

PRODUCTIVITY DIFFERENCES DUE TO VARYING APPROACHES TO SPREADING – AN ANALYSIS OF 30,000 SPREADING MAPS

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Introduction

In 2010 over 32,000 maps were processed through the TracMap mapping service. These maps were filtered down to 19,000 by filtering for only those who were carried out by contractors on blocks of over 3 hectares at an average speed of over 10km/hr and spread width of greater than 5 metres. Businesses with less than 25 maps in the database were also excluded from any intercompany comparison. It was felt this provided a sufficiently homogenous group to provide a basis for analysis.

The time to complete each job was then adjusted to a maximum elapsed time of 10 minutes between any single “spreadoff” / “spreadon”, to remove as much variation as possible in accounting for time for meal breaks, refilling the truck, and pausing the job to resume several days later. Time for a job was measured from first “spreadon” to last “spreadoff”.

True area covered (excluding overlap) per hour was used as the measure of efficiency.

Results

The resulting analysis showed significant differences in spreading efficiency, measured in average number of hectares spread per hour. The mean was 17.2 ha/hr, with 50% of all jobs falling between 12.8 ha/hr and 20.8 ha/hr.

There was a strong correlation between spreading efficiency and job size up to 50Ha. A great deal of that variation can be attributed to time spent starting and finishing a job, which comprises a greater percentage of time on small jobs. For jobs in the size range of 10 ha to 20 ha, the mean spreading efficiency was 15.7 ha/hr, whereas for jobs 50 ha to 60 ha in size, the mean was 20.5 ha/hr.

There were significant differences between spreading companies which can not be attributed to geographic location or farm type. There can also be significant differences between efficiency of drivers within an individual business, with those differences typically being 3 to 4 ha/hr.

However, it should be noted that there were big differences in the number of maps from different businesses, and this could distort the results, as the relatively small number of maps sent by some businesses may not be representative of their overall work efficiency.

Also, no analysis of terrain type, measured in terms of average slope, has been undertaken. It is thought that the impact of slope would account for much of the “noise” and range of efficiencies being achieved by both businesses and drivers. Impact of slope will be included in future analyses.

Conclusions

Not surprisingly, the following factors all have a positive effect on average hectares spread per hour.

- Higher average speed
- Increased spread width
- Reduced overlap
- Reduced percentage of total time spent not spreading.

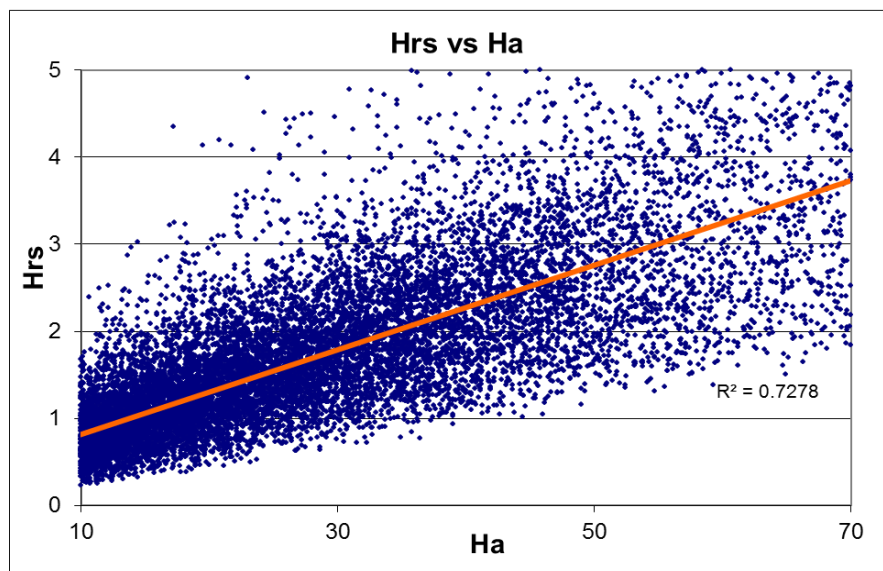
While it is recognized that speed is determined by terrain type, and product type and rate, as is spread width, there is room to for some operators to look closely at how they undertake their work, with small changes capable of generating useful productivity improvement.

