	1

Only 1% of the chopped corn had a length greater than 26 mm at the 5 mm cut setting (APPENDIX IV, FIGURE 10), and at the 9.5 mm cut setting. The smaller percentage of longer particles in corn, compared to alfalfa, was due to perpendicular feeding by the row crop head.

Windrow Pickup Losses: Pickup losses were insignificant at speeds up to 8 km/h in alfalfa and 7 km/h in green barley, provided that the windrows were not severely wind-scattered. The open-ended pickup design was effective in picking moderately scattered windrows and negotiating corners.

Row Crop Head Losses: Losses from the row crop head were insignificant at speeds below 9 km/h provided care was taken to keep the divider points centred between the rows.

POWER REQUIREMENTS

Tractor Size: Peak power take-off input, at maximum workrate, was about 120 kW in alfalfa and 95 kW in corn. Corresponding average power requirements were about 105 and 80 kW respectively. The lower power requirements in corn were due to the low feeding capabilities of the two-row row crop head in typical prairie corn crops.

Power requirements increased with shorter cut settings. For example, when harvesting 11 t/ha alfalfa, at 50% moisture content (at a dry-weight workrate of 15 t/h), reducing the cut length setting from 9.5 to 5 mm increased the power input by 23 kW. At the same dry-weight workrate, in the same field conditions, a 20% crop moisture increase did not significantly affect the power consumption at both cut settings.

[1]For each cut length setting, a forage harvester produces a range of lengths. Uniformity is important for proper operation of some silo unloaders. Reduced unloading rates may result if the silage contains a significant number of particles longer than 40 mm. On the other hand, length has tittle influence on silage palatability. The importance of length uniformity must be individually assessed, based on the type of silage handling equipment used.

Total drawbar power requirements on firm, level fields, at 7 km/h, were about 13 kW. This included the draft of the forage harvester and a dump wagon with a 3 t load. In soft, hilly fields, drawbar requirements were as great as 20 kW. A tractor with 120 kW power take-off rating should have sufficient power reserve to operate the International Harvester 830 at optimum workrates, in most field conditions.

Specific Capacity:[2] FIGURE 2 shows the specific capacity of the International 830 in alfalfa at 5 and 9.5 mm cut settings. 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.

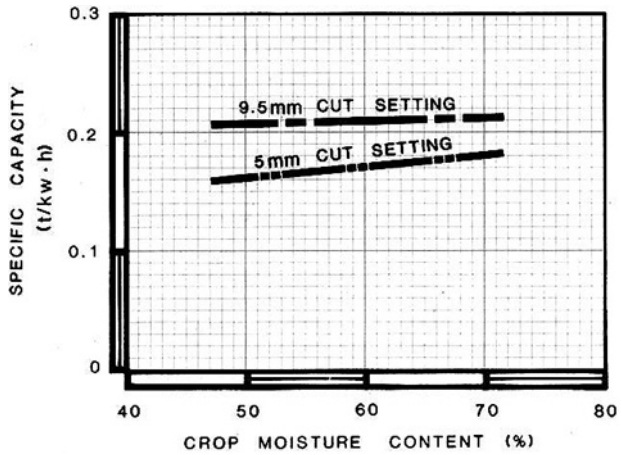


FIGURE 2. Specific Capacity in Alfalfa (based on dry-weight workrates).

As seen in FIGURE 2, a 20% increase in crop moisture content affected the specific capacity only marginally at the 9.5 mm cut setting, however there was a 12% increase in the specific capacity at the 5 mm cut setting.

Changing from 9.5 to 5 mm cut setting reduced specific capacity by about 20%.

In corn, at 76% moisture content, specific capacities were 0.15 t/kW.h at 5 mm cut setting and 0.17 t/kW.h at 9.5 mm cut setting. In green barley, at 49% moisture content, specific capacities were 0.27 t/kW.h at 5 mm cut setting and 0.31 t/kW.h at 9.5 mm cut setting. In alfalfa, the use of a 76 mm recutter screen caused a 20% decrease in specific capacity at 5 mm cut setting and a 25% decrease at 9.5 mm cut setting.

