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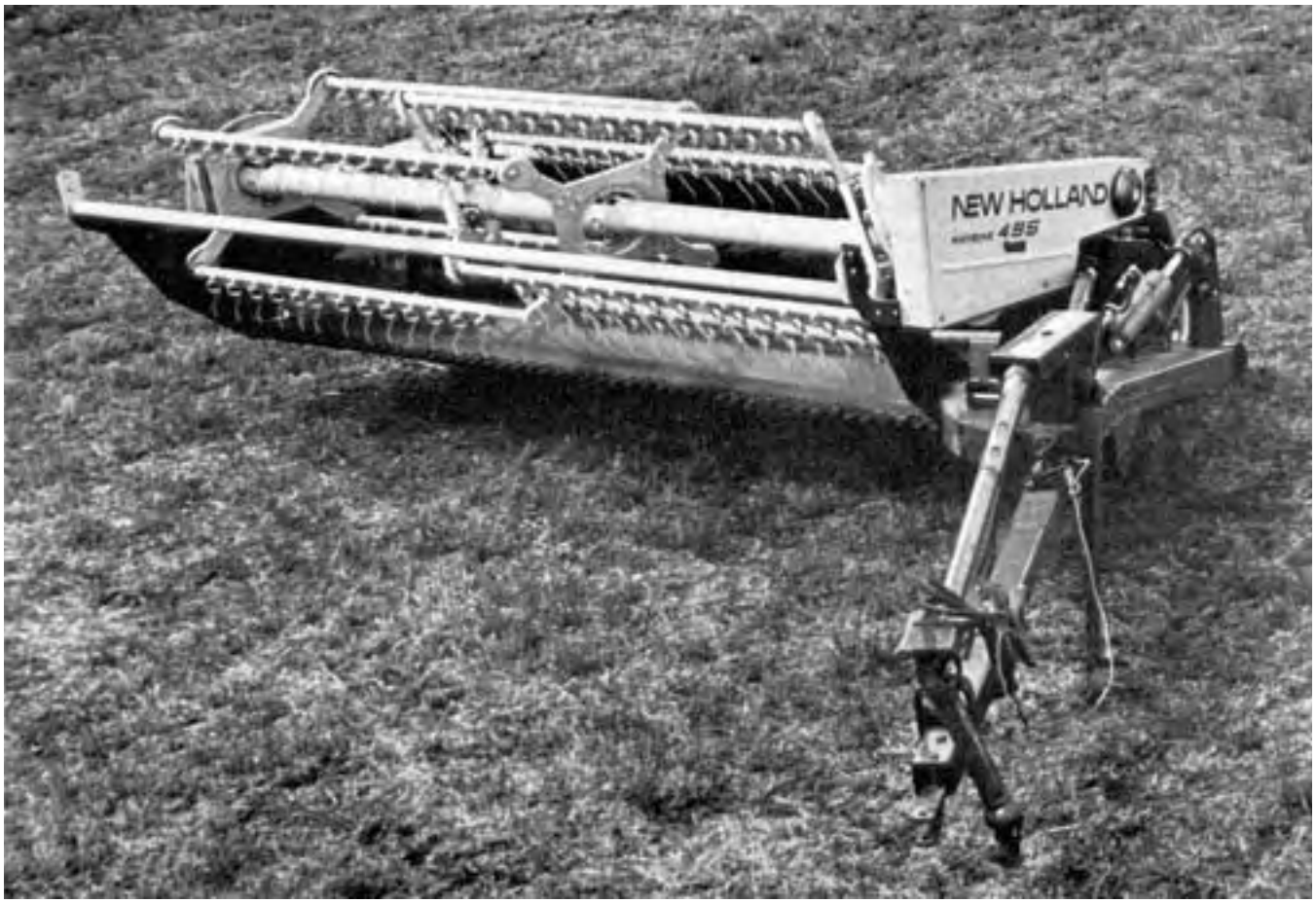
Evaluation Report 192



Sperry New Holland 495 Mower - Conditioner

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

SPERRY NEW HOLLAND 495 MOWER-CONDITIONER

MANUFACTURER:

Sperry New Holland
Division of Sperry Rand Corporation
New Holland, Pennsylvania 17557
U.S.A.

