



This operations manual is intended for assembly, operating, maintenance, inspection, safety warnings and cleaning procedures.





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1. Getting Started

1.1. Specifications

Operating Voltage:	11 - 15VDC or 120 - 240VAC 50/60Hz (Power supply included)
Operating Temperature:	-20 to 50 °C (-4 to 120 °F)
Power Consumption	~ 10 watts
Dimensions:	Customizable to fit any animal or feed requirement Bin capacity: 0.5 ~ 1.2 cubic meters Larger bin sizes can be made to user specifications
Data Communications:	Standard: Wi-Fi (802.11b/n/g) Optional: 4G/LTE Cellular Web-based online interface Data processing: cloud-based server
Sensors:	RFID Tag Reader - (ISO 11784/5 134KHz) Quad Load Cells - Bin weight Load Cell Resolution: 10 grams
Control:	Search "Control Feed" in your App Store

SmartFeed Bin Type	Overall Dimensions inches (cm)	Bin Dimensions inches (cm)	Bin Volume feet ³ (m ³)
Small	42 x 40 x 72 (112 x 183 x 102)	38 x 26 x 30 (96 x 66 x 76)	17.1 (0.48)
Beef	50 x 40 x 72 (132 x 183 x 102)	41 x 28 x 34 (104 x 71 x 86)	22.6 (0.64)
Dairy	60 x 40 x 72 (158 x 183 x 102)	50 x 28 x 34 (127 x 71 x 86)	27.5 (0.78)

1.2. SmartFeed Layout

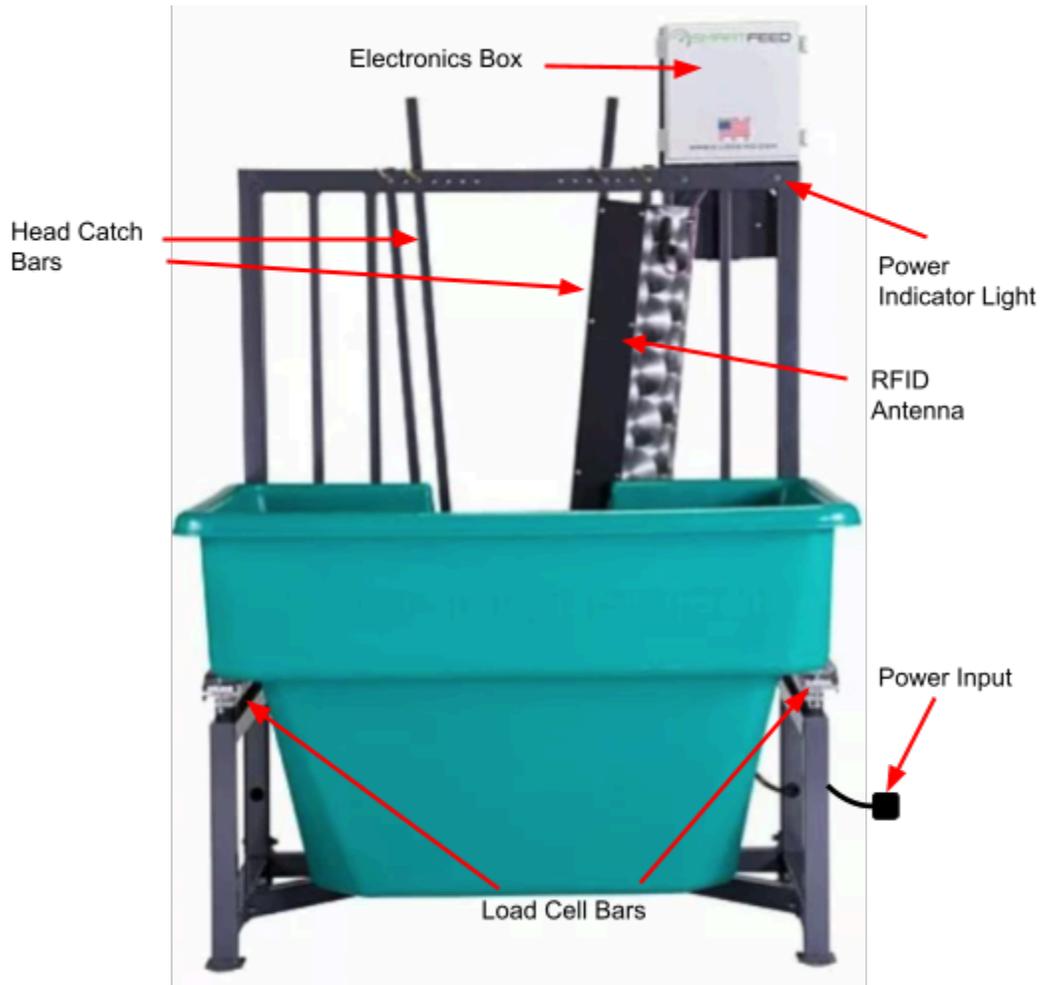


Figure 1) Reflects the back of the SmartFeed with the Poly Bin



1.3. Installation

Choosing a Location

i Note: SmartFeed is very sensitive to weight fluctuations. To get as accurate of a weight reading as possible, please follow these rules:

1. Choose a location where no grass or plants will grow under the bin
2. Ensure the bin is completely suspended by its load cell bars.
3. In windy environments, use solid obstructions, such as plywood, sheet metal, or other types of shelter to block as much wind as possible.
4. Ensure nothing is leaning against the bin. This includes wires, plants, farm tools, or other equipment.
5. Check regularly to ensure that feed has not fallen below the SmartFeed bin and is piling up.

i Before you set up SmartFeed:

- On standard SmartFeed systems with an AC power source, the power supply will be found on the right side of the system (left side from the animal's perspective). This means that the power outlet for SmartFeed must be on the right side of the bunk.
- Multiple SmartFeed systems can be connected together - referred to as "daisy-chaining". To do this, each subsequent SmartFeed bunk must be placed on the left side of the previous bunk. See Figure 2 below.

