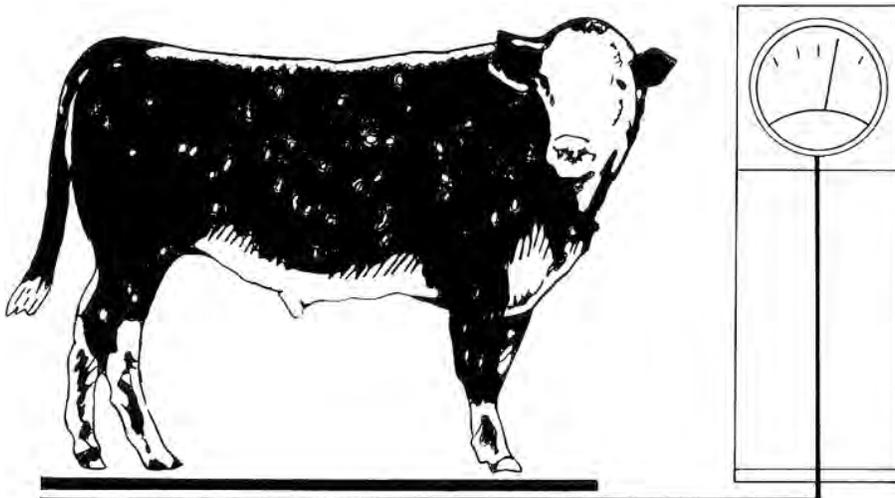


Evaluation Report

654



**Elias
Paul
Prairie Systems
Senstek**

Livestock Scales

A Co-operative Program Between

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LIVESTOCK SCALES

INTRODUCTION TO REPORT

The following PAMI evaluations were conducted as a cooperative study. The Saskatchewan Livestock Association (SLA) technicians provided field test assistance. The Horned Cattle Trust Fund and the Manitoba Cattle Producers Association provided financial sponsorship.

CHOOSING A LIVESTOCK SCALE

SCALE TYPE

An important first consideration in choosing a livestock scale is the scale type.

Electronic scales are typically easy to use and allow fast weighing, as the weight is displayed without any manual input. However, a power supply (or batteries) is needed and the electronics must be very well protected from the harsh operating environment that livestock scales are subjected to.

Mechanical (balance beam) scales are simple and therefore can be quite durable. They don't require any external power, but because the poise must be manually moved along the scale beam, weighing can take longer than other scale types.

Scales using a hydraulic load cell and pressure gauge generally allow for quick, easy weighing and need no external power supply. However, stability of the floor suspension system should be considered.

SCALE PERFORMANCE

Accuracy is important when choosing a scale. The scale to be selected must provide the required accuracy for your operation. Also, scale damping must be adequate to compensate for cattle movement and minimize the weighing time. The display should be easy to view both in the sunlight and in the shade. Ease of zeroing, and whether or not the scale calibration tends to shift should also be investigated. Also, operation from either side may be necessary for your operation.

SCALES

CHUTE PERFORMANCE

Adequate animal containment is very important for accurate weighing. A well designed chute will keep cattle movement to a minimum. This will keep variation in the displayed weight to a minimum and speed up weighing. Chutes with solid sides may make cattle entry into the chute easier, but performing other duties, such as administering medication, is easier with an open side chute. Some operators feel that bottom pivoting squeezes (if not properly adjusted) can tend to lift or push down on the animal slightly as the squeeze is closed, therefore possibly unnerving the animal. If transporting the chute is a consideration, swing-up wheels usually make switching from transport to field position easy.

OTHER CONSIDERATIONS

Prices, dealer service, and how well each scale fits your operation should also be considered.

SCOPE OF TEST

The scales evaluated by PAMI were configured as described in the General Description and Specifications sections of this report. The manufacturer may have produced different versions of this scale either before or after the PAMI tests. Therefore, when using this report, check to ensure the scale 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.

Each livestock scale was tested in the lab for about 10 hours. The scales were also operated in the field for about 50 hours during which cattle of all sizes were weighed. Throughout the test, each scale was evaluated for quality of work, ease of operation, operator safety, and suitability of the operator's manual. The chute's performance as an aid to cattle weighing was assessed, and mechanical problems were noted.

Senior Engineer: J. D. Wassermann

Project Engineer: D. E. Lischynski

Project Technologist: W.F. Stock

ELIAS

MANUFACTURER AND DISTRIBUTOR:

Elias Scale Manufacturing
P.O. Box 1304
North Battleford, Saskatchewan
S9A 3L8
Phone: (306) 445-2111

RETAIL PRICE:

\$2950.00 (June 1991, f.o.b. Humboldt, Saskatchewan).

SUMMARY AND CONCLUSIONS

Final laboratory tests with the Elias scale showed the displayed weight was from 2% lower to 1% higher than the actual load. Loading off center affected the displayed weight slightly. Field weighing was good. Installing an orifice in the hydraulic line made the display very readable. Cattle containment with the Elias chute was good. The squeeze and gates worked well, but the front head gate came unlatched occasionally.

The Elias dial gauge was good. The needle was quite stable after the orifice modification was installed. Chute operation was very good. Chute transporting was very good.