EASE OF OPERATION AND ADJUSTMENT

Hitching: The International Harvester 830 was equipped with an equal-angle hitch arrangement which attached to the tractor drawbar, extending it 130 mm. To adjust drawpole height, the hitch strap could be reversed or attached to the bottom of the drawpole to give four possible heights. Adjustment was ample for all the tractors used during field testing. The drive line pedestal height was adjustable.

Electric Remote Controls: The International 830 was equipped with three electric remote controls which adjusted discharge spout direction, spout deflector cap position, and operated the forward and reverse feedroll clutch. The control console could be mounted at a convenient location on the tractor and was powered by the tractor electrical system. The controls were effective and convenient to use.

Windrow Pickup: The pickup attachment (FIGURE 1) had excellent feeding characteristics in most crops. Pickup losses usually were insignificant at speeds below 8 km/h. The small diameter drum minimized windrow lift, while the open-ended auger design minimized end losses on sharp corners or when picking scattered windrows. Adjustable skid shoes made it possible to match the pickup height to field and windrow conditions.

In windrowed sweet clover and alfalfa, at moisture contents less than 50%, wrapping around the feed auger adversely affected performance at the 5 mm cut setting. Auger wrapping in this crop was eliminated by changing to the faster feed roll speed, 9.5 mm cut setting, or by reducing the feed auger speed. Alter-

[2]Since the specific capacities presented in FIGURE2 are based on dry-weight workrates, direct comparison to specific capacities of equipment such as balers is not valid. Bale d hay normally has a moisture content of about 20% and is not refined to the same degree as silage.

nately, removing 4 mm from the ends of the auger fingers, to permit them to retract completely, alleviated this problem. Wrapping around the ends of the feed auger was also a severe problem, especially in large, wide windrows or on corners, due to the auger flighting ends catching and holding the crop. Removing part of the end flighting (FIGURE 3) eliminated this problem. It is recommended that the manufacturer consider modifications to eliminate feed auger wrapping in dry, long stemmed crops such as sweet clover and alfalfa.

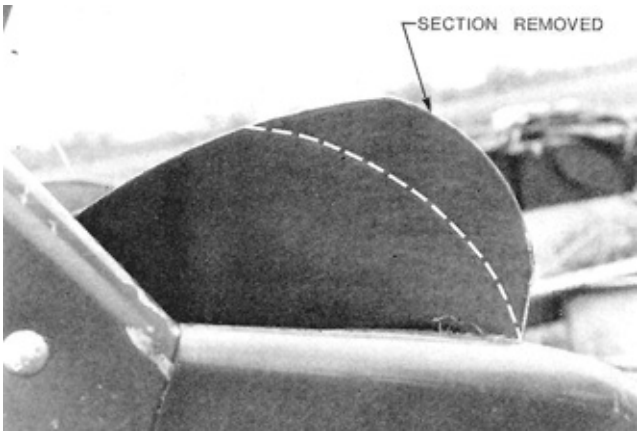


FIGURE 3, Auger flighting end modification.

Two-Row Row Crop Head: The two-row row crop head (FIGURE 4) was equipped with a belt gathering system for 960 mm row spacing. Feed was positive at forward speeds up to 9 km/h. To fully utilize the capacity of the harvester, higher forward speeds were necessary. A three-row row crop head would be more suitable for typical prairie corn crops.

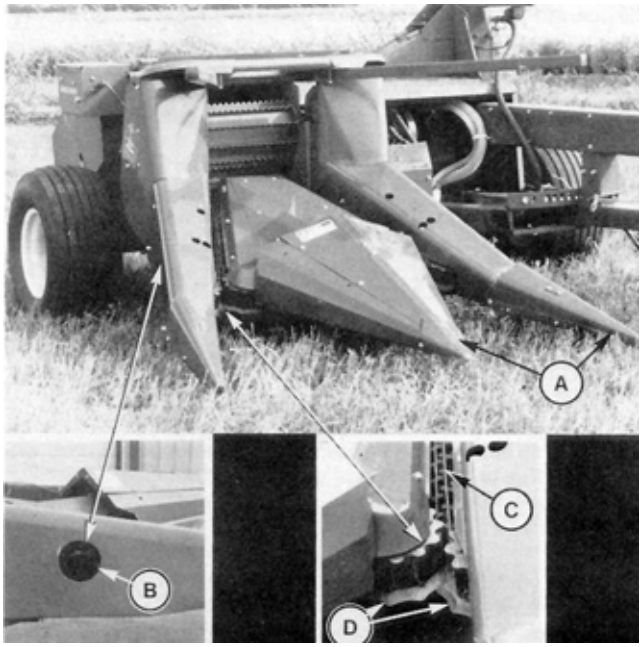


FIGURE 4. Two-Row Row Crop Head: (A) Divider Points, (B) Hole cut in Divider Nose to provide Access for Tension Adjustment, (C) Gathering Belt, (D) Serrated Cutting Disks.