DISTRIBUTORS:

Sperry New Holland
-- Box 777, Winnipeg, Manitoba R3C 2L4
-- Box 1907, Regina, Saskatchewan S4N 2S3
-- Box 1616, Calgary, Alberta T2P 2M7

RETAIL PRICE:

$10,885.00 (June, 1980, f.o.b. Humboldt, Saskatchewan with optional cutter bar wear plates and lateral transport kit).

SUMMARY AND CONCLUSIONS

Overall functional performance of the New Holland 495 Mower-Conditioner was good. Ease of operation and adjustment both were very good. Performance was lowered by poor header flotation in rough or stony fields, resulting in guard and knife damage.

Average field speeds varied from 4 to 9 km/h (2.5 to 5.5 mph) while average workrates varied from 1.5 to 3.0 ha/h (3.7 to 7.4 ac/h). Ground speed was usually limited by the cutter bar performance except in heavy slough hay where feedrate was limited by hesitant conditioner feeding.

Cutting ability was good in most standing crops. Windrow formation and quality varied from good to very good depending on crop type and stand.

Peak power take-off requirements varied from 10 to 15 kW (13 to 20 hp), A 30 kW (40 hp) tractor should have ample power to operate the New Holland 495 in most field conditions.

Header flotation was good in smooth, uniform field conditions, but cutter bar digging, with resultant knife and guard damage occurred in rough or stony fields.

The New Holland 495 was safe to operate as long as common sense was used and the manufacturer's safety recommendations were followed.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications, allowing more shielding adjustment, to improve windrow formation in light crops.
2. Modifications to reduce tractor tire and drawpole interference on sharp turns.
3. Modifications to improve header flotation in rough or stony fields.

Chief Engineer -- E.O. Nyborg
Senior Engineer -- J.D. MacAulay
Project Technologist -- D.H. Kelly

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Production changes are scheduled to allow for greater adjustments of shields in future production. This change will improve windrow formation capabilities.
2. This recommendation is being reviewed and consideration will be given to future models.
3. Consideration will be given to this recommendation for future production. Header flotation adjustments must be maintained in accordance with the operator's manual to ensure satisfactory operating life of cutter bar parts.

NOTE: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX

GENERAL DESCRIPTION

The New Holland 495 is a pull-type, power take-off driven mower-conditioner. The one-piece cutting platform uses a conventional reciprocating cutter bar with a cam action reel to move hay to the conditioner. The conditioner rolls crimp the hay, throwing it rearward, where it is formed into a windrow with adjustable shields. The knife is actuated by a belt driven wobble drive.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The New Holland 495 was operated in conditions shown in TABLES 1 and 2 for 106 hours while cutting about 256 ha (640 ac).

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

TABLE 1. Operating Conditions

Crop	Hours	Field Area
		ha
Bromegrass	16	24
Clover	32	90
Alfalfa, Bromegrass & Crested Wheatgrass	32	77
Green Feed	16	48
Prairie Hay & Slough Grass	10	17
Total	106	256

TABLE 2. Operation in Stony Fields

Field Condition	Hours	Field Area
		ha
Stone Free	12	29
Occasional Stones	23	58
Moderately Stony	61	151
Very Stony	10	18
Total	106	256

RESULTS AND DISCUSSION

QUALITY OF WORK

Windrow Formation: The New Holland 495 produced good quality windrows (FIGURE 1) in most hay crops. Windrow formation was controlled by two fixed side shields and an adjustable top baffle. In short, light crops, loose scattered windrows were produced (FIGURE 2) since the side shields could not be positioned to form a dense windrow. Modifications, allowing more shielding adjustment, are recommended to improve windrow quality in light crops.

Windrows were uniform in most crops. In light, short crops, hay sometimes collected on the cutter bar causing slight bunching. Some bunching also occurred in badly lodged hay due to uneven clearing of the cutter bar. Forward speed had little effect on windrow quality. Speed was usually limited by field roughness or cutting performance. Due to the centre delivery, continuous windrows were formed around corners.

FIGURE 1. Windrow Formation in Heavy Crops.

Cutting Ability: All tests were conducted with under-serrated knife sections. Cutting ability was good in most hay crops as long as the knife sections and guards were sharp. Cutter bar plugging occurred in fine stemmed, damp hay crops.

It was not possible to cut cleanly around sharp corners. Interference between the drawpole and inside rear tractor tire prevented the sharp turns needed to cut clean corners. It is

recommended that the manufacturer consider modifications to reduce tire and drawpole interference on sharp turns.