No safety hazards were present. The operator's manual was good. Two mechanical problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Including an orifice as standard equipment on all scales.
2. Providing a more positive head gate latch.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Orifices will be installed on all scales in the future.
2. The head gate latch has been improved.

Manufacturer's Additional Comments

Besides the above modifications, the rear gate on future scales will be lowered and calibration instructions will be improved in the instruction sheet. Plans are also in place for a platform stabilization device.

We feel that the scale used in these tests was not as accurate as most of our units due to a calibration shift. Thorough factory calibration should correct this.

GENERAL DESCRIPTION

The Elias scale is a portable hydraulic scale. The load on the scale is supported by four spring rods, and platform displacement is monitored with a hydraulic piston load cell. The load cell is connected, through a flexible hose, to a circular dial gauge. The gauge's maximum weight is 3000 lb (1360 kg) in 10 lb (5 kg) increments. Rough scale zeroing (and load cell preload) is done with a bolt at the center of the platform, and fine zeroing is done by adjusting the dial gauge. The test unit had an integral chute with a bottom pivoting squeeze and head gate on a side-hinged front gate (FIGURE 1).

More details are contained in the Specifications Section.

RESULTS AND DISCUSSION

QUALITY OF WORK

Laboratory Weighing: Initial laboratory tests indicated that the Elias scale consistently read about 2% higher than the actual load, with a dead weight centered on the platform. This represents a 20 lb error in a 1000 lb animal. Final laboratory tests showed the displayed weight read from 2% lower to 1% higher than the actual load (FIGURE 2). Loading off center caused the displayed weight to be from 3% lower to 1% higher than the actual load. The center of the dead load could not be placed outboard of the ground supports, as this caused the opposite end of the platform to tip up. The scale accuracy was not affected by low temperatures, but the scale had to be re-zeroed as the temperature changed.



FIGURE 1. Elias Scale.

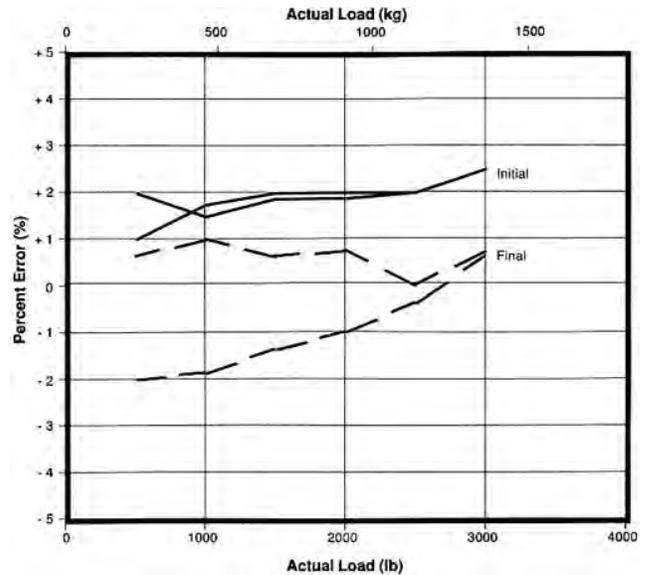


FIGURE 2. Scale Accuracy (Increasing and Decreasing Load).

Field Weighing: Field weighing was good.

Accuracy with cattle was similar to the laboratory results. Cattle motion had a great effect on the displayed weight with the original test unit. Normal cattle movement caused violent scale needle fluctuations, and in most cases, the displayed weight was unreadable. Installing an orifice in the hydraulic line greatly reduced the scale needle fluctuations, and made the displayed weight very readable. It is recommended that the manufacturer consider including an orifice as standard equipment on all scales.

The Elias scale returned to zero after almost every weighing. The scale had to be re-zeroed by about 10 lb (5 kg) approximately every 20 cattle.

Chute Performance: Cattle containment with the Elias chute was good.

It was quite effective in containing cattle of most sizes and temperament. The rear vertical sliding gate worked well, but because the bottom of the gate was rather high, cattle approaching the scale from the rear could open the gate and enter the chute before desired. Also, as the animal was moving backwards in the chute, it could occasionally step off the rear of the platform. The front head gate worked well most times, but the gate occasionally became unlatched before weighing was complete. It is recommended that the manufacturer consider providing a more positive head gate latch.

The platform on the Elias scale is essentially supported from one point. This caused the platform to become unstable during cattle entry and weighing. Occasionally, an animal would get its front feet on the platform and then become apprehensive about entering further, because the scale was shifting. Also, the metal floor could get quite slippery, and often animals would fall and become quite unnerved while trying to get up.

EASE OF OPERATION

Display: The dial gauge on the Elias scale was good.

It was easy to read in daylight, and the needle was quite stable, after the orifice modification was installed (FIGURE 3). Zeroing the scale was easy and convenient with the fine adjustment on the rear of the dial. A calm animal could be weighed in about 30 seconds, but lively animals could take up to two minutes to weigh.



FIGURE 3. Elias Dial Gauge.

Chute Operation: Chute operation was very good.

