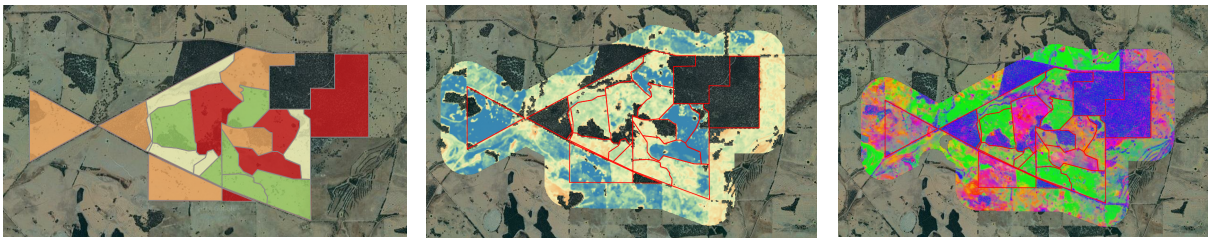
Pasture Management Practical



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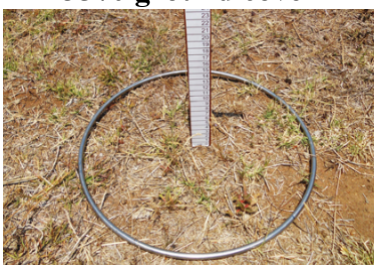
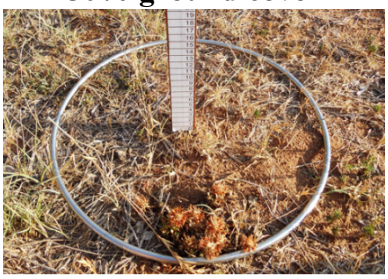
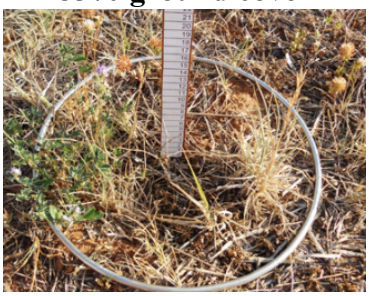
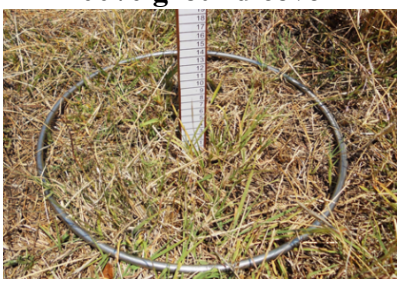
Manual pasture monitoring methods

Using Quadrats and visually assessing pasture quality

1. Take the metal quadrat and throw it randomly in to the paddock

2. Asses the percentage of ground cover of the pasture in the quadrat

35% ground cover 	**50% ground cover** 
85% ground cover 	**100% ground cover** 

What is the percentage of ground cover? _____

3. Asses the moisture content/greenness of the pasture in the quadrat

20% green cover 	**40% green cover** 
80% green cover 	**100% green cover** 

How green is the pasture? _____

4. Now take a pair of scissors or hand shears and cut ALL the pasture in the quadrat, DOWN TO THE GROUND. Collect the sample by placing it in to a bag and identify which paddock it is from.

To get an accurate estimation of a paddocks pasture quality, multiple samplings would have to be taken across each paddock. The cut samples would have to be weighed, dried and re weighed before dry matter and feed on offer calculations could be done.

Questions

Knowing what is involved with manual pasture quality estimations;

1. Do you think this method is a quick way of collecting pasture data for a large number of paddocks? Why/why not?

   Do you think this method is an accurate way to collect pasture data? Why/why not?

CiboLabs Pasture App

As well as the web interface, CiboLabs have developed a mobile data collection app to allow for rapid data collection in the paddock. The app is opened through your browser but will work offline, although it does need GPS to be turned on.

The app will upload any collected data once the phone or tablet is reconnected to mobile data or wifi.

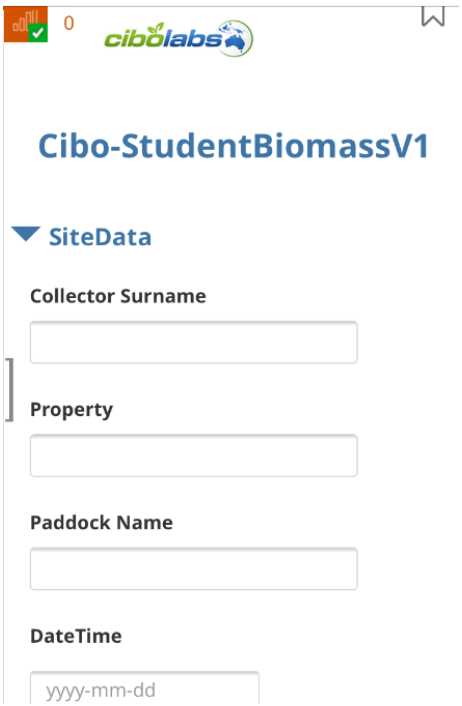
Open the CiboLabs pasture App here https://enketo.cibolabs.com/x/#bZGzpQVO

It is best to bookmark this page for easy access in the paddock.

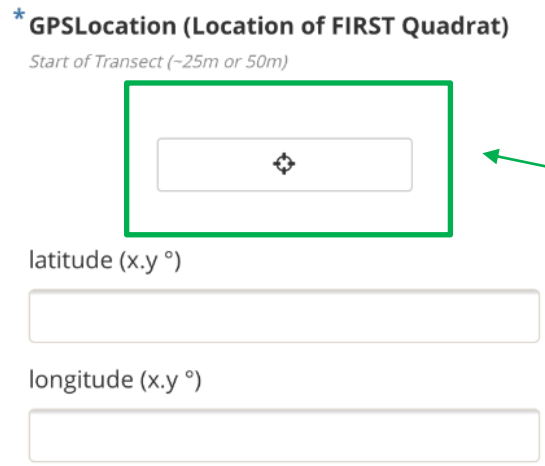
The app allows producers to collect a wide assortment of data including;

Data collection

Property, paddock and time identification



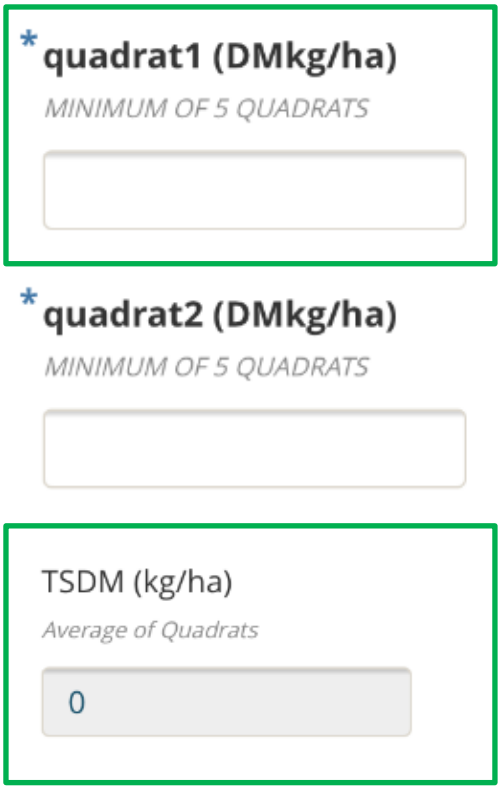
GPS location



Clicking this icon will record the GPS location of where you are standing

The app will ask for the GPS locations of where the first and last pasture cuts were taken

Manual Feed on Offer results



Can collect the manual pasture cut results (same method as done previously) for each paddock

Needs a minimum of 5 pasture cuts per paddock to calculate the average TSDM for the paddock

Photo of pasture quadrat

Site Photo - Direction of Transect

Might need to lower camera res to <5mb

Click here to upload file. (< 10MB)

Can take and upload a photo of the paddock to remind you later what the pasture quality was like and as a reference for what certain FOO values look like.

