

Prepared for:  
Dairy NZ

# Calculator technical guide

Great Futures in Dairy – Know the Market

April 2023



Scarlatti.co.nz

# Introduction

---

## The challenge for the dairy farming sector

There is a large gap between the supply and demand for people in the dairy industry. Many farm businesses are finding it difficult to attract high-quality applicants.

Offering competitive terms and conditions is part of the solution to this problem. Farmers often know what it takes to recruit staff from down the road but may not have good information about how competitive their jobs are with opportunities *outside* of dairy farming.

## The Know the Market project

This project has developed a benchmarking tool for dairy farm employers that provides feedback on how the *farm assistant* wage rates, work hours, and other employment conditions on their farm compare to *other industries* within the wider job market.

Comparison between farm jobs was out of scope as other sources, such as the Federated Farmer Remuneration Survey, already aim to do this.

This project utilised data from a variety of places, including:

- A survey of potential dairy farm assistants (see page 5)
- Job market data supplied by a pay benchmarking provider (see page 3)
- Interviews conducted with potential dairy farm assistants (see page 9).

## How to navigate this document

This document is arranged as follows:

- 1. The calculator (see page 2)**
  - a. What inputs does it use and why? (see page 2)
  - b. What outputs does it create and how do I interpret them? (see page 2)
  - c. How does it calculate this? (see page 5)
- 2. Other webpages (see page 9)**
  - a. Competitiveness insights (see page 9)
  - b. Meet your Target Market (see page 9)
- 3. Research limitations (see page 10).**

# The calculator

---

Farm employers are able to input their farm assistant jobs into the calculator and see how various outputs adjust as a result. The calculator tool is hosted on the DairyNZ website.

## What inputs does it use and why?

### What inputs are used?

The calculator allows the user to input four characteristics of the farm assistant role they are offering:

1. **Wage (including accommodation).** This can also be expressed as a salary. Jobs which offer accommodation to employees at a rate below what the market offers are essentially treated as a higher wage.
2. **Roster.** This refers to the number of days on / off that the job provides. We recognise that some jobs will have a roster that varies depending on the season; users will need to find the best match for their farm.
3. **Location.** This variable is both the driving time between the farm and nearest town as well as the region in which the farm is located.
4. **Hours.** This refers to the number of hours that an employee works on average each week. Similar to the roster, farms which have variable hours need to provide a reasonable approximation (i.e., hours worked in a year / 52).

### Why these variables and not others?

Farmer consultation prior to the development of the calculator narrowed down the list of variables to include by looking for two things: variables that were highly relevant to competitiveness; and that varied by farm.

One variable that was identified to be highly important to most potential employees, and that did vary by farm, was the team culture (this includes having a good manager and team environment). However, this is difficult to characterise in an objective way within a survey. Consequently, this has been omitted.

## What outputs does it create and how do I interpret them?

The core output of the model is the perceived 'adjusted hourly rate'. This represents what employees in other industries<sup>1</sup> think the value of the job is. For example, the real wage may be \$26 per hour, but the perceived adjusted wage may be \$23 per hour, if the job has some less pleasant characteristics.

Aside from this, the model also tells us the estimated proportion of potential applicants that would prefer your job to their current one (based on the perceived adjusted wage).

Below you will find each calculator graph, an explanation and an example interpretation. Note that the example is based on an employer inputting a role with the following characteristics:

- **Wage:** \$26.5

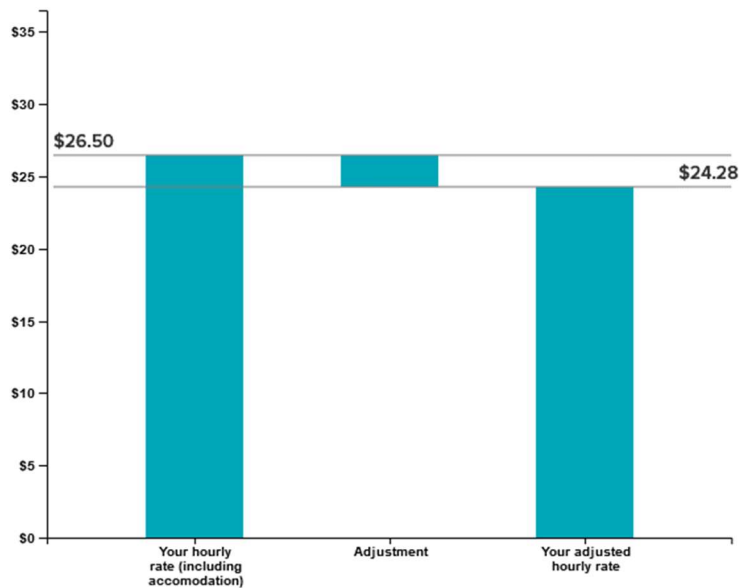
---

<sup>1</sup> This is based on employees who currently work a five-day-a-week job with 42.5 worked hours

- **Hours:** 46-50 a week
- **Roster:** 6:2
- **Distance to town:** 10 to 30 minutes
- **Region:** Southland

### Graph 1: Perceived adjusted hourly wage

The first graph from the calculator shows the difference between the hourly rate the job offers (including accommodation) and the model’s ‘adjusted hourly rate’. The adjustment bar in the middle is the change due to other factors of the job. For a 5:2 roster job, with 42.5 worked hours, and a location close to town; there will be no adjustment.



**Interpretation**

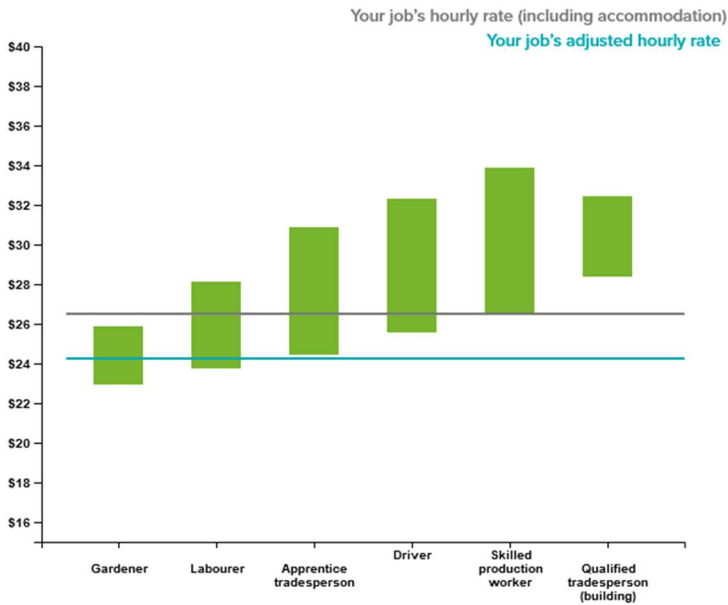
*In this example, the graph shows that the wage has been adjusted from \$26.50 to \$24.28, i.e., less appealing. This may be caused, for example, by the large number of hours required in the example job.*

Figure 1: The first output from the calculator.

### Graph 2: Competitiveness compared to other occupations

In addition to the adjusted rate, the calculator also outputs the hourly rates that are expected in other industries, such as labouring and gardening. The data behind these have been sourced from a commercial pay benchmarking provider. The bars show the middle 50% of wages for each industry and have been adjusted according to region by using differences in the average household income, and adjusted for inflation to 2023 levels.

A simple way of interpreting this graph is that people who sit below your blue line are likely to be attracted to your role.



**Interpretation**

*In this example, the blue line is overlapping gardener and labourer. This suggests that the employer is more likely to attract a gardener or labourer, than a driver, skilled production worker or qualified tradesperson.*

Figure 2: The second output from the calculator. This graph adjusts based on wages in your region.

### Graph 3: Impact of job changes on adjusted hourly rate

The third output from the calculator shows what the perceived adjusted wage (written on top of the columns) will be if changes are made to the job – in particular if the employer changes the roster or wage of the job they are offering. This helps the employer see what impact changing the job characteristics would have.<sup>2</sup>



**Interpretation**

*In this example, changing the roster from 6:2 to 5:2 would increase the adjusted wage by around 50c (from \$24.28 to \$24.73). Likewise, increasing the wage has a positive impact. This assumes that the hours haven't changed.*

Figure 3: The third output from the calculator.