Operating the chute could be done while standing next to the dial gauge. The squeeze was easy to operate by pulling a rope, but releasing the squeeze was periodically hampered by the locking rod bending. The dial gauge could be mounted on either side of the scale, but chute controls were only operable from the left side.

Transport: Transporting was very good.

The Elias scale towed well at highway speeds and did not obstruct the towing vehicle's rear lights. Switching from transport to field position involved winching the swing-up wheels. This was very convenient and coupled with the scale's light weight, made maneuvering the scale into tight spots easy. The Elias scale could be switched from transport to field position in about one minute.

OPERATOR SAFETY

No safety hazards were apparent when normal precautions were observed. When working around cattle, operators should exercise caution to avoid hand and other injuries. The Elias scale was equipped with a safety chain for towing.

OPERATOR'S MANUAL

The instruction sheet was good.

It included information on scale operation, zeroing, and service. It contained notes on calibration but did not make mention of keeping the dial at a consistent height during calibration, or the extreme care that must be taken during calibration.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. Extended durability testing was not conducted. However, the mechanical history of the Elias was recorded.

Once, during transport, a pin came off and the dial gauge and supporting mast fell off and were destroyed. It was replaced and no further problems were encountered. As previously mentioned, the squeeze locking rod bent periodically.

SPECIFICATIONS	
MAKE:	Elias
TYPE:	hydraulic
PLATFORM:	
-- length	97 in (2.5 m)
-- width	18 in (0.46 m)
-- height	5.8 in (145 mm)
-- material	metal checker plate
OVERALL DIMENSIONS (Operating Position):	
-- length	104 in (2.6 m)
-- width	62 in (1.6 m)
-- height	87 in (2.2 m)
WEIGHT:	1055 lb (480 kg)

PAUL

MANUFACTURER:

Adrian J. Paul Company
P.O. Box 729
Duncan, Oklahoma 73534
U.S.A.

DISTRIBUTOR:

Thornhill Ranching Products Ltd.
P.O. Box 30
Mossleigh, Alberta
T0L 1P0
Phone: (403) 534-3740

RETAIL PRICE:

\$4799.00 (June 1991, f.o.b. Humboldt, Saskatchewan, complete with side squeeze pen and portable wheel kit).

SUMMARY AND CONCLUSIONS

Final laboratory tests with the Paul scale showed the displayed weight was essentially the same as the actual load. Loading off center affected the displayed weight slightly. Field weighing was good. Normal cattle movement was effectively damped by the linkage system. Cattle containment with the Paul chute was fair. The squeeze and gates worked well, but animals often tried to climb out of the chute.

The Paul balance beam was good. Operating the poise and weight multipliers was easy and convenient. Chute operation was good, but the squeeze pull bar offered no mechanical advantage and was mounted quite high. Scale transporting was very good.

No safety hazards were apparent. The operator's manual was excellent. No mechanical problems were encountered.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Adding restraining bars at the top of the chute.

MANUFACTURER'S STATES THAT

With regard to recommendation number:

1. A restraining enclosure is standard equipment on our larger scales, and is now an option on our 305 series scales.

GENERAL DESCRIPTION

The Paul 305 scale is a portable mechanical scale. The load on the scale is supported by two sets of six cables. These cables transfer the load to a balance beam through a lever arm and cable arrangement. The displayed weight is read by noting the position of the poise on the balance beam. The beam read up to 1000 lb in 5 lb increments, and the scale capacity of up to 3000 lb is read by adding weight multipliers to the tip pot. Rough scale zeroing involves adding or subtracting lead shot in the tip pot, and a balance adjusting weight is used for fine zeroing. The test unit had an optional chute with a single side bottom pivoting squeeze and the optional transport system (FIGURE 4).

More details are contained in the Specifications Section.



FIGURE 4. Paul Scale.

RESULTS AND DISCUSSION

QUALITY OF WORK

Laboratory Weighing: Initial laboratory tests indicated that the Paul scale consistently read about 0.5% higher than the actual load, with a dead weight centered on the platform. This represents a 5 lb error in a 1000 lb animal. Final laboratory tests showed that the displayed weight was essentially the same as the actual load (FIGURE 5). Loading off center caused the displayed weight to be from 0.2% lower to 0.5% higher than the actual load. The scale accuracy was not affected by low temperatures.

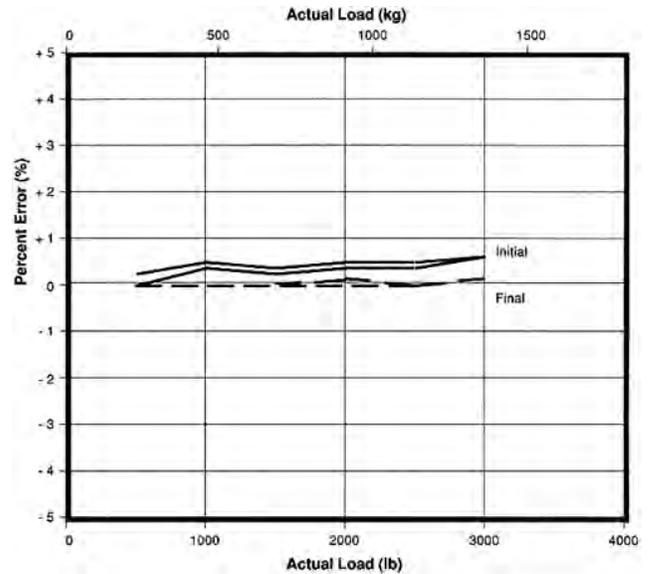


FIGURE 5. Scale Accuracy (Increasing and Decreasing Load).