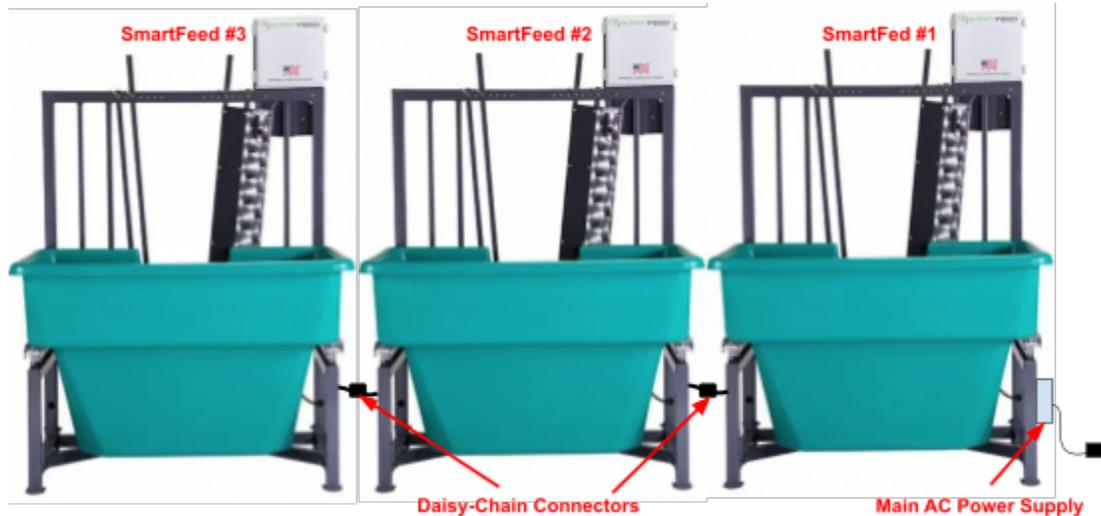


Figure 2) Daisy-Chained SmartFeeds with Main AC Power on Far Right

Anchoring the Frame to the Ground

ⓘ Caution! SmartFeed is front-heavy and can tip over easily if not anchored appropriately. Please use caution when moving or installing the system to prevent from injury or damage. ALWAYS ANCHOR ALL FOUR CORNERS OF SMARTFEED FIRMLY TO THE GROUND.

1. Select a location that will not allow the animals to access the feed bin from behind. Alternatively, place a fence around the SmartFeed to prevent access from behind.
2. Make sure the unit is on a level surface by placing it on flat pieces of metal, wood, or concrete.
3. Use rebar or ground anchors to secure the frame to the ground. See Figure 3 for reference.

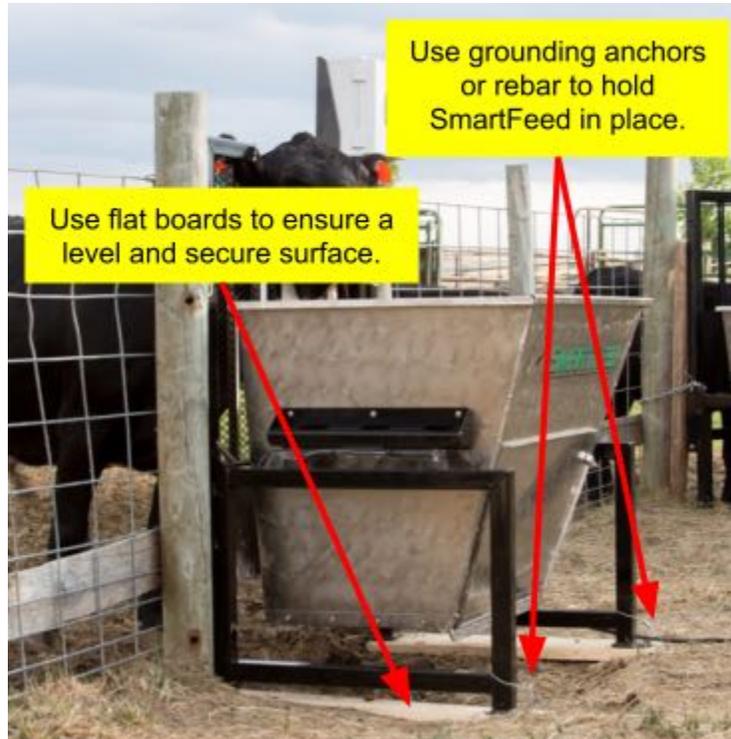


Figure 3) SmartFeed Orientation and Mounting Reference

4. Your feeder may have been shipped with protection spacers. Once the frame is anchored, remove the load cell protection spacers from each load cell bar. These spacers can be removed by lifting the bin up on each side (one at a time), then removing the spacer. Please save the spacers for future transportation.

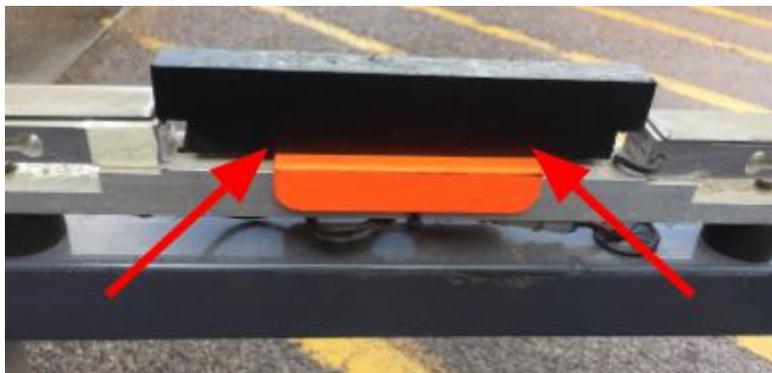


Figure 4) Load Cell Protection Spacers

1.4. Powering SmartFeed On and Off

SmartFeed only requires a 12 volt DC power source to operate. This low voltage is relatively harmless. However, if an external AC to DC power converter is used to power the SmartFeed, the AC power going into the converter can be hazardous. Please protect the AC power cord and exercise caution when using AC power.