<sup>2</sup> If the user has input a salary, this graph will also show the impact of lowering hours (while keeping salary fixed).

#### Graph 4: Impact of job changes on percentage of people interested

Finally, the adjusted rate is converted into a percentage of potential applicants. This provides an indication of the increase in the number of people who would be interested in your job under a set of alternative scenarios (increased wage / better roster / lower hours) relative to the current job.

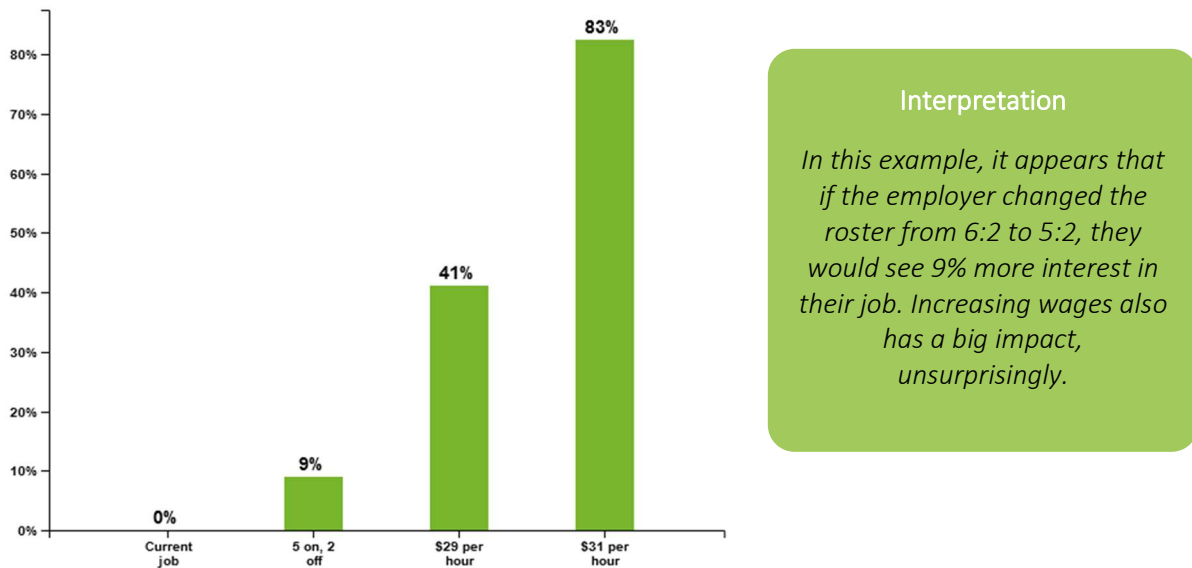


Figure 4: The fourth output graph from the calculator. Here the percentages reflect how many people could be attracted to your job if you decreased hours or increased wages.

### How does it calculate this?

#### Data sources

The calculator uses the following data sources:

- A survey of potential dairy farm assistants
- Job market data supplied by a pay benchmarking provider.

#### Survey of potential dairy farm assistants

The main data source relevant to the calculator was a survey.

This survey was undertaken in February and March 2023, with the aim of reaching people who aren't *currently* in the dairy sector but would be good candidates for a farm assistant role.

Criteria for eligibility included that the respondent:

- Be between 18 – 34 years old
- Live within 15 minutes from the countryside
- Work in particular jobs (in particular, jobs that are outdoors or hands-on)
- Have been in their current occupation for less than 7 years
- Earn under \$70,000k per annum

- NOT work in dairy currently.

These survey respondents were recruited via paid online advertising, partner organisations, and high schools. A sample size of 74 was achieved.

The survey asked about their current job, what they would like or dislike about dairy, how much they would expect to be paid for a farm assistant role, and how much they would expect to be paid to start at 5 am instead of 6 am. It did this via typical survey questions, as well as more specialised methodologies – in this case, choice modelling.

### Choice modelling

Choice modelling is a technique used to uncover the underlying preferences people have for different attributes in a product, called ‘utilities’. A survey is undertaken where respondents are asked to choose between different job attributes. A model can then be made which places a value on the attributes being analysed. For more detail on choice modelling, see [here](#)<sup>3</sup>.

