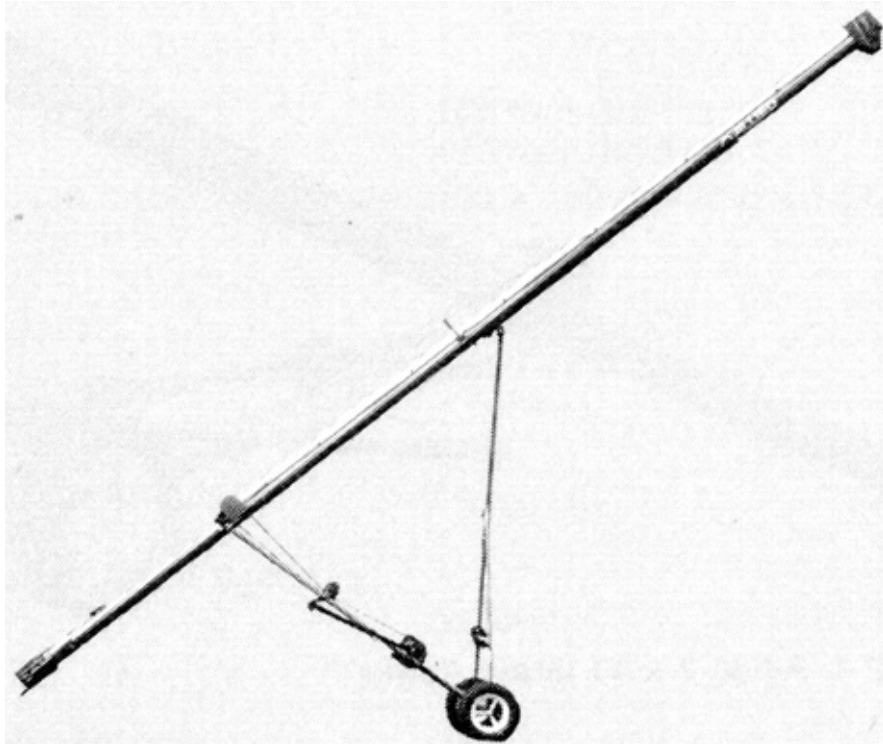


Evaluation Report

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Allied 7 x 41 Grain Auger

A Co-operative Program Between



ALBERTA
FARM
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PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

ALLIED 7 x 41 GRAIN AUGER

MANUFACTURER AND DISTRIBUTOR:

Allied Farm Equipment Limited
50 Panet Road
P.O. Box 1003
Winnipeg, Manitoba
R3C 2W5

RETAIL PRICE:

\$1,260.00 (September 1978, f.o.b. Winnipeg, complete with power take-off drive, less tires).



FIGURE 1. Allied 7 x 41 Grain Auger.

SUMMARY AND CONCLUSIONS

When operated at the manufacturer's recommended flighting speed of 555 rpm with a 30° elevation angle, corresponding to a lift of 6.4 m (21 ft), the capacity of the Allied 7 x 41 Grain Auger was 36.2 t/h (1330 bu/h) in wheat, 34.5 t/h (1520 bu/h) in rapeseed, 27.3 t/h (1880 bu/h) in oats and 32 t/h (1260 bu/h) in corn. By increasing the flighting speed (600 - 700 rpm depending on grain type) an increase in capacity was obtained.

Power requirements ranged from 1.8 to 5.9 kW (2.4 to 7.9 hp). Capacity and power depended on auger speed, elevation, grain type and moisture content.

Grain damage in dry wheat was less than 0.2% for each pass through the auger.

The Allied Grain Auger was easy to handle and convenient to operate.

No major durability problems occurred during the test.

Guarded pulley drives and nip points and a well shielded flight intake made the Allied Auger safe to operate and service provided that normal recommended safety procedures were followed.

The operator's manual was clearly written and provided much useful assembly, operating, servicing and safety information.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

Modifications to the hoisting arrangement to reduce the winch handle force required to raise the auger tube at high elevations.

Chief Engineer -- E.O. Nyborg

Senior Engineer -- J.C. Thauberger

Technical Officer -- J. Russell

THE MANUFACTURER STATES THAT

With regard to the recommendation:

Modifications, which reduce winch handle force required,

were introduced to production augers in May 1978. Winch handle effort for a new 7 x 41 auger has been measured at 27- 33 pounds, well within the ASAE recommended maximum of 50 pounds. Further reduction we believe, involves a safety factor, since handle effort provides the *feel* through which an operator may be aware of problems or obstacles to elevating or lowering the auger.