Ground cover and pasture quality

Average Ground Cover %)

Average of quadrats (0-100)

Green Fraction % (0-100)

Percentage Green (Average of Site)

Dry Matter % (100-Moisture%)

Hay should be >85%DM, All Green ~20-30%DM

These are added manually based on the methods described previously.

NDVI

Average NDVI for transect

NDVI can be measured using a handheld Greenseeker, or similar device

Pasture species and any comments

Dominant Species (common name)

Co Dominant (common name)

Sub Dominant (common name)

Comments

Accessing data

Once the data has been uploaded it can be accessed through Google Sheets here: https://bit.ly/2ZvEDhK

This is a “live” database.

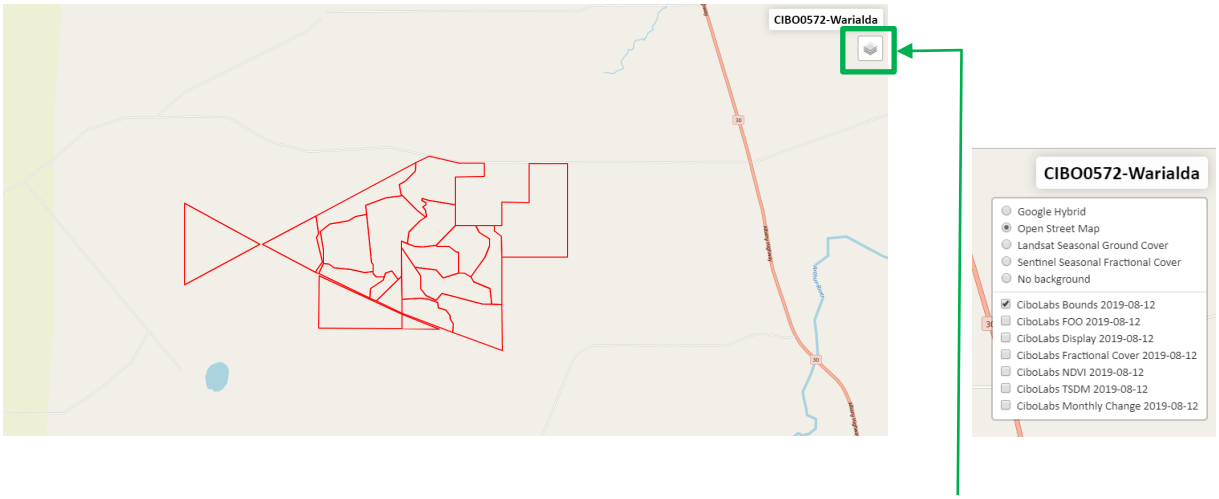
To work with the data (manipulate, graph etc) it will need to be saved to Excel.

Monitoring pasture using “Cibo Labs”

1. Open the current dataset for Warialda Farms on the CIBO labs website using the following link

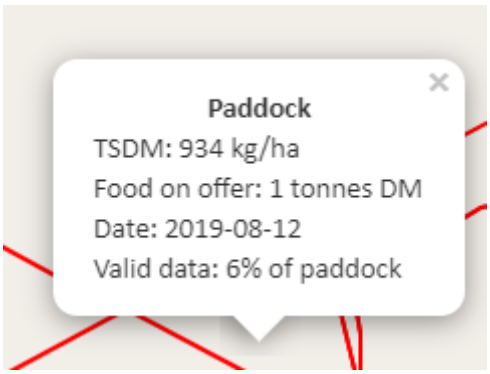
https://bit.ly/2m2JILo

Your screen should look like this.



2. Use the layers tab in the top right hand corner, under the farm name, to scroll through the different layer options.
3. Click on a paddock to see how much feed on offer (FOO), total standing dry matter (TSDM) and valid data there is for that paddock.

You will notice a pop up like the one below.



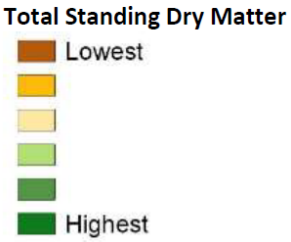
TSDM = the total amount of dry feed in the paddock in kilograms per hectare (a measurement of area)

Food on offer = The total amount of food on offer in the whole paddock

Valid data = How much of the paddock could be seen on that day and not covered by cloud

4. Use this same method to look at other paddocks on the property.

HINTS

Food on Offer (tonnes)		High amounts of pasture Low amounts of pasture
Fractional Cover		Photosyntheically active Non-photosynthetically active Bare ground
Normalised different vegetation index (NDVI)		Bare ground or water Poor, low density pastures Dense, green, healthy pasture
Total standing dry matter (kgs/ha)		Low amounts of dry feed High amounts of dry feed
Change in ground cover (past 30 days)		Pasture that has decreased in the last 30 days (areas with less feed) Pasture that hasn't changed in the last 30 days Pasture that has increased in the last 30 days (areas with more feed)

Comparing food on offer for different paddocks

Using the paddock ID numbers in the image below as reference, use the Cibo Labs interface to fill in the table below.

Feed on Offer - use the “CiboLabs FOO” layer and record the colour of the paddock. Then click on the paddock and record the amount of food on offer (in tonnes)

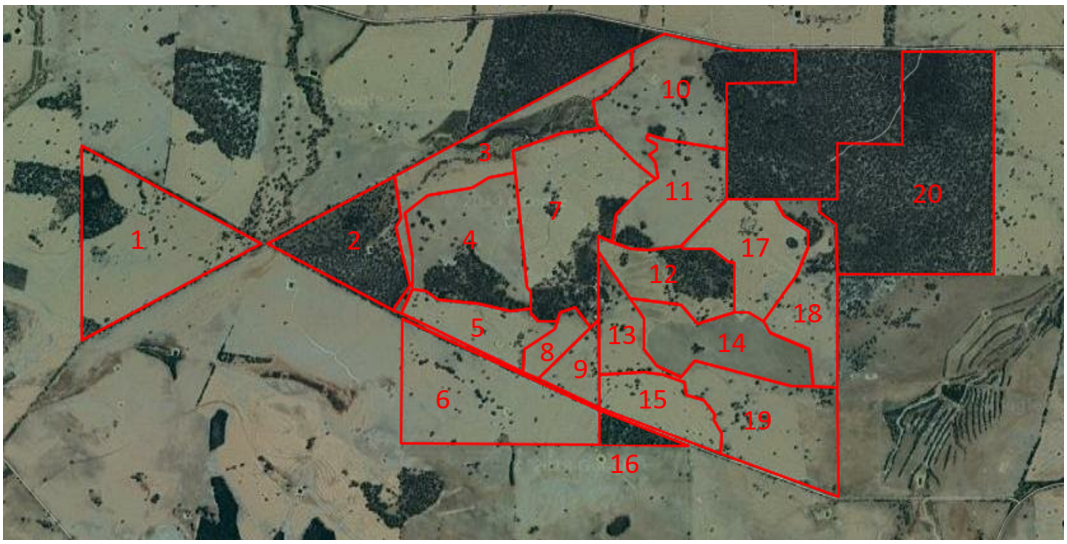
TSDM – use the “CiboLabs TSDM” layer and record the dominant colour in the paddock. Then click the paddock and record the TSDM value (in kg/ha)

Valid data – click on the paddock and record the value for valid data (in %)

Photosynthetic cover – use the “CIboLabs Fractional Cover” layer and record the dominant colour of the paddock. Record what this colour means.

