Australian Government
Cotton Research and Development Corporation

CottonInfo Extension Activity REPORT

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: **CSD1802**

Project Title: Improving the distribution uniformity of fertiliser spreaders to optimise fertiliser (urea) application

Project Commencement Date: **1/09/2017** **Project Completion Date:** 26/01/18

Part 2 – Contact Details

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Part 3 – Final Report

Background

1. Outline the background to the project.

There is an increasing use of spreaders for application of urea in the cotton industry. In fact 75% of growers apply granular fertiliser (eg Urea) pre-plant, at planting and in-crop up to flowering (CRDC Cotton Growing Practices 2016). However, a single pass of a broadcast spreader produces an uneven application. Overlapping the spread pattern can improve the uniformity, but the distance between machinery runs to provide the overlap (the bout width) cannot be determined accurately without proper testing.

Uneven application means that parts of the field are being under fertilised, while other parts are being over fertilised, often visible to the eye with a striping pattern across a crop. The performance testing and calibration of a fertiliser spreader is as important as the calibration of spray rigs.

The Australian Fertilisers Services Association and the Australian Fertiliser Industries FertCare initiative have developed Accu-Spread. This involves independent testing and accreditation of fertiliser spreading equipment. Following accreditation, a grower will know the capacity of the spreader to apply urea to industry standards. This means growers will have more confidence in applying an accurate rate, improving the efficiency of fertiliser use and avoiding the patchy, uneven patterns often visible from untested spreaders.

Darren Hart, Cotton Operations Manager, Keytah called CottonInfo to discuss the opportunity to hold a field day in the Moree region looking at spreader testing. He assisted with planning and reviewed the field day program, hosted the Moree Spreader field day and attended the second field day at Bellata.

Objectives

2. List the project objectives (from the application) and the extent to which these have been achieved.

Objectives:

1) To provide access to spreader testing service to growers so they can test the performance of their fertiliser spreaders and determine the accuracy of its spread pattern - Complete

2) Increase grower skills to adjust settings on spreaders and application method to improve the spread pattern - Complete

3) Increase grower understanding of costs associated with uneven fertiliser application – Wasn't covered in detail during the field days.

4) Increase grower confidence that the appropriate amount of fertilizer is being evenly applied across their fields - Complete

Methods

3. Detail the methodology and justify the methodology used. Include any discoveries in methods that may benefit other related projects.

This project was a collaborative effort between CottonInfo, Namoi Landcare, NW Local Land Services, Dryland Cotton Research Association, Incitec Pivot, GVIA & Sundown Pastoral Company (Darren Hart).

An Accu-spread assessor, Russell Nichol, was engaged to conduct 11 fertiliser spreader tests across 2 field days in the Gwydir and Namoi Valleys along with two additional on-farm visits.

1) Field day at 'Keytah', Moree to test the current calibrations of four spreaders, including Amazone, Bredal, Landaco and Kuhn.
2) Field day at 'Malarway', Bellata to test the current calibrations of five spreaders including Self-propelled Bredal, Bredal with extension bar, Landaco, Gyral, Marshall.
3) Farm visits – Bredal at Auscott Ltd and Landaco at Keytah.

Russell Nichol, the accu-spread accredited assessor with the help of field day participants tested the calibration of fertiliser spreaders. This involved driving the spreader machines over a line of around 50 collection trays. The contents of each tray were collected and weighed and data entered into a computer program that calculates the Coefficient of Variation for various bout widths. Participants were also shown how to make various adjustments to their spreaders to ensure an even spread pattern.

A number of manufacturers were engaged in the field days including Ben Nichols, Bredal Australia, Pete O'Connor, Landaco and WJ Matthews, Amazone. This provided an opportunity for growers to see different spreaders all in one place and discuss pros and cons with the manufacturers, along with other growers.

This project included a comprehensive field day evaluation (Appendix 2).

Outcomes

4. Describe how the project's outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.

This project resulted in improved accuracy of spreader application of Urea. The spreader pattern testing provided individual growers with an accurate bout width for an even application of urea on their fields. The engagement of different manufacturers meant some growers were able to greatly improve spreader performance with required repairs and maintenance fast tracked for the field day!

68 per cent of the participants had not ever had their spreaders tested for an accurate spread. The spreader field days provided an opportunity for 26 growers managing 156,385 ha agricultural farming land to improve the spread pattern of their fertiliser spreaders. The benefits of an improved spread pattern include:

- Having the appropriate amount of fertiliser applied evenly over a field
- Minimising environmental impacts through over application of nutrients
- Improved crop production
    - The cost of uneven application of fertiliser is reduced yields in areas that are under fertilised and potential loss of valuable N through runoff in over fertilised areas. Uneven application of fertiliser will result in a striping pattern across the field, indicating the under fertilised areas.
- Increased efficiency of Nitrogen fertiliser application, through more even application.
    - An uneven application means some areas of the field receive more than the crop requires, significantly increasing the risk of off-site environmental damage through leeching and runoff.

A report was provided to each grower to summarise the findings of their individual spreader tests (Appendix 2). This provides confidence that the appropriate amount of fertiliser is bring applied evenly across their fields.

5. Please report on any:-

a) Feedback forms used and what the results were – See attached report
b) The highlights for participants or key learnings achieved – See attached report
c) The number of people participating and any comments on level of participation – See attached report

Budget

6. Describe how the project's budget was spent in comparison with the application budget. Outline any changes and provide justification.

The original budget included $3000 from Growers to go towards spreader testing. This money was not received as a couple of growers bucked up at the end re paying for tests. So it would not be fair to charge some growers and not others. An extra $1000 cash was provided by DCRA and negotiations with Russel Nichol undertaken and he reduced his fee from $12,500 to $10,500 (ex GST). Project ended up being over spent by $720.09.

Please list expenditure incurred. ***(Double click inside the table to enter the data)***

Date	Description	Amount excl GST	GST	Total
4/10/2017	10 Spreader tests, travel and accommodation	10,500.00	1,050.00	11,550.00
3/10/2017	Catering Bellata Field Day Lunch	145.09	14.51	159.60
26/09/2017	Farmer Host thank you gift	80.00	8.00	88.00
26/09/2017	Catering Keytah Field Day Lunch	109.09	10.91	120.00
26/09/2017	Ice, 3 bags	8.19	0.81	9.00
26/09/2017	Ice, 3 bags	8.19	0.81	9.00
25/09/2017	Drinks, water, morning tea, handwash	181.38	12.04	193.42
25/09/2017	Porta Loo	188.17	18.82	206.99
				0.00
				0.00
				0.00
			TOTAL	**12,336.01**

Conclusion

7. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?

The spreader field days provided an opportunity for 26 growers managing 156,385 ha agricultural farming land to improve the spread pattern of their fertiliser spreaders. Nine spreaders where tested over two days with most machines needing minor (changing drop point and/or spinner speeds) adjusts. Just two machines required major changes; new spinners and skirting rubbers, as a result of machine wear and tear to ensure an accurate spread pattern. Most modern spreaders can deliver an accurate spread pattern, however machine set-up and maintenance is critical.

Extension Opportunities

8. Detail a plan for the activities or other steps that may be taken:
   (a) To tell other CGAs/growers/regions about your project.
   (b) To keep in touch with participants.
   (c) For future projects.

- Each Grower who had a spreader tested will receive an Accu-Spread Report showing the results of their spreader test.
- All participants will receive a summary of test finding.
- Results will be shared with growers from other valleys via the CottonInfo Website (Blog or Factsheet) and CottonInfo REO regional newsletters.
- All project documents will be shared with funding partners including NW Local Land Services, National Landcare Program, Dryland Cotton Research Association and Incitec Pivot.

Improving the distribution uniformity of fertiliser spreaders to optimise fertiliser (urea) application

Abstract

A total of 41 people (26 growers, 6 manufacturers, 7 industry personnel and 2 contractors) attended two spreader testing field days held at Moree and Bellata in September 2017. Eleven fertiliser spreaders were tested to determine the accuracy and spread and where necessary adjustments made to improve the evenness of application of urea fertiliser. Most modern spreaders can deliver an accurate spread pattern, however machine set-up and maintenance is critical.