Field Weighing: Field weighing was good.

Accuracy with cattle was similar to laboratory results. Excessive cattle motion caused the beam to oscillate enough that the poise would move along the beam. Normal cattle movement was effectively damped by the linkage system.

The Paul scale returned to zero after almost every weighing. The scale had to be re-zeroed approximately every 50 cattle.

Chute Performance: Cattle containment with the Paul chute was fair.

It was quite effective in containing cattle of most sizes and moderate temperament. The lateral position of the bottom squeeze pivot was adjustable. Setting the bottom width of the chute to about 26 in (660 mm) was found to be a good compromise between effective cattle containment and adequate cattle compatibility. Because of the squeeze action, smaller cattle were squeezed more on the top of their body than the bottom and vice versa. Also, because there were few restraining bars at the top of the chute, cattle often tried to climb out of the chute. It is recommended that the manufacturer consider additional restraining bars at the top of the chute. The rear vertical sliding gate worked well, as did the front gate.

The platform of the Paul chute was quite stable, and cattle were rarely apprehensive about entering.

EASE OF OPERATION

Display: The balance beam on the Paul scale was good.

It was easy to read in daylight conditions (FIGURE 6). Operating the poise and weight multipliers was easy and convenient, as was zeroing the scale. A calm animal could be weighed in about 30 seconds, but lively animals could take up to two minutes to weigh.

Chute Operation: Chute operation was good.

Operating all functions of the chute could be done while standing next to the balance beam. The rear gate lifting rope was set up as a block and tackle, which resulted in quite a long pull to raise the gate fully. The squeeze pull bar was mounted near the top of the chute, and it offered no mechanical advantage. This made operation difficult for short operators and also reduced its cattle containment ability. Also, when weighing, operators frequently bumped their head on the pull bar, as it stuck out the side of the chute above the balance beam. All scale and chute controls were accessible from

only the left side of the scale.



FIGURE 6. Paul Balance Beam.

Transport: Transporting was very good.

The Paul scale towed well at highway speeds and did not obstruct the towing vehicle's rear lights. Switching from transport to field position involved winching the swing-up wheels, removing the hitch, and installing the balance beam. This was very convenient, and coupled with the scale's light hitch weight, made maneuvering the scale into tight spots easy. The Paul scale could be switched from transport to field position in about one minute.

OPERATOR SAFETY

No safety hazards were apparent when normal precautions were observed. When working around cattle, operators should exercise caution to avoid hand and other injuries. The Paul scale was not equipped with a safety chain for towing.

OPERATOR'S MANUAL

The operator's manual was excellent.

It included information on scale operation, zeroing, set-up, and troubleshooting.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. Extended durability testing was not conducted. However, the mechanical history of the Paul was recorded.

No mechanical problems were encountered during these tests.

SPECIFICATIONS

MAKE:	Paul
MODEL:	305
SERIAL NUMBER:	90379
TYPE:	mechanical
PLATFORM:	
-- length	99 in (2.5 m)
-- width	38.5 in (0.9 m)
-- height	10.3 in (260 mm)
-- material	wood with metal cross bars
OVERALL DIMENSIONS (Operating Position):	
-- length	102 in (2.6 m)
-- width	
-squeeze open	73 in (1.8 m)
-squeeze closed	91 in (2.3 m)
-- height	80 in (2.0 m)
WEIGHT:	390 lb (630 kg)

PRAIRIE SYSTEMS

MANUFACTURER AND DISTRIBUTOR:

Prairie Systems and Equipment Ltd.
211B - 47th Street East
Saskatoon, Saskatchewan
S7K 5H1
Phone: (306) 242-2020

RETAIL PRICE:

\$1699.00 (June 1991, f.o.b. Humboldt, Saskatchewan).
(Pearson Chute: \$1875.00, f.o.b. Humboldt, Saskatchewan)

SUMMARY AND CONCLUSIONS

Final laboratory tests with the Prairie Systems showed the displayed weight was within 0.1% of the actual load. Loading off center did not affect the displayed weight. Field weighing was very good.

All but the most active cattle motion was damped. Cattle containment with the Pearson chute was excellent. When completely squeezed, animals were nearly immobilized.

The Prairie Systems indicator was excellent. The display was easy to read, and the push-buttons were convenient. The Pearson chute operation was very good. Chute transporting was good, but was inconvenient to change from transport to field position.

