

Answer key

Assessing the influence of different variables on performance and health

The provided database contains data for 200 dairy cows. They are either bedded on straw or concrete, and either fed silage only, or silage plus grain. Each cow has been mobility scored from 0 (good mobility) to 3 (severely impaired mobility) and weighed, in kilograms.

Create pivot tables to answer the following questions:

Q1: Assess the impact of bedding type on mobility score: How many cows bedded on straw have each mobility score? On concrete? Which bedding type would you choose, based on these data?

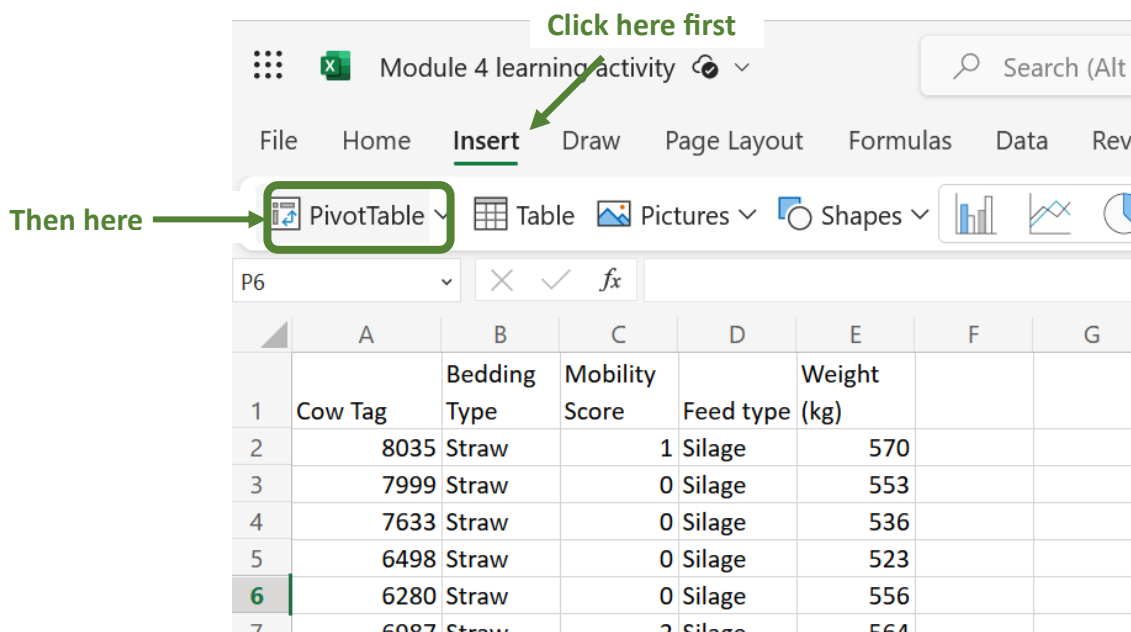
Solution:

By creating a pivot table, you can compare the mobility scores of cows bedded on straw with the mobility scores of cows bedded on concrete.

This is the information you will get from the pivot table (though it will look a little different in the spreadsheet):

	Mobility Score			
	0	1	2	3
Concrete	29 cows	28 cows	24 cows	19 cows
Straw	64 cows	33 cows	3 cows	0 cows

