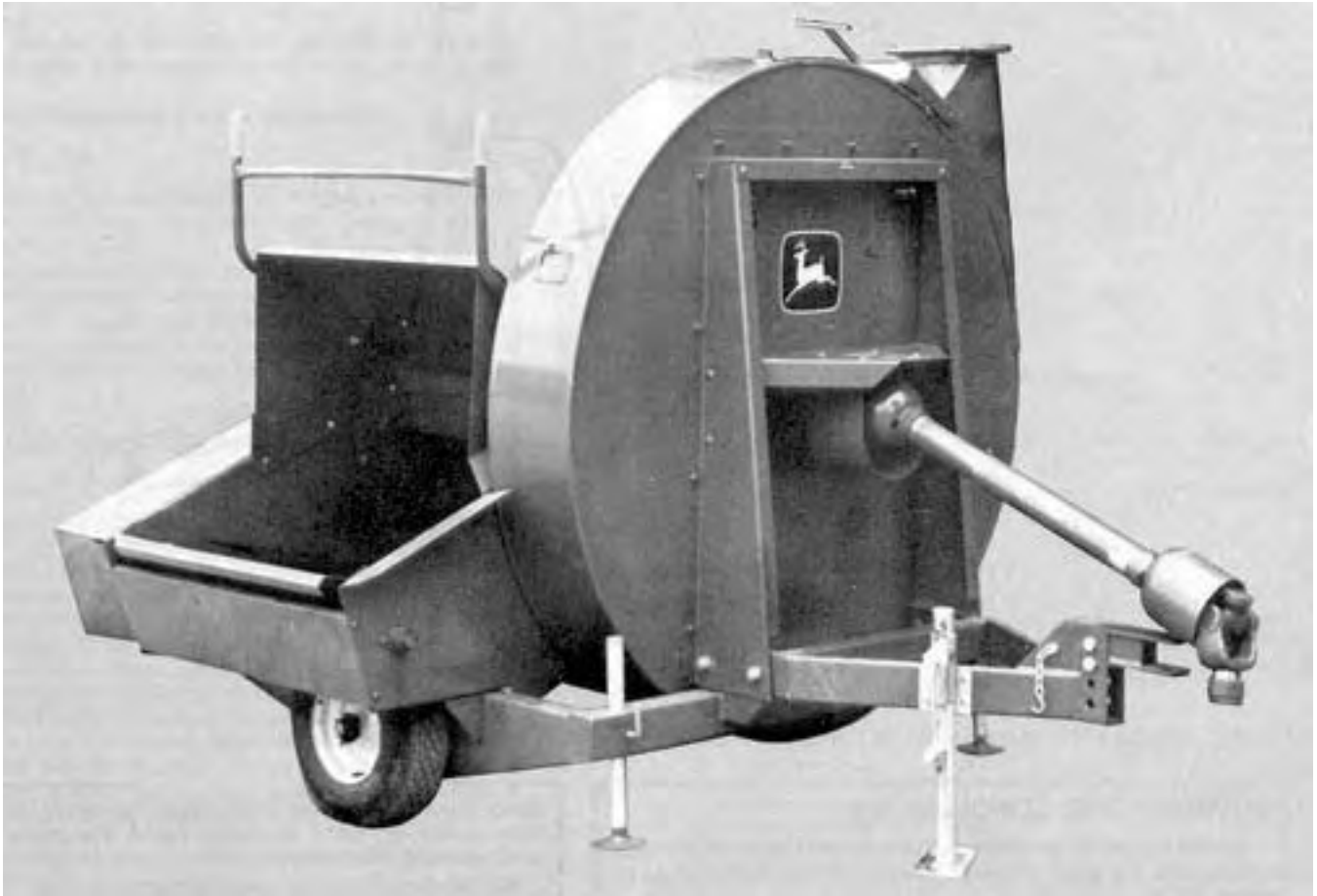


Evaluation Report

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John Deere 6500 Forage Blower

A Co-operative Program Between



JOHN DEERE MODEL 6500 FORAGE BLOWER

MANUFACTURER:

Kools Brothers, Inc.
P.O. Box 2157
Appleton, Wisconsin
U.S.A. 54911

DISTRIBUTOR:

John Deere Limited
455 Park Street
Regina, Saskatchewan
S4P 3L8

RETAIL PRICE:

\$3,200.00 (November 1979, f.o.b. Portage la Prairie, Manitoba with hopper magnet, quick-connect pipe clamp and telescoping pipe.)

