

Research Report 714

AER WAY AERATOR

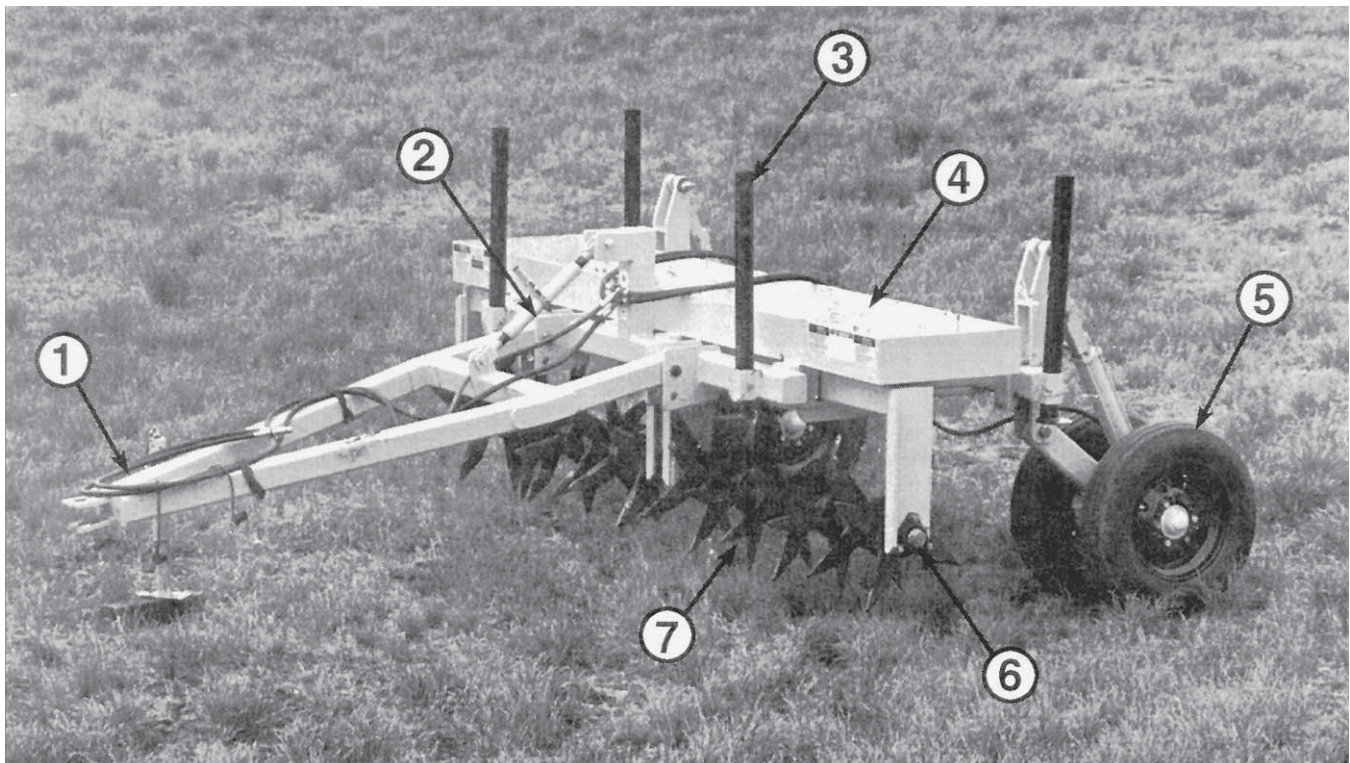


FIGURE 1. Aer Way Aerator: (1) Hitch, (2) Turnbuckle, (3) Support Stands, (4) Ballast Tray, (5) Transport Wheels, (6) Roller Frame and (7) Rollers

SUMMARY

The Aer Way is a ground driven aerator with tined rollers. The Alberta Farm Machinery Research Centre used the Aer Way aerator for two seasons. The unit was tested for suitability in the Southern Alberta farming and ranching area.

Ballast was added to the weight box for adequate penetration of the tines during the test. Ballast ranged from 380 to 440 lb/ft (565 to 655 kg/m). Penetration of the 8 in (203 mm) tines ranged from 4.5 to 7 in (114 to 178 mm) in alfalfa fields and 3 to 6 in (76 to 152 mm) in pasture fields.

Soil disturbance was minimal at the 0 degree roller setting. Soil disturbance increased as the roller angle was increased.