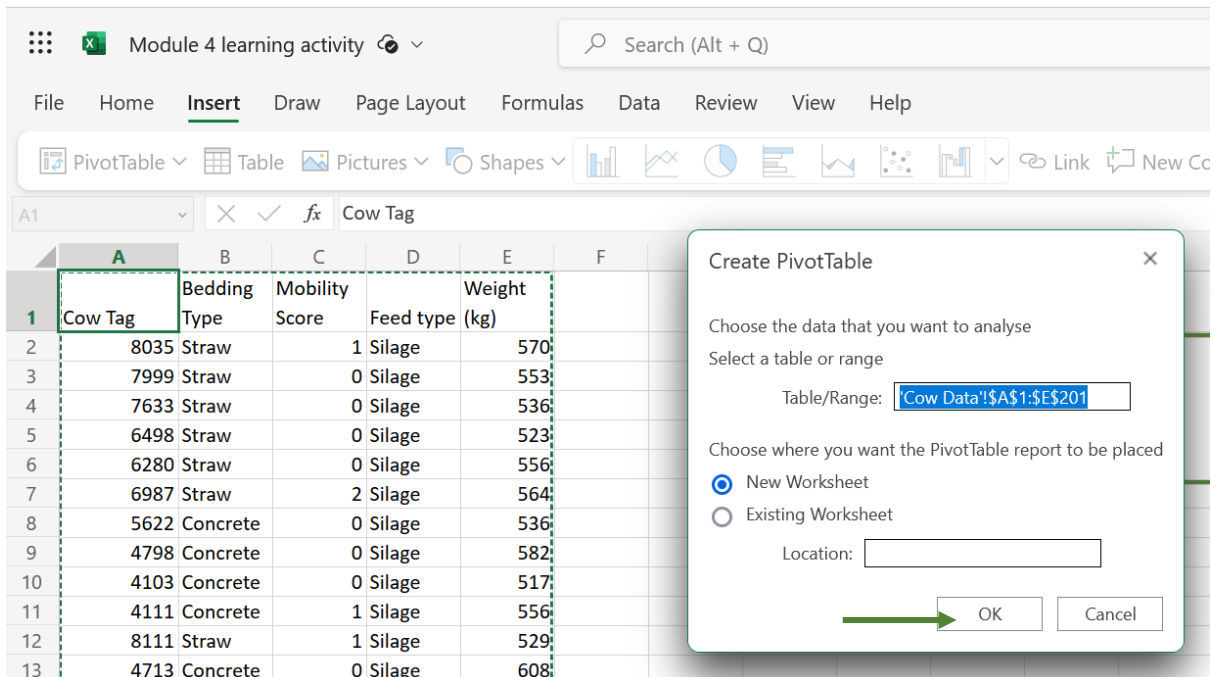
To insert a pivot table, first click the **Insert** tab. It will become underlined in green. Then click the **PivotTable** button as below:



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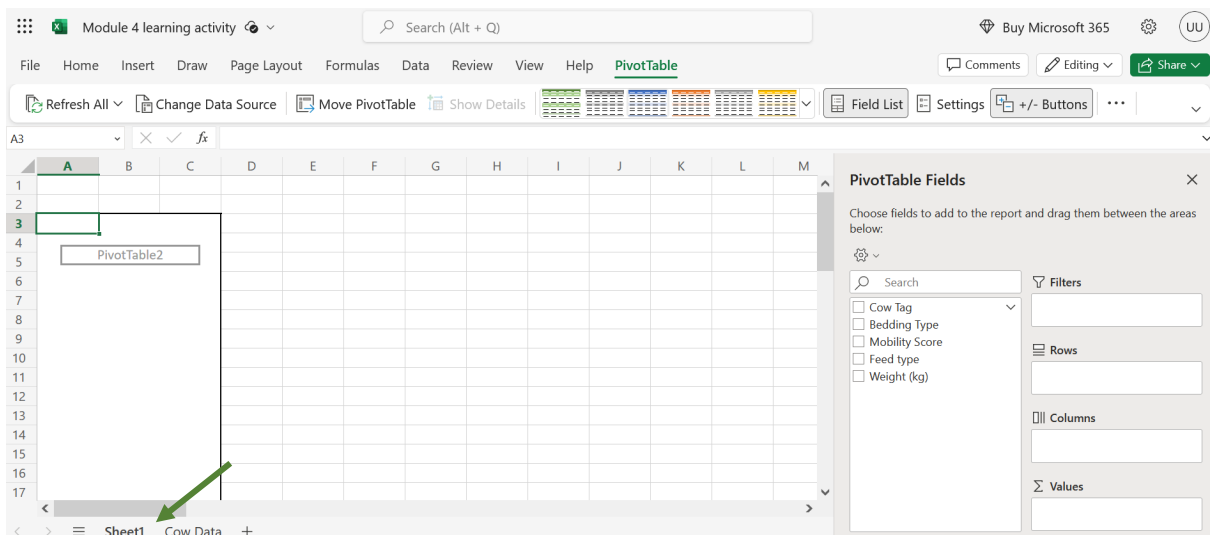
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A pop-up will appear on screen, and the spreadsheet columns will be selected (indicated by the green dotted line surrounding it):



To create the pivot table on a new sheet leave “New Worksheet” selected and click “OK”.