Before you power on SmartFeed:

1. Connect the provided power cable to the SmartFeed power plug. The plug is located directly on the far right side under the “wing” of the feed bin. See Figure 5 for reference.



Figure 5) SmartFeed Power Receptacle

2. Ensure all power cables are protected from animals and other possible sources of damage, such as vehicle or foot traffic.
3. Ensure the power cord is not a tripping hazard.
4. Contact C-Lock if the power cord is worn or wires are exposed.

To power on SmartFeed:

1. Depending on your SmartFeed setup, you may have a different method of applying power to the unit, either a power switch or a power connector. Ensure the power source is connected to your SmartFeed unit, and if applicable, turn the power switch to ON.
2. The power indicator light on SmartFeed will illuminate, to signify that it has power.
3. Once power is applied, please allow ~1 minute for the system to initialize.
4. Use the mobile Control Feed application to scan for your system to ensure it is fully powered on and ready.

To power off SmartFeed:

1. Locate the power receptacle (“Power Input”). (See Figure 1.)
2. Pull the white tab out.
3. Push down on the black latch and wiggle the connector back and forth while pulling it outward. (See Figure 6)

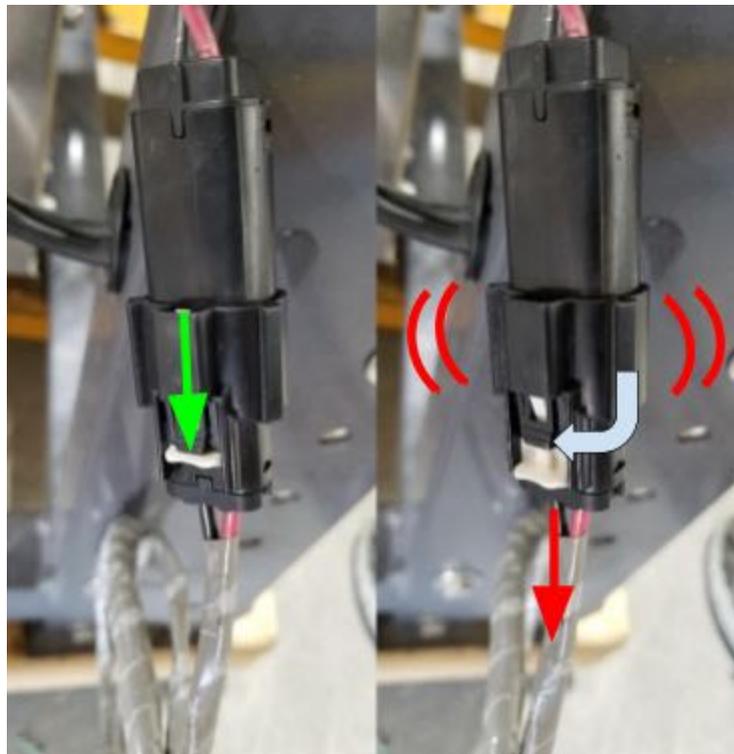


Figure 6) Steps for Disconnecting the Power Cable

1.5. Installing the Control Feed Mobile Application

Controlling and monitoring the SmartFeed system is made possible using the Control Feed mobile application. To install Control Feed on your mobile device, search for “Control Feed” by C-Lock Inc. in the Google Play Store or Apple App Store, or scan the QR code below.



Control Feed

Utilities



Apple App Store



Google Play Store

<https://apps.apple.com/us/app/control-feed/id1524038899>

<https://play.google.com/store/apps/details?id=com.controlfeed>

For instructions on using Control Feed, see **Section 3**.

2. Setup

2.1. Adjusting the Head Catch Bar Width

Appropriately setting the head-catch width is crucial. It is important to ensure that only one animal is able to stick its head into the feeder at a time. To adjust the head-catch width, perform the following:

1. Remove the pins on both the top and the bottom of the bars. (Top pins are shown in Figure 7.)
2. Space the bars in a V-shape form so that the animal's head will comfortably fit through the head-catch near the top of the bars, and narrowly fit through the bars at the bottom.
3. Once spaced appropriately, use the pins to lock the bars in position.
4. Adjust the additional (outside) bars to space them uniformly.
5. Check as your animals grow to ensure they can still comfortably fit through the head-catch.

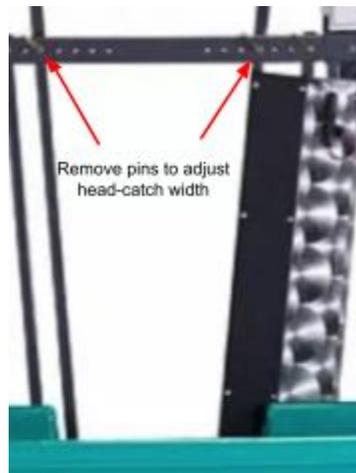


Figure 7) Head-Catch Adjustment

2.2. Adjusting the SmartFeed Height

2.2.1 - SmartFeed can be adjusted to accommodate a wide range of animal sizes. Adjusting the height requires at least two people. To adjust the full height of the front follow these steps:



Figure 8) Loosen four bolts to raise/lower the front of SmartFeed

- ⓘ **Caution:** At least two people are required to adjust the height of the SmartFeed system. The only equipment that is holding the gate at its height are the four bolts shown in Figure 8. Once these bolts are removed, the whole front of SmartFeed **will** fall (and is heavy), so be sure to have support and/or multiple people to hold it in place.
 - ⓘ **Note:** This is a Standard SmartFeed feature. SmartFeed Producer is not height-adjustable.
1. Remove the bolts and washers from these four spots.
 2. Raise or lower the bin supports to the desired height and insert the four bolts back in place.
 3. Adjust the head-catch as needed. See **Section 2.1**

2.2.2 - The lip of the stainless steel bin can also be adjusted up or down or removed completely by removing the screws shown below:



Figure 9) Adjusting the Bin Lip Height

2.3. Connecting to a Network

SmartFeed must have at least one of the following types of connection:

- WiFi - requires configuration when connecting to a new WiFi network.
- Ethernet - requires additional equipment and an ethernet cable run to SmartFeed.
- Cellular - requires a cellular modem (available at additional cost). A monthly cellular data plan charge may apply, depending on the cellular provider.