The pivoting divider points could be adjusted to prevent digging, by shortening the adjustable divider support. This adjustment was convenient and it took about 10 minutes to adjust all three divider points.

The skid shoes on the divider points did not provide adequate floatation on rough or stony fields. The centre pivoting divider point often bounced excessively in rough fields. Overall stalk gathering performance was good. For proper performance, maximum side drift from the row had to be less than 200 mm, which required an acceptable degree of operator vigilance.

Poor access was provided to the gathering belt tension adjustment, making it necessary to cut holes in the sides of the row crop divider points (FIGURE 4) to permit adjustment. It is recommended that the manufacturer consider modifications to improve the convenience of adjusting the gathering belts.

Feedroll Throat: Forage collected between the throat guides on the header carriage and the feedroll side plates during operation (FIGURE 5).

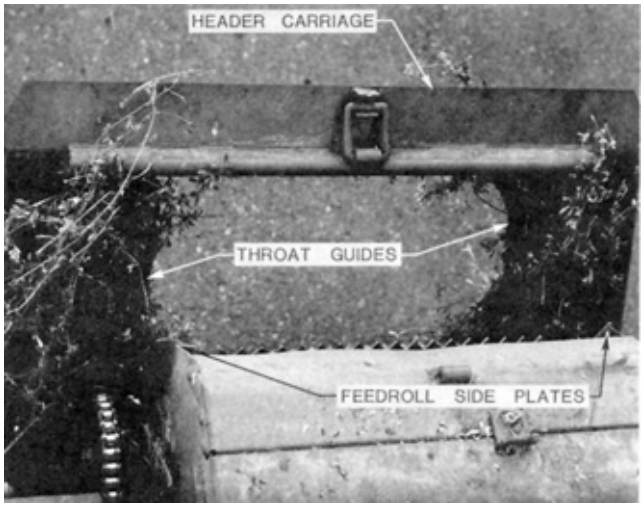


FIGURE 5. Forage Buildup behind Throat Guides on Header Carriage (Header removed).

When the header was raised, the accumulated forage caused the throat guides to move forward, contacting the feed auger flighting. It is recommended that the manufacturer consider modifications to eliminate this problem.

Feedrolls: The feedrolls were very aggressive in all crops. Occasional plugging occurred in bunchy windrows at high feedrates. Unplugging of the feedrolls was easily performed from the tractor by reversing the feedroll drive. The reversing clutch control was positive and effective.

Forage buildup on the front lower feedroll occurred in clover and alfalfa, but this did not affect feeding performance.

Cutterhead Plugging: Cutterhead plugging occurred only infrequently and usually resulted in the shear bolts shearing. Plugging was usually caused by engaging the power take-off clutch too quickly or failing to allow all forage to pass through the harvester before disengaging the power take-off clutch. Access to the shear bolts was 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.

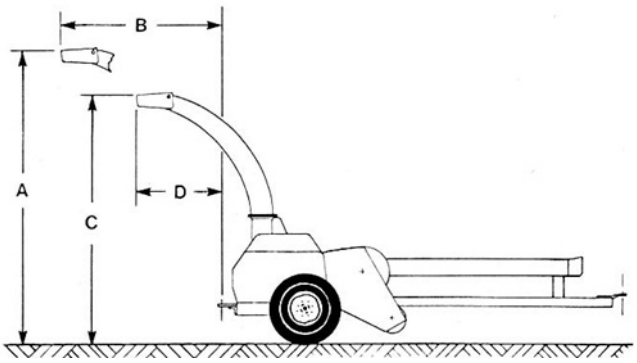


FIGURE 6. Discharge Spout Dimensions: (A) Lift, with extension, 3600 mm; (B) Reach with extension, 1830 mm; (C) Lift, 3300 mm; (D) Reach, 830 mm.