Janelle Montgomery
CottonInfo Regional Extension Officer, Gwydir & Mungindi

March 2018

Acknowledgements

The Spreader Field days were a collaborative event between CottonInfo, North West Local Land Services, Tamworth Regional Landcare and Dryland Cotton Research Association.

This project was supported by Tamworth Regional Landcare Association through funding from the Australian Government's National Landcare Programme and North West Local Land Services. The Cotton Research and Development Corporation, CottonInfo and Cotton Seed Distributors also provided funding towards the project. Thanks to Bede O'Mara from Incitec Pivot for providing the urea for the fertiliser tests at each field day. Support was also provided by spreader manufacturers including Pete O'Connor, Landaco, Ben Nichols, Bredal and Jeremy Matthews and his staff from WJ Matthews (Amazone Distributor).

Thanks go to:

- The cotton growers that hosted the field days including Darren Hart, "Keytah" Moree and Peter Fulton-Kennedy "Malaraway", Bellata.
- Cotton growers and manufacturers that supported the field day and transported spreaders to the field days for testing.
- Russell Nichol, Accredited Accu-spread assessor.
- Kate Pearce, NWLLS who helped with planning and organisation on the day and patiently entered all the calibration data after each test.
- Annabel Guest, DCRA who assisted with the Bellata Field Day.
- The funding partners (as outlined above).
- Gwydir Valley Cotton Growers Association

Pictured overleaf: **Keytah Field Day participants**

Contents

Introduction

Background

There is an increasing use of spreaders for application of urea in the cotton industry. However, a single pass of a broadcast spreader produces an uneven application. Overlapping the pattern spread can improve the uniformity, but the distance between machinery runs to provide the overlap (the bout width) cannot be determined accurately without proper testing.

Uneven application means that parts of the field are being under fertilised, while other parts are being over fertilised, often visible to the eye with a striping pattern across a crop. Increasing the efficient use of nitrogen fertilisers is an important cotton industry objective.

Darren Hart, Cotton Operations Manager, Keytah came to CottonInfo with the idea of holding a Spreader Testing field day. Spreader manufacturers were very supportive of the days, so this meant a number of different spreaders were tested and growers had the manufacturers on hand to answer any questions.

The Australian Fertilisers Services Association and the Australian Fertiliser Industries FertCare initiative have developed Accu-Spread. This involves independent testing and accreditation of fertiliser spreading equipment. Following accreditation, a grower will know the capacity of the spreader to apply urea to industry standards. This means growers will have more confidence in applying an accurate rate, improved the efficiency of fertiliser use and avoid the patchy, uneven patterns often visible from untested spreaders.

The benefits of having an Accu-Spread tested machine are to:

- minimise environmental impacts through over application of nutrients
- ensure the appropriate amount of fertiliser is evenly applied
- provide operators with information about the performance of their machines
- provide farmer with confidence that spreader operators are accurately applying the right amount of fertiliser in the right place

Objectives

1) To provide access to spreader testing service to growers so they can test the performance of their fertiliser spreaders and determine the accuracy of its spread pattern
2) Increase grower skills to adjust settings on spreaders and application method to improve the spread pattern
3) Increase grower understanding of costs associated with uneven fertiliser application
4) Increase grower confidence that the appropriate amount of fertilizer is being evenly applied across their fields

Methods

Accu-spread assessor, Russell Nichol, was engaged to conduct 11 fertiliser spreader tests across 2 field days in the Gwydir and Namoi Valleys along with two additional on-farm visits.

1) Field day at 'Keytah', Moree to test the current calibrations of four spreaders, including Amazone, Bredal, Landaco and Kuhn.
2) Field day at 'Malarway', Bellata to test the current calibrations of five spreaders including Self-propelled Bredal, Bredal with extension bar, Landaco, Gyral, Marshall.
3) Farm visits – Bredal at Auscott Ltd and Landaco at Keytah.

The fertiliser spreader test involved driving the spreader machines over a line of around 50 collection trays. The contents of each tray were collected and weighed and data entered into a computer program that calculates the Coefficient of Variation for various bout widths. Participants were also shown how to make various adjustments to ensure an even spread pattern.

A number of manufacturers were engaged in the field days including Ben Nichols, Bredal Australia, Pete O'Connor, Landaco and WJ Matthews, Amazone. This provided an opportunity for growers to see different spreaders all in one place and discuss pros and cons with the manufacturers, along with other growers.

This project included a comprehensive field day evaluation. The evaluation sheet is provided in Appendix 2.

Results

The results of 9 spreader tests are provided in Table 1. Two extra machines were examined, however windy conditions meant testing could not take place. Individual test reports are provided in Appendix 3.

Table 1: A summary of spreader test results

Spreader ID	Spreader	Test 1 Bout Width (m)	Test 2 Bout Width (m)	Comment
1	Self Propelled Bredal	35m	No further testing required	Despite windy conditions this spreader achieved 35m.
2	Amazone	24m & 43m	43m	No trouble spreading to wider width. Adjusting drop point back to 49 improved the evenness of spread , but the drop point should be between 40 and 43 to achieve an accurate spread at 36m
3	Landaco	24m & 40m	41m	Adjustments to spinner position and drop point to improve spreader pattern. To improve spread pattern at 36m, deck required further adjustment.
4	Landaco	18m	36m	1st test – bout width of 18m. Changed spinner speed and an accurate spread was achieved at 36m
5	Bredal	36m	No further testing required	This spreader achieved an accurate spread at 36m in the first test.
6	Bredal	37 m	No further testing required	This spreader achieved an accurate spread at 36m
7	Bredal	20m	-	Wind prevented further testing
8	Marshall	23m	-	Unable to make adjustment, no further testing conducted
9	Kuhn	22m	24m	Drop point changed from 5.5 to 6.5 to get accurate spread to 24m

Three out of nine spreaders tested accurate on the first test, spreaders 1, 5 & 6 (Table 1). That is the spreaders as tested could be operated at the required bout width, either 36m or 24m and still achieve an acceptable level of variation across the spread pattern.

Two spreaders were fitted with new spinners and or skirting rubbers prior to testing (machines 3 & 4, Table 1). While they tested well, they had been operating without the new components and no doubt would have tested poorly without the changes. This highlights the need for regular maintenance and repairs to ensure the spreaders are operating to specifications.

Six of the nine spreaders required adjustments to spinner setting and/or drop point to achieve an accurate spread.

Most modern spreaders can deliver an accurate spread pattern, however machine set-up and maintenance is critical.

The Accu-Spread Assessor (Russell Nichol) discussed various factors that can impact spreader performance which are summarised in the following key messages:

- Ensure no fertiliser build up on spreader components eg on spinners, chutes and splash plates. Clean the spreader regularly, both during and after use.
- Check machine for general 'wear and tear', replacing placing parts where needed eg worn or bent spinners and or vanes, splash plates or guide chutes with holes, dents or bent ends.
- Use the suggested spreader settings for each type of fertiliser ie spinner speed, gate opening and drop point as a guide, but always check application rates and distribution before using over large areas.
- Test the accuracy of spread for different products used eg Gypsum, Urea etc. Each product will require different spreader settings.
- Wind speed and direction in relation to direction of machine travel will affect spreader performance.
- Crop or stubble height will also impact performance.

Participant Responses

A comprehensive evaluation was conducted to provide evidence of changes in KASA (knowledge, aspirations, skills and attitudes) as a result of attending the field days. Participants completed an anonymous feedback sheet at the end of each event. The evaluation templates are provided in Appendix 2. A total of 28 evaluations were received over the three field days, where 41 people attended – a 68 percent response rate.

The results of the evaluation are summarised in this section.

Demographics

There were a total of 41 participants in the spreader field days, including 26 growers, 6 manufacturers, 7 industry personnel and 2 contractors as shown in Figure 1.

Not all participants completed the evaluation feedback sheet, 28 sheets were returned (68 percent of participants), with their classification provided in Figure 2. The irrigators who responded to the evaluation managed 156,385 ha land developed for irrigated cotton production.

