

Combine Modifications for Harvesting Down Corn after Derecho

RFR-A20123

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Introduction

On August 10, 2020, a severe derecho swept across central Iowa and into Illinois. The peak wind speeds were recorded at 110 to 140 mph causing widespread damage to structures and crops. Between Madrid and Luther, Iowa, the winds blew in a northwest to southeast direction laying the corn flat. Ninety-five percent of the corn plants were leaning at a 35-45 degree angle, and the highest point of the corn plant was about 2 ft off the ground. Very few of the corn plants had broken stalks or green snap.

Materials and Methods

The equipment used to harvest the down corn was a John Deere 9870 STS combine and a John Deere 608c non-chopping 8-row corn head. Because the corn was still attached at the base, a corn reel was not needed. Instead, a set of Roll-A-Cones® was attached to the John Deere 608c corn head. The Roll-A-Cones® were attached on the outside snouts and were driven by hydraulic motors controlled by the platform reel speed hydraulic circuit on the combine. To control the speed of the hydraulic motors, the dial-a-speed dial on the John Deere combine command touch armrest console was used. The speed of the Roll-A-Cones® was set to match the ground speed of the combine so these would gently bring the corn into the corn head.

Other attachments added to the corn head were a Truesight+™ row guidance and Foresight® head height control system from Headsight®. Both Truesight+™ and

Foresight® were operated using the Headsight® Horizon® controller, which is an ISOBUS system that displays the settings, diagnostics, and calibration procedures on any virtual terminal display. A John Deere GS3 2630 display was used to view the Horizon® controller in the combine cab. The John Deere GS3 2630 display had an AutoTrac™ RowSense™ activation. This activation allowed the Truesight+™ row feelers to communicate with the integrated steering system on the combine. Once everything was installed, the Truesight+™ and Foresight® head height control system was calibrated using the Horizon® controller.

A few adjustments were made on the corn head to help feed the corn crop into the header. The deck plates were widened slightly more than usual to help feed the stalks in, ear savers were removed, and the gathering chains were adjusted so the lugs were directly across from each other. May Wes yellow snout boots were added on all the snouts to help increase the visibility in the down corn.

Results and Discussion

On the first day of harvesting the down corn, September 23, 2020, a corn head snout point was destroyed. The automatic head height system was running too close to the ground and did not react quick enough to an animal hole covered by down corn. After replacing the snout point, the points were raised to flatten the angle and continued without any problems. The automatic head height system was turned off because it kept reacting to every missed corn stalk and would bounce up and down, missing plants. The John Deere 608c 8-row corn head is about the same width as the John Deere 9870 combine with duals. The head was kept level left to right and

height set manually before entering the down corn. The corn head snouts were not visible while running through the down corn. By monitoring behind the corn head and looking for disturbed soil, adjustments could be made to the corn head height. When disturbed soil was observed, the corn head height was increased to keep the corn head snouts from digging into the ground. The corn head was lowered when missed stalks were observed. The back-shaft speed of the corn head was set to 620 to 700 rpm depending on crop conditions and the speed of the combine. The Roll-A-Cones® on the two outside snouts were set to match the ground speed of the combine based on how gently and quickly it would flip the corn plant into the corn head. The ground speed of the combine varied between 3 to 3.5 mph depending on how the corn was feeding into the corn head. Harvesting at those speeds 95 to 98 percent of the corn crop was recovered. Yields varied between 150 and 200 bushels/acre at 20–25 percent moisture grain. Grain quality was adequate.

The stalk strength in most of the corn fields harvested with down corn was very good and there were no problems with plants breaking off. The rows running north and south were easier to harvest because the down corn was lying in a southeast direction. The rows running east and west were more difficult to harvest. When the corn plant fell over, it fell with the row so the ear was near the base of the plant. Combining the east/west rows going west went well because the corn plants were leaning into the corn head. Heading east, the combine was manually steered so the snout tips were against the base of the corn plant to pick up those ears. Doing this kept the losses low and avoided having to harvest in one direction. The corn plants had to be dry to make them flow into the corn head smoothly and not pile up and break off. A heavy dew or

a light rain would cause problems and delay harvesting of the down corn.

In conclusion, the addition of the Truesight+™ steering system and Roll-A-Cones® on the corn head made harvesting down corn easier on the operator, and it allowed the corn head to gather the corn plants into the machine that would have otherwise been lost on the ground. The addition of the Truesight+™ row feelers is an advantage in down corn because it keeps the corn head on the row when the operator can't see the row. Plus, with the combine steering itself, the operator can take the time to watch behind the corn head to see if the head height needs adjusted. The Roll-A-Cones® worked perfectly to gently flip the corn plants hanging over the outside snouts into the corn head so these could be harvested. For the most part, the Foresight® automatic head height system was not used. It was too responsive when reacting to a down corn plant that was missed by the corn head snouts. It would start to bounce causing it to miss even more corn plants. With a little more time and adjustment it could possibly have operated better. In the end, it seemed easier to leave the system turned off and manually adjust the corn head height.

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