The dimensions refer to the maximum ground clearance setting of the adjustable axle, which could be positioned to give dis-

charge spout heights 50, 100, and 150 mm lower than those shown.

The discharge direction and the discharge angle of the forage was controlled, from the tractor, with the electric remote controls. The quick upward response of the deflector cap activator made small adjustments, to the discharge angle, difficult. In rough fields, the deflector cap was unstable. Maximum rotation of the discharge spout with remote controls was 60°.

Recutter Screen: The 76 mm recutter screen was used for about 50 hours of field testing. The recutter screen was effective, if a close clearance was maintained between the screen and the cutterhead knives. The clearance was adjusted with four bolts on the sides of the cutterhead housing. If the clearance was not readjusted after knife sharpening, forage collected on the screen cutting edges, increasing the power requirement.

Removal or installation of the recutter screen was easy. It took an experienced operator about 20 minutes to install the screen and 10 minutes to remove it.

To install the recutter screen, the operator's manual advised the removal of the cutoff plate at the upper rear of the cutterhead chamber to fit the screen. However, this plate held a rubber seal which prevented chopped forage from accumulating around the sharpening assembly. It is recommended that the manufacturer consider modifications to the cutoff plate to permit its use with the recutter screen.

Knife Sharpening: The International 830 was equipped with a hydraulically driven cylindrical sharpening stone (FIGURE 7) that allowed each knife to be sharpened individually. The cutterhead drive is disengaged to permit the cutterhead to turn, allowing the sharpening stone assembly to follow the helical contour of each knife as the stone traverses the cylinder. Spring and guide rolls ensure proper contact between the knife and sharpening stone. Care had to be taken to ensure that residual crop material on the cylinder did not loosen and lodge in the cutterhead, and cause uneven sharpening.

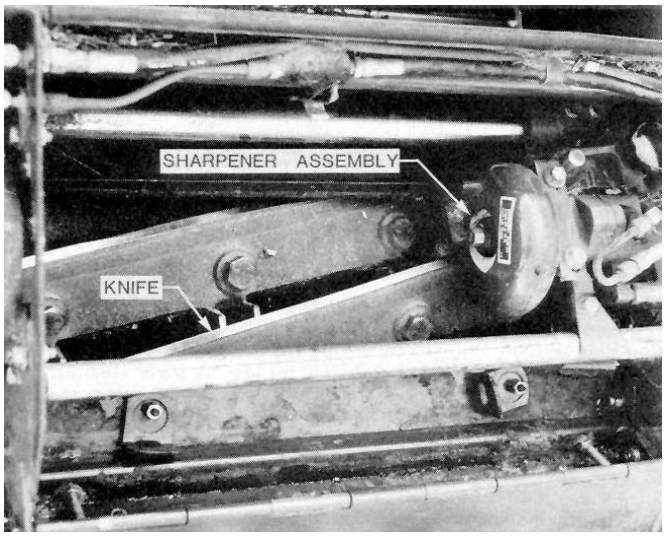


FIGURE 7. Cutterhead Knife Sharpener.

Shear plate clearance was adjusted by loosening the two mounting bolts and adjusting the caliper bolts at the shear plate ends. Adjusting bolts were easily accessible. A large, easily opened, hinged shield swung well away, giving excellent access to the cutterhead and feedroll drives. It took an experienced operator about 30 minutes to sharpen the cutterhead knives and adjust the shear plate.

The average period between knife sharpenings was about 15 hours. During the 245 hour test period, the knives incurred about 3 mm of wear, mainly due to sharpening.

One shearing edge of the reversible shear plate was worn significantly after 240 hou rs of operation, and had to be reversed.

During testing, it was not necessary to reset the cutterhead knives, which were each held in place with four bolts. Set screws would have made adjustments easier (FIGURE 8).