Ground cover change in 30 days – use the “CiboLabs Monthly Change” layer and record the dominant colour of the paddock. Record what this colour means.

You can use the colour reference charts in the section above to help you.



Date of data collection: _____

Paddock	Feed On Offer (tonnes)	TSDM (kgs/ha)	Valid data (%)	Fractional (photosynthetic) cover	Ground cover change in 30 days
1					
2					
7					
10					
14					
17					
19					

Questions

1. Did high NVDI relate to high FOO? Why might these be similar/different?
2. In terms of the amount of change in ground cover over the last 30 days, what would cause some paddocks on the farm to be growing while others remain the same and/or are going backwards?
3. What do you think influences the validity of the data collected for paddocks 2 and 20?
4. Based on the FOO and TSDM values, which paddock(s) would be the best to graze stock in now? Which paddock(s) would you not graze stock in?

Application of data

The data collected from the Cibo Labs interface can be useful to producers as it can help determine how many animals they can feed for a given period of time.

Example 1: Brad is a sheep producer who has a flock of 600 lactating ewes. However, the paddock they are in as is running out of feed. The paddock he wants to shift them to is a 50ha paddock. The Cibo labs data has informed him this paddock has a TSDM reading of 900kg/ha. Brad wants to know how long he can graze his ewes in this paddock for.

Number of ewes = 600 Paddock size = 50ha TSDM reading = 900kg/ha

A lactating ewe has a DSE = 3.0 (they eat 3 times more than a non-lactating sheep)

First Brad needs to work out the stocking density of his paddock.

$$\text{Stocking density} = \frac{\text{number of animals} \times \text{DSE of animal}}{\text{paddock size}}$$

$$\therefore \text{Stocking density} = \frac{600 \times 3.0}{50}$$

Stocking density = 36 DSE/ha (each day the flock is eating 36 kg of feed per hectare)

Example cont.

Next, Brad needs to know how many days he can run his 600 sheep in the new paddock

$$\text{Number of days} = \frac{\text{TSDM}}{\text{Stocking density}}$$

$$\therefore \text{ Number of days} = \frac{900}{36}$$

$$\text{Number of days} = 25 \text{ days}$$

Brad has enough feed in the paddock to gaze his ewes for 25 days.

Questions

1. If weaned lambs have a DSE of 1.5, calculate how long you could graze a flock of 500 lambs in;
    a. A 75ha paddock with a TSDM reading = 950kg/ha

    b. A 50 ha paddock with a TSDM reading = 1275kg/ha

    c. A 125ha paddock with a TSDM reading = 480kg/ha

2. Which paddock (a, b or c) would you choose to put the lambs in? Why?

Example 2: Mandy has a property where she grazes steers for a few months before they are moved to a feedlot. Mandy wants to buy some more stock but doesn't know how many animals to purchase. She knows that the steers will only be on her property for three months (90 days) and that she has 120ha to graze them on. Cibo Labs data has informed her that the 250ha paddock she wants to use has a TSDM reading of 1350kg/ha.

Paddock size = 120ha TSDM reading = 1350kg/ha Number of days = 90 days

Growing steer has a DSE = 10 (they eat ten times more feed than a non-lactating sheep)

First Mandy needs to know what the stocking rate of the paddock is

$$\text{Stocking density} = \frac{\text{TSDM}}{\text{Number of days}}$$

$$\therefore \text{ Stocking density} = \frac{1350}{90}$$

Stocking density = 15 DSE/ha (can run stock up to 15DSE per hectare for 90 days)

Example cont.

Next, Mandy needs to know how many animals she can purchase

$$\text{Number of animals} = \frac{(\text{stocking density X paddock size})}{\text{DSR}}$$

∴ Number of animals = (15 * 120) / 10

Number of animals = 180 steers

Mandy can purchase 180 steers from the saleyards.

Questions

1. If a lactating cow has a DSE of 16, calculate the number of cows you could graze for 30 days if you had;
    a. A 70ha paddock with a TSDM reading = 960kg/ha

    b. A 105ha paddock with a TSDM reading = 750kg/ha

    c. A 32ha paddock with a TSDM reading = 1200kg/ha

Extension Questions

While we could leave stock in a paddock long enough for them to eat all the available pasture, this would lead to overgrazed paddocks, areas of bare ground, poor water absorption and poor plant growth. This is not an effective way to farm and is very detrimental to land management. Therefore, it is often assumed that of the available pasture present 20% of it will not be grazed.

Now, recalculate the previous questions by reducing the TSDM values by 20%.

Example 1: Brad is a sheep producer who has a flock of 600 lactating ewes. However, the paddock they are in as is running out of feed. The paddock he wants to shift them to is a 50ha paddock. The Cibo labs data has informed him this paddock has a TSDM reading of 900kg/ha. Brad wants to know how long he can graze his ewes in this paddock for.

Number of ewes = 600 Paddock size = 50ha TSDM reading = 900kg/ha
A lactating ewe has a DSE = 3.0 (they eat 3 times more than a non-lactating sheep)

First Brad needs to calculate how much feed he has available for the sheep to eat

$$\text{True TSDM} = \text{TSDM} \times \frac{80}{100}$$

$$= 900 \times 0.8$$

$$= 720$$

Next, Brad needs to work out the stocking density of his paddock.

$$\text{Stocking density} = \frac{\text{number of animals} \times \text{DSE of animal}}{\text{paddock size}}$$

Example cont

$$\therefore \text{Stocking density} = \frac{600 \text{ X } 3.0}{50}$$

Stocking density = 36 DSE/ha (each day the flock is eating 36 kg of feed per hectare)

Next, Brad needs to know how many days he can run his 600 sheep in the new paddock

$$\text{Number of days} = \frac{\text{True TSDM}}{\text{Stocking density}}$$

Example cont.

$$\therefore \text{ Number of days} = \frac{720}{36}$$

Number of days = 20 days

1. If weaned lambs have a DSE of 1.5, calculate how long you could graze a flock of 500 lambs in;
    a. A 75ha paddock with a TSDM reading = 950kg/ha