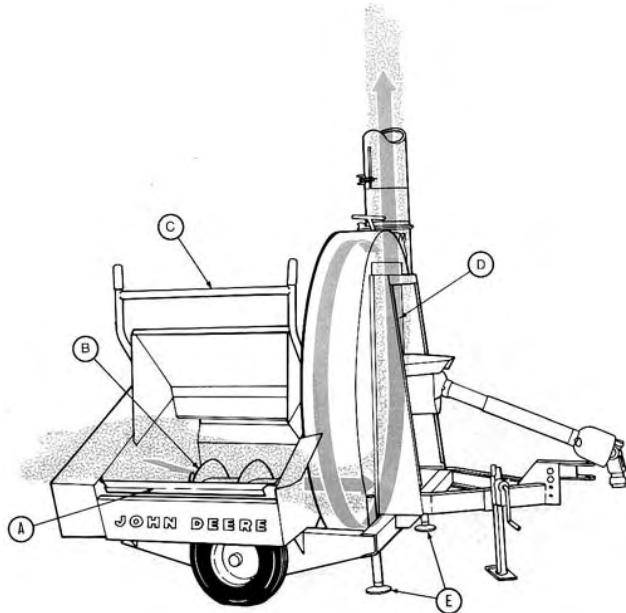


FIGURE 1. John Deere 6500: (A) Shaker Pan, (B) Transfer Auger, (C) Clutch Lever, (D) Blower Fan, (E) Stabilizers.

SUMMARY AND CONCLUSIONS

Overall functional performance of the John Deere 6500 forage blower was very good in clover, alfalfa and corn silage. Ease of operation was very good.

At 540 rpm power take-off speed, typical conveying rates into a 25 m (80 ft) high silo varied from 25 to 30 t/h (27 to 33 ton/h), in clover at 32% moisture and from 20 to 26 t/h (22 to 29 ton/h) in corn at 60% moisture. Conveying rates higher than 30 t/h (33 ton/h) at 540 rpm could not be maintained without the risk of clogging. Conveying rates could be increased an average of 20%, by increasing the power take-off speed to 620 rpm.

A 40 kW (54 hp) tractor should have sufficient power to operate the John Deere 6500 at maximum capacity in most conditions. The most efficient power use occurred when conveying at maximum rates. Crop type had little effect on power requirements or maximum conveying rates. Introducing water to the band housing increased the conveying rates.

The John Deere 6500 was convenient to position next to a silo. Levelling and stabilizing were easy. Blower pipe sections were convenient to join.

The John Deere 6500 transported well. Servicing and adjusting were convenient. The John Deere 6500 was safe to operate if the manufacturer's safety recommendations were closely followed. The operator's manual was very good, providing useful information on operation, servicing, and safety.

Two minor mechanical problems occurred during the test: The shaker pan attaching bolts loosened, damaging the pan, and the shaker rocker arm loosened on the rocker shaft.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing suitable locking devices on the bolts connecting the shaker pan to the rocker shaft.
2. Including information in the operator's manual on recommended shaker pan pitman settings for various crop conditions.

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. Loosening of the bolts fastening the shaker pan to the rocker shaft usually may be attributed to looseness of the rocker arm or the shaft. We have recently redesigned the rocker arm to more securely clamp the shaft, which should eliminate this tendency to loosen.
2. Variations which occur within a given material being handled make it difficult to give specific information on the setting for the shaker pitman arm. Generally, an aggressive action is used with crops such as haylage and less aggressive action with crops like corn silage. General instructions will be incorporated into the operator's manual at revision.

Note: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX II1.

GENERAL DESCRIPTION

The John Deere 6500 (FIGURE 1) is a 540 rpm, power take-off driven forage blower. It is equipped with a shaker pan type feed, a transfer auger and a six-blade blower, mounted on a two wheel transport trailer.

The shaker pan feed is equipped with an optional full width magnet, while a water inlet connection is provided on the blower housing.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The John Deere 6500 was operated for 45 hours while conveying about 525 t alfalfa, 75 t clover and 150 t corn, into silos ranging in height from 25 to 28 m.

It was evaluated for rate of work, power requirements, ease of operation and adjustment, operator safety and suitability of the operator's manual. Power and capacity measurements were conducted using a standard 230 mm blower pipe while conveying crops harvested with a John Deere 3800 forage harvester at a 6 mm cut setting.

RESULTS AND DISCUSSION

RATE OF WORK

The conveying rate depended on blower speed, silo height, feeding uniformity and blower pipe configuration. Typical conveying rates into a 25 m high silo, when operating at the recommended 540 rpm blower speed, varied from 25 to 30 t/h in clover at 32% moisture content. Typical conveying rates when operated at the same speed and height, in corn at 60% moisture content, varied from 20 to 26 t/h. When operated at 620 rpm blower speed, in the same conditions, conveying rates varied from 25 to 36 t/h in clover, and from 25 to 30 t/h in corn, representing an average 20% increase in capacity. Conveying rates higher than 30 t/h at 540 rpm, and higher than 36 t/h at 620 rpm could not be maintained without the risk of clogging. Uniform feeding was essential in reducing the possibility of clogging at high feedrates.