#### *Attributes analysed*

In the survey three attributes were analysed with choice modelling:

1. **Salary.** Respondents were asked to compare jobs at \$50,000, \$60,000 and \$70,000.
2. **Distance.** Respondents were asked to compare a job 5 minutes away from town to 30 minutes away.
3. **Days on.** Respondents were asked to compare jobs in which they would work 6, 5 and a half, and 5 days a week.<sup>4</sup>

For the purposes of this research, we assumed that hours did not matter as long as the pay increased at the same rate (for more on this, see page 10).

The data produced by the survey is a set of aggregated scores across the population representing the value people put on moving between different stages of each attribute (see **Error! Reference source not found.**).

*Table 1: Choice modelling utilities. Numbers represent the value put on moving different ‘levels’ within each attribute.*

Salary		Distance	Days off / Roster	
\$50,000 to \$60,000	\$60,000 to \$70,000	30 minutes to 5 minutes	6 days off to 5.5 days off	5.5 days off to 5 days off
10.9	11.0	7.2	11.1	9.6

These utilities are then interpolated where data is not available.

<sup>3</sup> <https://surveyengine.com/corporate/what-is-choice-modelling-and-what-are-choice-experiments/>

<sup>4</sup> ‘Days on’ was used in the resulting model to rank rosters. A 5:2 roster is translated by the model to 5 days on a week. A 12:2 roster is translated to 6 days on a week. While this is not exactly how rosters are valued (a 5:2 roster is different to a 10:4 one), we were constrained by the prior knowledge of people outside the sector about the ins and outs of working on a dairy farm.

### Valuing your job

Using results from the survey, the resulting model can compare any two jobs in terms of utility.

To build an 'adjusted rate' we look at how much of a change in salary is needed to offset any utility lost via roster and distance. For a baseline we used a job with a 5:2 roster, 0 minutes from town.

If your job has longer hours / further from town then the model will work out how much utility you lose (compared with the baseline job), and what the salary change would have to be to offset this.

See **Error! Reference source not found.** for an example.

Table 2: Example comparing changes to a job. In this case the job has a salary of \$60,000. The change from 5.5 days to 5 days means this job is 9.6 units of utility worse than the baseline job. In order to counteract this the salary would need to be \$68,700 instead.

Attributes	Changes	Utility lost
Distance	No change	0
Days off / Roster	5.5 days to 5 days	9.6
<b>Total</b>		<b>9.6</b>

Finally, salary is converted into wage by dividing by the number of hours in a year.

### Calculating percentage of applicants

With the adjusted wage, the model then calculates what percentage of potential applicants might be interested in your job. This is based upon the distribution of wages in other industries. We say the probability that someone at a given wage prefers your job to their own is a logistic function of their current wage  $w_c$  and your adjusted wage  $w_a$ :

$$p(\text{prefer your job}) = \frac{\max p}{1 + e^{-(w_a - w_c)}}$$

Here  $\max p$  is the maximum probability that someone will prefer your job. Using additional survey data, we calculated this as 85% by looking at how many respondents wouldn't accept a dairy farming job even at \$100,000. By integrating over the distribution of  $w_c$  we can tell what the average probability is across the population for an adjusted wage  $w_a$ . The plot of this curve is shown in Figure 5.