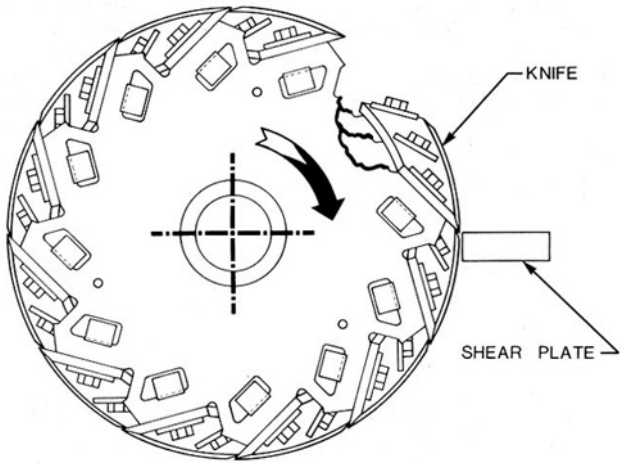


FIGURE 8. Cutterhead Assembly

Adjusting the Length of Cut: The length of cut could be changed either by adding or removing cutterhead knives or by changing the feedroll drive sprocket. Changing the feedroll drive sprocket was the easier method. This was done by reversing the dual sprocket. This standard sprocket provided 5 and 9.5 mm cut settings, while an optional sprocket gave 6 to 13 mm cut settings. Reversing or exchanging feedroll drive sprockets took one man about 20 minutes.

Exchanging Header Attachments: The windrow pickup head and row crop head were both easy to mount and remove. A yoke at the top of the header carriage (FIGURE 5) was used for aligning and lifting the headers into place when mounting. Two pins locked the header to the carriage. The skid shoes on the windrow pickup required a second pair of locking pins to connect the floatation assembly. The header drive chain had to be disconnected.

It took two men to align and mount either attachment. The time required to exchange attachments was about 35 minutes. Instructions for removing header attachments were not clear in the operator's manual. Floatation was easily adjusted by relocating a locking pin.

Transporting: The drawpole could be placed in one of two transport positions or in six operating positions. Only the transport and extreme two left positions were used during tests. Drawpole adjustment was easy. The spring-loaded drawpole locking pin could be retracted from the tractor with a rope.

The International 830 was easy to maneuver and towed well in transport position. Ground clearance was adequate and there was ample hitch clearance for turning sharp corners. A hitch was provided at the rear for towing the wagon in line with the harvester when in transport position.

Lubrication: The International 830 had 30 pressure grease fittings with additional 6 fittings on the header attachments. Daily lubrication was required on 9 fittings and 7 chains, taking about 10 minutes.

Weekly and seasonal lubrication of all other fittings took an additional 10 minutes. Chain lubrication and inspection time was increased due to the number of drive chains employed and their difficult accessibility.

OPERATOR SAFETY

A comprehensive safety section was included in the operator's manual. The International 830 was safe to operate and service, as long as common sense was used and the manufacturer's safety recommendations were followed.

Shielding gave good operator protection from all moving parts. The one hinged shield provided access to all the major drives. Shields guarding frequently serviced components, were hinged.

OPERATOR'S MANUAL

The operator's manual was concise and clearly written, containing much useful information on operation, adjustment, servicing and safety. Further information should be included in the operator's manual on removing header attachments, and on remounting the cutterhead cut-off plate when the recutter screen is in use.

DURABILITY RESULTS

TABLE 5 outlines the mechanical history of the International 830 during 245 hours of operation while harvesting about 160 ha of forage, and 95 ha of corn. The intent of the test was evaluation of functional performance. The following fail ures represent those which occurred during the functional testing. An extended durability evaluation was not conducted.

TABLE 5. Mechanical History

ITEM	Operating Hours	Equivalent Field Area (ha)
The discharge direction motor drive spring pin sheared and was replaced at	53,178	58,188
The pickup auger flighting separated from the auger drum due to welds breaking loose and was repaired at	75	80
The cable, connecting the electrical control actuator to the discharge angle actuator, had worn and had broken at the take up spool and was replaced at	82	87
The right feedroll throat guide was worn due to interference with the feed roll. The guide was modified to eliminate interference at	85	
A loose set screw on the transfer auger drive sprocket caused the sprocket to slip off the cutterhead shaft at	98	104
The fan was contacting the front side of the fan housing and was readjusted at	145, 201	155, 211
The cutterhead sharpener door retaining bolts broke, causing the door to drop into the cutterhead chamber during operation, damaging two knives, and was repaired at	191	201
The feedroll drive chain tightener bracket and idlers were worn and replaced at	220	230
The left gathering belts on the row crop head were out of time. requiring adjustment at	240	250
One gathering belt on the left side of the row crop head had cracked longitudinally and was replaced at	242	252

DISCUSSION OF MECHANICAL PROBLEMS

Feedroll Throat Guides: The right throat guide rubbed on the right side of the front upper feedroll, resulting in wearing of both the guide and the feedroll. The problem was remedied by modifying the adjustment on the throat guide so that it could be moved away from the feedroll.