A new sheet (Sheet1) containing a pivot table outline will be created as shown below:



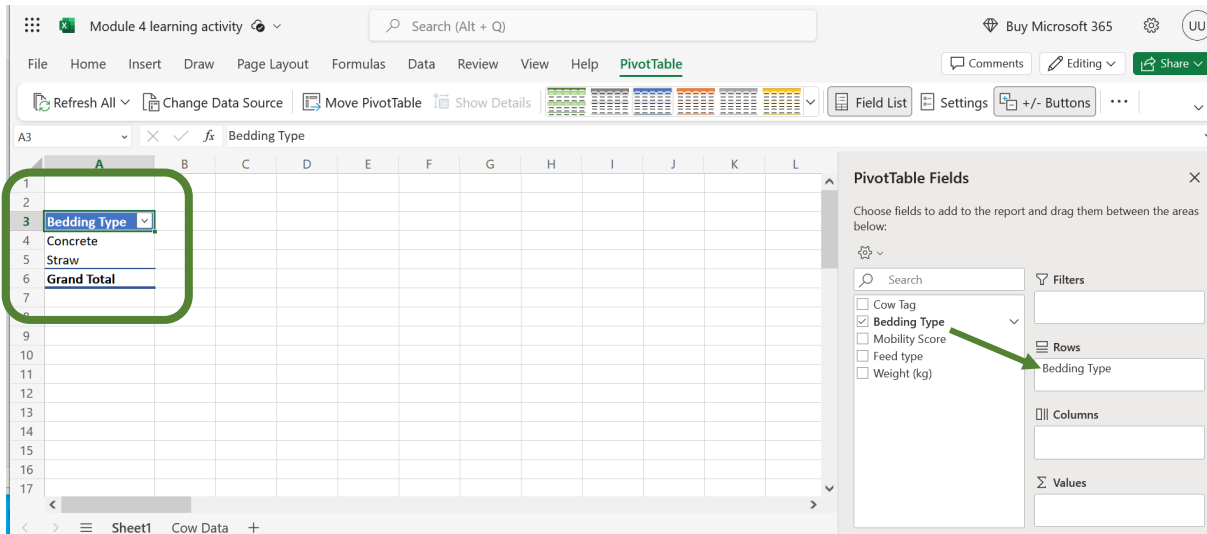
Now you will specify which variables to include in the pivot table.

First select the independent variable: the one which we want to assess the impact of. In this case it is **Bedding Type**.

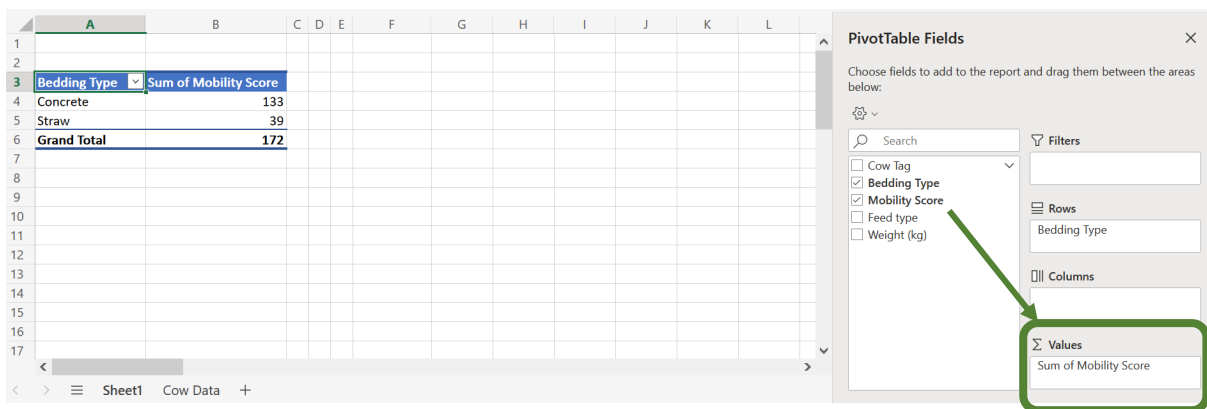
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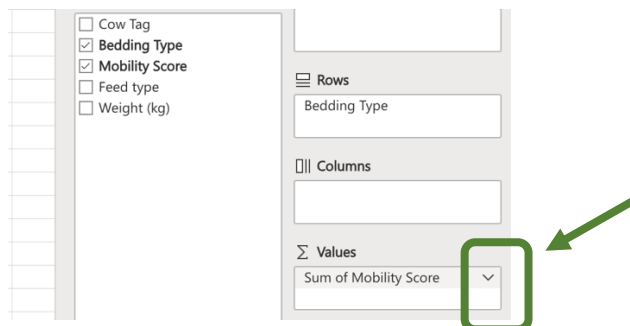
Drag **Bedding Type** from the list and place it into the **ROWS** box. Two bedding types will appear in the pivot table:



Now select the dependent variable – the one that is potentially impacted by bedding choice. In this case it is **Mobility Score**. Drag **Mobility Score** from the pivot table fields into the **Values** box:



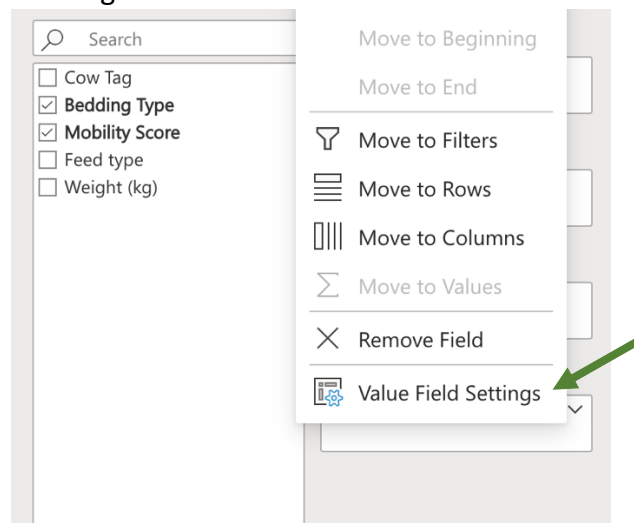
Excel automatically sums the values of the Mobility Scores for each bedding type. You want to know the Count (number of each mobility score) rather than the summed total of the mobility scores, so change the Value Field Settings by clicking the small drop-down arrow to the right of the “Sum of Mobility Score” text in the Values box:



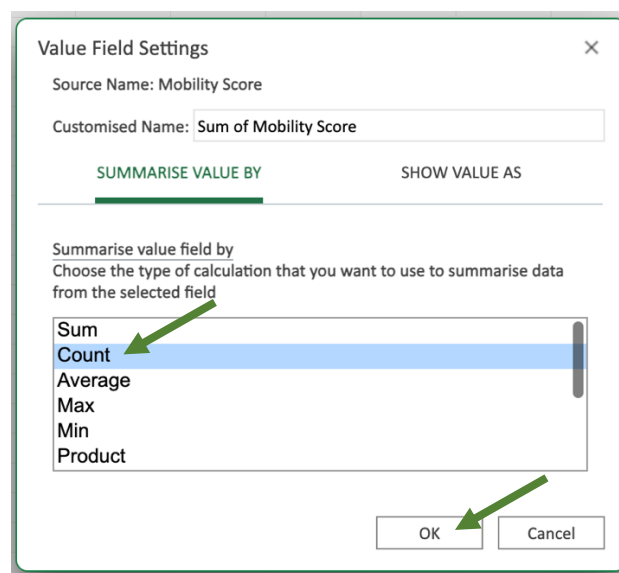
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Then select “Value Field Settings”:



Click on “Count” and then “OK”:



The pivot table has now updated to tell you the number of observations for each bedding type:

2		
3	Bedding Type	Count of Mobility Score
4	Concrete	100
5	Straw	100
6	Grand Total	200
7		

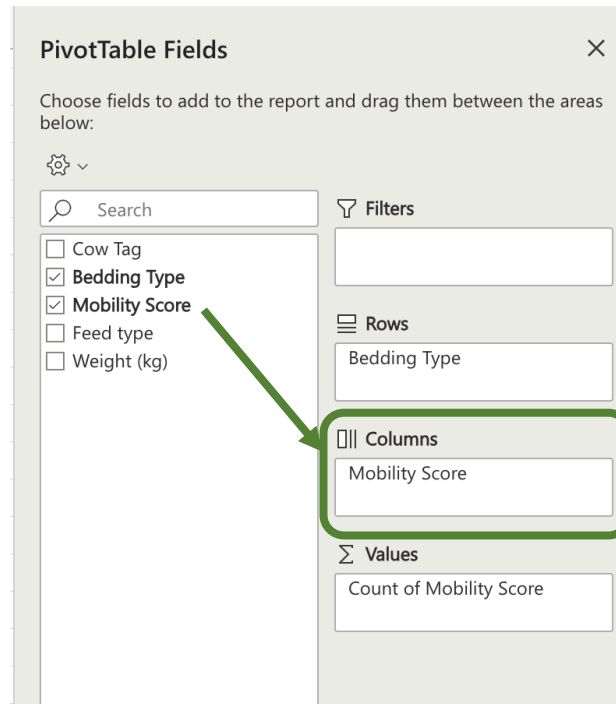
This means 100 cows were bedded on concrete, and 100 cows were bedded on straw.