    b. A 50 ha paddock with a TSDM reading = 1275kg/ha

    c. A 125ha paddock with a TSDM reading = 480kg/ha

2. If a lactating cow has a DSE of 16, calculate the number of cows you could graze for 30 days if you had;

    a. A 70ha paddock with a TSDM reading = 960kg/ha

    b. A 105ha paddock with a TSDM reading = 750kg/ha

    c. A 32ha paddock with a TSDM reading = 1200kg/ha

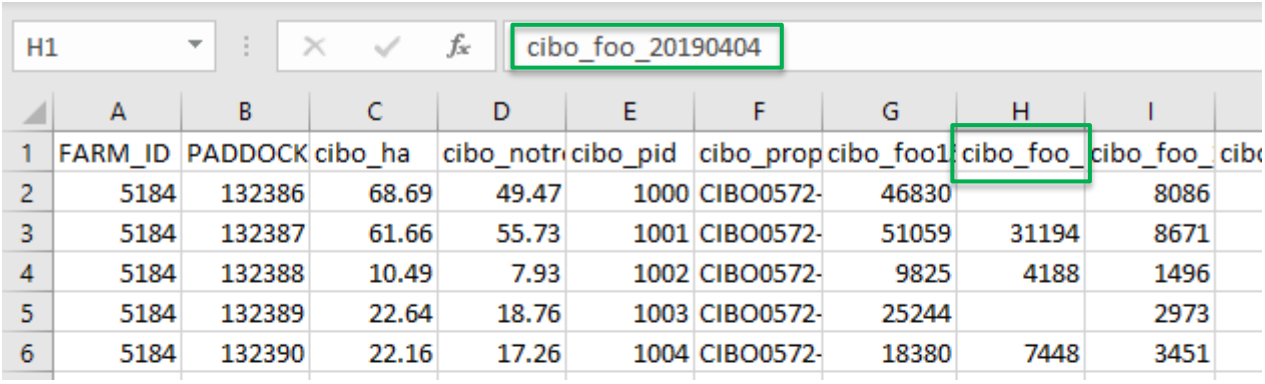
Graphing Feed on Offer

1. Open up “CIBO0572-Warialda-Paddocks.xlsx”
2. Before you do anything **save this file to your folder.**

Your spreadsheet should look something like this

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	FARM_ID	PADDOCK	cibo_ha	cibo_notr	cibo_pid	cibo_prop	cibo_foo1	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_
2	5184	132386	68.69	49.47	1000	CIBO0572-	46830		8086			8124		
3	5184	132387	61.66	55.73	1001	CIBO0572-	51059	31194	8671			7776		15824
4	5184	132388	10.49	7.93	1002	CIBO0572-	9825	4188	1496			1493		1555
5	5184	132389	22.64	18.76	1003	CIBO0572-	25244		2973			3096		3801
6	5184	132390	22.16	17.26	1004	CIBO0572-	18380	7448	3451			3441		9017
7	5184	132391	115.33	0.12	1005	CIBO0572-	91		61			65		
8	5184	132392	8.32	6.61	1006	CIBO0572-	7610	3229	1139			1039		
9	5184	132393	51.26	33.81	1007	CIBO0572-	43670		6007	26160		6077		
10	5184	132394	30.91	20.43	1008	CIBO0572-	21992		2873			2832		8877
11	5184	132395	56.98	37.14	1009	CIBO0572-	37322		6258			6141		9861
12	5184	132396	33.53	29.53	1010	CIBO0572-	23989		5778	20029		5444		16188
13	5184	132397	66.45	54.75	1011	CIBO0572-	70000	23020	10287			9381		6948
14	5184	132398	35.71	35.16	1012	CIBO0572-	31623		3940			3468		6659
15	5184	132399	28.29	13	1013	CIBO0572-	12608		3010			3036		6071
16	5184	132400	66.84	44.67	1014	CIBO0572-	27698	34725	8393			8557		9632
17	5184	132401	43.62	31.42	1015	CIBO0572-	36364		8082			7805		18118
18	5184	132402	33.55	28.18	1016	CIBO0572-	36763	23246	5150			4641		5547
19	5184	132403	37.07	0.84	1017	CIBO0572-	785		366			391		
20	5184	132411	5.98	0.21	1018	CIBO0572-	189		107			114		87
21														

You will notice that many of the column headings end in an 8-digit number



	A	B	C	D	E	F	G	H	I	
1	FARM_ID	PADDOCK	cibo_ha	cibo_notr	cibo_pid	cibo_prop	cibo_foo1	cibo_foo_	cibo_foo_	cibo
2	5184	132386	68.69	49.47	1000	CIBO0572-	46830		8086	
3	5184	132387	61.66	55.73	1001	CIBO0572-	51059	31194	8671	
4	5184	132388	10.49	7.93	1002	CIBO0572-	9825	4188	1496	
5	5184	132389	22.64	18.76	1003	CIBO0572-	25244		2973	
6	5184	132390	22.16	17.26	1004	CIBO0572-	18380	7448	3451	

Here cell H1 ends in “_20190404”.

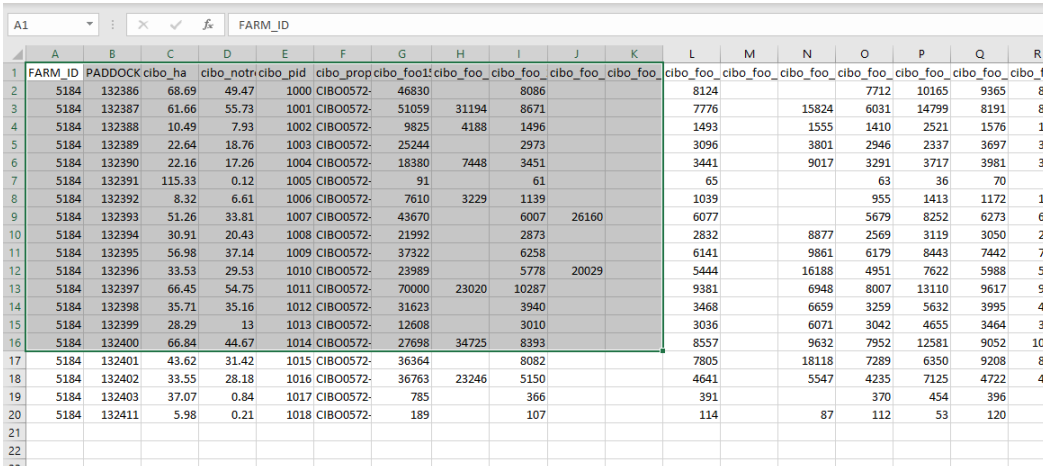
This is the date that this data was collected on (04/04/2019).

However, in its current format this is not useful for graphing data over time and so you will need to reformat your spreadsheet.

3. Highlight the entire dataset and copy the data.

   Click Call A1 and hold until you have highlighted all the data in the spreadsheet.

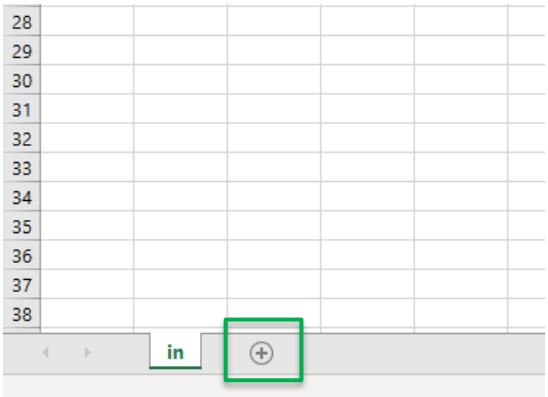
   The image shows the highlighted data (grey) and non-highlighted data (white)