Using the 10 degree tilt pipe attachment on the blower discharge outlet, to aid in blower pipe alignment, caused a reduction in the conveying rate, into a 25 m silo, by as much as 50%. Use of elbows and similar attachments should be avoided. Introducing water to the band housing, particularly when working with legume crops, was effective in preventing gum buildup in the band housing and blower pipe, thereby improving performance.

POWER REQUIREMENTS

Tractor Size: Peak power take-off input, at 36 t/h maximum conveying rate into a 25 m silo, was 31 kW in both clover and corn. A tractor with a 40 kW power take-off rating was used during the testing and had sufficient power to operate the John Deere 6500 at maximum capacity.

Specific Capacity: Specific capacity is a measure of how efficiently a machine performs a task. A high specific capacity indicates efficient energy use, while a low specific capacity indicates less efficient operation. Specific capacity for the John Deere 6500 was about 1.0 t/kWh in corn, and ranged from 1.0 to 1.3 t/kWh in clover, when blowing into a 25 m high silo. Specific capacity was greatest at maximum feeding rates. Increasing the blower speed from 540 to 620 rpm did not appreciably change the specific capacity, due to a corresponding increase in power input.

EASE OF OPERATION AND ADJUSTMENT

Positioning: The John Deere 6500 was equipped with an adjustable hitch and a hitch jack to aid in levelling the blower. Hitch height adjustment range was 75 mm. Removing and replacing the two bolts to adjust the hitch height, took from 5 to 10 minutes. Once the hitch had been levelled, two easily adjustable stabilizers, on the blower frame, could be lowered to the ground to minimize vibration during operation.

If minimum blower height was desired, the wheels could be easily removed and the blower frame lowered directly onto the ground. For safety, the hitch should not be disconnected from the tractor during operation.

A quick-connect pipe clamp made it easy to install the standard 230 mm blower pipe.

Hopper: The hopper dimensions complied with recommended industry practice* As a result the John Deere 6500 was compatible with most types of forage unloading equipment.

Shaker Pan Feed: The shaker pan effectively moved forage into the transfer auger. Shaker pan stroke could be varied by positioning the shaker pitman, but no information was provided on recommended stroke settings. The full width magnet at the lower end of the shaker pan effectively trapped ferrous metal objects before they entered the transfer auger.

Clutch Lever: The shaker pan and transfer auger could be easily stopped with the clutch lever (FIGURE 1), if clogging was imminent. It took about 55 N force to operate the clutch.

Transporting: The John Deere 6500 Forage Blower trailed well at road transport speeds. The manufacturer recommended that transport speed not exceed 32 km/h. A properly sized hitch pin with spacers to prevent vertical hitch movement, was needed for safe transport. A suitable safety chain should also be used when transporting on public roads.

The John Deere 6500 could also be transported easily in the box of a pickup truck by removing the hitch assembly from the blower frame. This took about 10 minutes. A front end loader or hoist was needed to lift the blower into the box.

Removable Blower Housing Band: The blower housing band (FIGURE 2) could be rotated or removed, to facilitate pipe coupling or cleaning, by loosening the band tightener. Replacing the band, after removal, was somewhat difficult for one man. Deeper guides (FIGURE 2) would have made it easier to replace. No clean-out door was provided to aid in cleaning when the blower clogged.

Shear Bolts: Shear bolt location beneath the rear power take-off shield was convenient. It took about 10 minutes to replace a shear bolt.

Adjustments: Few adjustments were needed during normal operation. Easy removal of the blower housing band made checking and adjustment of fan blade clearance convenient while a hinged shield (FIGURE 2) provided convenient access to the auger drive belt tension adjustment.

Servicing: The John Deere 6500 had eight pressure grease fittings and six locations that required oiling. The operator's manual recommended oiling six locations every 50 hours, greasing the four power shaft fittings daily, and greasing the blower bearing every 20 hours. Daily lubrication and maintenance took about 5 minutes.



FIGURE 2. Blower (with hinged drive shield open): (A) Drive Belt Tension Adjustment, (B) Rocker Connecting Link, (C) Shield, (D) Band Guides, (E) Band Tightener, (F) Housing Band.

OPERATOR SAFETY

The John Deere 6500 was safe to operate if normal safety procedures were observed. All moving parts were adequately shielded. The clutch lever enabled emergency disengagement of the shaker pan and transfer auger.