No safety hazards were apparent. The operator's manual was very good. Two mechanical problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Making all self-leveling legs for livestock scales from stronger material.
2. More durable protection for the load cell wiring.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Prairie Systems agrees with PAMI's recommendation. Previously, we had been sourcing the self-leveling legs from another manufacturer and we had encountered similar problems. Prairie Systems has since started to manufacture a self-leveling leg made of the stronger material that we now use on all our cattle scales. The problem has not occurred since.
2. Prairie Systems agrees with PAMI's recommendation. The scale supplied to PAMI was the stationary model, which is typically hard wired. Portable units incorporate quick disconnects which provide more protection for the load cell wiring.

Manufacturer's Additional Comments

Pearson Chute: An improved transport system that does not require load bar removal is now available.

GENERAL DESCRIPTION

The Prairie Systems scale is an electronic scale. It consists of four strain gauge load cells with self-leveling legs and an electronic indicator.

The Prairie Systems scale was delivered with the load cells mounted on a platform (FIGURE 7). To facilitate field tests, the two load bars were constructed, and two load cells attached to each. These load bars were mounted under a Pearson chute, which has an automatic head gate and a parallel action squeeze (FIGURE 8). This report states the performance of both. The Prairie Systems scale can be mounted on other livestock chutes.

The indicator's maximum weight is 4000 lb in 1 lb increments, and could also display in 0.5 kg increments. Rough zeroing is done by entering a series of instructions using the display buttons, and fine zeroing is done by pushing a button. The indicator can use either 120 V AC or 12 V DC power.

More details are contained in the Specifications Section.

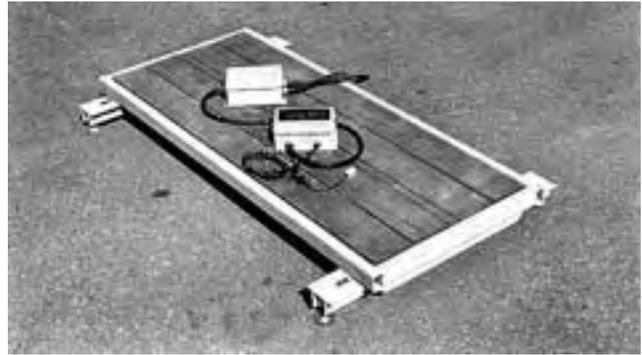


FIGURE 7. Prairie Systems Scale.



FIGURE 8. Prairie Systems Scale Installed on Pearson Chute.

RESULTS AND DISCUSSION

QUALITY OF WORK

Laboratory Weighing: Initial laboratory tests indicated that the Prairie Systems scale read from 0.1% higher to 0.1% lower than the actual load, with a dead weight centered on the platform. This represents a 1 lb error in a 1000 lb animal. Final laboratory tests showed similar results (FIGURE 9). Loading off center did not affect the displayed weight. The scale accuracy was not affected by low temperatures.

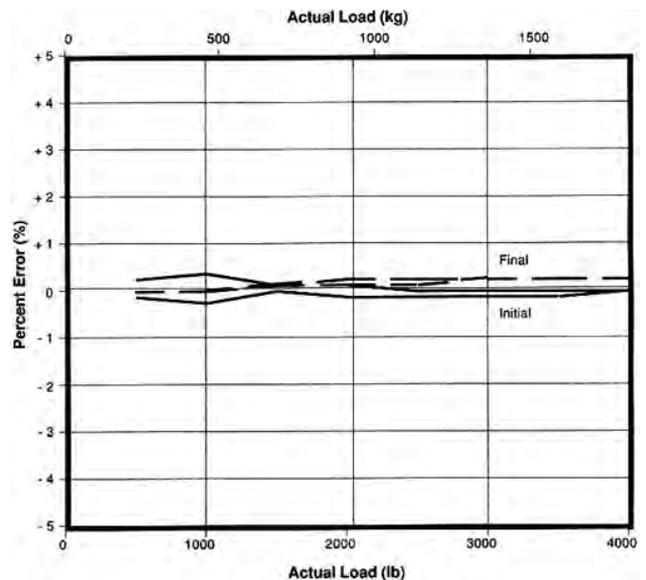


FIGURE 9. Scale Accuracy (Increasing and Decreasing Load).

Field Weighing: Field weighing was very good.

Accuracy with cattle was similar to the laboratory results. All but the most active cattle motion was effectively damped. Most times, a stable displayed weight could be read almost immediately after the animal was contained.

The Prairie Systems scale returned to zero after almost every weighing. The scale had to be re-zeroed by about 2 lb (1 kg) approximately every 15 cattle.

Chute Performance: Cattle containment with the Pearson chute was excellent.

When completely squeezed, animals of all sizes and temperament were nearly immobilized. The automatic head gate worked well, but was rarely needed for cattle weighing. The vertical sliding rear gate also was effective in containing cattle.

With the Prairie Systems load bars under the Pearson chute, the platform was very stable, and cattle were not apprehensive about entering the chute.

EASE OF OPERATION

Display: The Prairie Systems indicator was excellent.

Operating the push-button controls was easy and convenient. The displayed weight could be easily read at a glance in all lighting conditions (FIGURE 10). A calm animal could be weighed in about 20 seconds, but lively animals could take up to a minute to weigh.



FIGURE 10. Prairie Systems Indicator.