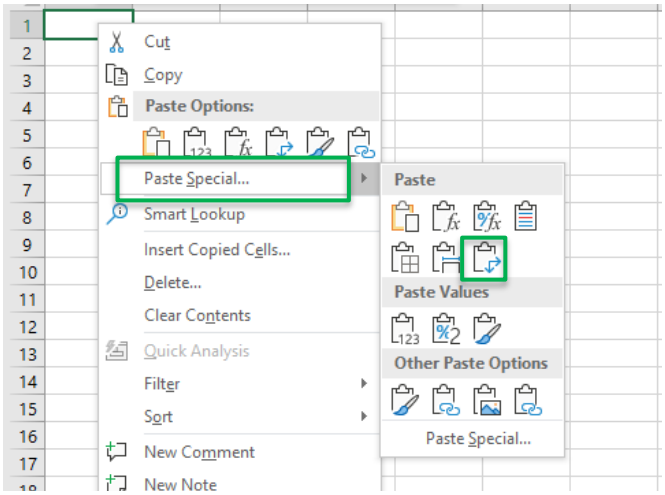
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	FARM_ID	PADDOCK	cibo_ha	cibo_notr	cibo_pid	cibo_prop	cibo_foo1	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_foo_	cibo_
2	5184	132386	68.69	49.47	1000	CIBO0572-	46830		8086			8124			7712	10165	9365	8
3	5184	132387	61.66	55.73	1001	CIBO0572-	51059	31194	8671			7776		15824	6031	14799	8191	8
4	5184	132388	10.49	7.93	1002	CIBO0572-	9825	4188	1496			1493		1555	1410	2521	1576	1
5	5184	132389	22.64	18.76	1003	CIBO0572-	25244		2973			3096		3801	2946	2337	3697	3
6	5184	132390	22.16	17.26	1004	CIBO0572-	18380	7448	3451			3441		9017	3291	3717	3981	3
7	5184	132391	115.33	0.12	1005	CIBO0572-	91		61			65			63	36	70	
8	5184	132392	8.32	6.61	1006	CIBO0572-	7610	3229	1139			1039			955	1413	1172	1
9	5184	132393	51.26	33.81	1007	CIBO0572-	43670		6007	26160		6077			5679	8252	6273	6
10	5184	132394	30.91	20.43	1008	CIBO0572-	21992		2873			2832		8877	2569	3119	3050	2
11	5184	132395	56.98	37.14	1009	CIBO0572-	37322		6258			6141		9861	6179	8443	7442	7
12	5184	132396	33.53	29.53	1010	CIBO0572-	23989		5778	20029		5444		16188	4951	7622	5988	5
13	5184	132397	66.45	54.75	1011	CIBO0572-	70000	23020	10287			9381		6948	8007	13110	9617	9
14	5184	132398	35.71	35.16	1012	CIBO0572-	31623		3940			3468		6659	3259	5632	3995	4
15	5184	132399	28.29	13	1013	CIBO0572-	12608		3010			3036		6071	3042	4655	3464	3
16	5184	132400	66.84	44.67	1014	CIBO0572-	27698	34725	8393			8557		9632	7952	12581	9052	10
17	5184	132401	43.62	31.42	1015	CIBO0572-	36364		8082			7805		18118	7289	6350	9208	8
18	5184	132402	33.55	28.18	1016	CIBO0572-	36763	23246	5150			4641		5547	4235	7125	4722	4
19	5184	132403	37.07	0.84	1017	CIBO0572-	785		366			391			370	454	396	
20	5184	132411	5.98	0.21	1018	CIBO0572-	189		107			114		87	112	53	120	
21																		
22																		

   Once your data is all highlighted click **“Clt + C”**

4. Open up a new sheet



5. Paste the data in to your new worksheet and right click the cell A1. Select **Paste Special** and then the transpose option 



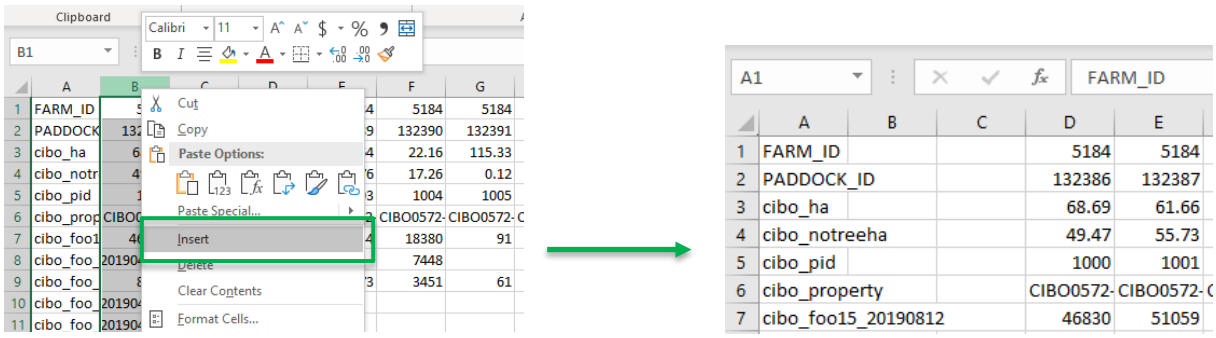
You will now see that your data has been flipped and that the column headings are now the row headings.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	FARM_ID	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184	5184		
2	PADDOCK	132386	132387	132388	132389	132390	132391	132392	132393	132394	132395	132396	132397	132398	132399	132400	132401	132402	132403	132411		
3	cibo_ha	68.69	61.66	10.49	22.64	22.16	115.33	8.32	51.26	30.91	56.98	33.53	66.45	35.71	28.29	66.84	43.62	33.55	37.07	5.98		
4	cibo_notr	49.47	55.73	7.93	18.76	17.26	0.12	6.61	33.81	20.43	37.14	29.53	54.75	35.16	13	44.67	31.42	28.18	0.84	0.21		
5	cibo_pid	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018		
6	cibo_prop	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572-	Warialda	
7	cibo_foo1	46830	51059	9825	25244	18380	91	7610	43670	21992	37322	23989	70000	31623	12608	27698	36364	36763	785	189		
8	cibo_foo_20190404	31194	4188		7448		3229						23020			34725		23246				
9	cibo_foo_	8086	8671	1496	2973	3451	61	1139	6007	2873	6258	5778	10287	3940	3010	8393	8082	5150	366	107		
10	cibo_foo_20190414								26160			20029										
11	cibo_foo_20190419																					
12	cibo_foo_	8124	7776	1493	3096	3441	65	1039	6077	2832	6141	5444	9381	3468	3036	8557	7805	4641	391	114		
13	cibo_foo_20190429																					
14	cibo_foo_20190504	15824	1555	3801	9017					8877	9861	16188	6948	6659	6071	9632	18118	5547		87		
15	cibo_foo_	7712	6031	1410	2946	3291	63	955	5679	2569	6179	4951	8007	3259	3042	7952	7289	4235	370	112		

However, we still need to reformat the dates

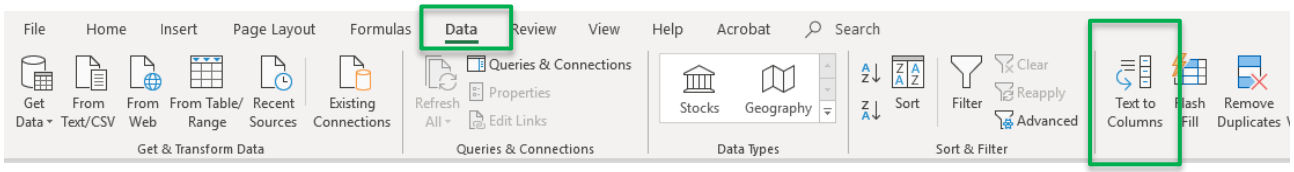
6. Insert two new columns to the right of column A

   Highlight column B, right click and select “Insert”. Repeat this process.