The unit was raised out of the ground when sharp turns were made to prevent possible damage to the rollers. The roller angle was adjustable with five different positions from 0 to 10 degrees. The 2.5 degree roller position could not be secured by the front retaining pins on the test unit. The retaining pins were placed down through the weight box. To retain easy access to the pins the positioning of the ballast was important.

Power take-off horsepower requirements in untilled soil conditions with 440 lb/ft (655 kg/m) of ballast at 6 mph (9.7 km/h) ranged from 11.2 PTO hp/ft (28 kW/m) at a 0 degree roller angle to 12.8 PTO hp/ft (31.5 kW/m) at a roller angle of 10 degrees.

A slow moving vehicle (SMV) sign was not provided by the manufacturer. A safety tow chain and the accommodations for securing the chain were not provided.

The test unit was originally equipped with optional hard-faced welded tine rollers. After eight hours of operation, one tine broke off each roller. The manufacturer claimed the rollers were defective and replaced the rollers with bolt-on tine rollers. No damage occurred to the new rollers.

AER WAY AERATOR

MANUFACTURER AND DISTRIBUTOR:

Holland Hitch Western Ltd.
17909 Roan Place
Surrey, British Columbia
V3S 5K1
Phone: (604) 574-7491

RETAIL PRICE:

\$6,500.00 (May, 1995 f.o.b. Lethbridge) for 10 ft (3 m) Aer Way Aerator with bolt-on tines (4 row pattern, 7 in (178 mm) spacing) and pull attachment kit.

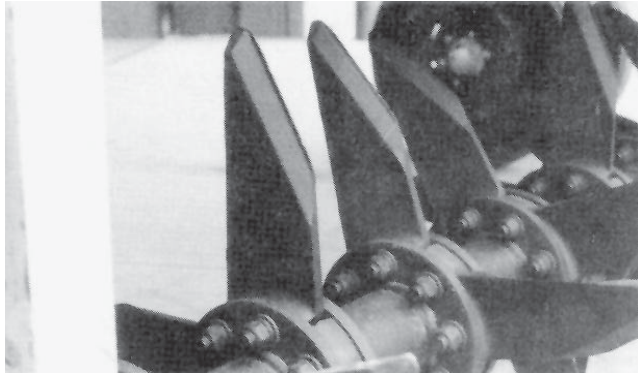


FIGURE 2. Aer Way Aerator Roller Tines.

INTRODUCTION

Reviving or extending the life of forage stands has received much attention lately due to an increase in forage acreage. One method of extending the life of a forage stand is aeration or breaking up surface soil compaction. One of the machines available in Canada to break up surface soil compaction is the Aer Way aerator.

The Aer Way is a ground driven, tined roller aerator. The unit is mounted to the tractor with a three point hitch or towed with an optional pull attachment kit. Wheels support the back of the unit when the pull attachment kit is used. Units consist of one, two or four rollers. The rollers are offered in various lengths. Weight boxes are located above the rollers.

The tines are 8 in (203 mm) long, 3 in (76 mm) wide, 0.5 in (13 mm) thick and shaped to a point with a cutting edge on one side. The amount of soil disturbance is determined by the angle of the tined roller. The angle of the roller varies from 0 to 10 degrees.

The test unit consisted of two 4.5 ft (1.4 m) rollers with the optional bolt-on tines. The tines were in a 4 row pattern on a 7 in (178 mm) spacing. The unit was equipped with the optional pull attachment kit. Two sets of dual wheels were used for transport.

FIGURES 1 and 2 show the location of major components while detailed specifications are given in APPENDIX I.

The Alberta Farm Machinery Research Centre used the Aer Way aerator for two seasons. The unit was operated in the Southern Alberta farming and ranching area. Soil conditions and machine performance were monitored during the test. The Aer Way aerator was operated for 33 hours while aerating 189 ac (76 ha). Soil texture ranged from silty clay loam to clay. Subsurface stone conditions varied from occasional to moderately stony. The unit was evaluated for quality of work, ease of operation and adjustment, power requirements, operator safety and suitability of the operator's manual.

RESULTS AND DISCUSSION

QUALITY OF WORK

Ballast was added to the weight box for adequate penetration of the tines during the test. Ballast ranged from 380 to 440 lb/ft (565 to 655 kg/m). Penetration of the 8 in (203 mm) tines ranged from 4.5 to 7 in (114 to 178 mm) in alfalfa fields and 3 to 6 in (76 to 152 mm) in pasture fields with the unit fully ballasted.