What is more surprising, is that increasing spread width has little impact on degree of overlap, but a large impact on the number of hectares covered per hour, and is one of the biggest single factors in improving efficiency, and presumably therefore profitability.

The other major factor which may be able to be altered by businesses is the spreading on/off ratio. Having farmers organize for gates to be open, and other factors that cost time, can have a major effect on hectares covered in a day.

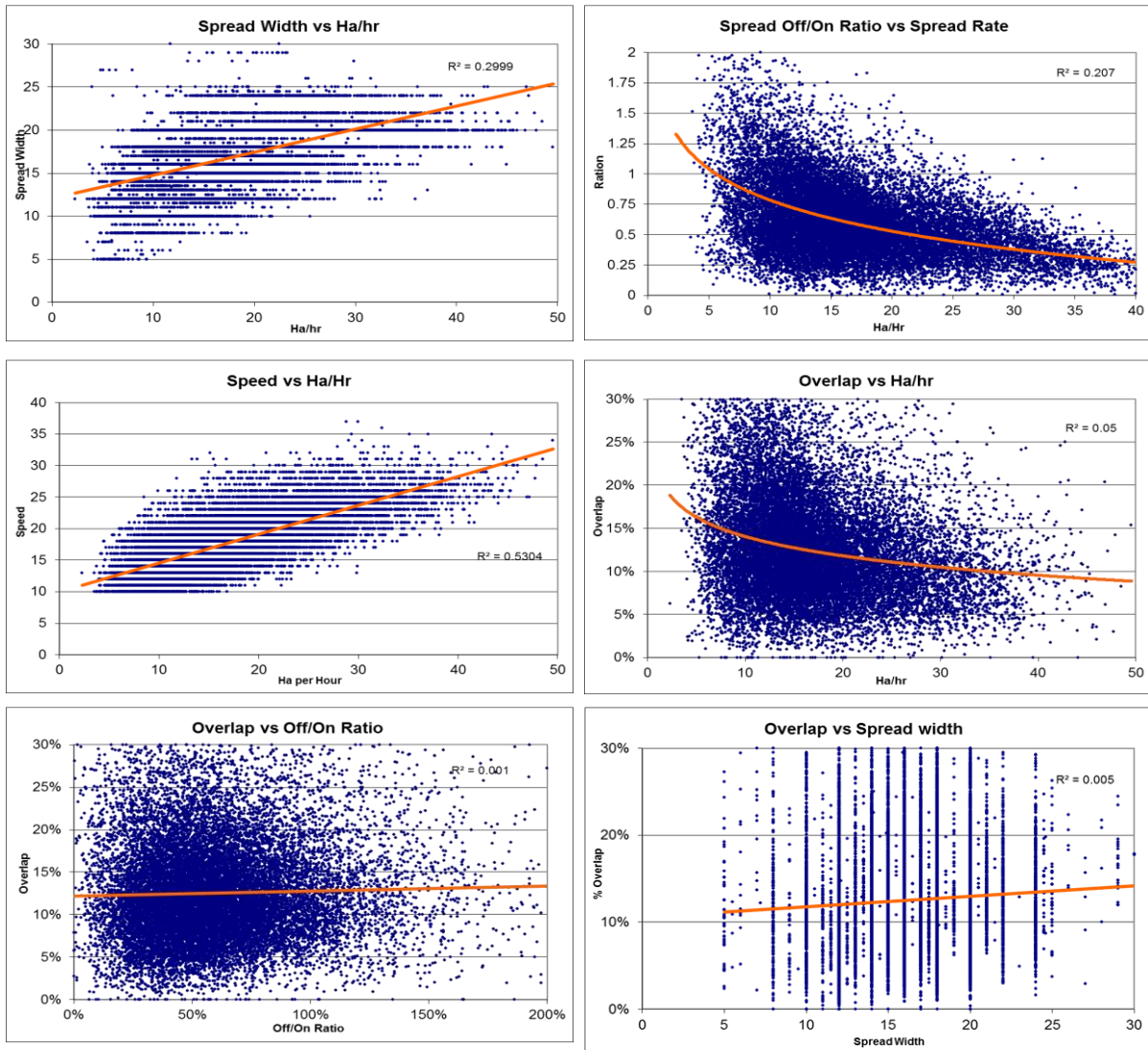
XY Relationship Graphs

These graphs examine the relationship between potential efficiency factors and job efficiency, over all the 19,000 jobs.



