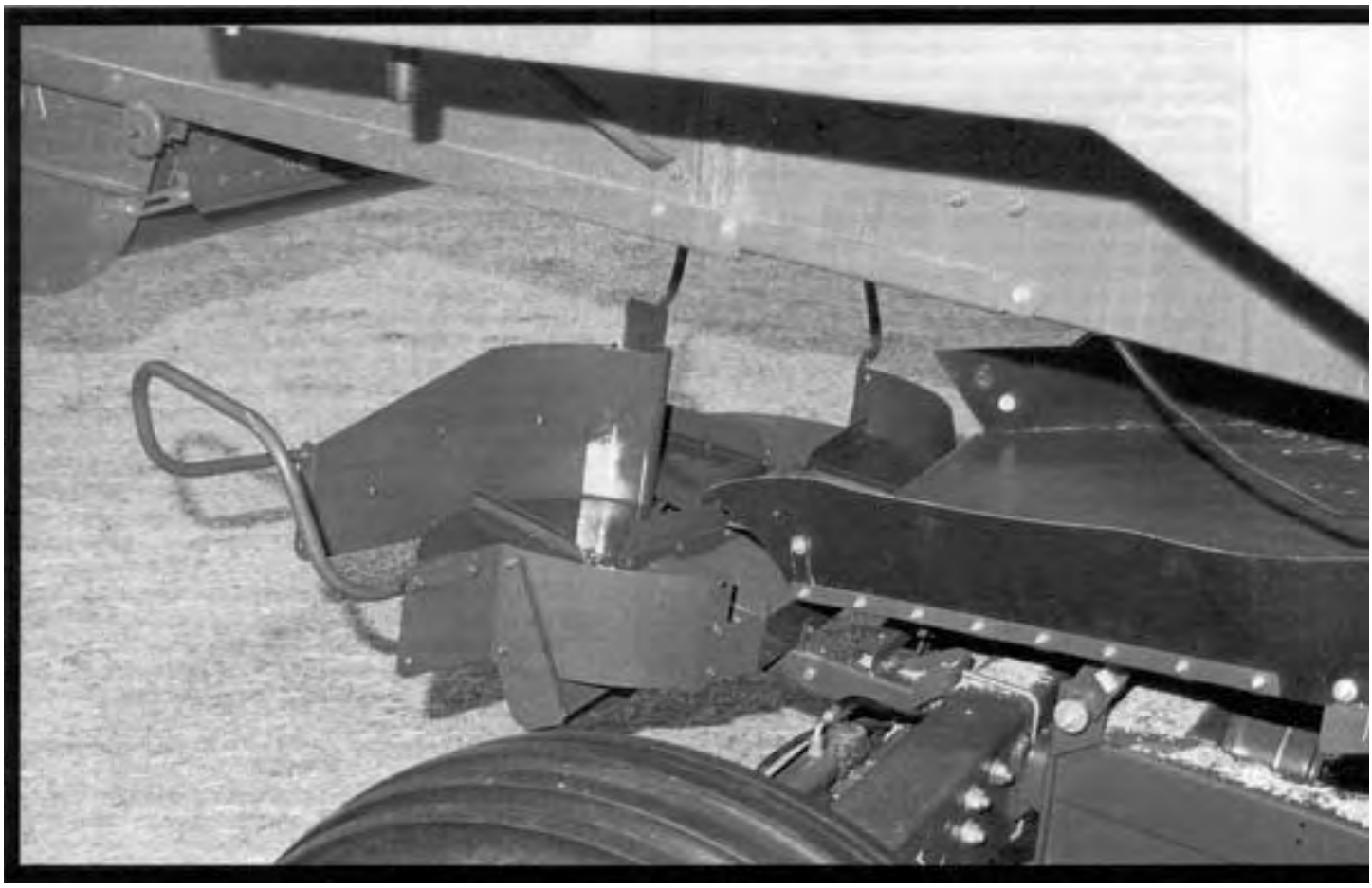
Printed: July, 1991
Tested at: Humboldt
ISSN 0383-3445
Group 4c

Evaluation Report 657



John Deere Chaff Spreader

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

JOHN DEERE CHAFF SPREADER

MANUFACTURER:

John Deere Harvester Works
1100 - 13th Avenue
East Moline, Illinois 61244
U.S.A.