Penetration of the tines depended on the soil condition. Pasture

land was usually harder, so penetration of the tines was less. Full penetration of the tines in all conditions would require more ballast.

The soil disturbance after operation of the aerator depended on soil conditions and the angle of the tined rollers. FIGURE 3 shows the soil surface after aerating in a silty clay loam soil at a 0 degree angle in a second year alfalfa field. Soil disturbance was minimal. FIGURE 4 shows the soil surface after aerating in a silty clay loam soil at a 5 degree angle in a 10 year old pasture stand. Many small lumps were left on the surface. FIGURE 5 shows the soil surface after aerating in a clay loam soil at a 10 degree angle in a 30 year old pasture. Soil disturbance was minimal due to the heavy sod on the surface.

The Aer Way aerator was equipped with a rear drawbar. An optional flexible tine chain harrow could be pulled behind the unit to level out the soil disturbance. A land roller was used on one alfalfa field to level the surface after aeration.



FIGURE 3. Aeration at a 0 degree angle in alfalfa.



FIGURE 4. Aeration at a 5 degree angle in a 10 year old pasture stand.



FIGURE 5. Aeration at a 10 degree angle in a 30 year old pasture stand.

EASE OF OPERATION AND ADJUSTMENT

Five minutes were required to lubricate the six grease fittings. All grease fittings were easily accessible.

Five minutes were required to place the unit into transport position (FIGURE 6). Transport locks were provided for the hydraulic cylinders. Before transporting, the unit was raised in the front with the turnbuckle to obtain adequate ground clearance. Transport width

was 10.2 ft (3.1 m) and maximum transport height was 5.3 ft (1.6 m) which allowed for safe transport of the unit. The unit towed well at speeds of 18 mph (29 km/h). The wheel tread width of 10.1 ft (3.1 m) made the unit stable during transport.



FIGURE 6. Transport position.

One person could hitch or unhitch the unit in five minutes. Support stands were provided when the category II or III three-point hitch option was used. The unit required the use of a tractor with one set of remote hydraulics to raise and lower the aerator.

The unit was raised out of the ground when sharp turns were made to prevent possible damage to the rollers. Location of the outer tines allowed for close aeration to obstacles and fence lines. The aeration marks were difficult to see while operating at the 0 degree roller angle.

A turn-buckle controlled the fore-and-aft leveling. Adjusting the turn-buckle with the unit full of ballast was difficult.

The angle of aeration was changed in five minutes. The roller angle was adjustable with five different positions from 0 to 10 degrees (FIGURE 7). Two retaining pins secured each roller in position. The 2.5 degree roller position could not be secured by the front retaining pins on the test unit. The retaining pins were placed down through the weight box. To retain easy access to the pins the positioning of the ballast was important. Weights used during the test included a water tank (FIGURE 6) and flat metal plates. Both types of weights were raised up so the roller angle retaining pins were accessible.

The flat metal plates weighed 3450 lb (1553 kg) and the water and tank weighed 3970 lb (1800 kg). Hitch weight during transport with the unit ballasted was 1730 lb (785 kg). Loads on the transport tires were within the safe limits when the unit was ballasted.

The bolt-on tines were easy to replace. Five minutes were required to replace a tine. Each tine was held on by two bolts. Replacement cost of one bolt-on tine was \$23.50.

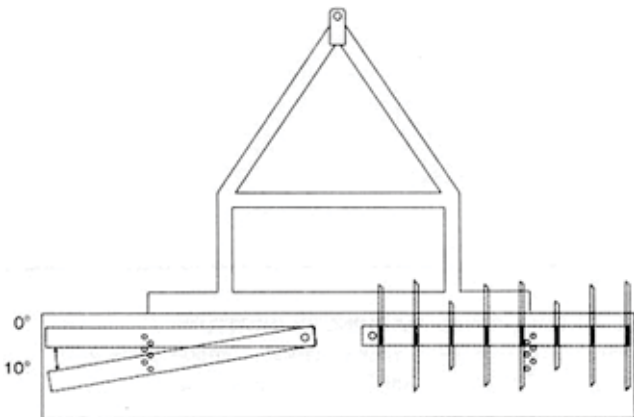


FIGURE 7. Roller angle adjustment.

POWER REQUIREMENTS

In clay loam soil with 3979 lb (1899 kg) of ballast the average draft of the 9 ft (2.7 m) wide unit at 6 mph (9.7 km/h) ranged from 4076 lb (18.1 kN) at a 0 degree roller angle to 4645 lb (20.7 kN) at a 10 degree roller angle. Average hitch weight ranged from 347 to 548 lb (1.5 to 2.4 kN).