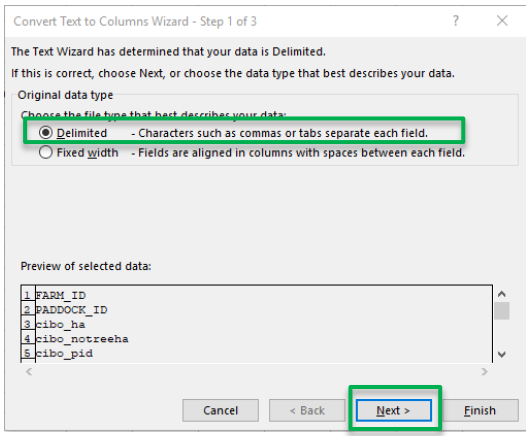


7. Highlight column A

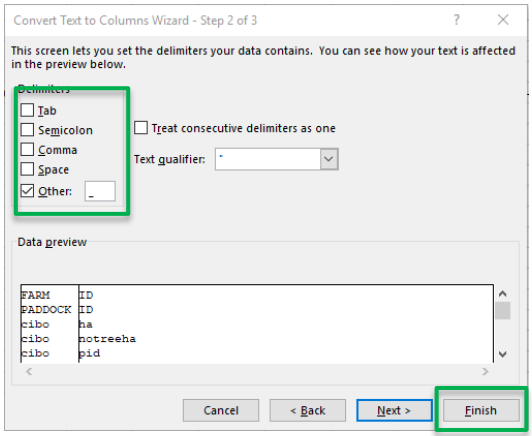
8. In the **Data** tab select **Text to columns**



9. In the first command box select **"Delimited"** then select **"Next"**.



10. In the next window, uncheck ‘Tab’, select **“Other”** and place a **“_”** in the box. Then select **“Finish”**



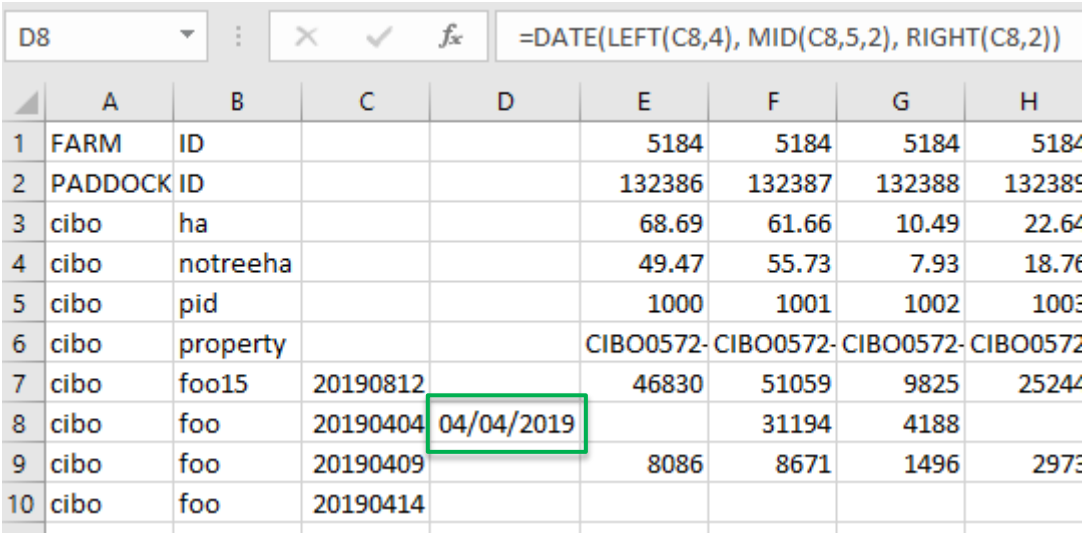
You will notice that the headings from Column A have been split wherever there was a “_” and that all the numbers (dates) are now listed in Column C.

	A	B	C
1	FARM_ID		
2	PADDOCK_ID		
3	cibo_ha		
4	cibo_notreeha		
5	cibo_pid		
6	cibo_property		
7	cibo_foo15_20190812		
8	cibo_foo_20190404		
9	cibo_foo_20190409		
10	cibo_foo_20190414		
11	cibo_foo_20190419		
12	cibo_foo_20190424		
13	cibo_foo_20190429		

	A	B	C
1	FARM	ID	
2	PADDOCK	ID	
3	cibo	ha	
4	cibo	notreeha	
5	cibo	pid	
6	cibo	property	
7	cibo	foo15	20190812
8	cibo	foo	20190404
9	cibo	foo	20190409
10	cibo	foo	20190414
11	cibo	foo	20190419
12	cibo	foo	20190424
13	cibo	foo	20190429

11. Like you did previously, insert a column to the right of Column C. This column will end up containing our list of dates.
12. Type the following formula in to cell D8

    D8 =DATE(LEFT(C8,4), MID(C8,5,2), RIGHT(C8,2))



	A	B	C	D	E	F	G	H
1	FARM	ID			5184	5184	5184	5184
2	PADDOCK	ID			132386	132387	132388	132389
3	cibo	ha			68.69	61.66	10.49	22.64
4	cibo	notreeha			49.47	55.73	7.93	18.76
5	cibo	pid			1000	1001	1002	1003
6	cibo	property			CIBO0572-	CIBO0572-	CIBO0572-	CIBO0572
7	cibo	foo15	20190812		46830	51059	9825	25244
8	cibo	foo	20190404	04/04/2019		31194	4188	
9	cibo	foo	20190409		8086	8671	1496	2973
10	cibo	foo	20190414					

You will now see that the number from cell C8 has been converted to the correct date format in D8.

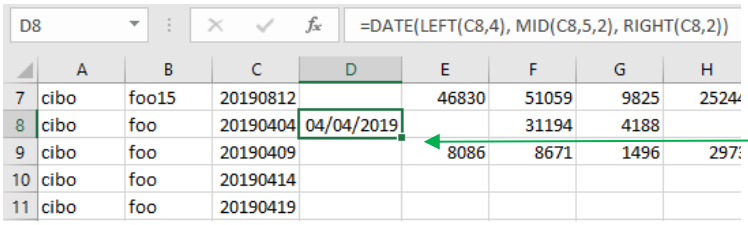
13. Apply the same formula to the rest of Column D

Do you know how to quickly apply a formula to the entire column?

Click on the cell that you would like to copy (in this case D8).

Double click on the little green square at the bottom right hand corner of the cell.

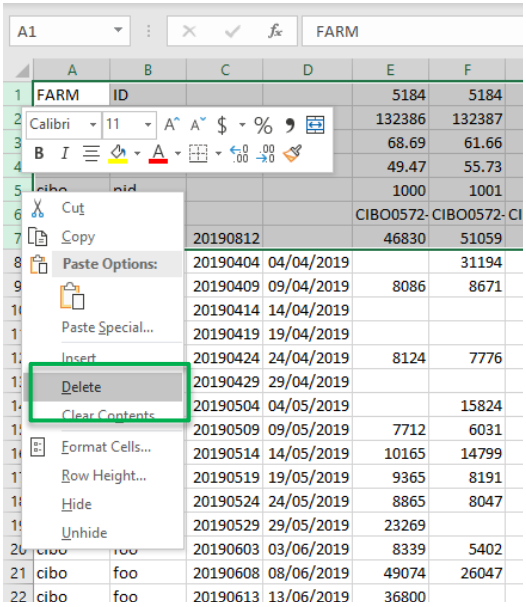
This will copy the formula all the way down the column to the last row of the spreadsheet.



	A	B	C	D	E	F	G	H
7	cibo	foo15	20190812		46830	51059	9825	25244
8	cibo	foo	20190404	04/04/2019		31194	4188	
9	cibo	foo	20190409		8086	8671	1496	2973
10	cibo	foo	20190414					
11	cibo	foo	20190419					

As you only want the data that relates to the amount of feed on offer in each paddock you can delete some of the data to make things easier.

14. Delete **rows 3-7**



Then delete **all rows from 'Row 31' onwards.** Your spreadsheet should look like this.