As expected, there was a good relationship between job size and total time for the job, but big variations in time between jobs of the same size.

But for all of these XY graphs, there is generally a very poor relationship correlation, because no filtering has been done for other “noise” factors.



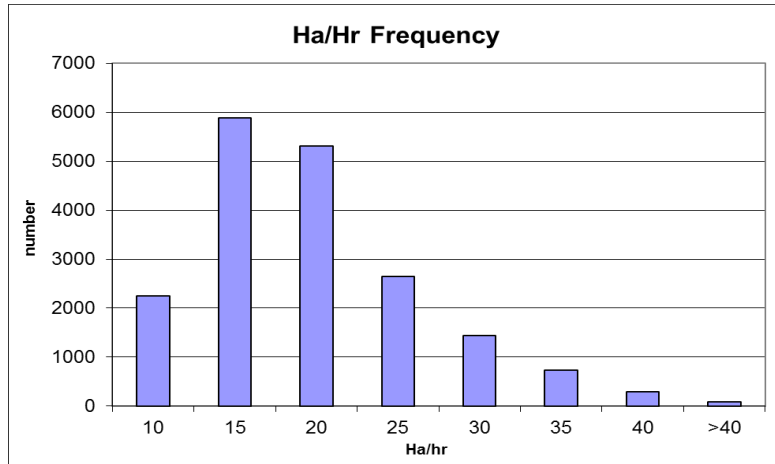
Histogram Graphs

These graphs examine the relationships of efficiency factors, related to job size.

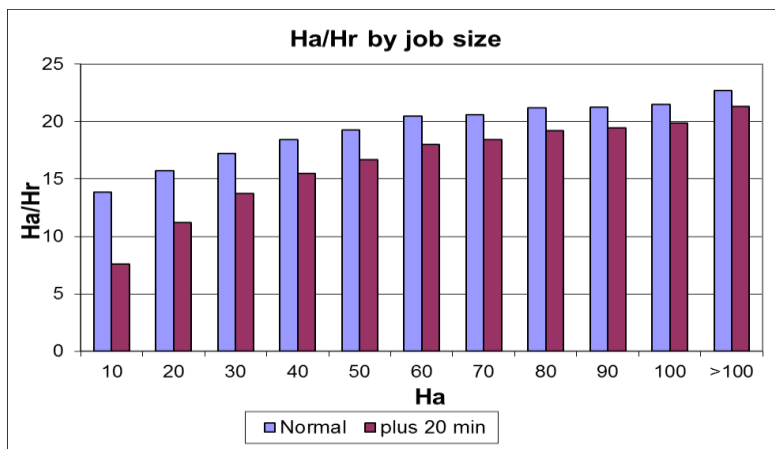
Most jobs are under 30 hectare job size, although as some larger jobs get split into two or more separate applications, true job size is probably greater than shown here.