Regarding winch location, we have not found a more convenient position which is not also more vulnerable to inadvertent contact by machinery or persons in the operating area.

GENERAL DESCRIPTION

The Allied 7 x 41 Grain Auger (FIGURE 1) is a nominal 180 mm (7 in) diameter, 12.8 m (42 ft) long portable screw conveyor. The conveyor tube is mounted on a tubular frame and telescoping mast arrangement supported by a single axle with two wheels.

Discharge height is varied with a crank operated cable winch. The auger flight is supported by bearings at both the intake and outlet ends.

The Allied Grain Auger may be powered with a tractor power take-off belt drive, power take-off direct drive, gas engine or electric motor. The engine attaches to an adjustable mount near the axle with power transmitted through V-belts, a gearbox and drive chain.

The test machine was equipped with a tractor power take-off belt drive.

Detailed specifications are given in APPENDIX I.

RESULTS AND DISCUSSION

EASE OF OPERATION AND ADJUSTMENT

Discharge Height: A crank-operated cable winch varied the discharge height from 3 to 8.5 m (9.8 to 27.9 ft). With the auger empty and the lifting mechanism well lubricated, elevating the

auger was fairly difficult, particularly at high elevations, and required a maximum winch handle force of 173 N (38 lb). The winch was inconveniently located at auger elevations above 20° (FIGURE 2). To fully raise or lower the auger, about 125 turns of the winch crank were required.



FIGURE 2. Inconvenient Winch Handle Location.

Auger Reach: Horizontal reach and clearance of the Allied are shown in FIGURE 3. Reach, measured from the top of the front support to the outlet, was 3.5 m (11.5 ft) both at 14° and 43°, while clearance, measured from the tire to the outlet, varied from 4.8 m (15.8 ft) to 3.3 m (10.8 ft).

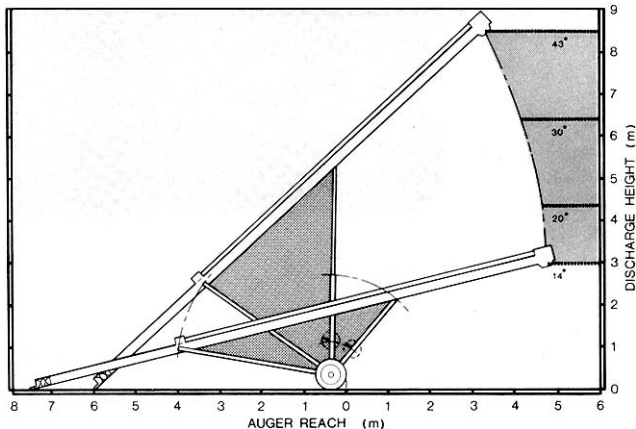


FIGURE 3. Auger Reach at Various Discharge Heights

Hitch weight varied from 27.3 kg (60 lb), at minimum elevation, to 63.6 kg (140 lb), at maximum elevation.

Adjustments: A conveniently located optional belt tension idler

was required to enable a constant belt tension to be maintained at all auger elevations.

Transporting: The Allied Grain Auger transported well and was stable at speeds up to 100 km/h (60 mph) on paved highways and 50 km/h (30 mph) on gravel roads. When using the proper hitch pin, a fixed clevis hitch at the inlet end provides a reliable connection. The operator is advised to use a suitable safety chain to prevent accidental unhitching when transporting on public roads. Clearance under power lines was adequate, with a transport height (with the auger fully lowered) of about 3 m (9.8 ft).

RATE OF WORK

Capacity: FIGURE 4 shows the capacity of the Allied in dry wheat over the full range of auger elevations and over a range of flying speeds, with the inlet end completely submerged in grain. Maximum capacities ranged from 50.3 t/h (1850 bu/h) at the minimum elevation of 14° to 35.1 t/h (1290 bu/h) at the maximum elevation of 43°.