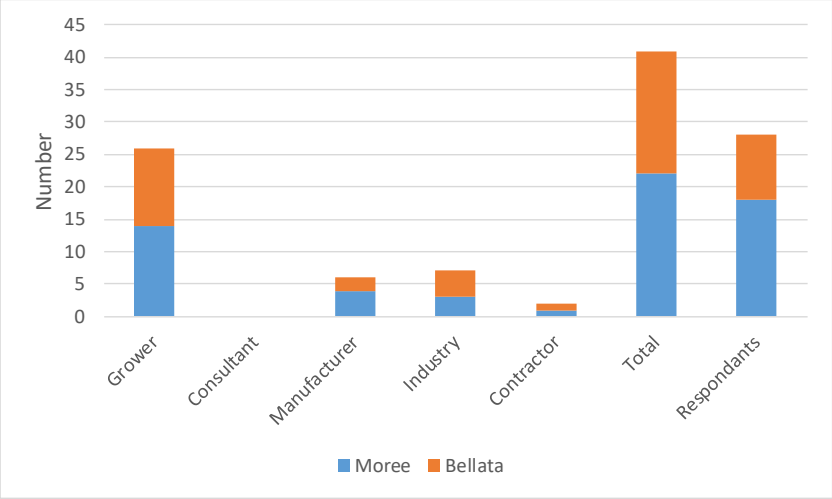

Figure 1: Classification of field day participants

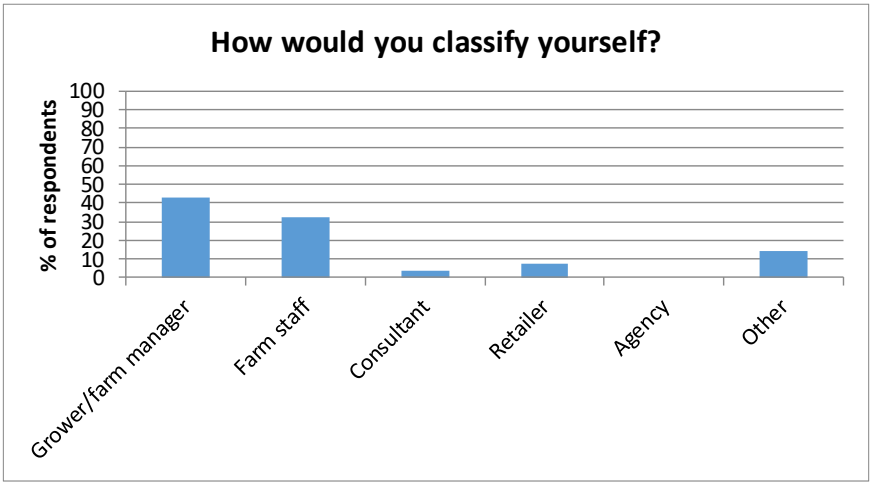

Figure 2: Classification of evaluation respondents who attended the Fertiliser Spreader Field Days

Event Publicity

The participants heard about this field day mostly through CottonInfo and through conversations with friends, family and advisors as shown in Figure 2. CottonInfo promoted the field days on the CottonInfo events calendar, emailed flyer to local network and promoted in the Gwydir and Mungindi Grower. The flyer is attached in Appendix 1.

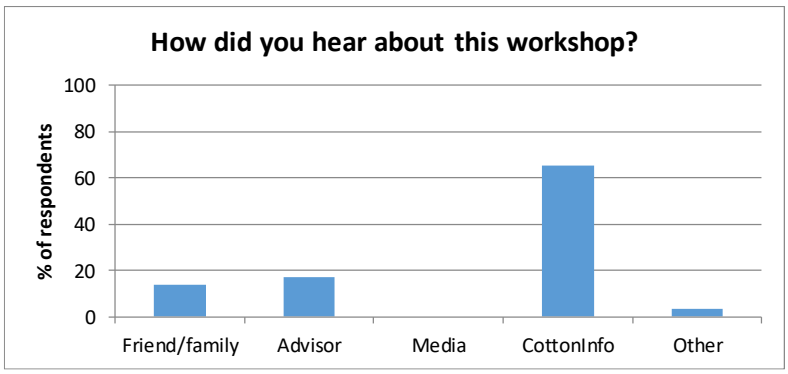

Figure 2: How participants heard about the 2015 Cotton Irrigation Technology Tour

Field day aims, expectations and presentations

Overall, participants indicated that the field days had met their aims and expectations. Over 90 percent of respondents either agreed of strongly agreed that their aims and expectations of the field day had been met as shown in Figure 3.

Field day participants found the presentations to be of a high standard (Figure 3) and mostly delivered at a level that field day participants could understand. One participant said "*there was a level of assumed knowledge, but we don't all have that knowledge*".

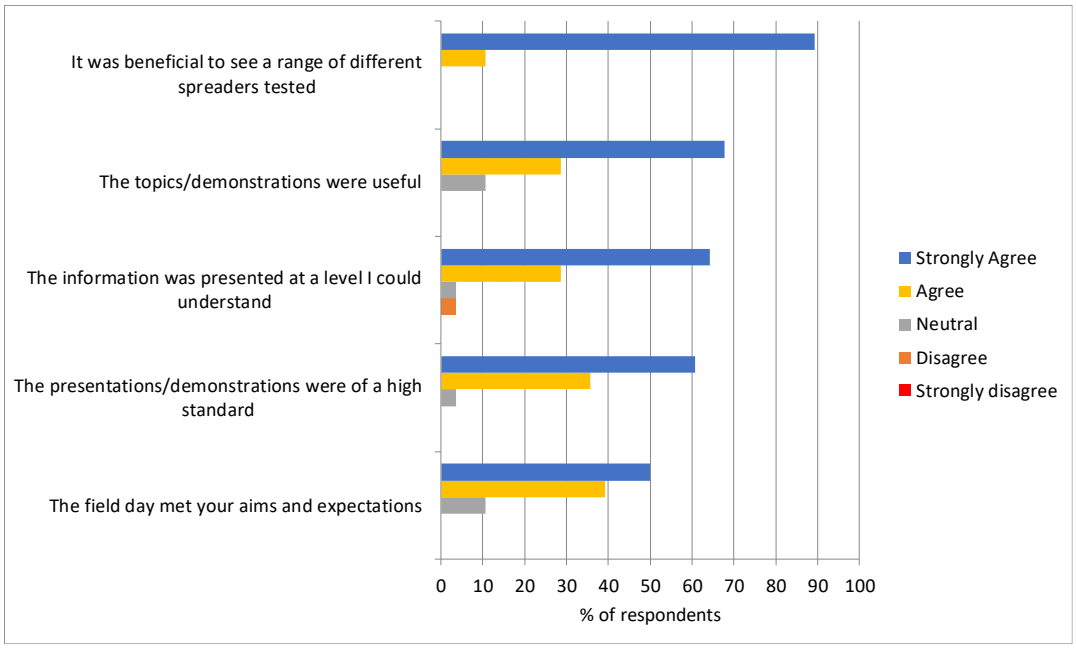

Figure 3: Usefulness of the field days in meeting aims, expectations and presentations

Importantly, participants liked having a range of different spreaders available on the day to test.

68 per cent of the participants had not ever had their spreaders tested for an accurate spread, as shown in Figure 4.