Feedroll Drive: The tightener bracket wore from contact of the chain against one leg of the bracket due to slipping of the idler sprocket on the bearing. Examination showed onedrive sprocket to be out of line, causing the idler sprocket to ride off centre. The bracket and idler sprocket were replaced, however the problem could not be remedied.

Blower Fan: The first contact was remedied by grinding the front edge of one fan blade. When interference once again occurred, the problem was eliminated by aligning the main gear box to the fan housing. The front of the gear box had to be raised 1 mm. There was no information in the operator's manual on aligning the blower fan.

Discharge Angle Actuator Cable: This cable was replaced with a 10 mm plastic rope and no further wear resulted.

APPENDIX I

SPECIFICATIONS

MAKE: International Harvester

MODEL: 830

SERIAL NO.: 0670012 0002609

OVERALL DIMENSIONS:
-- height (discharge spout removed) 1430 mm
-- length 4800 mm
-- width
  -- without attachments 3000 mm
  -- with windrow pickup 3080 mm
  -- with two-row row crop head 3240 mm
-- ground clearance 200 mm, 250 mm, 350 mm (adjustable)
--wheel tread 2660 mm

WINDROW PICKUP:
-- serial number 0680001000 4118
-- type floating cylindrical drum with spring teeth
-- height adjustment adjustable skid feet
-- working width 1600 mm
-- overall width 1920 mm
-- tooth spacing 75 mm
-- number of tooth bars 3
-- pickup speed 115 rpm
-- tooth tip speed 9.5 km/h
-- tooth length 95 mm
-- auger diameter 560 mm
-- auger length 1700 mm
-- auger speed 150 rpm

TWO-ROW ROW CROP HEAD:
-- serial number 068000 C004471
-- distance between rows 960 mm
-- type of cutter serrated disks
-- cutter speed 146, 170 rpm (adjustable)
-- type of stalk gatherer rubber belt
-- gathering belt/ground synchronization speed 4.4, 5.1 km/h (adjustable)

FEEDROLL ASSEMBLY:
-- throat opening 600 x 120 mm
-- roll width 590 mm

	Front		Rear	
	upper	lower	upper	lower
-- roll diameter	305	220	182	140
-- roll speed (at 5 mm cut setting)	63	72	110	120

CUTTERHEAD:
-- type cylindrical
-- number of knives 12
-- width 625 mm
-- diameter 456 mm
-- speed 850 rpm

RECUTTER SCREEN:
-- width 635 mm
-- arc length 635 mm
-- opening size 76 x 135 mm

KNIFE SHARPENER:
-- type rotating cylindrical stone, driven by hydraulic motor
-- size
  -- diameter 127 mm
  -- width 24 mm

CONVEYING ASSEMBLY:
-- transfer auger
  -- diameter 250 mm
  -- length 1900 mm
  -- speed 580 mm
-- fan
  -- diameter 810 mm
  -- blade width 160 mm
  -- discharge spout diameter 230 mm
  -- speed 1000 rpm

TIRES: two, 31 x 31.5 -- 6 ply rating

WEIGHTS:	*With Windrow Pickup*	*With Two-Row Row Crop Head*
-- left wheel	896 kg	812 kg
-- right wheel	878 kg	890 kg
-- hitch	104 kg	274 kg
TOTAL	1878 kg	1976 kg

LUBRICATION:

-- main unit	
-- grease fittings	9 daily, 17 weekly, 4 yearly
-- chains	7 daily, 1 weekly
-- wheel bearings	2 yearly
-- gear boxes	yearly
-- windrow pickup	
-- grease fittings	2
-- chains	3
-- two-row row crop head	
-- grease fittings	4 yearly
-- chains	1 daily
-- gear boxes	1 yearly