	A	B	C	D	E
1	FARM	ID			5184
2	PADDOCK	ID			132386
3	cibo	foo	20190404	04/04/2019	
4	cibo	foo	20190409	09/04/2019	8086
5	cibo	foo	20190414	14/04/2019	
6	cibo	foo	20190419	19/04/2019	
7	cibo	foo	20190424	24/04/2019	8124
8	cibo	foo	20190429	29/04/2019	
9	cibo	foo	20190504	04/05/2019	
10	cibo	foo	20190509	09/05/2019	7712
11	cibo	foo	20190514	14/05/2019	10165
12	cibo	foo	20190519	19/05/2019	9365
13	cibo	foo	20190524	24/05/2019	8865
14	cibo	foo	20190529	29/05/2019	23269
15	cibo	foo	20190603	03/06/2019	8339
16	cibo	foo	20190608	08/06/2019	49074
17	cibo	foo	20190613	13/06/2019	36800
18	cibo	foo	20190618	18/06/2019	6924
19	cibo	foo	20190623	23/06/2019	44448
20	cibo	foo	20190628	28/06/2019	24177
21	cibo	foo	20190703	03/07/2019	15489
22	cibo	foo	20190706	06/07/2019	44324
23	cibo	foo	20190708	08/07/2019	19417
24	cibo	foo	20190713	13/07/2019	
25	cibo	foo	20190718	18/07/2019	
26	cibo	foo	20190723	23/07/2019	
27	cibo	foo	20190728	28/07/2019	29629
28	cibo	foo	20190802	02/08/2019	
29	cibo	foo	20190807	07/08/2019	48748
30	cibo	foo	20190812	12/08/2019	46803
31					
32					

Now we can determine how much feed was on offer over the whole property on each day.

15. Total the Feed on offer for each day by entering the following formula in to cell X3

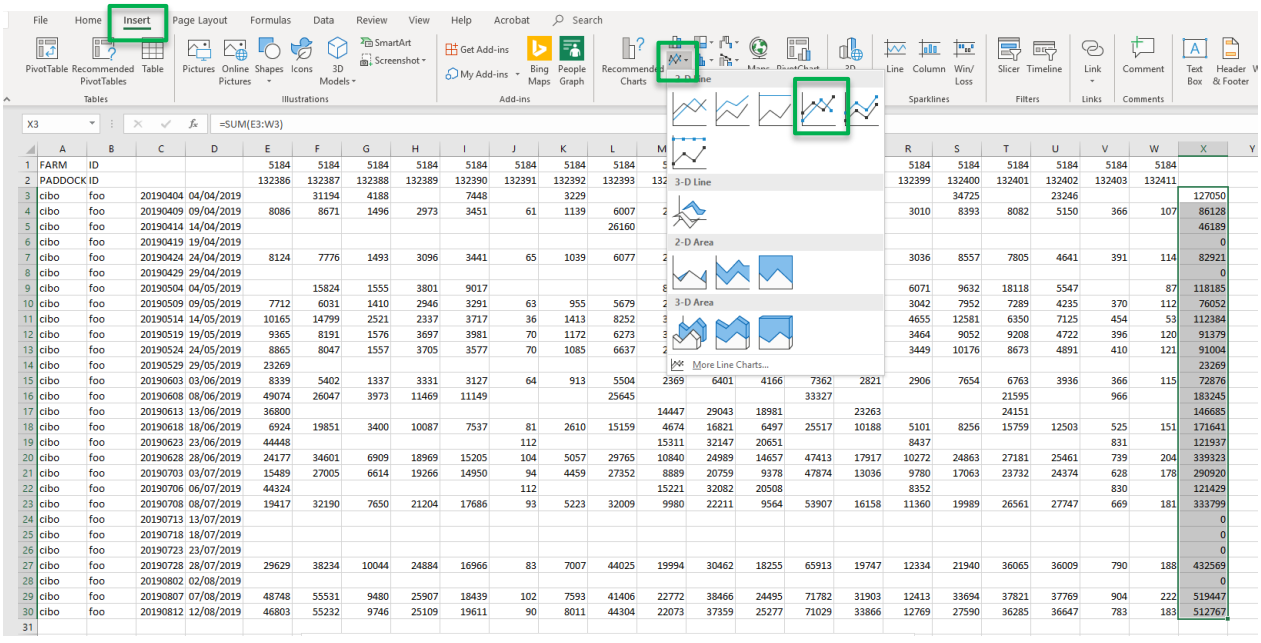
    X3 = SUM(E3:W3)

16. Apply the same formula to the rest of Column X

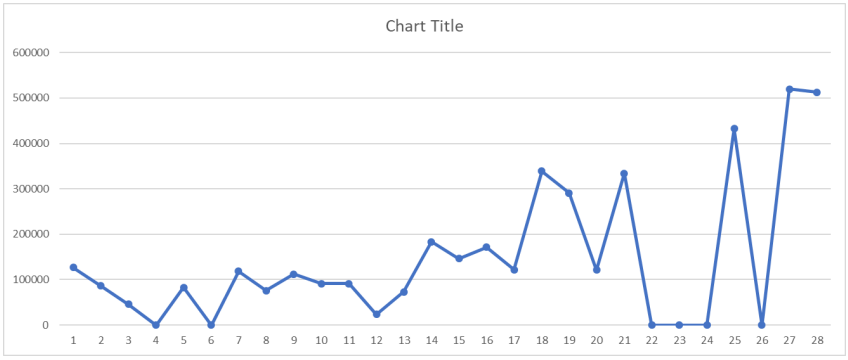
17. Now graph the total feed on offer for the property

To graph, highlight data from **X3 to X30.**

Select the **"Insert"** tab and add insert a **line graph**, as shown below.



Your graph should look something like this.

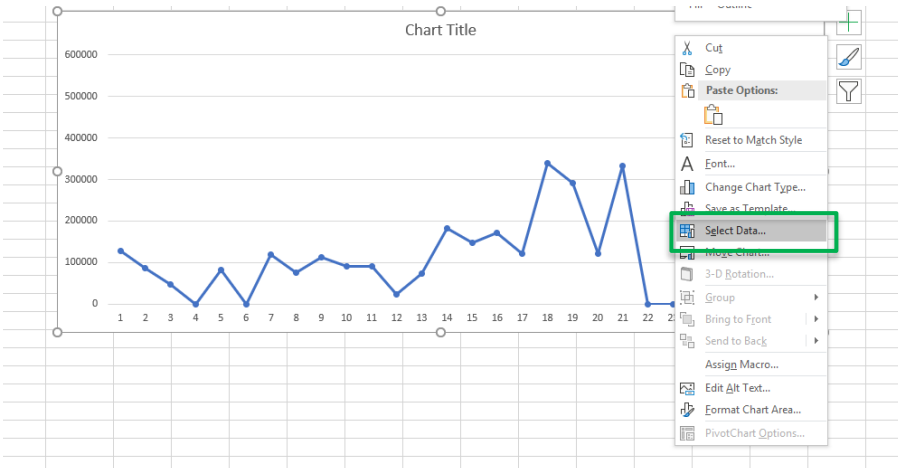


You will notice that the labels on the horizontal axis (x axis) are sequential numbers and not the date on which the data was collected.

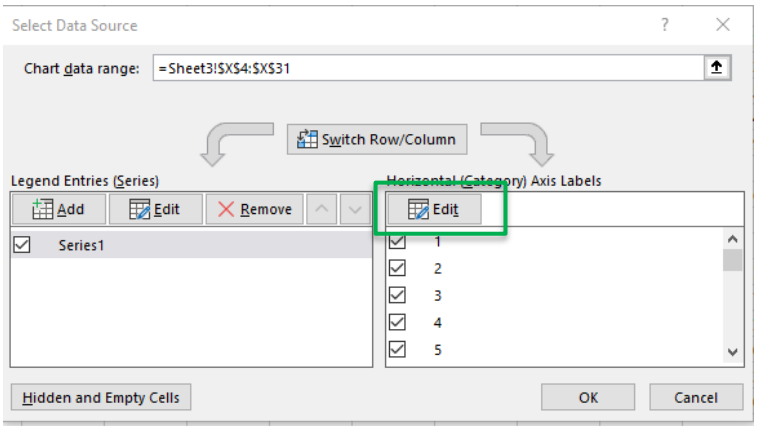
You need to add the dates to the horizontal axis.