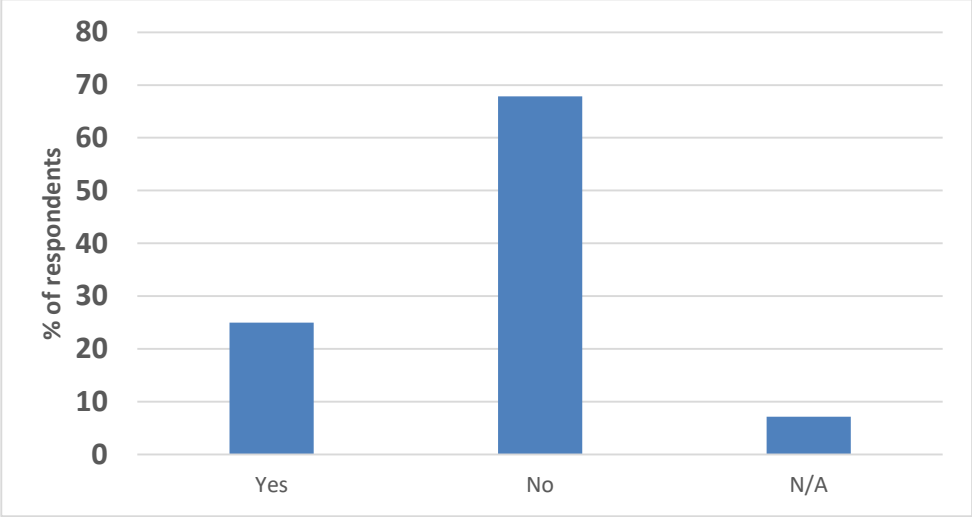

Figure 4: Have you ever had a fertiliser spreader tested for accuracy.

New knowledge gained

A summary of change in KASA (Knowledge, Attitude, Skills & Aspirations) indicated an increase in the level of understanding as a result of attending the spreader field days (Figure 5).

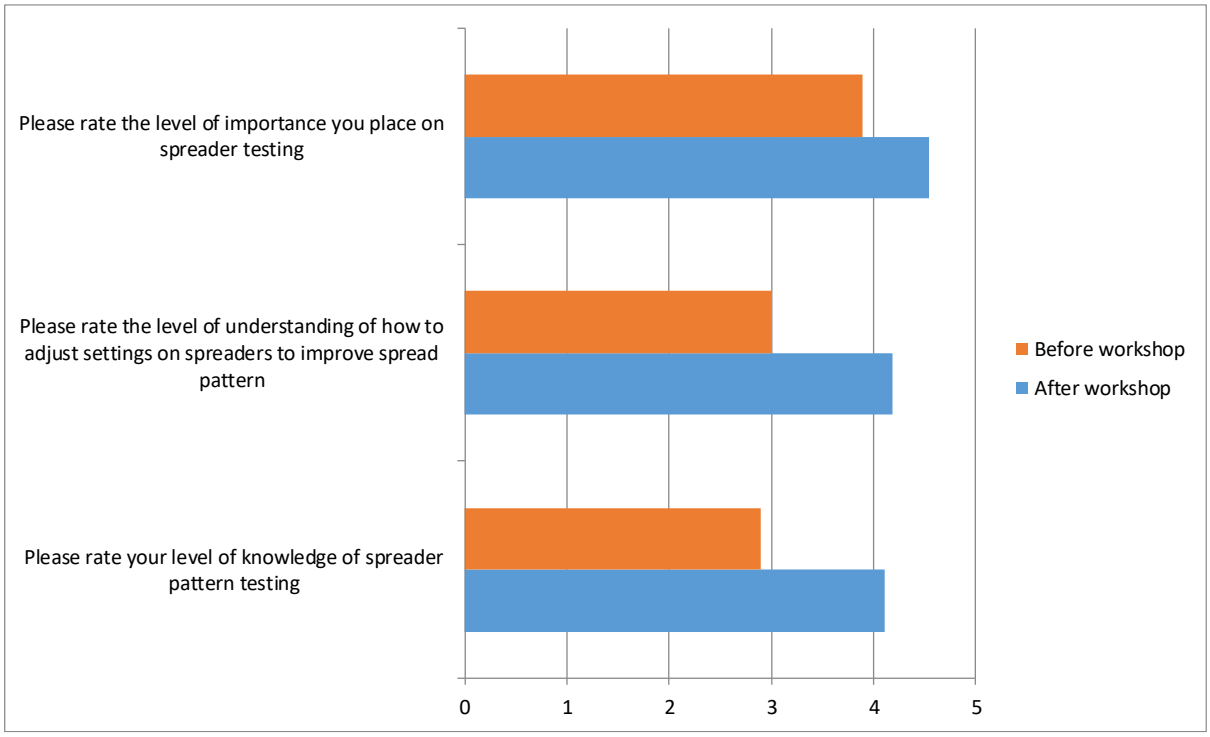

Figure 5: Knowledge, attitude and skills before and after the field day where 5 is very good or high and 1 is basic or low.

Participants already placed a high level of importance on testing the spread patterns of fertiliser spreaders prior to the field day, however, this level increased as a result of attending the field day. They also improved their knowledge and understanding of spreader testing and how to adjust spreader settings to improve the evenness of spread.

Finally, participants provided a few comments about the day:

"Good Job"
"Thanks for the opportunity"
"Great Day!"
"I'm shopping for a reliable spreader"

Conclusion

The spreader field days provided an opportunity for 26 growers managing 156,385 ha agricultural farming land to improve the spread pattern of their fertiliser spreaders. Nine spreaders where tested over two days with most machines needing minor (changing drop point and/or spinner speeds) adjusts. Just two machines required major changes; new spinners and skirting rubbers, as a result of machine wear and tear to ensure an accurate spread pattern. Most modern spreaders can deliver an accurate spread pattern, however machine set-up and maintenance is critical.

Appendix 1: Field Day Flyer

Accu-spread calibration field day

Ever wondered how accurate your spreader pattern is? Do you know how to adjust the settings to improve the spread pattern?

You are invited to one of two field days with accu-spread accredited assessor, Russell Nichol, at Keytah and Bellata. During the field days, Russell will test the current calibrations of three spreaders, and show you how to make adjustments to ensure an even spread pattern.

Spreaders to be calibrated include Bredal, Amazone, Landaco (Keytah) and Gyral, Bredal, Landaco (Bellata). Urea provided for testing courtesy of Incitec Pivot.

Date: Tuesday 26 September
Time: 9am-3:30pm (lunch provided)
Venue: 'Keytah', Moree (Meet at the Keytah Office at 9am).
Directions: Follow Gwydir Highway for 10km, turn right onto Watercourse Rd and travel 17km, turn left Goonal Rd and travel 8km and turn into Keytah. Follow signs to office.
Map: https://goo.gl/maps/m6dwY9JnLBB2

Date: *NEW* Wednesday 27 September
Time: 9am-3:30pm (lunch provided)
Venue: Peter Fulton-Kennedy's 'Malaraway'.
Directions: Take Millie Rd at Bellata and head west for 16km. Once you come to the "Koiwan" mailbox (white drum) continue for 800m. Turn left into Malaraway (20L white drum and field day sign).
Map: https://goo.gl/maps/79EVBdz7rVz

Program:

- 9am: Meet 9am at office (Keytah) or sheds (Bellata), then travel as a group to spreader testing site
- 9:15-11:30: Test spreaders
- 11:30-1:30: Lunch, collate and present spreader test results
- 1:30–3:30: Show farmers how to make adjustments to ensure an even spread pattern

RSVP: to Janelle Montgomery, CottonInfo: 0428 640 990, janelle.montgomery@cottoninfo.net.au.

This project is supported by Tamworth Regional Landcare Association through funding from the Australian Government's National Landcare Programme and North West Local Land Services. Support has been provided by Incitec Pivot Fertilisers, Amazone, WJs and Bredal. Photo by Jeremy Matthews.

Appendix 2: Evaluation Sheet

Spreader Testing Field Days

We would appreciate your comments on the field day

Delivery & Content	**Disagree**				**Agree**
1) The field day met your aims and expectations	1	2	3	4	5
2) The presentations/demonstrations were of a high standard	1	2	3	4	5
3) The information presented was at a level you could understand	1	2	3	4	5
4) The topics/demonstrations covered were useful.	1	2	3	4	5
5) It was beneficial to see a range of different spreaders tested	1	2	3	4	5

6) How could we have improved the field day to be more useful for you?