2.3.1. WiFi

SmartFeed can be configured to connect to any WiFi network. Please see **Section 3** for instruction on using Control Feed to configure SmartFeed to use a new WiFi network.

2.3.2. Ethernet

Additional equipment must be installed into SmartFeed to allow for an Ethernet connection. To use an ethernet connection, please contact C-Lock.



2.3.3. Cellular

If your SmartFeed(s) came with a cellular modem, they will already be configured to connect to the modem. For US customers, the modem will also include a pre-installed SIM card. No additional work is required.

For international customers, an activated 2FF “Mini SIM” card will be required. Please ensure that the SIM card has a data plan allowance of at least 1GB per month of data.

For instructions on installing the SIM card, see Appendix A.

2.4. Calibrating and Checking the Scale

- ❗ It is recommended to recalibrate the scale any time the feed bin is removed or the system is moved or repositioned.
- ❗ It is recommended to check the scale for accuracy every time the bin is empty - or on a weekly or monthly basis. This will ensure accurate readings.
- ❗ SmartFeed operates on the principle of bin weight changes. If at any time, the operator must change the amount of feed in the bin, it is important to mark that event so that it's not interpreted as unknown intake. To mark an event as an empty or fill event, please see **Section 3, part 6d**.

To check for accurate weight measurement:

1. Make note of the current weight in the feed bin using the Control Feed app.
2. Place the calibration weight in the feed bin. Every C-Lock provided calibration weight will have the exact weight marked on it.
3. Ensure the SmartFeed bin weight increases by the correct amount.
4. If the weight increase is incorrect - check that the feed bin is fully suspended only by the load cell bars. If it is suspended correctly, please calibrate the scale.

To calibrate the scale:

1. Remove all feed and debris from the feed bin. If needed, open the cleaning door to remove the last bits of feed (not available for SmartFeed Producer systems).
2. From the Control Feed app, press Zero
3. When prompted to zero, ensure nothing is touching the bin. Then press Yes.
4. Place your calibration weight in the center of the bunk.

5. Press Set Span and Calibrate
6. Type in the mass of your calibration weight, ensuring to select the appropriate units of weight (lb or kg).
7. Press “Calibrate”
8. The correct weight should now be displayed on Control Feed.

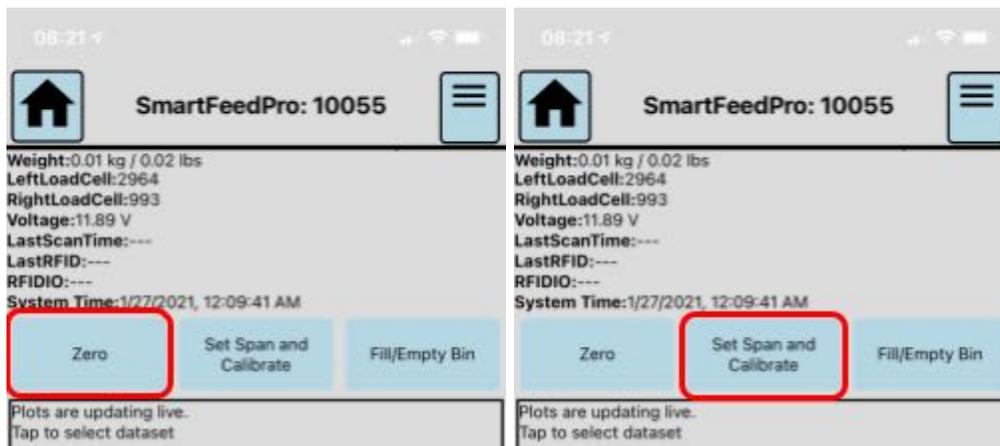


Figure 10) Zeroing (Taring) and Calibrating SmartFeed

2.5. Checking your EID (RFID) Tags

To check if the RFID reader is working for your EID tags:

1. You will need a spare ear tag.
2. Open the electronics box by unlatching the 2 fasteners.
3. Hold the ear tag next to the RFID antenna (Figure 1).
4. Watch for the green "READ" light to blink on the RFID circuit board in the electronics box. When you see the green "READ" light blink, this means it has detected an RFID tag.

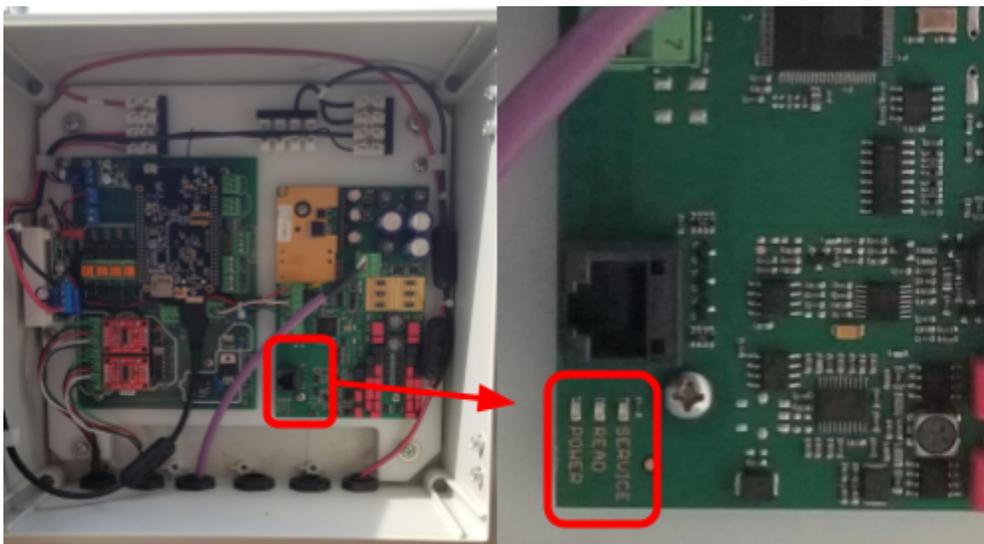


Figure 11) Checking the RFID Reader

3. Control Feed Mobile App

Although SmartFeed is an online measurement system, most common tasks can be performed from the feeder itself using the Control Feed mobile app.

