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Objective:

JBS Five Rivers Cattle Feeders in Dalhart, Texas feeds 76,000 head of cattle every year. In the past year they have started receiving precipitation in the evenings in North Texas. When this occurs the damp feed bakes in the sun the next day, therefore becomes cemented to the bottom of the bunks (see Fig 1 & 2). This has not been an issue for the past couple of years during the drought. The current bunk sweepers (see Fig 3 & 4) cannot dislodge the cemented feed. A mechanism is needed to break the hard pan of feed up. A practical solution would decrease man hours, decrease feeding time, and improve cattle feed efficiency.

Constraints

- Mounts to bunk sweeper
- Does not decrease life of feed bunk
- Removes hard pan layer of feed
- Is easily detachable
- Is easily affordable

Figure 1.

Bunk from Five Rivers Cattle Feeders containing hard pan feed at the bottom.

Figure 2.

A slick, clean bunk after being shoveled out at the same Five Rivers feedlot.

Design Procedures

- Received measurements of the bunk sweep
- Measured testable bunks at the Purdue University Beef Unit
- Made cardboard mock-up of testable bunk for shop use
- Brainstormed and finalized on a design
- Pro-E 3-D drawing was created
- Manufactured parts and assembled mechanism
- Performed test runs at the Purdue University Beef Unit
- Documented and analyzed results

Blade Scraper Design and Function

- The blade scraper design measurements were based off of Purdue Beef Unit's bunks.



Figure 1. The scraping blade was a converted skidsteer cutting edge that was modified to fit the bottom of the bunk. The Danish springs allow for flex in case the blade gets caught in the bunk.



Figure 2. The coulter wheel assembly acts as guide wheels in the bunk so the scraper would stay off the wall, and chews up the feed that may have been stuck in the corners.



Figure 3. A custom 3-point mount was created to mount to a bunk sweeper. The arm itself is able to extend side-to-side and up and down to fit other bunk styles. The arm also has two pivot points that allow the scraper to adjust itself when going through the bunk.



Figure 4. The final product is hydraulically lifted over the front of the bunk. Hydraulics then apply down pressure for hard packed feed areas to break up.



Figure 3 and 4.

A trailer sweeper and a three-point mounted arm sweeper are both currently used at feedlots in Dalhart, Texas.

Alternative Solutions

- Auger type
 - Many moving parts
 - Requires extra power from PTO
- Steel Brush
 - Debris hazardous to cattle
 - Requires extra power from tractor

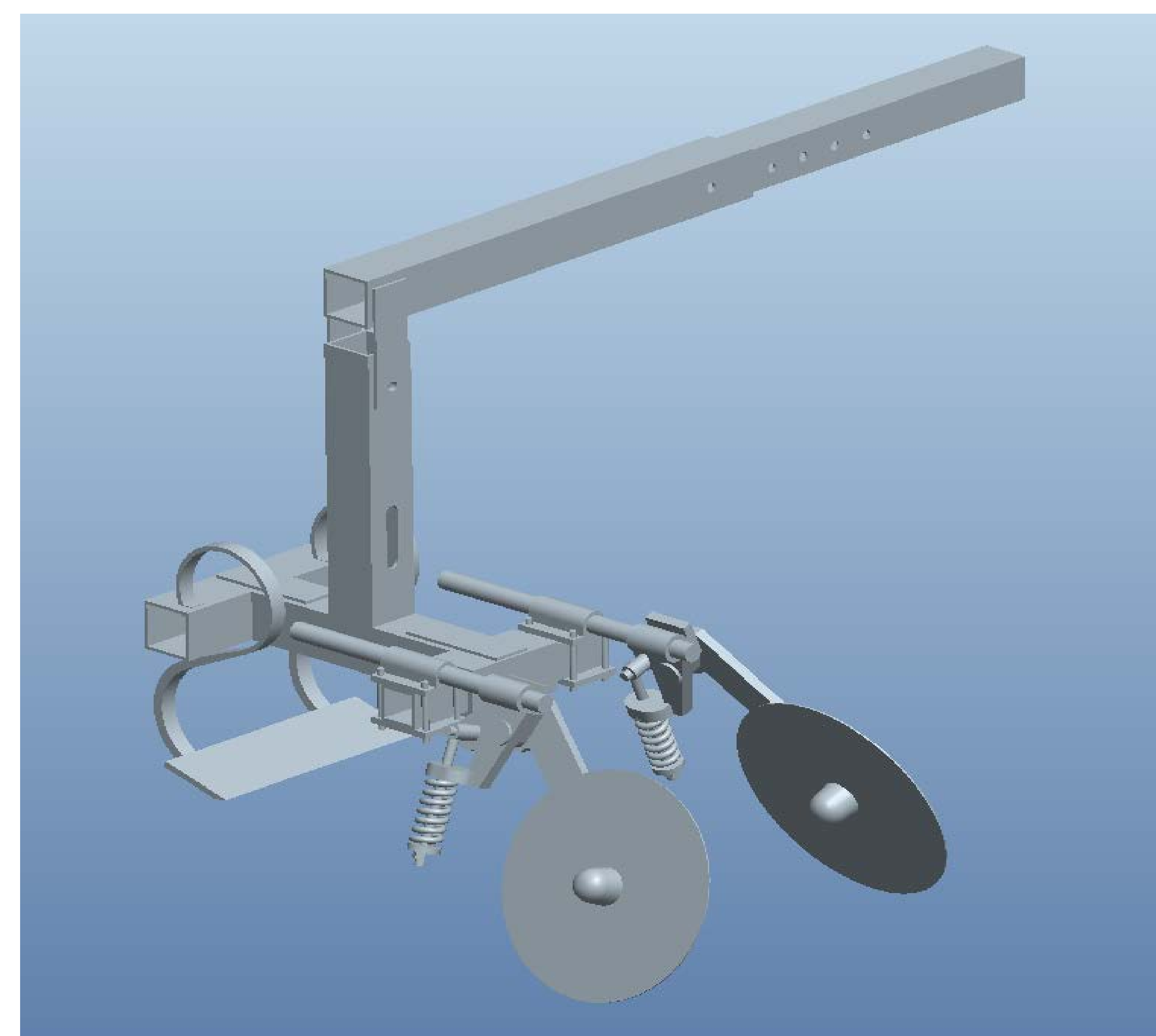


Figure 5.

Assembly drawing of the current prototype.

Financial Assessment Before

- 5 workers scraping manually at \$13/hr
- 5 hours to complete task
- 5 workers x \$13/hr x 5 hrs is \$325/ day
- \$325/ day x 5 days is **\$1,625/ week**

Financial Assessment After

- Scraper unit cost: ~\$1,000
- 2 Workers x \$13/hr x 3 hrs
- New labor cost: \$78
- Total savings: \$247 / Day
- Payback time: 4 days

Results

This mechanism has allowed the hard pan to be freed, while decreasing man hours, decreasing feeding time, and improved cattle feed efficiency. This attachment should be used at 1.5 mph. Although the initial results were quite good, this design is not finalized. It still needs a few more modifications to make it easier to work in feed bunks.

Possible Modifications

- Vertical adjustment tube needs to be shorter
- Danish springs need to be swapped for stiffer springs
- Longer adjustment for the horizontal tube on the arm