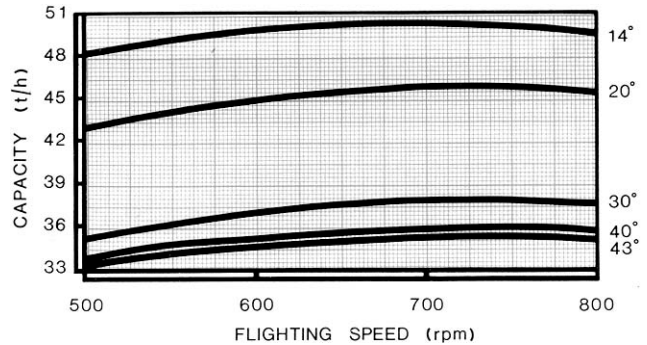


FIGURE 4. Capacity in Dry Wheat.

Maximum capacity occurred within an auger flying speed range from 650 to 750 rpm. This corresponds to a power take-off speed of 630 to 730 rpm.

FIGURE 5 shows capacities of the Allied Auger in dry wheat, oats, corn and rapeseed at an elevation angle of 30°. Maximum capacities were 38.1, 27.9, 33.4 and 36.0 t/h (1400, 1920, 1310 and 1590 bu/h) for wheat, oats, corn and rapeseed respectively. Maximum capacities occurred at flying speeds ranging from 575 to 675 rpm. Lower capacities can be expected for tough or damp grains, at normal operating speeds.

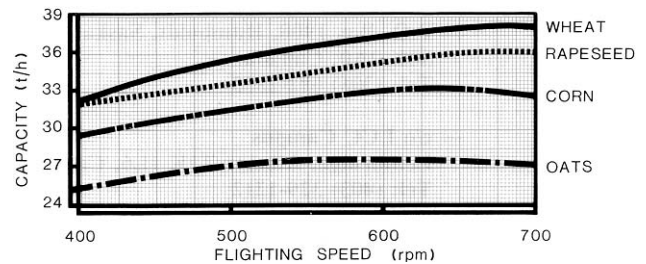


FIGURE 5. Capacity at 30° Elevation

Specific Capacity: Specific capacity is a measure of the efficiency of a grain auger. A low specific capacity indicates inefficient power use while a high specific capacity indicates efficient operation. FIGURE 6 shows the specific capacity, per metre of vertical lift, when operating at 30° in dry wheat, oats, corn and rapeseed. Specific capacities ranged from 5.4 to 13.8 t/kW-h. Lower specific capacities can be expected for tough or damp grain.

Critical Speeds: As indicated in FIGURES 4 and 5, maximum capacities occurred at certain flying speeds for each grain and elevation angle. In general, suitable speeds were about 675, 575, 625 and 675 rpm in wheat, oats, corn, and rapeseed respectively. In addition, at certain critical speeds, flying vibration occurred. This phenomenon, known as resonance, is common to all grain augers. The resonant speed is dependent on grain type, condition and elevation angle. A close watch should be kept to ensure that the auger is not operated at the critical speed.

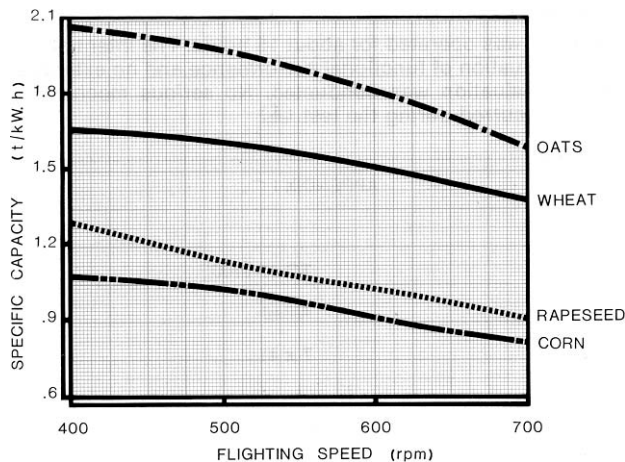


FIGURE 6. Specific Capacity Per Metre of Vertical Lift (at 30° elevation)

POWER REQUIREMENTS

FIGURE 7 shows the power requirements for the Allied in dry wheat, oats, corn and rapeseed for an elevation angle of 30°. More power would be needed to auger grain with a higher moisture content or in unusual conditions. In general, a 10 kW (14 hp) engine would have ample power to operate the Allied at maximum capacity in most conditions.