DISTRIBUTOR:

John Deere Limited
455 Park Street
Regina, Saskatchewan
S4P 3L8
Phone: (306) 721-7950

RETAIL PRICE:

$3520.00 (July, 1991, f.o.b. Humboldt, Saskatchewan).

FIGURE 1. John Deere Chaff Spreader.

SUMMARY AND CONCLUSIONS

Quality of Work: The flow of material through the spreader was very good. The spreading discs easily handled all of the chaff and plugging never occurred. Chaff spreading was good. Spread widths were typically 20 ft (6.1 m) wide. The chaff was spread with desirable uniformity without dense rows.

Rate of Work: The spreader easily handled all of the chaff from a John Deere 9500 combine in all crops.

Ease of Operation and Adjustment: The John Deere chaff spreader is normally dealer installed, however, provided instructions allowed for installation by the purchaser. The spreader could be easily removed by two persons or a safe lifting device.

Ease of spreader adjustment was excellent. Spread width was adjusted by changing the spreader speed, however, speeds above 500 RPM did not increase spread width. Ease of combine adjustment was good. Access to the cleaning shoe adjustments was aided by the long wrench supplied by the manufacturer. Shoe effluent was easy to sample with the chaff spreader attached.

Ease of servicing was excellent. Only belt tension required checking or adjustment. Ease of cleaning was excellent.

Power Requirements: The hydraulic power required to drive the chaff spreader was 3 hp (2.2 kW).

Safety: All combine choppers and spreaders are potentially dangerous. Warning decals were provided. The safety instructions in the operator's manual should be read prior to machine operation.

Operator's Manual: The operator's manual was very good and provided all the necessary information.

Mechanical History: No mechanical problems occurred during the test.

RECOMMENDATIONS

No recommendations have been made.

Senior Engineer: J.D. Wassermann
Project Manager: L.G. Hill

Project Technologist: A.R. Boyden

GENERAL DESCRIPTION

The John Deere chaff spreader mounts at the rear of the combine to spread chaff from the combine cleaning shoe (FIGURE 1). The chaff is conveyed to the spreading discs with a shaker pan. The twin horizontal counter rotating spreader discs throw chaff to each side.

The John Deere chaff spreader is hydraulically driven from a pump mounted on the straw chopper drive shaft and through a flow control valve that controls the spreader disc speed. The John Deere chaff spreader is optional for the John Deere 9400, 9500, and 9600 combines.

Specifications for the spreader are given in APPENDIX I.

SCOPE OF TEST

The machine evaluated by PAMI was configured as described in the General Description, FIGURE 1, and Specifications section of this report. The manufacturer may have produced different versions of this machine either before or after the PAMI tests. Therefore, when using this report, check to ensure the machine being considered is the same as the one evaluated in this report. If differences are found, PAMI or the manufacturer may be contacted to determine the effect of the changes on performance.

The John Deere chaff spreader was used on a John Deere 9500 combine. It was operated in the conditions shown in TABLE 1 for about 117 hours. During this time, measurements and observations were made in various crops to evaluate the spreader for rate of work, quality of work, ease of operation, adjustment, power requirement, operator safety, and suitability of the operator's manual.

Laboratory tests were also conducted to determine the uniformity of the spread pattern. The stationary combine was fed a typical rate of dry crop material by a conveyor. The straw and chaff was spread over an unobstructed concrete floor. The chaff from the spreader that fell within 2 ft (0.61 m) wide strips across the width of the spread pattern were weighed to determine spread uniformity.

TABLE 1. Operating Conditions

Crop	Yield Range		Width of cut		Hours	Field Area	
	bu/ac	t/ha	ft	m		ac	ha
Barley	33 - 100	1.8 - 3.6	20, 30	6.1, 9.1	31	264	107
Canola	12 - 35	0.7 - 2.0	20, 24	6.1, 7.3	22.5	180	69
Flax	20 - 25	1.3- 1.6	30	9.1	6	70	28
Fall Rye	23 - 46	1.4 - 2.9	18, 21	5.5, 6.4	17	140	57
Wheat	23 - 53	1.5- 3.6	18, 60	5.5, 18.2	40.5	325	132
Total					117	970	393

RESULTS AND DISCUSSION

QUALITY OF WORK

Chaff Handling: Chaff handling was very good.

The shaker pan easily conveyed all the chaff to the spreaders even in tough conditions. The spreading discs easily handled all of the chaff, and plugging never occurred. Spreading: Chaff spreading from the John Deere chaff spreader was good.