_____

_____

7) Have you ever had your fertiliser spreader tested for accuracy of spread **Yes** ☐ **No** ☐

Change in knowledge, skills & attitude where 1 is very basic and 5 is very good (Circle your rating)

8) Please rate your level of knowledge of spreader pattern testing

Before the workshop	1	2	3	4	5
After the workshop	1	2	3	4	5

9) Please rate your level of understanding of how to adjust settings on spreaders to improve its spread pattern

Before the workshop	1	2	3	4	5
After the workshop	1	2	3	4	5

10) Please rate the level of importance you place on spreader testing

Before the workshop	1	2	3	4	5
After the workshop	1	2	3	4	5

11) How did you hear about this fieldday? Tick

Friend/family/other farmer ☐ Advisor ☐ Media eg radio ☐ CottonInfo ☐

Other ☐ please specify_____

12) How would you classify yourself? Tick

Grower/Farm Manager ☐ Farm Staff ☐ Consultant ☐ Retailer ☐

Agency ☐ Other ☐_____

13) How much agricultural land do you manage? _____ ha

Any further feedback_____

_____

Thank you

Appendix 3: Accu-Spread Test Reports

Self-Propelled Bredal

Results Test 1:
Fertiliser - Urea

ID	1	Spinner RPM	950
Date	27-Sep-17	Spinner type	H DP8 DECK 100
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	BREDAL-SELF PROPELLED	Truck Rego	

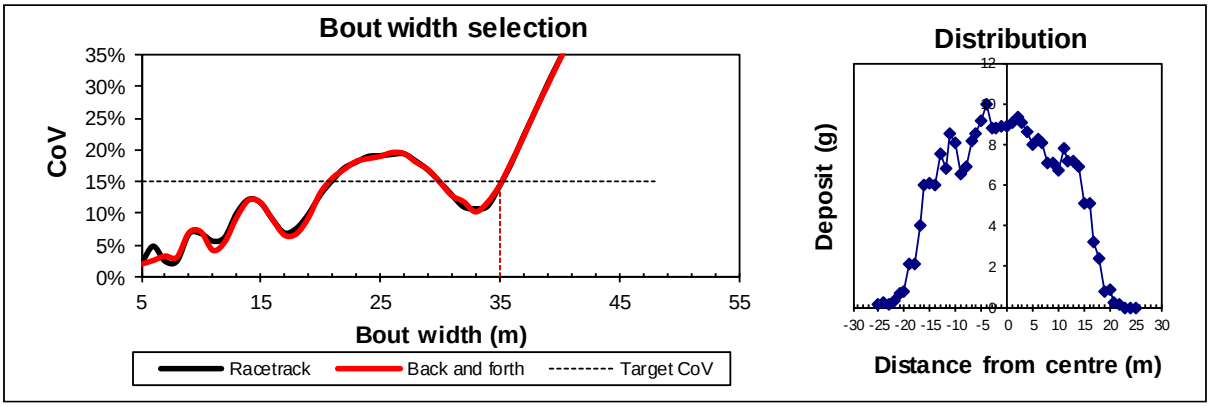

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 20m, and between 30 and 35m. Despite windy conditions, this spreader achieved 35m, a very good result. No further tests conducted.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

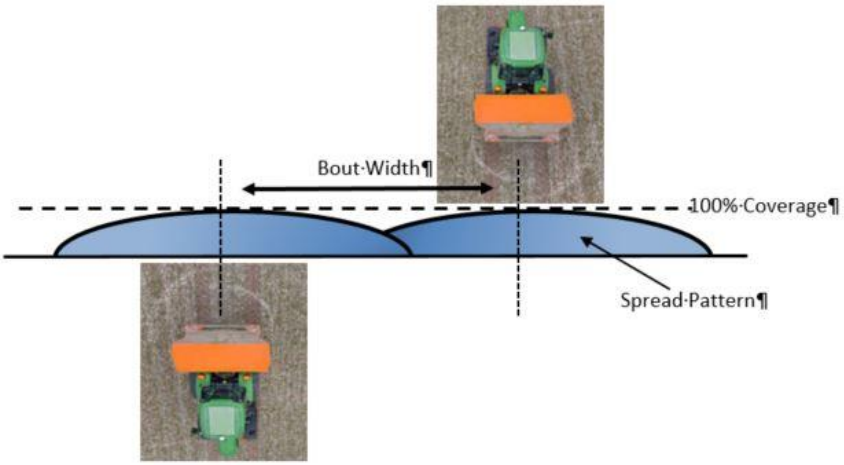

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Figure 4 shows the deposits across the paddock when a bout width of 35m is used with this spreader.

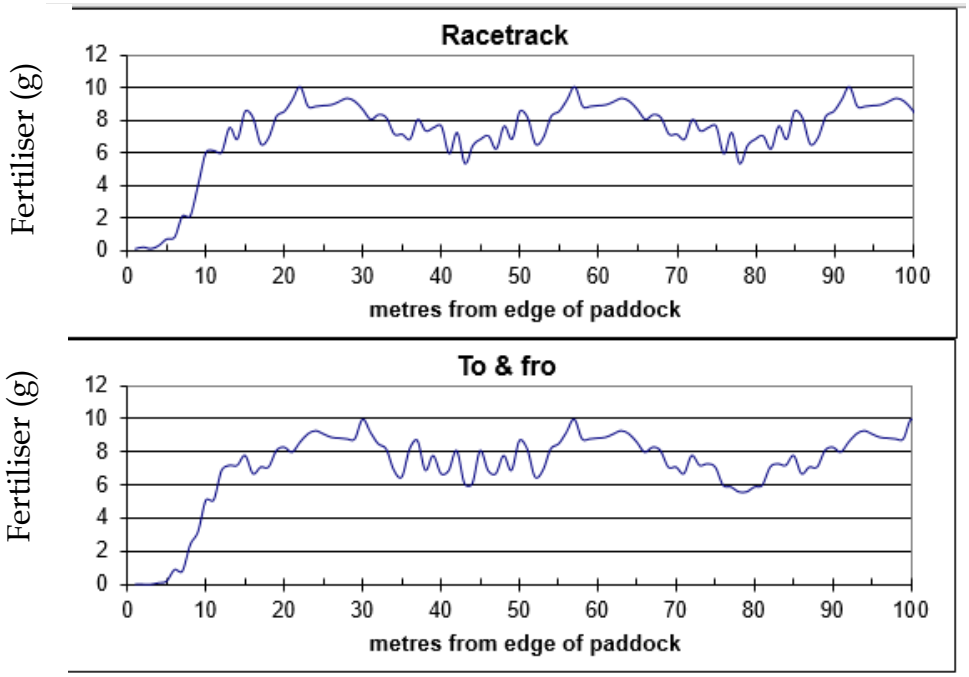

Figure 4: Fertiliser deposits across the field with bout width of 35m.

This is not an Accu-Spread certification. Accu-Spread certification is available to professional contractors whose operators hold a Fertcare Level A certificate (Product Knowledge and Spreading) along with independent testing of their equipment by an authorised Accu-Spread tester. Go to www.fertcare.com.au

For further information contact Russell Nichol M: 0418 505 002 E: russell.nichol@bigpond.com

AMAZONE SPREADER

Results Test 1: Drop point 51
Fertiliser - Urea

ID	2	Spinner RPM	950
Date	16-Sep-17	Spinner type	TS3 DP51
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	AMAZONE	Truck Rego	

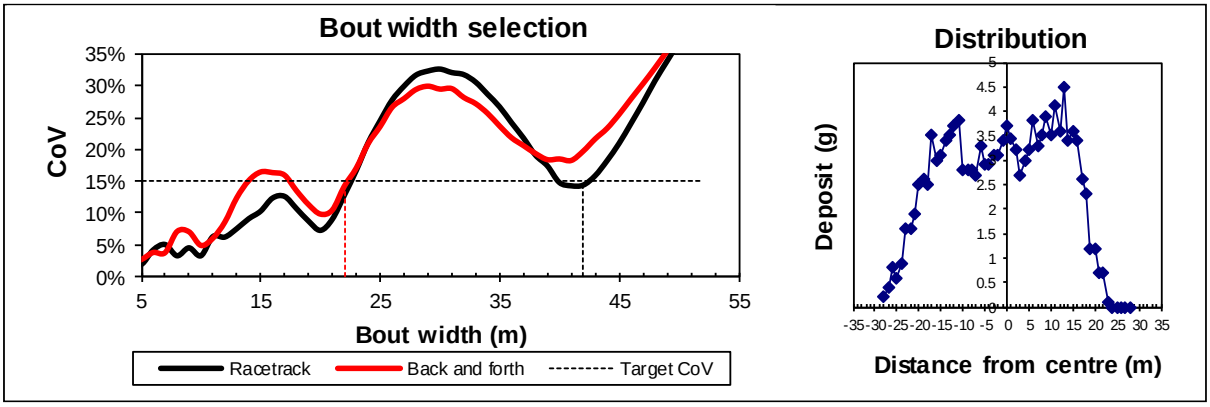

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 24m for the Back and Forth driving pattern and 43m for the racetrack. With the TS 3 Spinners and a Drop Point 51 it actually spread product out too far (43m) (Figure 1) and left the spread pattern a little bit light behind the machine (Figure 2).