FIGURE 2. Windrow Formation in Light Crops.

Stubble: Three general types of stubble are formed by a mower. These are ideal, undulating, and irregular as shown in FIGURE 3. The New Holland 495 produced ideal stubble in most hay crops as long as the cutter bar was sharp. Once the cutter bar became worn, irregular stubble was formed, especially in fine stemmed hay. When the header support springs were adjusted to the manufacturer's recommended settings for operation in stony conditions, undulating stubble was formed due to excessive header bounce.

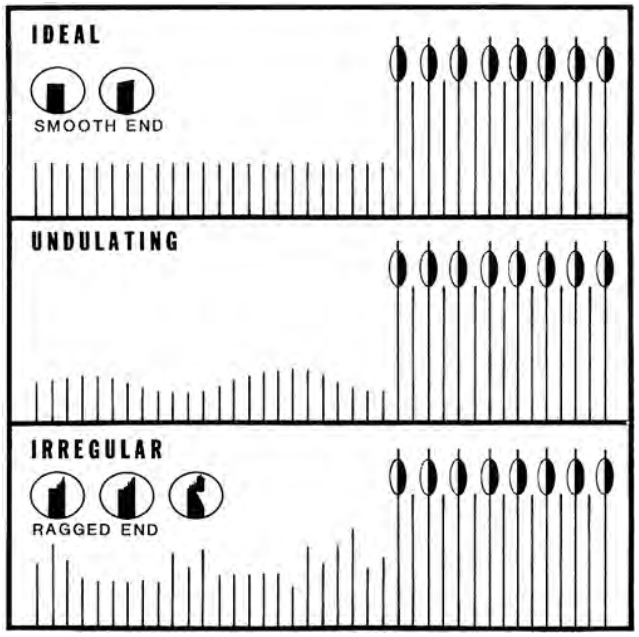


FIGURE 3. Types of Stubble.

Header Flotation: The header on the New Holland 495 is equipped with adjustable skid shoes designed to follow the field contour. Two sets of adjustable springs provide flotation. The operator's manual recommended that in normal field conditions, the springs be set to obtain a header lift force of 310 N (60 lb). In stony fields, a header lift force from 155 to 225 N (30 to 45 lb) is recommended.

The manufacturer's recommended spring settings were unsuitable for most field conditions. Severely undulating stubble was produced at header lift force settings lower than 270 N (55 lb). At a setting of 270 N, header flotation was good in smooth, uniform field conditions. In rough and stony conditions, however, cutter bar digging, with resultant knife and guard damage occurred, as noted in DISCUSSION OF MECHANICAL PROBLEMS. It is recommended that the manufacturer consider modifications to improve header flotation in rough or stony field conditions.

Reel Performance: Reel performance was good in all crops. Reel position had to be adjusted when cutting very short or very long hay to provide uniform flow to the conditioner.

Reel speed was variable from 50 to 80 rpm by adjusting the belt drive sheave, while an optional speed reducing kit allowed reel speeds from 39 to 64 rpm. For optimum performance, reel tip speed should be about 10% faster than the ground speed. Ground speeds from 9 to 14 km/h (5 to 8 mph) were possible with the standard drive and from 7 to 11 km/h. (4 to 7 mph) with the optional drive.

Reel tooth movement, which was actuated with a cam, was not adjustable. The cam action fed hay from the 3.8 m (12 ft) wide cutter bar to the 2.8 m (9 ft) wide conditioner rolls.

Conditioner Performance: The New Holland 495 was equipped with two rubber conditioner rolls, with an intermeshing herringbone design. Roll clearance could be set with removable shims, while roll pressure could be adjusted through torsion bars. The operator's manual recommended that the conditioner rolls be adjusted so that 90% of the stems and 5% of the leaves show conditioner action.

Conditioner performance was very good in all crop conditions. Feeding was aggressive in all crops except in heavy, fine stemmed slough grass. In heavy fine grass, hesitant conditioner feeding limited feedrates.

The purpose of a conditioner is to reduce field curing time, by bruising the plant stems, resulting in more uniform drying. FIGURES 4 and 5 show the average effects that can be expected in using a conditioner in typical prairie haying conditions. The figures compare average drying times for hay cut with a 3.7 m (12 ft) wide windrower with and without conditioning. In average haying conditions, the use of a conditioner will likely permit baling from one-half to one day sooner. A second benefit is reduced leaf loss, since stems and leaves are at a more uniform moisture content in conditioned windrows. Much variation can be expected due to weather conditions.