Please note, the Control Feed app will only work within 20 meters of a SmartFeed system. It is not guaranteed that feeders farther than 20 meters will respond correctly.

1. Begin by pressing “Start Scanning for Systems”.
2. A list of nearby devices will appear on the screen. See Figure 12.
3. Press the System you wish to control.
4. A side-box will appear while it attempts to connect to the system.

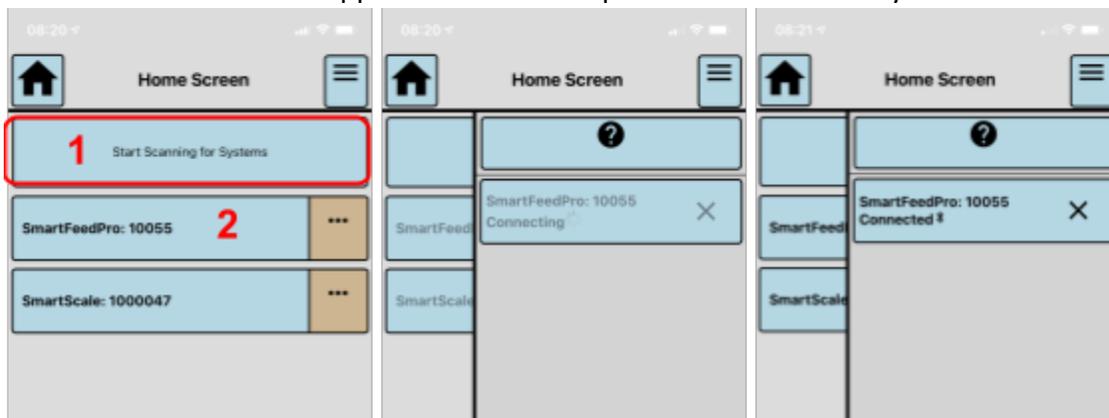


Figure 12) Scanning and Connecting to a SmartFeed System

5. Once connected, tap the button on the side to launch the control interface.

6. From this interface, you can:
 - a. see the current state of each sensor on the system.
 - b. Zero/Tare the bin
 - c. Recalibrate the bin
 - d. Indicate that the bin is about to be emptied or filled
 - e. View a real-time plot of data
 - f. Change WiFi network credentials for the feeder
 - g. Return to the list of all scanned feeders
 - h. See which feeders are currently connected

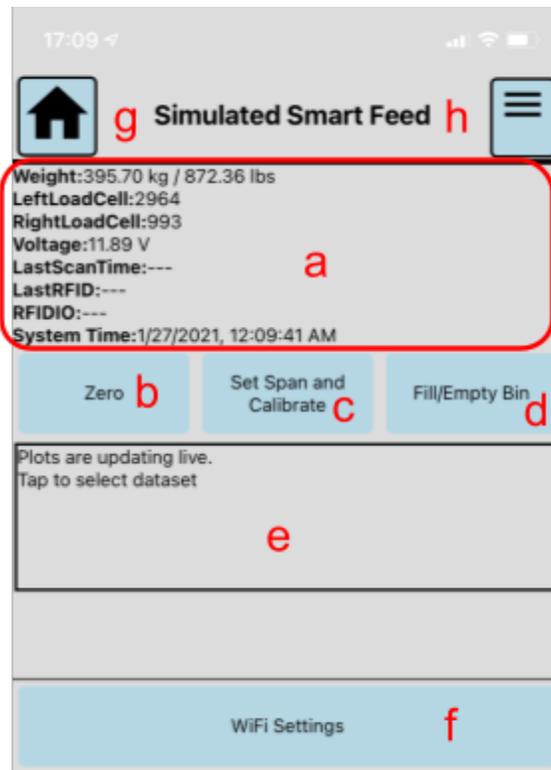


Figure 13) Control Feed Main Interface Controls

Configuring the WiFi Network Credentials

To change the WiFi network that SmartFeed connects to:

1. Tap “WiFi Settings”
2. Tap the button with the WiFi network you wish SmartFeed to use
3. In the box that appears, select WPA2
 - If the network is an open network (no password), select None
4. Enter the password for the network under “Password” (if applicable).
5. Tap Add. The system will immediately reboot and connect to the new network.

