Aim: To find out the optimum rate of ProGibb required to increase pasture growth.

Hypothesis: I predict that the lower than recommended rate of progibb will be the best because Nufarm (the progibb marketer) may be trying to encourage farmers to use a heavier rate so that they have to buy more to cover the same area.

Independent Variable: The amount of giberellic acid applied (via stock solutions)

Controlled variables: Time from application to grass collection; same soil type and topography; same pasture; same pasture length at the start; same measuring system and tools eg. Hedge trimmers and scales; same quantity of water applied.

Dependant variable: Pasture DM quantity

Method for stock solution:
1) Get a 5L conicle flask with a cork, a measuring cylinder, a small plastic pipette, surfactant, distilled water, progibb, 5L containers and small watertight containers to hold 4x10mL samples of each solution. ①
2) Take the conicle flask and pour 2.5litres of distilled water into the conicle flask.
3) Measure out 0.5grams of progibb and place into a beaker then mix with distilled water until completely dissolved.
4) Pour the mixture into the conicle flask.
5) Measure out 10mL of surfactant using a measuring cylinder and pour into conicle flask
6) Rinse out both the beaker and the measuring cylinder into the flask 3 times with distilled water.
7) Fill up conicle flask with distilled water until it is just below the 5L mark then use the small plastic pipette to pipette distilled water into the conicle flask until the bottom of the meniscus is just on the 5L mark.
8) Shake the conicle flask with the cork on to mix the solution up then pour into the 5L container through the funnel stopping and mixing the flask occasionally to ensure that everything comes out.
9) Repeat steps 2 to 8 another 3 times increasing the amount of progibb by o.5grams each time.

Method for cutting and applying progibb:
1) Collect a 1mx1m wood frame (one metre squared), building spray marker, a lawnmower, a garden mister, water, a measuring cup (250mL) and 4x10mL samples of each stock solution (using a 10mL pipette) and labell appropriately.
2) Cut a 12mx10m area of pasture down to an even height in a place with equal shelter, sun, topography and the same grass type in a place where the pasture is even.
3) Use the one metre squared wood frame and mark out 20xone metre squared plots as follows:
4) Using the measuring cup measure out 250mL of water and pour into the mister then apply to the first plot in line 0.
5) Repeat step 4 for all other plots in line 0.
6) Pour one 10mL sample of stock solution 1 into mister then measure 250mL of water into mister and apply to the first plot in line 1.
7) Repeat step 6 for all the other plots in line 1 rinsing out mister after each plot.
8) Pour one 10mL sample of stock solution 2 into mister then measure 250mL of water into mister and apply to the first plot in line 2.
9) Repeat step 8 for all other plots in line 2 rinsing out mister after each plot.
10) Pour one 10mL sample of stock solution 3 into mister then measure 250mL of water into mister and apply to the first plot in line 3.
11) Repeat step 10 for all other plots in line 3 rinsing out mister after each plot.
12) Pour one 10mL sample of stock solution 4 into mister then measure out 250mL of water into mister and apply to the first plot in line 4.
13) Repeat step 12 for all other plots in line 4 rinsing out mister after each plot.
14) Wait 14days and then cut each plot down as low as possible (all the same height) with hedge trimmers.
15) Collect the grass from each plot and weight using kitchen scales then record the weights in a table.
16) Dry the grass from 3 of the plots using a microwave then work out the average percentage drymatter content which will be the predicted drymatter content for the rest of the plots.
     (Dry weight/wet weight) . (100/1)
17) Remove any outliers from the results then calculate the average drymatter content for each different progibb application rate and the control plots.
     Average wet weight . DM%
18) Compare the results from lines 1,2,3 and 4 to line 0 to see which application rate of progibb is the optimum rate, taking into account costs and returns.

Conclusion: From the data found during the experiment I found out by carrying out the experiment that stock solution 4 when applied to pasture gave the best growth response of 20.6%. This was an application rate of 16grams to the hectare of gigerellic acid (40grams to the hectare of progibb). The recommended rate of 8 grams of giberellic acid to the hectare (20grams to the hectare of progibb) gave a response of 3.8% over the 14days which is less than half that of 40grams to the hectare of progibb. This means that the optimum rate of giberellic acid is 16grams to the hectare (40grams to the hectare of progibb). Applications 1 and 3 gave responses but these weren't as strong as those seen from application 4. The results show that my conclusion was wrong and as the amount of progibb applied increased the pasture response increased aswell.

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Discussion: Progibb (40% giberellic acid) is a growth regulator used to stop pasture going dormant and to increase pasture growth when temperatures are lower than optimum. Progibb can be purchased from rural supply stores such as CRT at a cost of around $180 for 250grams. At the optimum rate this would be enough to cover 6.25Ha.

The cost of application and chemical for this optimum rate would be around $130/Ha. Through a boom sprayer and could return a dairy farmer roughly $370 over a 2 week period. This is based on an average cow eating 17kgDM/day and turning it into 1.47kgMS/day. The returns over application cost is almost 4 so it is well intruely worth the application especially on the shoulders of the milking season where conditions aren't favourable and the farmer has time.

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The following graph shows the cost against the return of application over a 14day period which shows that application 3 and 4 were the only ones worth doing because they returned a production increase of more than the application rate. Application 1 and 2 had higher costs than returns so would not be worth carrying out.

Evaluation: I believe my results are reliable because the controlled variables were all kept the same during the experiment. Once the results were gathered I removed outliers because these effected the overall results of the experiment. This meant that the final results were far more accurate because before the outliers were removed the recommended rate showed a lower growth than when nothing was applied which I believed was not correct. Results from a trial carried out at Massey University in 2008 by W. Hofmann show that the application of progibb could increase pasture growth by 195kgDM/Ha. Over 4 weeks. The application rate was not stated but comparing these to the results I found they are reasonably similar if the extra growth rate on my trial plots continued to be similar for a future 2 weeks. The testing was to do with dairying so the pasture used was Harper long rotation ryegrass that was 3years old and treated with AR1 endophyte as seed. White clover, red clover and chicory were also apart of the mix but not significantly. This grass would be a similar grass type used on a dairy farm so it would resemble the characteristics of grass used on a dairy farm.

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