Chaff and straw spreading is a key part of good soil management. Heavy concentration or rows of chaff and/or straw can cause difficulty in subsequent tillage and seeding operations. Heavy concentrations may also cause slow soil warming, nitrogen depletion or toxic build up.

Ideally, all crop residue should be redistributed evenly over the field. This seldom happens. To get the most effective spread, it is necessary to match cutting and spreading width closely. It is also important that the spreader provide suitable spread uniformity over the spread width.

FIGURE 2 shows the chaff spread pattern of the John Deere chaff spreader along with the straw spread from the John Deere straw chopper. FIGURE 2 shows the material concentration across the spread that would be typical for a 50 bu/ac (3.4 t/ha) wheat crop (MOG/ G = 1)*, when the spread and cut widths are closely matched. APPENDIX II provides a guideline for crop residue concentration ratings.

**MOG/G refers to the weight of Material-Other-than-Grain divided by the weight of grain. The value of 1 means the MOG and Grain are equal.*

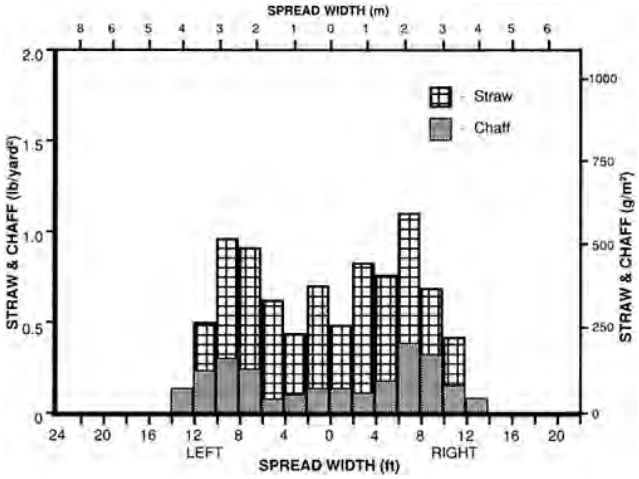


FIGURE 2. Spread Pattern Uniformity.

The John Deere's spread in FIGURE 2 shows that chaff could be spread up to 28 ft (8.5 m). Chaff concentrations were in the desirable range when width of cut was similar to spread widths. Higher yields or wider widths of cut would increase the concentration, while lower yields would reduce the concentration.

In the field, chaff was also typically spread up to 20 ft (6.1 m) (FIGURE 3). Spreader speed and wind affected the spread width and uniformity. Most of the chaff was spread to the sides. No rows or heavy concentrations were apparent.

FIGURE 3. Typical Spread Pattern.

RATE OF WORK

The John Deere chaff spreader easily handled all of the chaff from the John Deere 9500 combine in all crops. Combine MOG feedrates at times were in excess of 600 lb/min (16.3 t/h). Typically, about 15 to 20% of the MOG was chaff going over the cleaning shoe. The spreader easily spread the chaff and no plugging or bridging occurred.

EASE OF OPERATION AND ADJUSTMENT

Installation: The John Deere chaff spreader was installed by the dealer, however, the provided instructions allowed for installation by the purchaser. Installation required mounting the hydraulic pump, a flow control valve, and hydraulic lines. The mount for the spreader body attached to the rear axle of the combine. The spreader body was easily removed. Disconnecting required removal of two pins and disconnecting the hydraulic hoses. Two persons or a lifting device was required to remove it from the mounts.

Spreader Adjustment: Ease of spreader adjustment was excellent.

Spread width was adjusted by changing the spreader speed. The maximum spread width occurred at about 500 RPM in most conditions. Speeds above 500 RPM did not increase spread width.

Combine Adjustment: Ease of combine adjustment was good.

With the chaff spreader in place, the operator could stand ahead of the axle and beside the shaker pan to adjust the sieve or chaffer with the long wrench supplied by the manufacturer.

Shoe effluent could be sampled with the chaff spreader attached by reducing the spreader speed and catching the discharge from either side.

Servicing: Ease of servicing was excellent.

No lubrication was required for the chaff spreader. Only sealed bearings were used and the belt tension required only periodic checking and adjustment.

Cleaning: Ease of cleaning was excellent.

All straw or chaff was easily removed after machine use.

POWER REQUIREMENTS

The maximum power required to operate the chaff spreader was 3 hp (2.2 kW). The hydraulic system pressure at 640 RPM was 390 PSI (2700 kPa) at a flow of 11 US gpm (41.6 L/min).