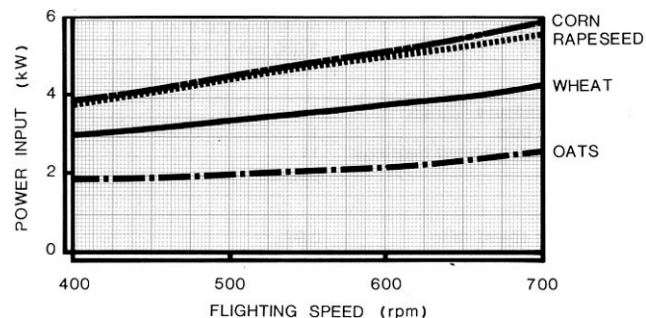


FIGURE 7. Power Requirements at 30° Elevation

Grain Damage: Grain damage, in dry wheat (at 11% moisture content) was less than 0.2% for each pass through the Allied. This was insignificant as long as the same grain was not augered many times. Cracking at higher moisture contents would be lower.

OPERATOR SAFETY

The Allied 7 x 41 Grain Auger met current ASAE¹ safety standards and was safe to operate if normal precautions were observed. The operator's manual emphasized safety precautions. Good operator protection was provided by the inlet guard (FIGURE 8).

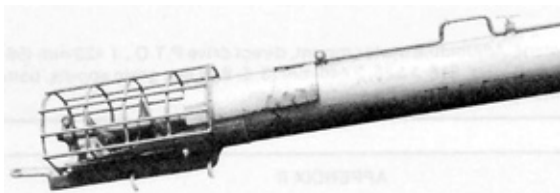


FIGURE 8. Inlet Guard

OPERATOR'S MANUAL

The operator's manual for the Allied contained comprehensive information on assembly, operation, safety and servicing.

¹American Society of Agricultural Engineers. Standard, S318.6 "Safety for Agricultural Equipment", March 1978.

DURABILITY RESULTS

The Allied was operated for about 15 hours. The intent of the test was evaluation of functional performance and no extended durability evaluation was conducted. No serious mechanical problems occurred during the test.

APPENDIX I

SPECIFICATIONS

Serial Number:	TC-41-5100
Make:	Allied
Model:	7 x 41
Dimensions:	
-- overall length along auger tube	12.8 m (504 in)
-- overall width	230 mm (91 in)
-- wheel tread	230 mm (91 in)
Auger Tube:	
-- inside diameter	170 mm (6.75 in)
-- length inlet to outlet centres	12.4 m (490 in)
-- length of inlet	355 mm (14 in)
-- size of outlet	oval 180 x 200 (7 x 8 in)
Fighting:	
-- diameter	150 mm (6.0 in)
-- pitch	160 mm (6.25 in)
-- length of exposed intake fighting	150 x 300 mm (6.0 x 11.75 in)
Elevating Height:	
-- maximum (43°)	8480 mm (334 in)
-- minimum (14°)	3000 mm (118 in)
Lubrication:	
-- number of pressure fittings	1
-- oil bath gear box	1
-- number of prelubricated bearings	11
-- wheels	packed
Drive:	
-- PTO/flighting speed ratio	0.97
-- number of V-belts	
(a) engine drive	2
(b) power take-off drive	2
-- number of roller chains	1
-- number of gear boxes	1
Winch:	
-- make and model	Fulton 945A
-- average cable wind	65 mm/turn (2.6 in/turn)
-- turning torque (maximum)	57 N-m (41 ft-lb)
Tires:	2-G78x 15

Inlet Safety Shield:	
-- grille openings	60 x 100 mm (2.5 x 4 in)
-- overall size	255 x 450 mm (10 x 17.75 in)

Weight (PTO Drive):				
-- left wheel	191	(420)	215	(472)
-- right wheel	227	(500)	240	(528)
-- hitch point	64	(140)	27	(60)
Total	482 kg	(1060 lb)	482 kg	(1060 lb)

Optional Equipment: Adjustable motor mount, direct drive P.T.O., 1420 mm (56 in) tumbling shaft, belt idler, 915, 1525, 2440 mm (3, 5, 8 ft) flex grain spouts, battery holder, 6.4 m (21 ft) corn screen end section.

APPENDIX II

METRIC UNITS

In keeping with the Canadian metric conversion program this report has been prepared in SI units. For comparative purposes, the following conversion may be used.

1 tonne (t) = 1000 kg	= 2204.6 pounds (lb)
1 metre (m) = 1000 mm	= 39.37 inches (in)
1 kilowatt (kW)	= 1.34 horsepower (hp)
1 kilogram (kg)	= 2.2 pounds (lb)
1 newton (N)	= 0.22 pounds force (lb)



**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