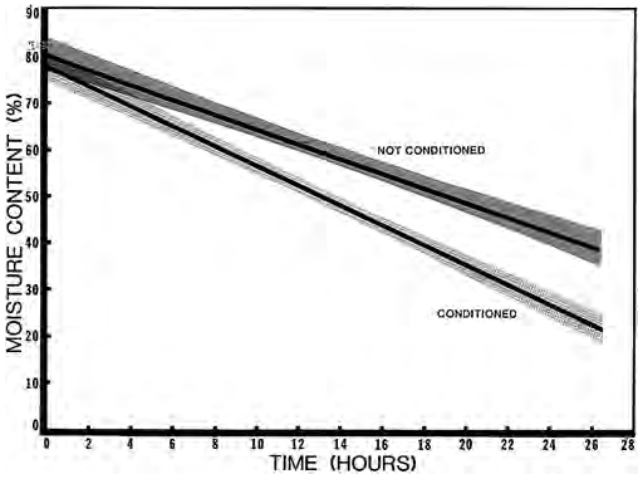


FIGURE 4. The Effect of Conditioning in a 3 t/ha Sweet Clover Crop.

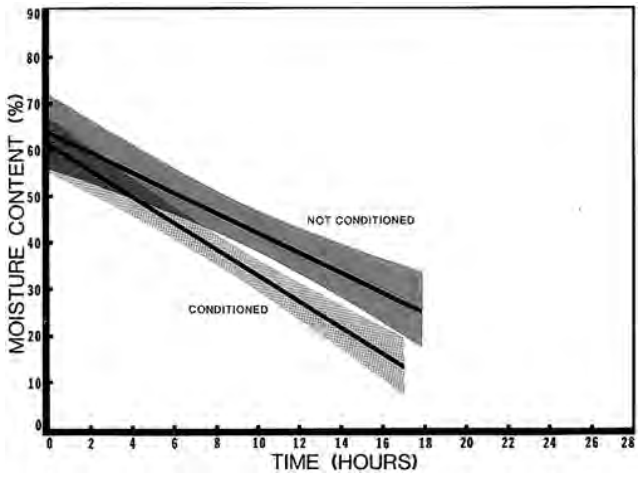


FIGURE 5. The Effect of Conditioning in a 2.5 t/ha Brome-Alfalfa Crop.

Leaf Loss: Leaf loss from the conditioner was negligible. The high moisture content of standing hay crops allow aggressive roll action with little leaf loss.

RATE OF WORK

Average field speeds varied from 4 to 9 km/h (2.5 to 5.5 mph) while average workrates varied from 1.5 to 3 ha/h. Ground speed was usually limited by cutter performance, except in heavy, fine stemmed slough grass, where workrate was limited by hesitant feeding into the conditioner.

EASE OF OPERATION

Controls: Header height was controlled through the tractor hydraulics with a standard 203 mm (8 in) stroke remote hydraulic cylinder. A mechanical stop, which locked the header in raised position, permitted easy installation and removal of the remote hydraulic cylinder. A tractor drawbar extension was needed.

Transporting: The New Holland 495 has two transport positions. In semi-transport position, the hitch tongue is swung to the right to permit the tractor to travel in front of the cutter bar. In full transport position, the hitch and wheel positions are changed, permitting the windrower to be pulled from the right end (FIGURE 6).

A rope, controlling a hitch lock, was provided to swing the drawpole from field and semi-transport position without leaving the tractor. It took one man about twenty minutes to place the New Holland 495 in full transport position.

FIGURE 6. Full Transport Position.

Adjustments: Reel speed was adjusted manually by varying the two halves of the drive sheave. Lower reel speeds were possible by purchasing an optional speed reducing kit. The reel drive belt had a spring loaded tightener and did not need adjustment during the test. Fore-and-aft reel position as well as the reel height was easily adjusted by repositioning the reel in appropriate holes.

Conditioner speed was not adjustable. The clearance between the two rolls was adjusted by removable shims while the pressure between the rolls was adjusted by two hand cranks controlling torsion springs.

Servicing: Daily lubrication took from 10 to 15 minutes. The New Holland 495 had 22 grease fittings, four chains and one gearbox.