18. Add dates to horizontal axis

Click on your graph, right click and select **"Select Data"**.



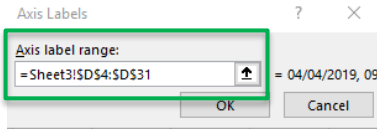
In the pop up window select **“Edit”**



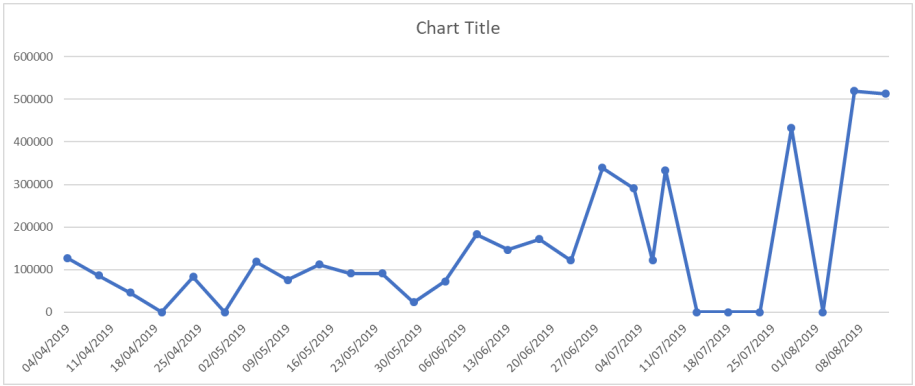
You can then select your date labels from Column D, by first clicking cell D3 and selecting

“Shift **+** Ctrl **+** the down arrow” to include all values below.

Your **“Axis label range”** will read something similar to what is below. Click **“OK”** and then click **“OK”** again.

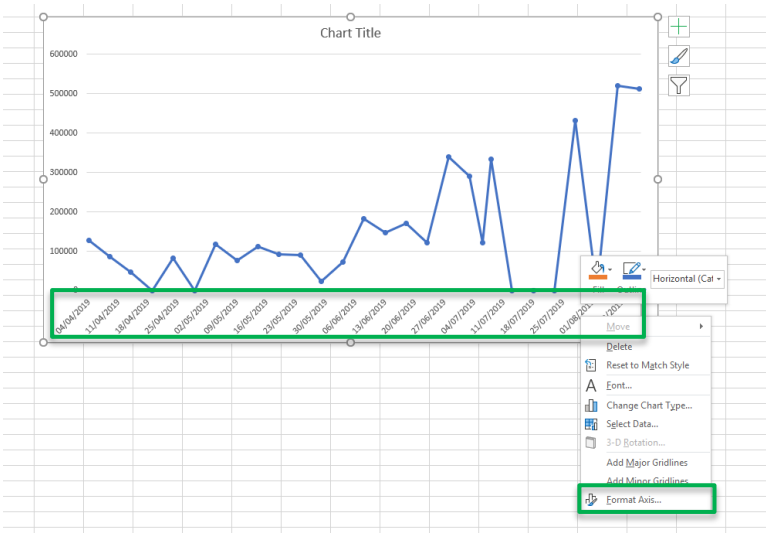


Your graph will now have a series of dates as the values on the horizontal axis.

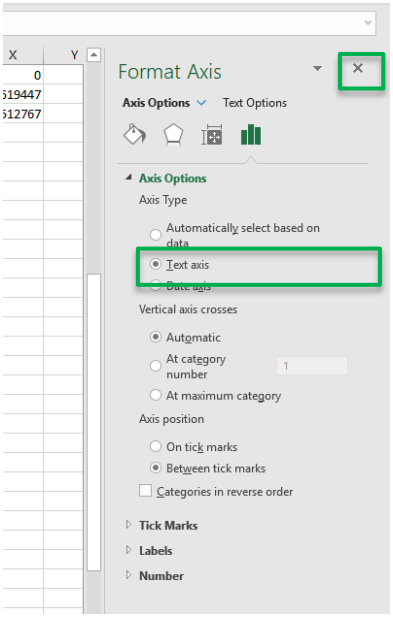


However, excel has automatically set the dates shown and some dates in column D may not be shown.

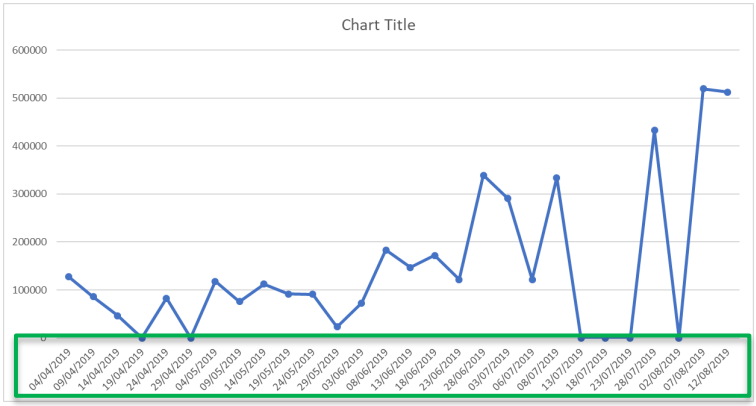
To make sure all dates are visible **right click** over your **horizontal axis**. Choose the **"Format Axis"** option.



A toolbar will pop up on the right-hand side. Select **"Text axis"** then close the toolbar.

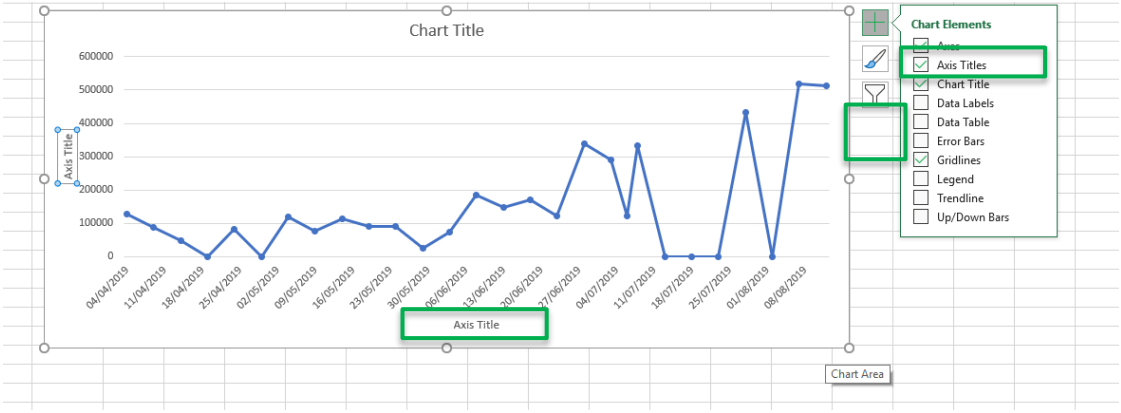


Your graph will now include all the dates in column D.



19. Add axis titles

Select your graph then select the green **"+"** at the top right and check **"Axis Titles"**



Double click the "Axis Title" for the horizontal axis and type in **"Date"**.

Do the same for the "Axis Title" on the vertical axis but type in **"Total feed on offer (kgs)"**.

Questions

1. What trend can you identify in the data?
2. What day has the highest total feed on offer recorded? And what is the amount of feed on offer for this day?
3. What is the difference between the total feed on offer at the start to the end of the data collection period?
4. Why do some days have a total feed on offer recording of zero?