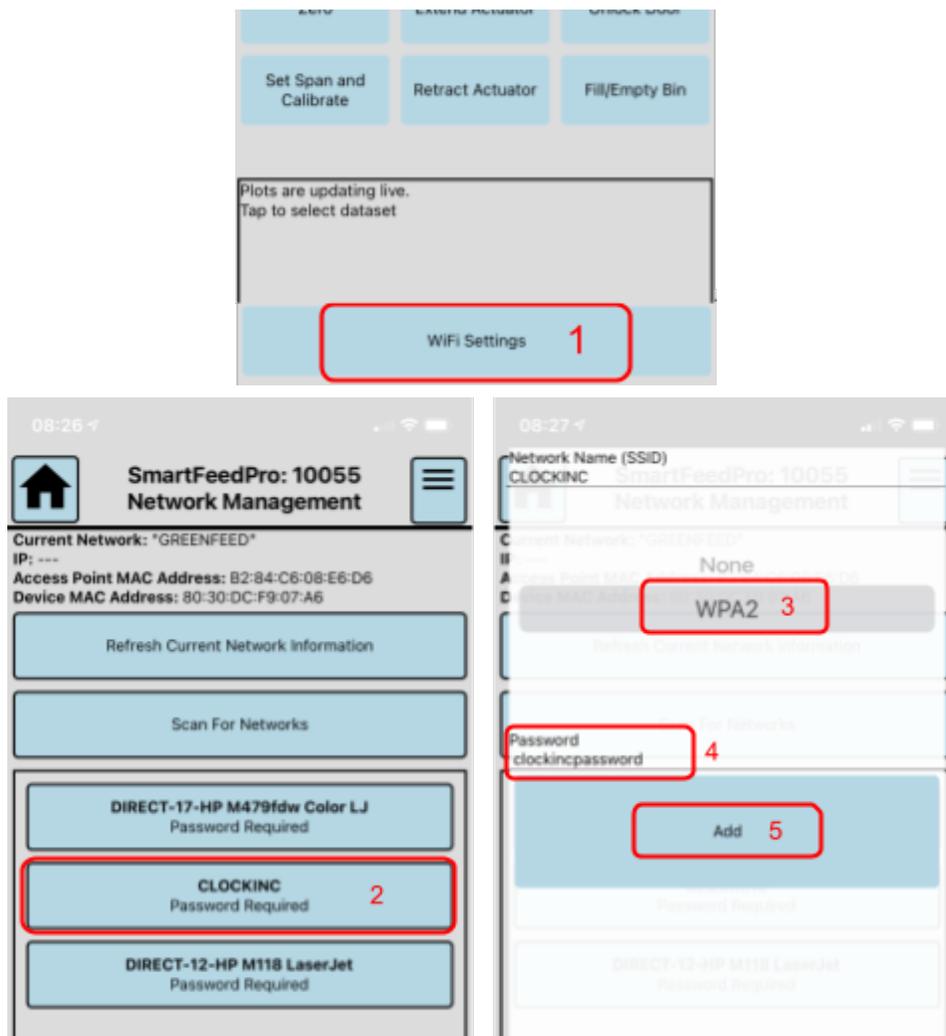


Figure 14) Control Feed WiFi Configuration



4. Training Animals

- SmartFeed requires all animals to have an RFID tag. SmartFeed is compatible with the following RFID standards: ISO 11784 or ISO 11785. To purchase these tags, please contact C-Lock.
- SmartFeed has a built-in RFID Reader. This reader will scan the tags automatically.
- When introducing the animal to the SmartFeed for the first time, it is important to make sure the animal associates the SmartFeed with food.

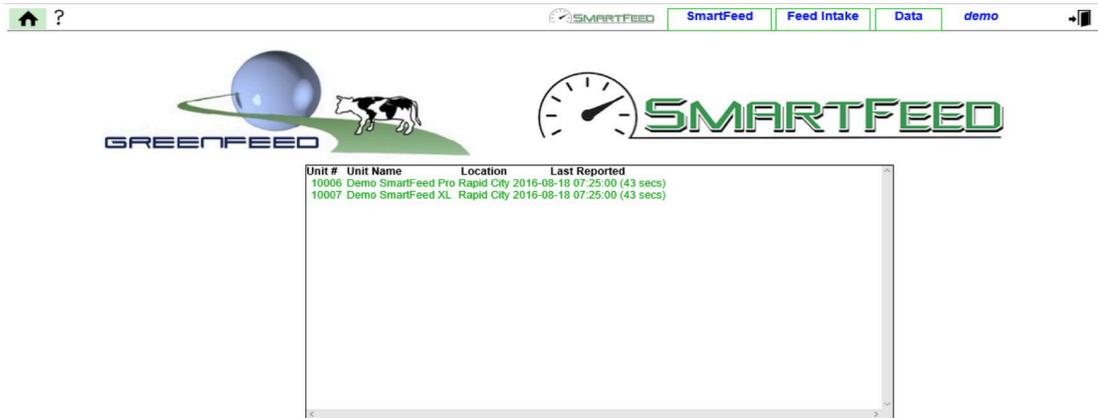
5. Online User Interface

By accessing the SmartFeed interface, users are allowed to customize notifications, adjust configurations, monitor SmartFeed unit(s), and more.

🔑 Log in to <https://ext.c-lockinc.com> with your assigned credentials.

Navigate through the website by selecting each page on the top of the screen: [Home icon](#), [SmartFeed](#), [Feed Intake](#), or [Data](#).

5.1. Home



Unit #	Unit Name	Location	Last Reported
10006	Demo SmartFeed Pro	Rapid City	2016-08-18 07:25:00 (43 secs)
10007	Demo SmartFeed XL	Rapid City	2016-08-18 07:25:00 (43 secs)

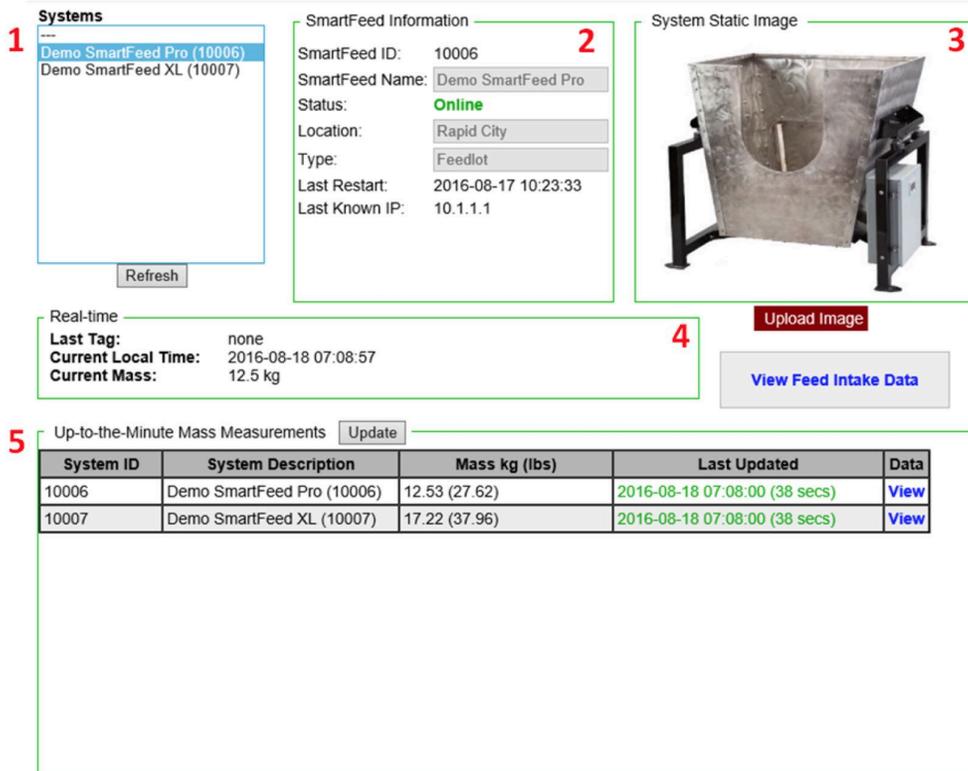
The home table displays each of your SmartFeed units. The Unit Number, Unit Name, Location, and Last Reported time will appear in the table.