Power take-off horsepower requirements in untilled soil

conditions with 440 lb/ft (655 kg/m) of ballast at 6 mph (9.7 km/h) ranged from 11.2 PTO hp/ft (28 PTO kW/m) at a 0 degree roller angle to 12.8 PTO hp/ft (31.4 PTO kW/m) at a roller angle of 10 degrees. Overall tractor size needed to operate the Aer Way in the above stated conditions ranged from 101 to 115 PTO hp (78 to 86 PTO kW). Tractor sizes have been adjusted to include tractor efficiency and represent a tractor operating at 80 percent of maximum power take-off ratings as determined by Nebraska Tractor Tests or as presented by the tractor manufacturer. The tractor sizes given will have ample power reserve to operate in the stated conditions.

OPERATOR SAFETY

The Aer Way aerator was safe to operate if normal safety precautions were observed. Transport ground clearance of the tines was 14 in (356 mm). A SMV sign was not provided by the manufacturer. A safety tow chain and the accommodations for securing the chain were not provided.

OPERATOR'S MANUAL

The operator's manual contained information on assembly, safety and maintenance. A detailed parts lists was included in the manual but not for the unit tested. No information was provided in the manual on the pull attachment kit.

MECHANICAL HISTORY

The test unit was originally equipped with the optional hardfaced welded tine rollers. After eight hours of operation, one tine broke off each roller. The manufacturer claimed the rollers were defective and replaced the rollers with the bolt-on tine rollers. No damage occurred to the new rollers.

The hitch jack stub and jack were damaged by the rear tractor tire while making a sharp turn in the field. The stub and jack were replaced. The jack was placed in the ballast tray during further field operation.

**APPENDIX I
SPECIFICATIONS**

MAKE: Aer Way Aerator
MODEL: AWI00Q-2380HC
SERIAL NUMBER: BK53N

MANUFACTURER: Holland Hitch Western Ltd.
17909 Roan Place
Surrey, British Columbia
V3S 5K1

DIMENSIONS:	<u>Field Position</u>	<u>Transport Position</u>
-width	10.2 ft (3.1 m)	10.2 ft (3.1 m)
-length	12.1 ft (3.7 m)	12.1 ft (3.7 m)
-height	3.9 ft (1.2 m)	5.3 ft (1.6 m)
-working width	9.0 ft (2.7 m)	
-ground clearance (maximum)		14.0 in (356 mm)
-wheel tread		10.1 ft (3.1 m)

ROLLERS:

- type bolt on tine
- number two
- width 54 in (1372 mm)
- shaft diameter 3 in (76 mm)
- tines per row four
- number of rows eight
- tine spacing 7 in (178 mm)
- blade/point tip to 9.5 in (241 mm) roller (distance)

HITCH:

- type double clevis
- shape A-frame
- adjustment 3.5 in (89 mm)
- leveling turnbuckle

FRAME:

- shape rectangular

-cross section hitch: 3.5 x 3.5 in (89 x 89 mm)
frame: 4 x 4 in (102 x 102 mm)

TINE:

- type bolt-on
- thickness 0.5 in (13 mm)
- width at the base 3 in (76 mm)
- length 8 in (203 mm)
- number 64
- working depth 8 in (203 mm) (maximum)

TIRES:

- number four, two sets of duals
- size 6.40 - 15, 6 ply

NUMBER OF LUBRICATION POINTS:

- grease fittings four roller bearings, two turnbuckles
- wheel bearings four

WEIGHT:

- hitch 910 lb (413 kg)
- transport tires 1760 lb (789 kg)
- TOTAL 2670 lb (1211 kg)

OPTIONS INCLUDED ON TEST MACHINE:

- pull type conversion kit
- 54 in (1372 mm) rollers with hard-faced, 3-row tines on 7 in (178 mm) spacing; replaced with 54 in (1372 mm) rollers with bolt-on 4 row tines on 7 in (178 mm) spacing.

OTHER AVAILABLE OPTIONS:

- Category 1 or 2 three-point hitch "A" frame
- standard or hard-faced tines in 3 or 4 row pattern on 7 in (178 mm) spacing
- bolt-on tines in 4 row pattern on 5 in (127 mm) spacing
- 6 width options from 5.5 to 24 ft (1.7 to 7.3 m) -flexible tine chain harrow



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