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You now want to see the number of cows with each mobility score value, on each bedding type.

To do this drag the **Mobility Score** heading into the **Columns** box:



The table will update to show the counts of the different mobility scores:

2								
3	Count of Mobility Score	Mobility Score	▼					
4	Bedding Type	▼	0	1	2	3	Grand Total	
5	Concrete		29	28	24	19		100
6	Straw		64	33	3			100
7	Grand Total		93	61	27	19		200
8								

Therefore, these data showed that fewer cows bedded on straw had moderately- or severely-impaired mobility compared to those bedded on concrete. You may therefore decide to bed your cows on straw to reduce lameness.

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Q2: What is the average weight for cows fed silage only? For cows fed silage and concentrates?

Solution:

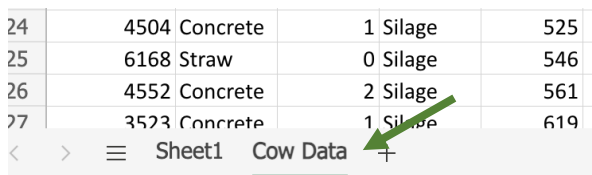
Silage only: average weight of 574.35kg

Silage and grain: average weight of 643.98kg

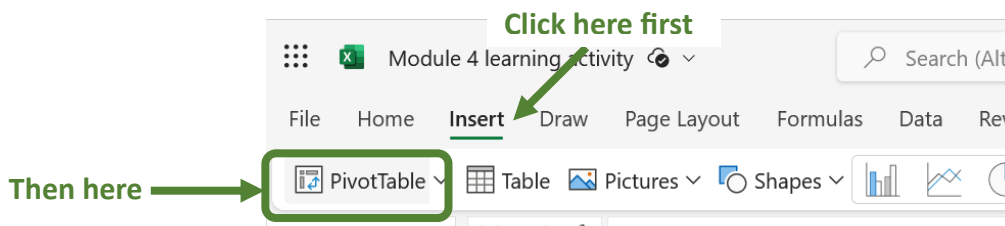
Use a pivot table to compare the average weights of cows receiving each of the two diets.

Select the **Cow Data** sheet:

24	4504	Concrete	1	Silage	525
25	6168	Straw	0	Silage	546
26	4552	Concrete	2	Silage	561
27	3523	Concrete	1	Silage	619

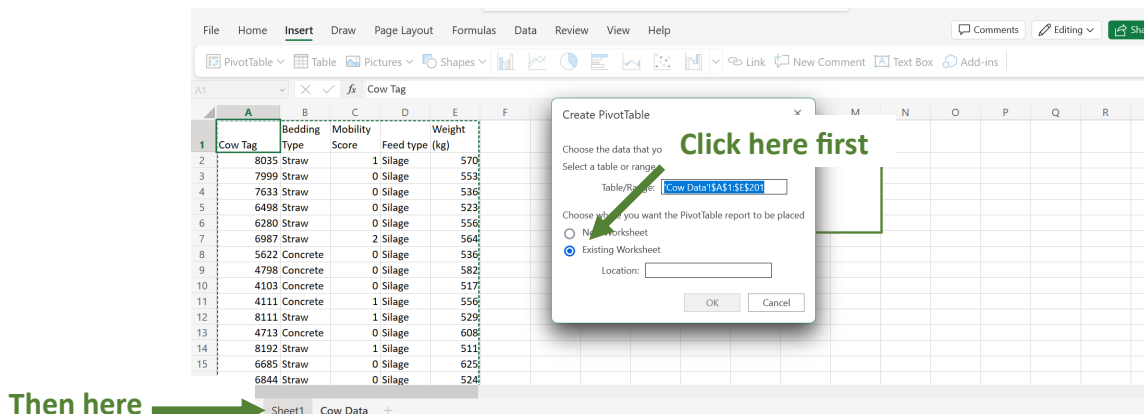


Then **Insert** in the ribbon, and then **Pivot Table**:



	A	B	C	D	E	F	G
		Bedding	Mobility		Weight		
1	Cow Tag	Type	Score	Feed type	(kg)		
2	8035	Straw		1 Silage	570		
3	7999	Straw		0 Silage	553		
4	7633	Straw		0 Silage	536		
5	6498	Straw		0 Silage	523		
6	6280	Straw		0 Silage	556		
7	6987	Straw		2 Silage	564		

To place the second pivot table in the same sheet as table from the previous question, under the “Choose where you want to Pivot Table to be placed” prompt, select the **Existing Sheet** option and go to the second Sheet by clicking the **Sheet1** tab at the bottom of the window:

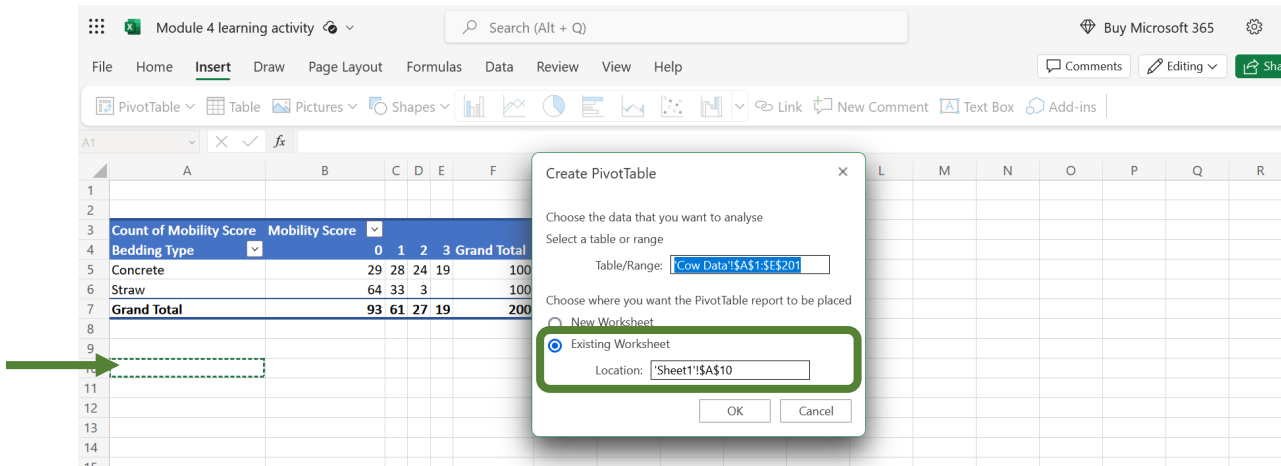


	A	B	C	D	E	F	G
1	Cow Tag	Type	Mobility	Score	Feed type	Weight	
2	8035	Straw		1 Silage	570		
3	7999	Straw		0 Silage	553		
4	7633	Straw		0 Silage	536		
5	6498	Straw		0 Silage	523		
6	6280	Straw		0 Silage	556		
7	6987	Straw		2 Silage	564		
8	5622	Concrete		0 Silage	536		
9	4798	Concrete		0 Silage	582		
10	4103	Concrete		0 Silage	517		
11	4111	Concrete		1 Silage	556		
12	8111	Straw		1 Silage	529		
13	4713	Concrete		0 Silage	608		
14	8192	Straw		1 Silage	511		
15	6685	Straw		0 Silage	625		
	6844	Straw		0 Silage	524		