If color is...	Time last Synced
Green	Seconds ago
Yellow	Minutes ago
Red	Hours ago
Grey	Days ago

 For additional assistance, click the ? button in the upper-left corner.

5.2. SmartFeed

SmartFeed makes measuring feed intake simple. The following page allows the user to customize, monitor, and configure SmartFeed settings and data.



The screenshot displays the SmartFeed web interface with five numbered callouts:

- Systems:** A list of SmartFeed systems, including "Demo SmartFeed Pro (10006)" and "Demo SmartFeed XL (10007)".
- SmartFeed Information:** Details for the selected system (ID: 10006, Name: Demo SmartFeed Pro, Status: Online, Location: Rapid City, Type: Feedlot, Last Restart: 2016-08-17 10:23:33, Last Known IP: 10.1.1.1).
- System Static Image:** A placeholder for a static image of the feeder, with an "Upload Image" button.
- Real-time:** Real-time data including "Last Tag: none", "Current Local Time: 2016-08-18 07:08:57", and "Current Mass: 12.5 kg".
- Up-to-the-Minute Mass Measurements:** A table showing mass measurements for two systems.

System ID	System Description	Mass kg (lbs)	Last Updated	Data
10006	Demo SmartFeed Pro (10006)	12.53 (27.62)	2016-08-18 07:08:00 (38 secs)	View
10007	Demo SmartFeed XL (10007)	17.22 (37.96)	2016-08-18 07:08:00 (38 secs)	View

- Systems:** SmartFeed systems owned by the current user will appear here. Select one of the SmartFeed feeders to view more information.
- SmartFeed Information:** General information such as ID, NAME, STATUS, etc.
- System Static Image:** Click the Upload Image button to select an image for your SmartFeed feeder (not required).
- Real-Time:** Displays the last RFID tag detected, Current Local Time, and Current Mass.
- Up-to-the-Minute Mass Measurements:** Displays the SmartFeed(s) ID, System



Description, Current Mass, and Last Updated time.

- These values are updated once per minute, as long as the system is connected to the Internet. Click the Update button to refresh the Real-Time data.

The screenshot shows a configuration window titled "Configuration". It is divided into two main sections: "General Settings" and "Email".

General Settings:

- Known mass of calibration weight for scale: 5 kg = 11.02 lb
- Times to upload data (:mm:ss): :59:59
- Time to reset the animal feed quota: 00:00:00 every 1 day(s)
- Remember a tag for: 3 seconds
- This feeder is set to: Normal Mode Training Mode
- Limit one feeding period (door open time) to a maximum of: 60 seconds

Email:

- Email daily feed intake reports
- Email Address: [text input field]
- Email If:
 - No data is received for 2 and 4 hours
 - Feed bin is empty (below 5 kg, 13.2 lb)
 - Or daily feed varies by more than 0 % in a week
 - Battery power is low

At the bottom of the form are four buttons: "Save Settings", "Upload Now", "Short Shutdown", and "Re-enable Feeders".

- **Known Mass of calibration weight for scale:** The displayed mass is the mass of the calibration weight entered on the SmartFeed (see **Section 3.7**).
 - **Times to upload data:** enter the specific minute and second of each hour for automatic upload.
Use the format (:mm:ss) when entering digits for "Times to upload data".
 - **Time to reset the animal feed quota:** Enter the specific time of quota reset. Resetting the quota will set the animal's feed intake to zero. This allows the user to specify what time of day the animals are allowed to eat again.
 - **Email:** You can assign different alerts to different email addresses. For instance, when a bin is nearly empty, it will email a particular person or a group of persons. Enter email address(s) for notifications. Multiple emails can be entered by separating with a comma (e.g johnsmith@example.com,marysmith@example.com).
- Any adjustments made in the configuration will sync with the SmartFeed system while it is connected to the Internet.
 - Once changes have been made, click Save Settings. You will receive a confirmation.

5.3. Feed Intake

This page will show the feed intake for each animal in a given time-span.

5.3.1. Animal Statistics



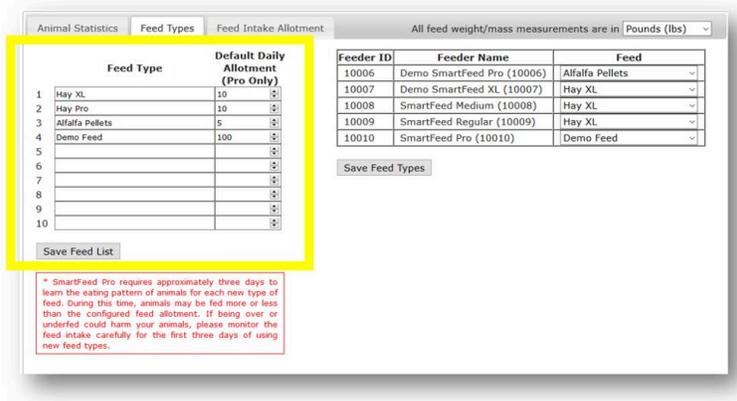
The screenshot shows a web interface for "Animal Statistics". It features a navigation bar with tabs for "Animal Statistics", "Feed Types", and "Feed Intake Allotment". On the right, there is a dropdown menu for "Show weights in" set to "Pounds (lb)". Below the navigation bar, there is a "Feeder:" dropdown menu set to "All Feeders", followed by date selection fields for "01/21/2021" and "01/24/2021". There are also checkboxes for "Show All" and "Show Visits", and buttons for "Go", "Download", and "Alt. Download".