Chute Operation: Chute operation was very good.

Operating all functions of the Pearson chute could be done from one location at the side of the chute. Operating the squeeze required a simple downward pull on a bar, while the rear vertical sliding gate was operated with a rope. Opening the automatic head gate was easy, but some operators found the levers too short. All controls could be configured to be operated from either side.

Transport: Transporting was good.

The Pearson chute towed well at highway speeds, but the hitch weight was prone to changing from negative to positive when going over bumps. This could cause the rear of the towing vehicle to oscillate. The chute did not obstruct the towing vehicle's rear lights. When switching from transport to field position, the wheels and axle were slid out the front of the chute's undercarriage. Because of this, the load bars could not be permanently attached to the chute and had to be removed every time the chute was transported. This was very inconvenient, and required two people. Maneuvering into tight spots was difficult because of the way the wheels were removed, and also the hitch weight changed from over 200 lb (91 kg) with the hitch on the ground, to negative with the hitch above level. Changing the Pearson chute/Prairie Systems scale combination from transport to field position took about 5 minutes.

OPERATOR SAFETY

No safety hazards were apparent when normal precautions were observed. When working around cattle, operators should exercise caution to avoid hand and other injuries. A chain was attached to the hitch, but was lighter than typical safety chains.

OPERATOR'S MANUAL

The operator's manual was very good.

It contained information on zeroing, troubleshooting, and general operation.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. Extended durability testing was not conducted. However, the mechanical history of the Prairie Systems was recorded.

After weighing about 50 cattle, the self-leveling legs bent. They were replaced with legs made of stronger material, and no further problems were encountered. It is recommended that the

manufacturer consider making all self-leveling legs for livestock scales from this stronger material.

Twice during the test, the flexible conduit that protects the load cell wiring between the load bars and the indicator broke at the load bars. It is recommended that the manufacturer consider more durable protection for the load cell wiring.

SPECIFICATIONS	
SCALE	
MAKE:	Prairie Systems
TYPE:	electronic
POWER REQUIREMENTS:	120 V AC or 12 V DC
CHUTE	
MAKE:	Pearson
DISTRIBUTOR:	Dale A. McKenzie P.O. Box 202 Warner, Alberta T0K 2L0 (403) 642-3928
PLATFORM DIMENSIONS:	
-- length	96 in (2.4 m)
-- width	40 in (1.0 m)
-- height	6.9 in (175 mm)
-- material	metal checker plate with metal cross bars
OVERALL DIMENSIONS (Operating Position):	
-- length	105 in (2.7 m)
-- width	45 in (1.2 m)
-- height	79 in (2.0 m)
WEIGHT:	1520 lb (690 kg)

SENSTEK

MANUFACTURER AND DISTRIBUTOR:

Senstek
809 - 46th Street East
P.O. Box 340
Saskatoon, Saskatchewan
S7K 3L3
Phone: (306) 664-6711

RETAIL PRICE:

\$1895.00 (June 1991, f.o.b. Humboldt, Saskatchewan with updated indicator). (Pearson Chute: \$1875.00, f.o.b. Humboldt, Saskatchewan)

SUMMARY AND CONCLUSIONS

Final laboratory tests with the Senstek scale showed the displayed weight was 0.5% lower than the actual load. Loading off center did not affect the displayed weight. Field weighing was good with the original indicator. Excessive cattle motion could be damped with the damping knob, but this increased the response time. Damping with the updated indicator was very effective. Cattle containment with the Pearson chute was excellent. When completely squeezed, animals were nearly immobilized.

The original Senstek indicator was good. However, the displayed weight was difficult to see. The updated Senstek indicator was very good. The push-button controls were easy to operate. The Pearson chute operation was very good. Chute transporting was good, but was inconvenient to change from transport to field position.

No safety hazards were apparent. The operator's manual was very good. No mechanical problems were encountered.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Lengthening the load bar cable.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We have not had concerns raised by our customers. However, longer cable lengths are available as an option.

Manufacturer's Additional Comments

The original indicator is no longer in production. Only the updated indicator is now available.

Pearson Chute: An improved transport system that does not require load bar removal is now available.

GENERAL DESCRIPTION

The Senstek 4000 U scale is an electronic scale. It consists of two load bars and an electronic indicator (FIGURE 11).

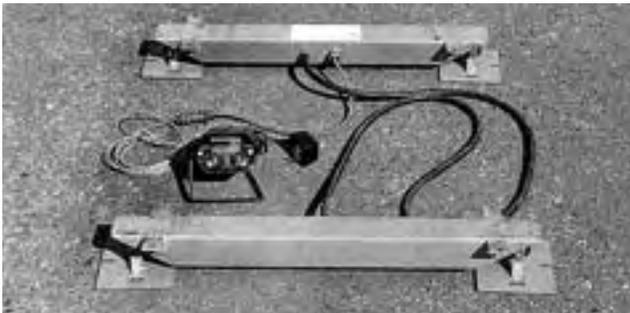


FIGURE 11. Senstek Scale.