POWER REQUIREMENTS

Measured peak power take-off requirements varied from 10 to 15 kW (13 to 20 hp). A 30 kW (40 hp) tractor should have ample power to operate the New Holland 495 in most field conditions.

OPERATOR SAFETY

The Sperry New Holland 495 was safe to operate and service as long as common sense was used and the manufacturer's safety recommendations were followed. Rotating parts were well shielded.

OPERATOR'S MANUAL

The operator's manual was clear, well written and contained necessary information on operation, servicing, adjustments, and safety procedures.

DURABILITY RESULTS

TABLE 3 outlines the mechanical history of the New Holland 495 during 106 hours of field operation while cutting about 256 ha (640 ac). The intent of the test was functional evaluation. The following failures represent those, which occurred during functional testing. An extended durability evaluation was not conducted.

TABLE 3. Mechanical History

Item	Operating Hours	Equivalent Area (ha)
Cutter Bar		
-Individual knife sections or guards were damaged and replaced at	8,16,24, 28,31,38, 53,59,75 and 79	19, 38, 58, 67, 75, 92, 128,142,181 and 190
-The entire set of guards and a new knife were installed at	80	193
-The cutter bar drive belt was replaced at	69	166

DISCUSSION OF MECHANICAL PROBLEMS

Cutter Bar: Severe cutter bar durability problems occurred during the test. During the first 190 ha (475 ac) of fieldwork, 19 knife sections and 5 guards had to be replaced. The remaining guards and knife sections were so badly worn by the end of 190 ha (475 ac) that the entire cutter bar needed replacement. The knife guard mounting sill was also bent by rocks on many occasions.

Cutter bar problems were attributed to poor header flotation. Setting the flotation springs for a header lift force from 155 to 225 N (30 to 45 lb), as recommended in the operator's manual for stony fields, resulted in severe cutter bar bounce and undulating height of cut. Setting the flotation springs for a header lift force of 270 N (55 lb), produced a uniform stubble height, but apparently did not give sufficient flotation to protect the cutter bar in rough or stony fields.

APPENDIX I
SPECIFICATIONS

MAKE:	Sperry New Holland Mower-Conditioner
MODEL:	495
SERIAL NUMBER:	475155

HEADER:

-- width of cut (divider pointers)	3850 mm
-- effective cut (inside dividers)	3710 mm
-- range of cutting height	45 to 118 mm
-- guard spacing	76 mm
-- length of knife section	76 mm (under serrated)
-- knife stroke	76 mm
-- knife speed	773 cycles/min.

REEL:

-- number of bats	2 sets of 4
-- bat action	cam
-- number of reel arms per bat	2
-- diameter	1105 mm
-- number of teeth per bat	4 with 13 4 with 15
-- bat teeth spacing	130 mm
-- reel speed range	49 to 80 rpm (38 to 63 with optional speed reduction kit)
-- reel position adjustment	
-fore-and-aft	130 mm
-height above cutter bar	57 mm

CONDITIONER ROLLS:

-- number of rolls	2
-- roll construction	rubber, herringbone design
-- length	2795 mm
-- diameter	244 mm
-- speed	640 rpm
-- roll pressure control	torsion bar

0VERALL DIMENSIONS:	**Field Position**	**Transport Position**
-- length	4600 mm	6000 mm
-- width	5825 mm	2950 mm

TIRES:
-- size 2, 11L x 14, 4-ply

WEIGHT:	**Field Position**	**Transport Position**
-- left wheel	540 kg	800 kg
-- right wheel	934 kg	700 kg
-- hitch pin	546 kg	520 kg
Total	2020 kg	2020 kg

SERVICING:

-- grease fittings	15, every 8 hours 7, every 50 hours
-- chains	4, every 50 hours
-- wheel bearings	2, yearly
-- gearbox	1, yearly

APPENDIX II
MACHINE RATINGS

The following rating scale is used in PAMI Evaluation reports:

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

APPENDIX III
CONVERSION TABLE:

1 hectare (ha)	= 2.5 acres (ac)
1 kilometre/hour (km/h)	= 0.6 miles/hour (mph)
1 tonne/hectare (t/ha)	= 0.5 ton/acre (ton/ac)
1 metre (m)	= 39 inches (in)
1 millimetre (mm)	= 0.04 inches (in)
1 kilowatt (kW)	= 1.3 horsepower (hp)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 newton (N)	= 0.2 pounds force (lb)

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