SAFETY

All combine choppers and spreaders are potentially dangerous. Material discharged can reach velocities that can cause serious injury or death. Extreme caution is required at all times when working near operating spreaders.

The John Deere combine had 3 decals mounted on each side of the rear hood that warned to "stay clear" when engine is running. These decals adequately warned of the dangerous areas. The discharge was lower and open, and required caution. Safety instructions in the operator's manual should be read prior to machine operation.

OPERATOR'S MANUAL

The operator's manual was very good.

It provided the necessary information for operation and maintenance. The operator's manual was for the entire combine. The safety instructions at the front of the book were adequate for safe operation of the entire machine.

MECHANICAL HISTORY

The intent of the test was to evaluate functional performance. Extended durability testing was not conducted. No mechanical problems occurred during the 117 hours of field operation.

APPENDIX I
SPECIFICATIONS

MAKE:	John Deere Chaff Spreader
MANUFACTURER:	John Deere Harvester Works 1100 - 13th Avenue East Moline, Illinois 61244 U.S.A.
DIMENSIONS: (Spreader Body Only)	
-- width	80.5 in (2045 mm)
-- length	44.6 in (1133 mm)
-- height	20.5 in (521 mm)
WEIGHT:	202 lb (92 kg)
SPREADING SYSTEM:	
-- type	twin spinning discs
-- number of blades	4
-- disc diameter	26.5 in (673 mm)
-- outlet area each side	94.9 in2(0.61 m2)
DRIVE:	
-- type	hydraulic (with belt to drive discs)
-- hydraulic motor	Ross model 8C10
-- number of bearings	4 (all sealed)
-- hydraulic lines	steel, rubber, ISO quick couplers

APPENDIX II
CROP RESIDUE CONCENTRATION RATINGS

Conclusive scientific research could not be located to rate the impact of different concentrations of crop residue. However, field experience has provided basic information in this area. The following explains the development of ratings used by PAMI in this report.

In Western Canada, a typically high wheat yield is about 50 bu/ac (3.4 t/ha). These crops usually have at least an equal amount of Material-Other-than-Grain(MOG). In such crops, when very dry, some combines can put up to 35% of the MOG over the cleaning shoe (i.e. chaff). Conversely, if conditions are tougher, the amount of chaff goes down, and up to 85% of the MOG from the combine is straw.

When chaff is dropped directly behind the combine, the accumulation is very noticeable. However, chaff spread over 40% of the width of cut appears acceptable, while spreading over 50% of the width of cut is desirable. Straw typically appears acceptable when spread over 70% of the width of cut, while spreading over 80% of the width of cut is desirable. The following table shows approximate concentrations of chaff, straw or a combination, which could occur at various levels in the 50 bu/ac (3.4 t/ha) crop described.

These concentrations can be used as a guide for maximum concentrations in other yields also.

CONCENTRATION lb/yd² (gm/m²)			
Rating	**Chaff**	**Straw**	**Total MOG**
Desirable	below 0.44 (238)	below 0.66 (358)	below 1.10 (596)
Acceptable	below 0.55 (298)	below 0.76 (412)	below 1.31 (710)
Unacceptable	over 0.55 (298)	over 0.76 (412)	below 1.31 (710)
Theoretical	*0.22 (119)*	*0.53 (297)*	*0.62 (336)*

SUMMARY CHART
JOHN DEERE CHAFF SPREADER

RETAIL PRICE	$3520.00 (July 1991, f.o.b. Humboldt, Saskatchewan)
QUALITY OF WORK	
Chaff Handling	**Very Good;** plugging never occurred
Spreading	**Good;** 20 ft (6.1 m); desirable uniformity
RATE OF WORK	Handled all chaff from combine at total MOG feedrates that reached 600 lb/min (16.3 t/h).
EASE OF OPERATION AND ADJUSTMENT	
Installation	Usually dealer installed
Spreader Adjustment	**Excellent;** spread width adjusted by changing spreader speed
Combine Adjustment	**Good;** shoe access was aided by the long wrench supplied
Servicing	**Excellent;** only belt tension required checking or adjustment
Cleaning	**Excellent;** all straw and chaff easily removed
POWER REQUIREMENTS	3 hp (2.2 kW), hydraulic
SAFETY	Decals and information in operator's manual provided
OPERATOR'S MANUAL	**Very Good;** provided all the necessary information
MECHANICAL HISTORY	No mechanical problems occurred

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