Accu-Spread graphs explained

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth

driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).
The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

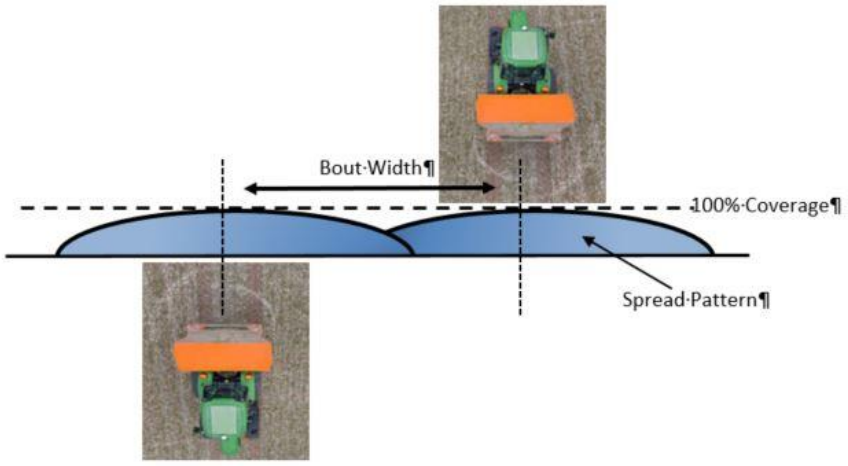

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Results Test 2: Drop Point 49

ID	2	Spinner RPM	950
Date	16-Sep-17	Spinner type	TS3 DP49
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	AMAZONE	Truck Rego	

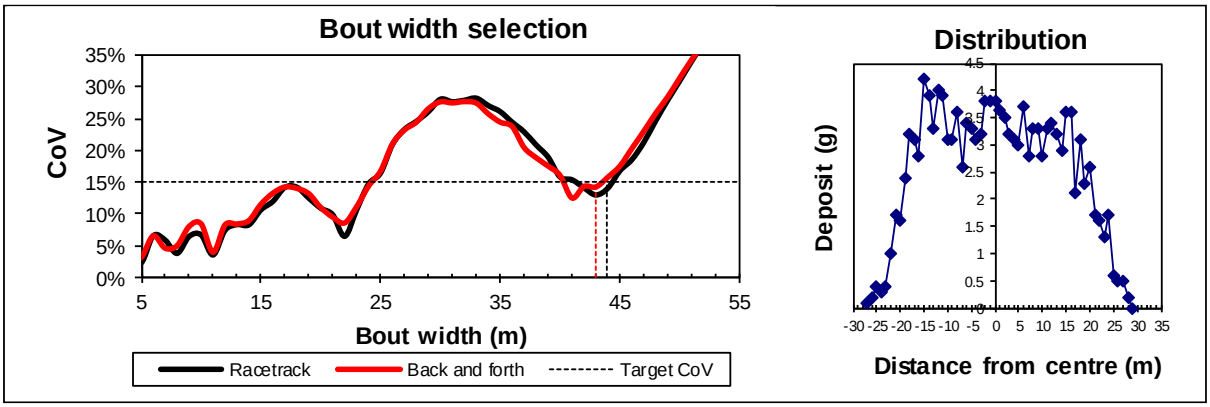

Figure 4: Bout Width Selection*

Figure 5: Distribution

*The bout width is the distance between spreader runs

The drop point was adjusted, dropped back from 51 to 49, the spreader then met the 15% CoV 43m (Figure 4). So in this case the Drop Point would have been too high at 49. It would be the maximum spread for that Amazone spreader. By bringing the Drop Point back to 49, it improved the evenness of spread, filling the section behind the machine (Figure 5).
To achieve a 36 m spread pattern, from experience of testing similar machines, the Drop Point should be back somewhere between 40 and 43.

The drop point is just a scale, no units. Amazone is 1 to 60.
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Landaco

Results Test 1: Drop point 37
Fertiliser - Urea

ID	3	Spinner RPM	1100
Date	16-Sep-17	Spinner type	LE 12 OS37
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	LANDACO	Truck Rego	

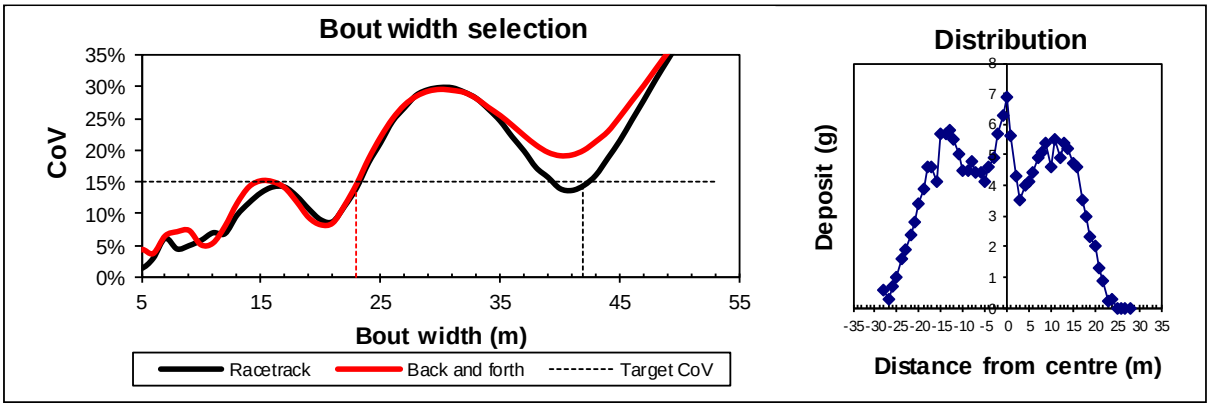

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

Pete Connor from Landaco put a new centre V on this spreader, including new skirting rubbers prior to this first test (without the skirting rubbers, fertiliser would have been spilling out behind and it would have tested poorly).

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 24m, and also around 40m. Figure 2 shows the machine was spreading a bit light either side of the machine, a little bit lopsided and a high peak right behind the middle. Its only 2g higher, so not massive. Depth position and spinner blade position would be affecting the shape of the distribution graph. Probably a bit of spillage still happening to cause the higher peak in the centre of the machine.

Accu-Spread graphs explained
Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser.

The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

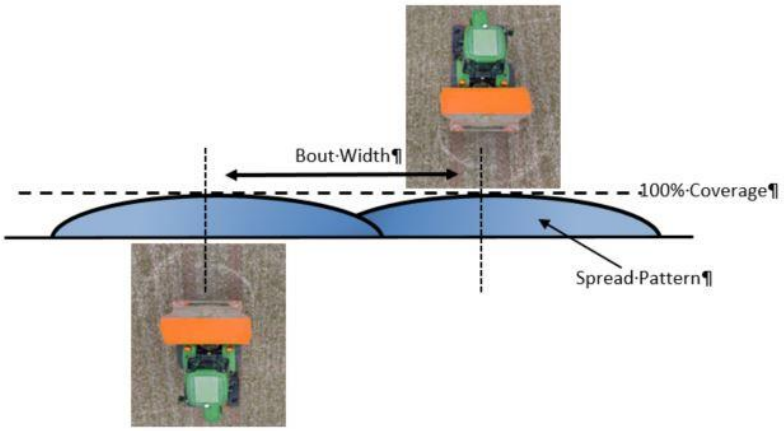

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Results Test 2: Drop Point 39 and offset spinner to position 'C'.