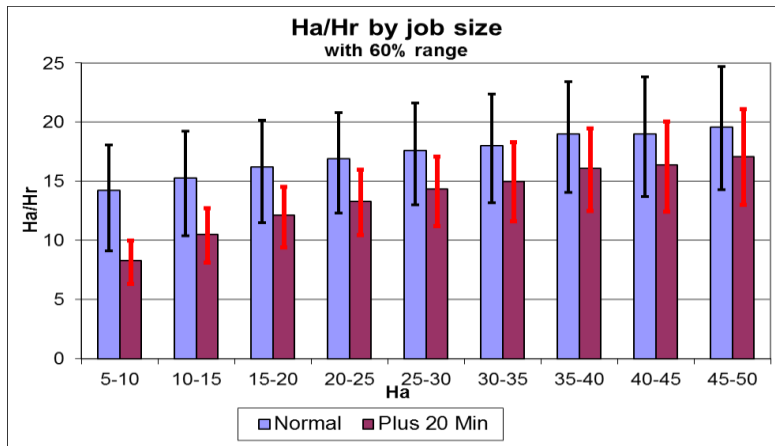
Most jobs were in the range of between 10 and 20 ha/hr



Smaller areas had on average significantly lower rates per hour. This is attributed to typically being in smaller or scattered paddocks, hence more downtime opening gates etc. narrower spread widths also has a small effect.

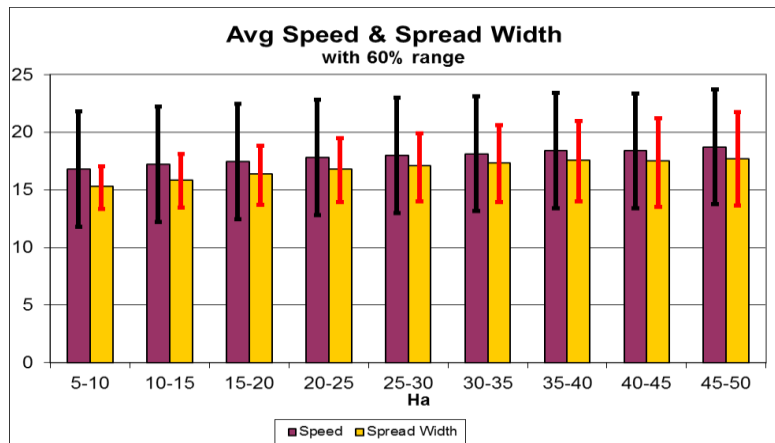


This lower rate decreased even further if allow 10 minutes at start of job and end of job for setup and pack up.

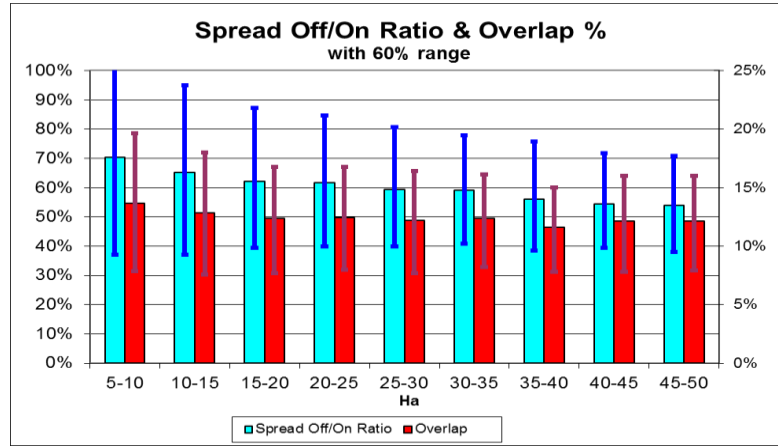


However, there was quite a range, as shown by the bars at left, showing the 20% and 80% levels.

Average speeds only increased slightly for larger jobs, but there was a slight increase in spread width, as one would expect with larger jobs, presumably often also associated with larger paddocks.