OPTIONAL EQUIPMENT:

-- three-row row cop head, 760 mm row spacing
-- recutter screens, sizes 56 and 76 mm
-- spout extensions, horizontal -- 100 mm, vertical -- 300 mm
-- spout wear liner
-- vertical gatherer feedroll for row crop head
-- wagon hitch extension plate
-- automatic wagon hitch
-- shoe wear plate for windrow pickup
-- cutterhead torque wrench
-- feedroll drive sprocket assembly to provide 6 mm and 13 mm cut lengths

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

(a) excellent
(b) very good
(c) good
(d) fair
(e) poor
(f) unsatisfactory

APPENDIX III

CONVERSION TABLE

1 hectare (ha)	= 2.5 acres (ac)
1 kilometre/hour (km/h)	= 0.6 mile/hour (mph)
1 metre (m)	= 3.3 feet (ft)
1 millimetre (mm)	= 0.04 inches (in)
1 kilowatt (kW)	= 1.3 horsepower (hp)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 tonne (t)	= 2200 pounds mass (lb)
1 newton (N)	= 0.2 pounds force (lb)
1 tonne/hour (t/h)	= 1.1 ton/hour (ton/h)
1 tonne/kilowatt hour (t/kW-h)	= 0.8 ton/horsepower hour (ton/hp-h)

DISTRIBUTION OF PARTICLE LENGTHS

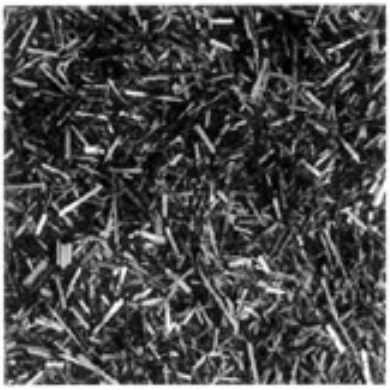


FIGURE 9a
Less than 4 mm

FIGURE 9b
4 to 9 mm

FIGURE 9c
9 to 13 mm

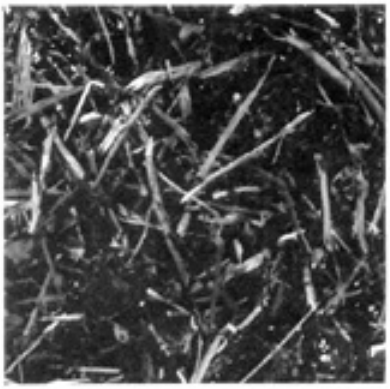


FIGURE 9d
13 to 26 mm

FIGURE 9e
26 to 100 mm

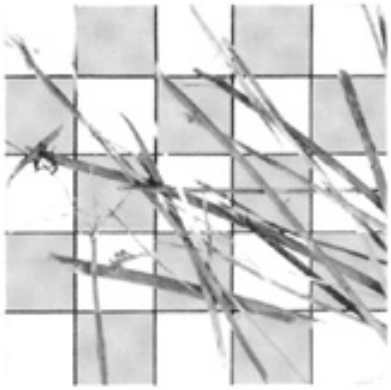


FIGURE 9f
Greater than 100 mm

FIGURE 9. Typical Distribution of Particle Lengths in Alfalfa (20 mm grid).

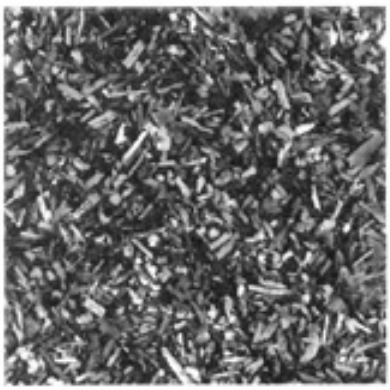


FIGURE 10a
Less than 5 mm

FIGURE 10b
5 to 7 mm

FIGURE 10c
7 to 9 mm

FIGURE 10d
9 to 13 mm

FIGURE 10e
13 to 26 mm

FIGURE 10f
Greater than 26 mm

FIGURE 10. Typical Distribution of Particle Lengths in Corn (20 mm grid).

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