Fertiliser - Urea

ID	3	Spinner RPM	1100
Date	16-Sep-17	Spinner type	LE 12 C 37 OS39
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	LANDACO	Truck Rego	

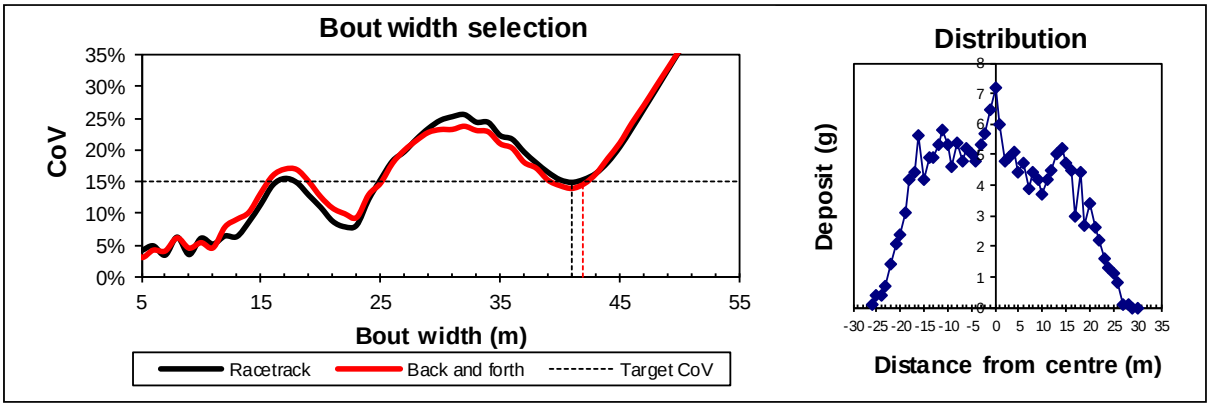

Figure 4: Bout Width Selection*

Figure 5: Distribution

*The bout width is the distance between spreader runs

Changed the offset of the LE12 Spinners, with a position C (on side of the spreader) and changed drop point to 39mm, ie moved the deck 2mm out away from the spreader. It made a small difference, dropping the red line down to a CoV 15% at 40m (Figure 4). Figure 4

shows that the recommended maximum bout width is 41m. Spreading at a bout width of 24m would also produce an acceptable spread pattern. To achieve a better spread pattern at 36m you would move the deck away another 2mm.

It is critical that when you move the deck you move it in very small amounts. A large change will result in a completely different spread pattern.

Figure 6 shows the deposits across the paddock when a bout width of 36m is used with this spreader.

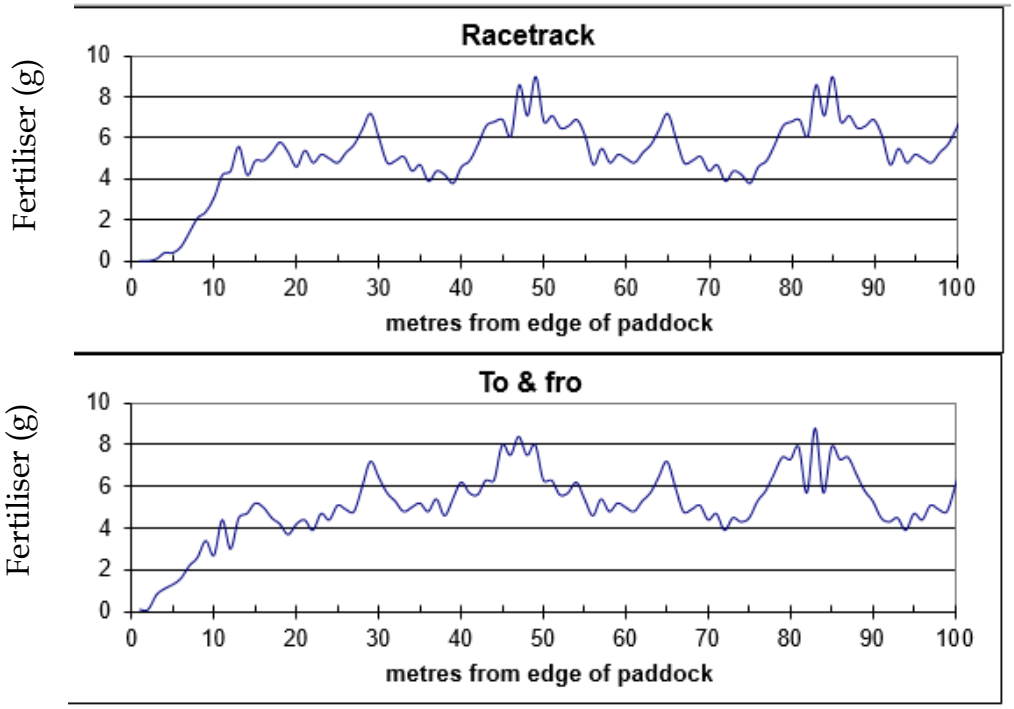

Figure 6: Fertiliser deposits across the field with bout width of 35m.

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Landaco

Results Test 1: Spinner RPM 1000
Fertiliser - Urea

ID	4	Spinner RPM	1000
Date	27-Sep-17	Spinner type	LE 12 C37
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	LANDACO	Truck Rego	

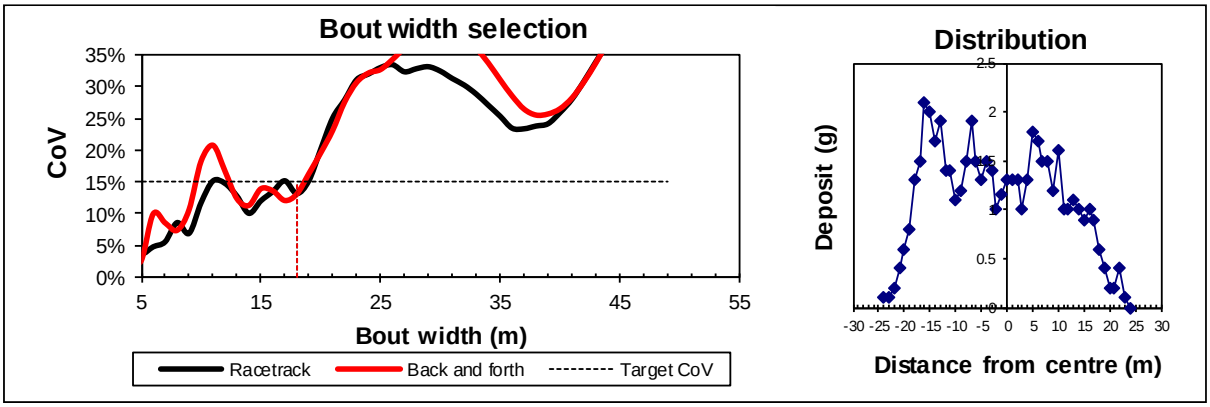

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 18m. This machine was fitted with new spinners prior to this first test. The bout width was only 18m. Not achieving 36 m in this 1st test.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