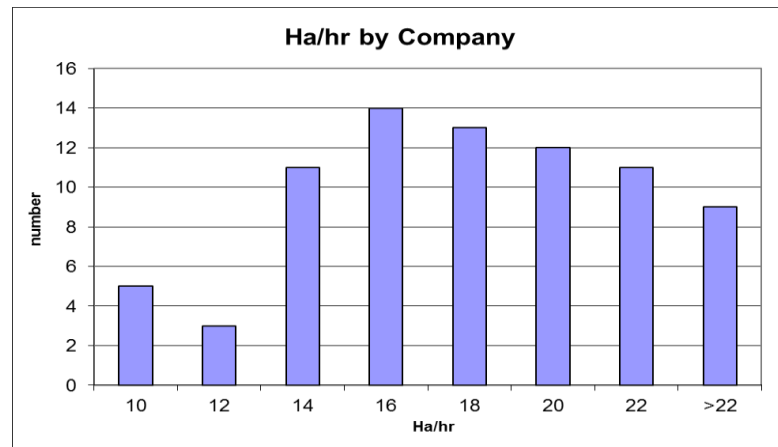
Percentage “not spreading” was significantly higher for smaller jobs, but there was also a very wide range of values on those smaller jobs.



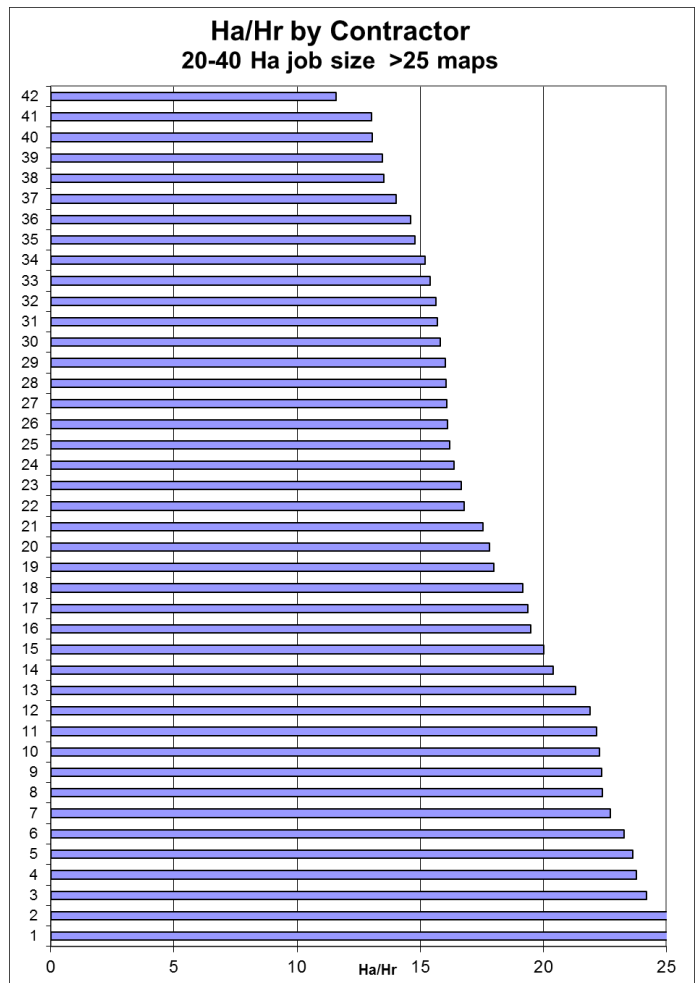
Inter business and driver comparisons

As mentioned earlier, because some businesses have only put a small number of maps through the database, and which may not be representative of all their work, this comparison may be skewed.

This graph shows the number of spreading businesses in each grouping of average spread efficiency.