Each load bar contains two strain gauge load cells and can be used in permanent or portable situations. For these tests, they were mounted under a Pearson chute, which has an automatic head gate and a parallel action squeeze (FIGURE 12). This report states the

performance of both. The Senstek scale can be mounted on other livestock chutes.



FIGURE 12. Senstek Scale Installed on Pearson Chute.

The original indicator's maximum weight is 4000 lb in 1 lb increments below 2000 lb, and 10 lb increments above 2000 lb. The indicator could also display in 1 kg increments. Rough scale zeroing is done by removing a plug and adjusting a screw, and fine zeroing is done with a knob on the indicator panel. A damping knob is also on the indicator panel.

The original indicator used for most of these tests has been replaced by an updated indicator. The updated indicator's maximum weight is 4000 lb displayed in 0.5 lb increments and could also display in kilograms in 0.2 kg increments. This unit can be used as a direct replacement for the original indicator. Features of the updated unit include an improved display, push-button zeroing, an averaging feature, and several other programmable options. Both indicators can use either 120 V AC, 12 V DC, or battery power.

More details are contained in the Specifications Section.

RESULTS AND DISCUSSION

QUALITY OF WORK

Laboratory Weighing: Initial laboratory tests with the original indicator indicated that the Senstek scale consistently read about 0.1% lower than the actual load, with a dead weight centered on the platform. This represents a 1 lb error with a 1000 lb animal. Final laboratory tests indicated that the displayed weight was about 0.5% lower than the actual load (FIGURE 13).

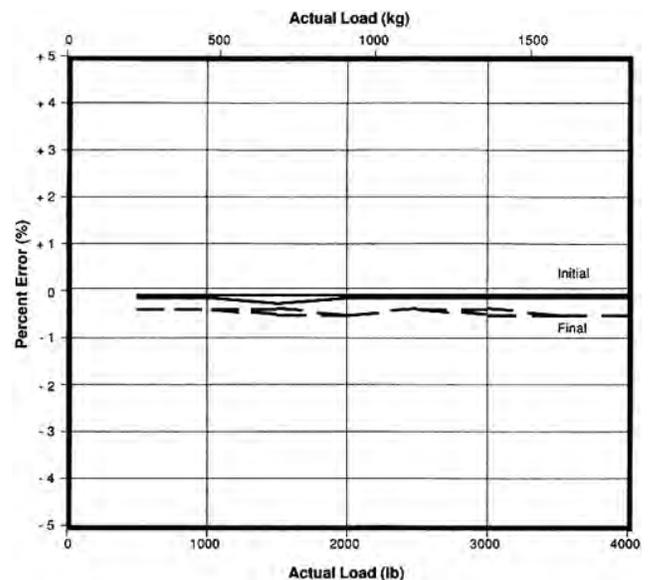


FIGURE 13. Scale Accuracy (Increasing and Decreasing Load).

Loading off center did not affect the displayed weight. Operating in cold temperatures could cause the displayed weight to read about 0.4% lower than the actual load.

Field Weighing: Field weighing with the original Senstek indicator was good.

Accuracy with cattle was similar to the laboratory results. Excessive cattle motion could be damped with the damping knob,

but this increased the response time.

The Senstek scale returned to zero after almost every weighing. The scale had to be re-zeroed by about 2 lb (1 kg) approximately every 15 cattle.

When using the averaging feature with the updated indicator, damping was very effective. Cattle motion did not affect the displayed weight at all. This made weighing fast and easy.

Chute Performance: Cattle containment with the Pearson chute was excellent.

When completely squeezed, animals of all sizes and temperament were nearly immobilized. The automatic head gate worked well, but was rarely needed for cattle weighing. The vertical sliding rear gate also was effective in containing cattle.

With the Senstek load bars under the Pearson chute, the platform was very stable, and cattle were not apprehensive about entering the chute.

EASE OF OPERATION

Display: The original Senstek indicator was good.

Operating the damping and zeroing controls was easy, but the displayed weight was difficult to see under all lighting conditions (FIGURE 14). A calm animal could be weighed in about 20 seconds, but lively animals could take up to a minute to weigh.



FIGURE 14. Original Senstek Indicator.

The updated Senstek display was very good. The push-button controls were easy to operate, and the displayed weight was easily visible under daylight conditions, but could get difficult to read as the surrounding light decreased (FIGURE 15). Calm or lively animals could be weighed in about 15 seconds.



FIGURE 15. Updated Senstek Indicator.

Chute Operation: Chute operation was very good.

Operating all functions of the Pearson chute could be done from one location at the side of the chute. Operating the squeeze required a simple downward pull on a bar, while the rear vertical sliding gate was operated with a rope. Opening the automatic head gate was easy, but some operators found the levers too short. All controls could be configured to be operated from either side.

Transport: Transporting was good.

The Pearson chute towed well at highway speeds, but the hitch weight was prone to changing from negative to positive when

going over bumps. This could cause the rear of the towing vehicle to oscillate. The chute did not obstruct the towing vehicle's rear lights. When switching from transport to field position, the wheels and axle were slid out the front of the chute's undercarriage. Because of this, the load bars could not be permanently attached to the chute and had to be removed every time the chute was transported. This was very inconvenient, and required two people. Maneuvering into tight spots was difficult because of the way the wheels were removed, and also the hitch weight changed from over 200 lb (91 kg) with the hitch on the ground, to negative with the hitch above level. Changing the Pearson chute/Senstek scale combination from transport to field position took about 5 minutes.

