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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		А	В	С	D	Е	F	G
			Bedding	Mobility		Weight		
	1	Cow Tag	Туре	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	6007	Ctrow	າ	Cilago	561		

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

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	Α	В	С	D	E	F	Create PivotTable ×
		Bedding	Mobility		Weight		
1	Cow Tag	Туре	Score	Feed type	(kg)		Choose the data that you want to analyse
2	8035	Straw	1	Silage	570		Select a table or range
3	7999	Straw	0	Silage	553		
4	7633	Straw	0	Silage	536		lable/Range: Cow Data !\$A\$1:\$E\$201
5	6498	Straw	0	Silage	523		Choose where you want the PivotTable report to be placed
6	6280	Straw	0	Silage	556		New Werkshot
7	6987	Straw	2	Silage	564		New Worksheet
8	5622	Concrete	0	Silage	536		O Existing Worksheet
9	4798	Concrete	0	Silage	582		Location:
10	4103	Concrete	0	Silage	517		
11	4111	Concrete	1	Silage	556		OK Cancel
12	8111	Straw	1	Silage	529		
13	4713	Concrete	0	Silage	608		

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.** 

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:

Cow Tag  Bedding Type	
Mobility Score Feed type Weight (kg)	Bedding Type
	]   Columns
	Σ Values
	Sum of Mobility Score

Then select "Value Field Settings":

O Search	Move to Beginning
Cow Tag	Move to End
Mobility Score	Move to Filters
Weight (kg)	Move to Rows
	Move to Columns
	∑ Move to Values
	× Remove Field
	🔯 Value Field Settings

Click on "Count" and then "OK":

Value Field Setting	gs	×
Source Name: Mob	ility Score	
Customised Name:	Sum of Mobility	Score
SUMMARISE	VALUE BY	SHOW VALUE AS
Summarise value fie Choose the type of from the selected fi	eld by calculation that yo ield	ou want to use to summarise data
Count		
Average		
Max		
Product		
L		
		OK Cancel

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

2				
3	Bedding Type	$\sim$	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.

You now w	ant to s	see the i	number	of cows	with each	mobility	score	value, d	on each	bedding
type.										

PivotTable Fields	×
Choose fields to add to the repor below:	t and drag them between the areas
<š> ~	
🔎 Search	√ Filters
Cow Tag	
Mobility Score Feed type	⊒ Rows
Weight (kg)	Bedding Type
	[]   Columns
	Mobility Score
	$\sum$ Values
	Count of Mobility Score

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	$\sim$					
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.

Answer key

Assessing the influence of different variables on performance and health

# 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	4	1504	Concrete	1	Silage	525
25	(	5168	Straw	0	Silage	546
26	4	1552	Concrete	2	Silage	561
27	:	3523	Concrete	1	Sil .ve	619
<	$\rangle \equiv$	S	neet1 Co	ow Data	+	

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

		🚺 Modu	Cli ule 4 learni	i <b>ck here</b> ing ictivity	first 🌝 ~		,∕ Se	arch (Alt
	File	e Home	Insert	Draw P	age Layou	t Formu	ılas Da	ta Rev
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		А	В	С	D	Е	F	G
	1	Court Tog	Bedding	Mobility	Food type	Weight		
	2		Straw	Score 1	Silago	(Kg) 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	6007	Ctrouv	2	Cilogo	EGA		

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:



Answer key

Assessing the influence of different variables on performance and health

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:

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Ĩ	🗗 PivotTable 🗸 🏢 Table	📉 Pictures 🗸	C Shape	es ~		🕚 📰 🔤 🔛 🖂 🗠 Link	t⊐ Nev	v Comm	ent [ 🔼 Te	ext Box 👌	Add-ins			
	~ × ✓	fx						_						
	A	В	C D	E	F	Create PivotTable	$\times$	L	М	N	0	Р	Q	R
1					- 1	Choose the data that you want to analyse								
3	Count of Mobility Score Bedding Type	Mobility Score	✓ 0 1 2	3	Grand Total	Select a table or range Table/Range: Cow Data!!\$A\$1:\$F\$201								
6 7	Straw Grand Total		29 28 24 64 33 3 93 61 27	19	100	Choose where you want the PivotTable report to b	e placed							
8 9						New Worksheet     Existing Worksheet								
11 12 13						Location: ['Sheet1'!\$A\$10	ancel							
14														

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

	Module 4 learning	g activity 🏾 🎯 🗸				lt + Q)							Buy Micro	osoft 365 🔹 🛈
Fil	e Home Insert Di	raw Page Layout	t Fo	rmula	as Data Re	eview Vie	w He	lp <u>Piv</u>	otTable				Comments	Editing 🗸 🕝 Share 🗸
I,	🖯 Refresh All 🗸 📄 Chan	ge Data Source	🖪 Mo	ve Piv	votTable 1 Sh	iow Details					~		Field List 🗄 Settings 🕒 +/- Bu	ttons ···· v
A10	• × <	fx												~
1 2 3	A Count of Mobility Score	B Mobility Score	C	E	F	G	H	1	J	К	L	^	PivotTable Fields Choose fields to add to the report and dr	imes ag them between the areas
4 5	Bedding Type 🛛 🗹 Concrete	0 29	1 28 2	2 3 4 19	Grand Total 100								below: ⟨ऄ ~	
6 7 8 9 <b>10</b> 11 12	Straw Grand Total PivotTa	64 93 able3	61 2	3 7 19	100 200								O     Search     ♥     ♥     FI       □     Cow Tag     >       □     Bedding Type     →       □     Mobility Score     ■     ℝ       □     Feed type     ■       □     Weight (kg)     ■	lters
13													ПІІ с	olumns

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:

PivotTable Fields $ imes$						
Choose fields to add to the report and drag them between the areas below:						
送~ ~						
Ø Search	√ Filters					
Cow Tag Bedding Type						
Mobility Score     Feed type	⊒ Rows					
└─ Weight (kg)	Feed type					
	[]   Columns					
	∑ Values					
	Sum of vveight (kg)					

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

Value Field Settings

Sum of Weight (kg)	V
Sam of Weight (kg)	

Then select "Value Field Settings":

Then select "Average" then "OK":

/alue Field Settin	gs	×				
Source Name: Weight (kg)						
Customised Name:	Sum of Weight (kg	/eight (kg)				
SUMMARISE	VALUE BY	SHOW VALUE AS				
Sum						
Sum Count						
Average						
Average Max Min		l				
Average Max Min Product						

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**.