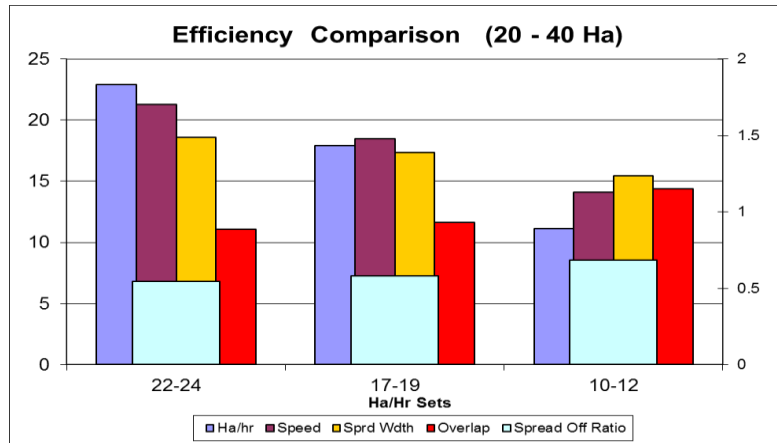


Even when restricted to jobs of between 20 and 40 hectares, and only displaying businesses who put greater than 25 maps through the system, there is still a wide range in the effective number of hectares spread per business. Much of this is probably attributable to the type of jobs, farm type, and geography, with its consequent impact on average speed, spread width, and percentage time not spreading. Notwithstanding, there are businesses from the Southland plains and the Waikato area represented at both ends of the graph at right.



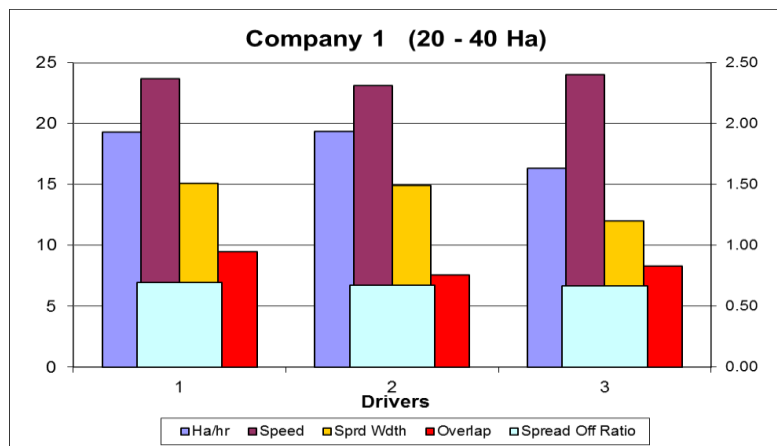
This graph shows the average difference in efficiency factors at three different efficiency levels.

As effective hectare rate drops, so does speed and spread width, while overlap and percentage “nonspreading” increase.

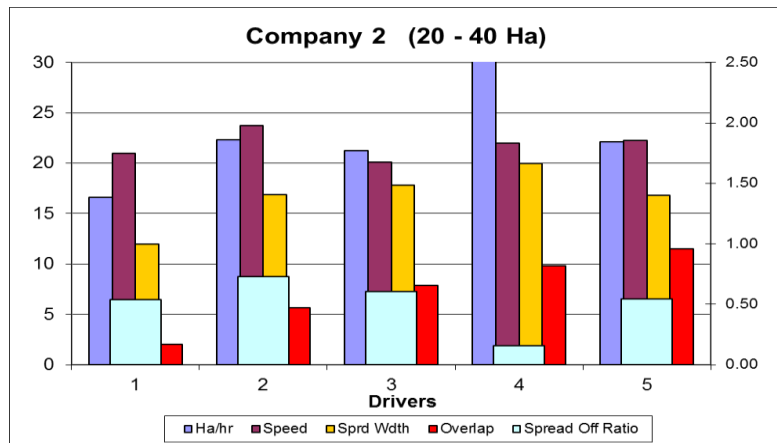


These three charts show driver comparisons for three different businesses.

In company 1, driver 3 has a spread width of 12 metres compared with the 15 metres of the other two. As a consequence, his is covering 16.3 ha/hr compared to 19.3 ha/hr for the other drivers.



In company 2, driver 4 is achieving over 30 ha/hr, attributable to very little down time, whereas driver 1 is 5ha/hr less than the other three, primarily due to the narrower spread width, despite achieving very little overlap.



All are driving at similar speeds.

In company 3, driver 3 is achieving 4 ha/hr more than the others, primarily due to lower downtime and wider spread width.