1. Select desired feeder(s) in the “Feeders” drop-down menu.
 - The feed intake tables will only display for the selected feeders.
 - Selecting numerous (20 or more) feeders at once will take longer to compute intakes
2. Enter the date range.
 - Large date ranges (multiple weeks at once) may take longer to compute. By default, the last four days are chosen.
3. Check Show Visits to view the individual visits of animals (rather than only daily intakes). You will be limited to a maximum of 5000 entries when viewing in the browser.
4. Click the “Go” button to view the summary table for the chosen data range.
 - The first sets of tables are categorized by type of feed. Each animal’s intake is displayed by day in the selected date range.
 - The last table displays each individual intake in ascending order based on time. This last table will not appear if the list is too long. To view this table, only choose one day to view.
5. To download the data as a CSV for use in a spreadsheet program or other software, click the “Download” or “Alt. Download” button. These two buttons will provide different formatting to the data. Each has benefits depending on what software will be used for viewing:
 - Use Alt Download for Excel or spreadsheet software
 - Use Download for R, SAS, or other statistical software

5.3.2. Feed Types

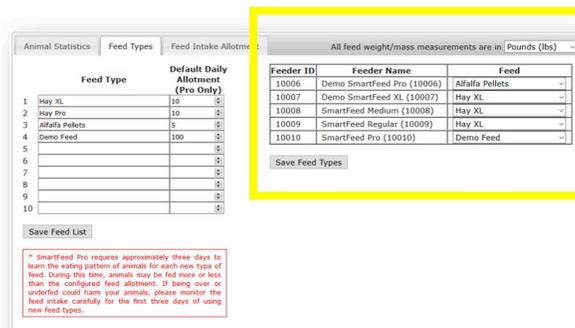
Before SmartFeed can synchronize, track, and control feed intake, you must first define what type of feed is in each feeder.

1. On the left table, enter each Feed Type that will be used and the Default Daily Allotment (Smartfeed Pro Only).
 - A maximum of 10 feed types is allowed.
2. Click “Save Feed List” for changes to take effect.



If an animal encounters the SmartFeed with an unrecognized RFID tag, the Default Daily Allotment will be set to that ear tag

3. On the right side of the page, select the correct feed type, for each SmartFeed unit, by using the drop down menu on the right table.
4. Click “Save Feed Types” for changes to take effect.



5.3.3. Feed Intake Allotment

The Feed Intake Allotment is meant only for SmartFeed Pro, but for SmartFeed and SmartFeed Producer, it is meant to give Visual IDs or Animal Names to each RFID tag. This does not affect the operation of SmartFeed. It is only for convenience purposes.

To make changes to an animal's name (Visual ID), find the animal in the list and type in a new ID/Name. Once all changes have been made, click Save.

Animal Statistics
Feed Types
Feed Intake Allotment
All feed weight/mass measurements are in Pounds (lbs)

Saved	Animal Name	RFID Tag	Hay	Alfalfa	Cracked Corn
Yes	100101_Apple	00000000900014002508353	44.09	6.61	4.41
Yes	100102_BigBen	00000000900014002508396	44.09	6.61	4.41
Yes	100103_Clovis	00000000985171000600578	44.09	6.61	4.41
Yes	100104_Oreo	00000000982000209460954	44.09	6.61	4.41
Yes	200104_Iams	00000000982000209460975	44.09	6.61	4.41
Yes	200104_Iams_2	00000000982000209460981	44.09	6.61	4.41

Save

* SmartFeed Pro requires approximately three days to learn the eating pattern of animals for each new type of feed. During this time, animals may be fed more or less than the configured feed allotment. If being over or underfed could harm your animals, please monitor the feed intake carefully for the first three days of using new feed types.



5.4. Data

The data tab is meant for viewing data on a single chart, which is not required for normal use. This feature can be useful for examining general trends in your herd. For more information on using the Data page, please contact C-Lock.

6. Maintenance

- To clean the inside of the feed bin, unlatch the two cleaning door locks and allow the door to drop. Use a power washer to spray and remove all debris and residue.
- To ensure accurate weight, clean underneath the bin. Make sure there is no food or debris touching the bottom of the feed bin.
- Check the bin calibration (**Section 2.4**) once per week and recalibrate as necessary.

Appendix A - Configuring the Cellular Modem

If your SmartFeed system includes a cellular modem, the modem will be pre-configured. The only thing that must be done is inserting an activated Mini-SIM (type 2FF) card and checking for an Internet connection. To do this, follow these steps:

- 1) Locate the modem. It will be in the SmartFeed battery box, or in a separate box by itself.



- 2) Disconnect power from the modem to turn it off.
- 3) Insert the 2FF SIM card into the slot.



- 4) Apply power and ensure the modem lights turn on.
- 5) Wait three minutes.



- 6) Use a laptop, tablet, or smartphone to check for a WiFi connection. The name of the WiFi network will vary depending on the SmartFeed configuration, but the network should start with "SMARTFEED".
- 7) Join this network, when prompted for the password, enter: smartfeed
- 8) On the laptop, tablet, or smartphone, go to <http://www.c-lockinc.com/ip> You should be presented with the following message: **Your IP address is xx.xx.xx.xx**
- 9) If you see this message, it means your modem is configured and ready.
- 10) If you do not see this message, please contact C-Lock for assistance.