OPERATOR SAFETY

No safety hazards were apparent when normal precautions were observed. When working around cattle, operators should exercise caution to avoid hand and other injuries. A chain was attached to the hitch, but was lighter than typical safety chains.

OPERATOR'S MANUAL

The operator's manual was very good.

It contained information on zeroing, troubleshooting, and general operation.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. Extended durability testing was not conducted. However, the mechanical history of the Senstek was recorded.

No mechanical problems occurred. However, in field position, the electrical connector between the load bars and the indicator was on the ground due to the short load bar cable length. This made it prone to moisture entry, which could cause erroneous readings. It is recommended that the manufacturer consider lengthening the load bar cable.

SPECIFICATIONS	
SCALE	
MAKE:	Senstek
MODEL:	4000 U
SERIAL NUMBER:	552909
TYPE:	electronic
POWER REQUIREMENTS:	120 V AC, 12 V DC, or battery
CHUTE	
MAKE:	Pearson
DISTRIBUTOR:	Dale A. McKenzie P.O. Box 202 Warner, Alberta T0K 2L0
(403) 642-3926	
PLATFORM DIMENSIONS:	
-- length	96 in (2.4 m)
-- width	40 in (1.0 m)
-- height	6.9 in (175 mm)
-- material	metal checker plate with metal cross bars
OVERALL DIMENSIONS (Operating Position):	
-- length	105 in (2.7 m)
-- width	45 in (1.2 m)
-- height	79 in (2.0 m)
WEIGHT:	1520 lb (690 kg)

**APPENDIX I
MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:
 Excellent Fair
 Very Good Poor
 Good Unsatisfactory

SUMMARY CHARTS

Elias

RETAIL PRICE \$2950.00 (June 1991, f.o.b. Humboldt, Sask.)

QUALITY OF WORK

Laboratory Weighing Displayed weight from 2% lower to 1% higher than actual load; loading off center affected displayed weight slightly
 Field Weighing **Good**; orifice in hydraulic line made display readable
 Chute Performance **Good**; front head gate came unlatched occasionally

EASE OF OPERATION

Display **Good**; needle stable after orifice installed
 Chute Operation **Very Good**; convenient to operate
 Transport **Very Good**; towed well; set up in 1 minute

OPERATOR SAFETY No hazards apparent

OPERATOR'S MANUAL **Good**; more detail needed on calibration

MECHANICAL HISTORY Two mechanical problems

Paul

RETAIL PRICE \$4799.00 (June 1991, f.o.b. Humboldt, Sask.)

QUALITY OF WORK

Laboratory Weighing Displayed weight essentially the same as actual load; loading off center affected displayed weight slightly
 Field Weighing **Good**; normal cattle movement damped
 Chute Performance **Fair**; cattle often tried to climb out of chute

EASE OF OPERATION

Display **Good**; operation easy and convenient
 Chute Operation **Good**; squeeze pull bar high
 Transport **Very Good**; towed well; set up in 1 minute

OPERATOR SAFETY No hazards apparent

OPERATOR'S MANUAL **Excellent**; thorough

MECHANICAL HISTORY No problems encountered

Prairie Systems

RETAIL PRICE \$1899.00 (June 1991, f.o.b. Humboldt, Sask.)
 (Pearson Chute: \$1875.00, f.o.b. Humboldt, Sask.)

QUALITY OF WORK

Laboratory Weighing Displayed weight within 0.1% of actual load; loading off center did not affect displayed weight
 Field Weighing **Very Good**; almost all cattle motion damped
 Chute Performance **Excellent**; animals nearly immobilized

EASE OF OPERATION

Display **Excellent**; displayed weight easy to read, push-button convenient
 Chute Operation **Very Good**; convenient to operate
 Transport **Good**; towed well; set up in 5 minutes

OPERATOR SAFETY No hazards apparent

OPERATOR'S MANUAL **Very Good**; useful information

MECHANICAL HISTORY Two mechanical problems

Senstek

RETAIL PRICE \$1895.00 (June 1991, f.o.b. Humboldt, Sask.)
 (Pearson Chute: \$1875.00, f.o.b. Humboldt, Sask.)

QUALITY OF WORK

Laboratory Weighing Displayed weight 0.5% lower than actual load; loading off center did not affect displayed weight
 Field Weighing **Good**; with original indicator; damping knob effective
 Updated indicator damping very effective
 Chute Performance **Excellent**; animals nearly immobilized

EASE OF OPERATION

Display **Good**; with original indicator; displayed weight difficult to see
Very Good; with updated indicator; push-button convenient
 Chute Operation **Very Good**; convenient to operate
 Transport **Good**; towed well; set up in 5 minutes

OPERATOR SAFETY No hazards apparent

OPERATOR'S MANUAL **Very Good**; useful information

MECHANICAL HISTORY No problems encountered



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