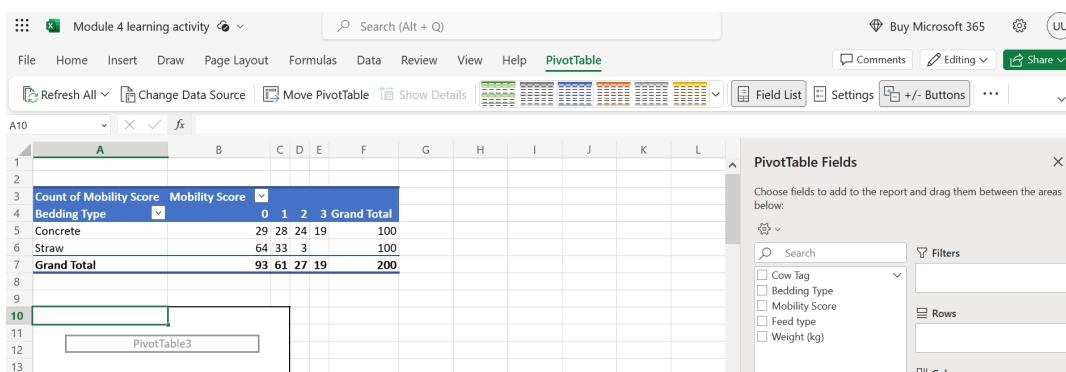
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Now select the cell in Sheet1 you want the top left corner of the pivot table to be placed in. This is indicated by the cell outlined by the green dotted line, as shown below. The “Location” value will update to reflect this cell:

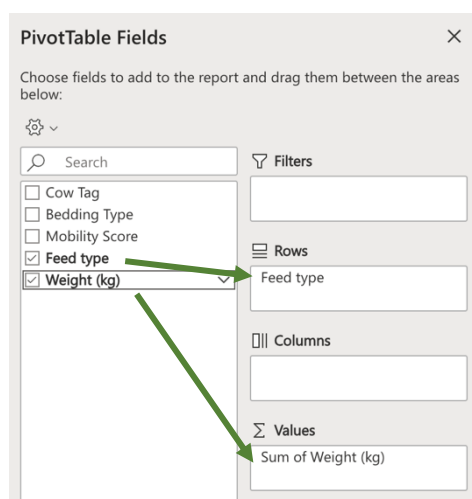


Now click “OK” and the new blank pivot table will appear:



This time the independent variable is **Feed Type** and the dependent variable is **Weight (kg)**.

Drag the **Feed Type** variable name to the **Rows** box and **Weight (kg)** to the **Values** box:



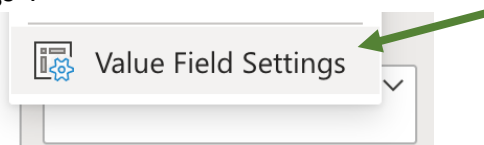
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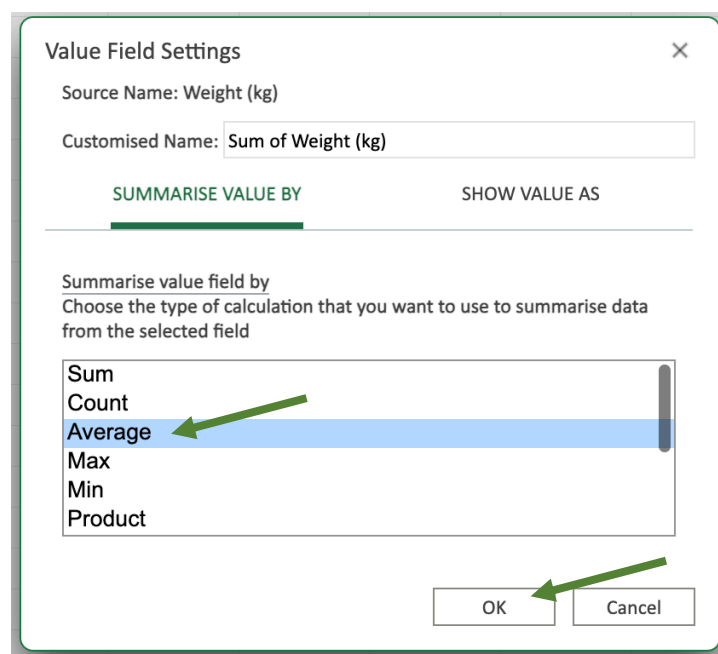
Excel has provided the **Sum of Weight (kg)**, so to change this to **Average of Weight (kg)**, click the small arrow as shown below:



Then select "Value Field Settings":



Then select "Average" then "OK":



The pivot table will update to this:

Feed type	Average of Weight (kg)
Grain	643.98
Silage	574.35
Grand Total	609.165

From this we can see that cows fed on silage only weighed an average of **574.35kg**, which is less than cows fed grain as well as silage, who weighed an average of **643.98kg**.