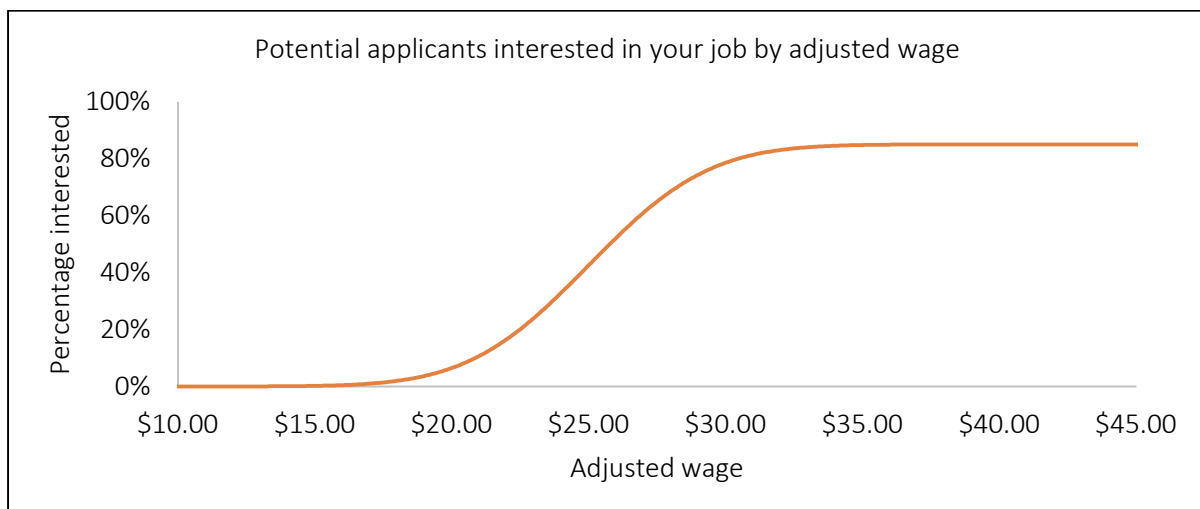


Figure 5: Plot of percentage interested in your job by adjusted wage. Two things are important to note: 1. While the minimum wage is \$22.7, some people are paid below that because they are in training. 2.



*Although some people are interested in the job around \$20.0, this is partly only because other industries are not fully paying minimum wage.*

Using this curve, we can see what the percentage of applicants will be based on job characteristics. Changes in this percentage can then be reported based on potential changes to the inputs.

### **Benefits of this combined approach**

There are several benefits to using this approach:

- **It is well suited to complex problems** – Choice modelling helps to identify whether one's predictions are in the right ballpark – this is a suitable methodology where no answer is likely to be exact.
- **It broadens the scope of analysis to include factors other than salary** – The point of this project is to help farmers understand the consequence that attributes other than salary can have on a job's attractiveness.
- **It is data driven** – By using a survey of potential applicants, along with pay data, the model is made more robust.

## Other webpages

---

### Competitiveness insights

A number of other insights came from the survey data, which while not robust enough for the calculator, provide an idea of where job applicants preferences lie in terms of other job characteristics.

### Know your Target Market

Another piece of work done within this project, was a number of interviews with people who fitted the profile of an attractive potential applicant to a dairy farm assistant role, who isn't currently in dairy.

In order to show case studies of people close to being interested in a role and representative of the wider dairy sector, interviewees were selected from the survey respondents, based on their:

- Interest in a dairy farm role
- Current occupation
- Gender
- Ethnicity.

These people were invited to participate in a phone interview following Scarlatti ethics guidelines, and gave approval of the written, anonymised case study.

## Research limitations

---

All research has its limitations. In this case, anyone interpreting of results should keep in mind that:

- **There are many factors attracting someone to a job.** Not all factors are covered by this tool. While the model addresses the main factors in attraction, it doesn't consider things like the importance of career progression and team culture.
- **These factors are complex.** There are complexities in measuring these different factors. For example, the project assumed that increasing hours wouldn't matter to someone, as long as they are paid for them. However, this is a simplification. In reality higher hours have a greater marginal cost. In other words, a worker may not be willing to work an extra hour at their usual rate – they may expect to be paid more as this time may be worth more to them. This complexity may be explored in future updates of the calculator.
- **Survey data does not always reflect real-life decisions.** There is some uncertainty around the quality of data, from any survey. While we have confidence about pay (because it has come from a reputable organisation specialising in pay data) and the overall importance of hours, salary, and so on, it is harder to be confident about the true number of people who would accept the job, as survey respondents' real-life decisions may not be the same as the ones they said they would make in the survey.
- **Aggregation means niche jobs that appeal to niche audiences may be understated.** The model uses the aggregate preferences of the sampled population rather than individual preferences. While this makes the model more robust to outliers it does mean the results don't reflect the population as a whole. If you are offering a farm job which is highly appealing to a small subset of people, but not the average employee, then the model may understate the value of the job.