OPERATOR'S MANUAL

The operator's manual was clear and well written and contained much useful information on operation, servicing, adjustment and safety procedures. The manual gave no information on suggested shaker pan stroke settings for different crop conditions. It is recommended that appropriate information be included in the operator's manual.

DURABILITY RESULTS

TABLE 1 outlines the mechanical history of the John Deere 6500 during 45 hours operation while conveying about 750 t of chopped forage. The intent of the test was evaluation of functional performance. The following failures represent those that occurred during functional testing. An extended durability evaluation was not conducted.

TABLE 1. Mechanical History

Item	Hours
The bolts connecting the shaker arms to the shaker pan loosened at	30
The rocker arm slipped off the shaker shaft at	40

DISCUSSION OF MECHANICAL PROBLEMS

Shaker Pan Bolts: Some damage to the shaker arms (FIGURE 3) and shaker pan connection resulted when the pan bolts loosened. It is recommended that a suitable locking device be installed on these bolts.

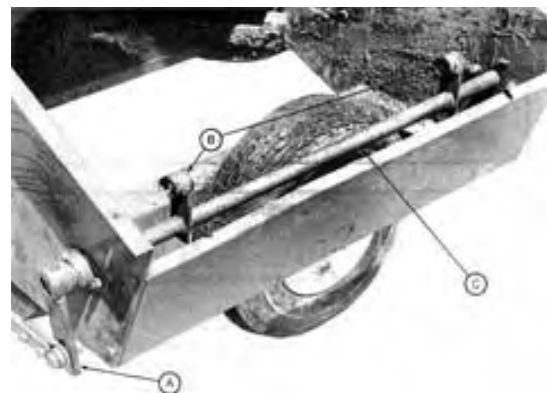


FIGURE 3. Rocker Arm Assembly for Shaker Pan Feed: (A) Rocker Arm, (B) Shaker Arms, (C) Shaker Shaft.

*American Society of Agricultural Engineers. Standard, S328.1, "Dimensions for Compatible Operation of Forage Harvesters, Forage Wagons, and Forage Blowers," December 1978.

Rocker Arm: After reinstalling the rocker arm (FIGURE 3) the shaker shaft was peined to eliminate the problem.

APPENDIX I SPECIFICATIONS	
Make:	John Deere
Model:	6500
Serial No.:	006505 GD
Overall Dimensions:	
-- width	1850 mm
-- length	2160 mm
-- height (without pipe attachments)	1665 mm
-- wheel tread	1270 mm
Hopper:	
-- type	rectangular
-- height, with wheels	550 mm
-- height, wheel removed	450 mm
-- width	790 mm
-- horizontal clearance	390 mm
Conveyor:	
-- Shaker Pan	
-frequency (at 540 PTO rpm)	354 cycles/min
-stroke (minimum)	40 mm
(maximum)	55 mm
-- Auger	
-speed	354 rpm
-diameter	230 mm
Fan:	
-- number of fan blades	6
-- fan diameter	1430 mm
-- fan blade clearance adjustment	20 mm
-- fan speed at 540 rpm	
power take-off	540 rpm
-- width of fan blades	203 mm
-- fan housing water inlet size	19 mm
Blower Pipe Diameter:	
	230 mm
Tires:	
	two, 4.8 x 8, 2-ply
Weights: (with 4 foot telescoping pipe attachment)	
-- right wheel	190 kg
-- left wheel	265 kg
-- hitch	85 kg
TOTAL	540 kg
Lubrication Points:	
-- 10 h interval	4
-- 20 h interval	1
-- 50 h interval	6
-- 500 h interval	1
-- beginning and end of season	2
Hitch Height:	
--minimum	395 mm
--maximum	470 mm
Telescoping Pipe Attachment:	
--minimum length	1245 mm
--maximum length	2160 mm
Optional Equipment:	
-- 230 to 200 mm pipe reducer	
-- 10° tilt pipe attachment	
-- blower pipe	

APPENDIX II MACHINE RATINGS	
The following rating scale is used in PAMI Evaluation Reports:	
(a) excellent	(d) fair
(b) very good	(e) poor
(c) good	(f) unsatisfactory

APPENDIX III CONVERSION TABLE	
1 kilometre/hour (km/h)	= 0.6 mile/hour (mph)
1 metre (m)	= 3.3 feet (ft)
1 kilowatt (kW)	= 1.3 horsepower (hp)
1 tonne (t)	= 2200 pounds mass (lb)
1 newton (N)	= 0.2 pounds force (lb)
1 tonne/kilowatt hour (t/kWh)	= 0.8 ton/horsepower hour (ton/hph)



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