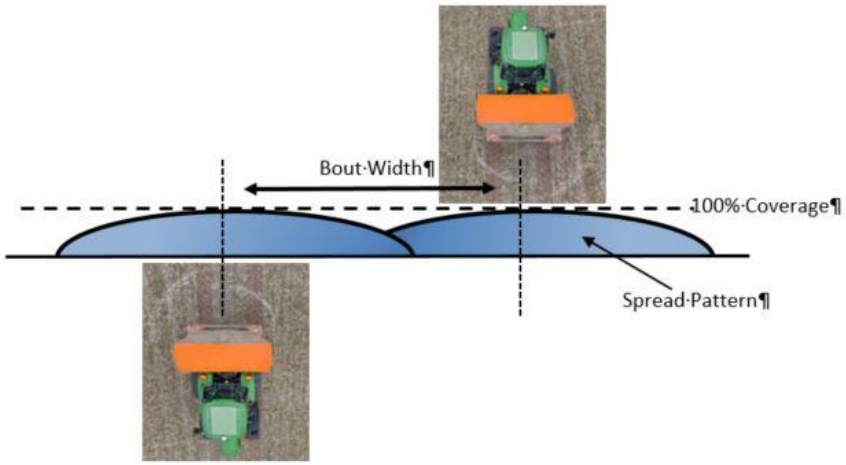

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Results Test 2: Spinner RPM 1100

Fertiliser - Urea

ID	4	Spinner RPM	1100
Date	27-Sep-17	Spinner type	LE 12 C+37
Fertiliser type	UREA	Tag number	
Fertiliser rate	140 kg/ha	Screen test%	2-60-38-O
Truck make	LANDACO	Truck Rego	

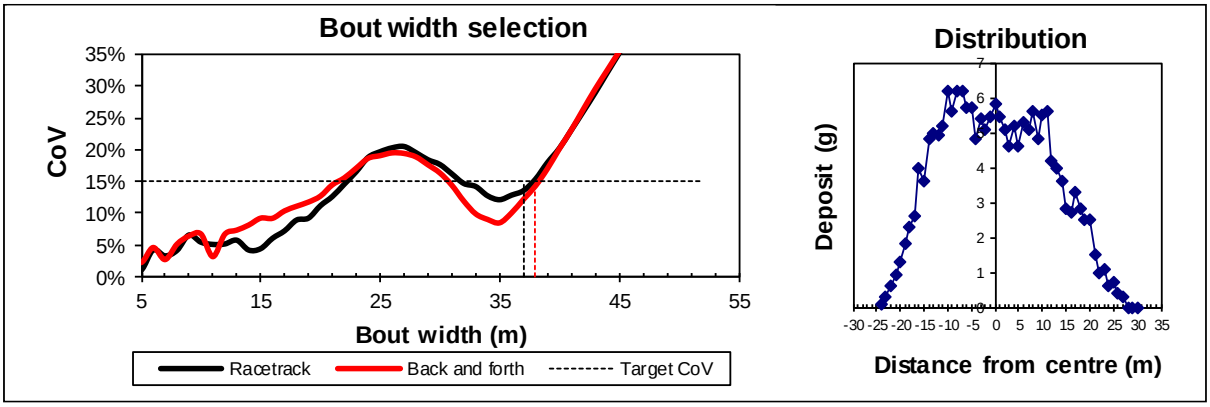

Figure 4: Bout Width Selection*

Figure 5: Distribution

*The bout width is the distance between spreader runs

The spinner speed was changed to 1100 RPM. The extra 100 RPM resulted in the wider bout width. In fact, this spreader can now spread evenly at 36m (Figure 4).

Figure 6 Shows the deposits of fertiliser across the paddock when a bout width of 36m is used with this spreader.

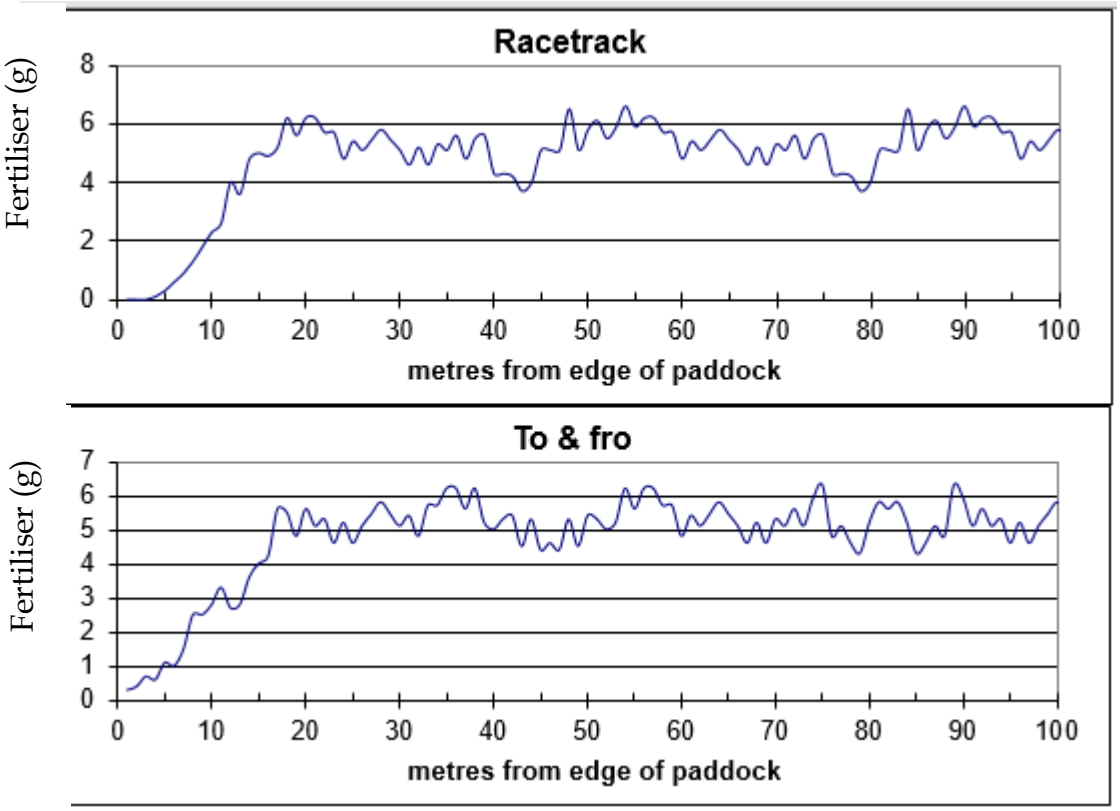

Figure 6: Fertiliser deposits across the field with bout width of 36m.

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Bredal

Results Test 1:
Fertiliser - Urea

ID	5	Spinner RPM	950
Date	27-Sep-17	Spinner type	H DP4.5
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	BREDAL	Truck Rego	

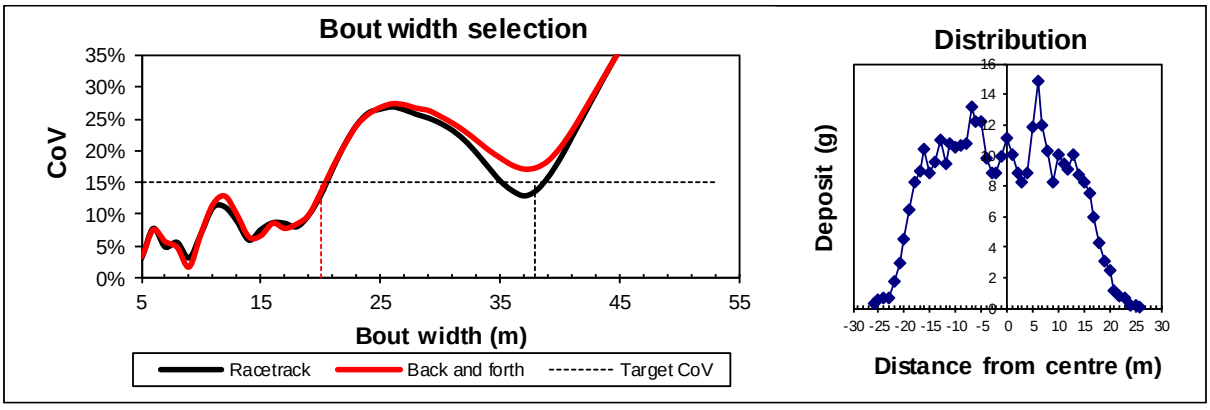

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 21m. Alternatively, a spreading bout width of 36m would also produce a reasonable spread pattern.

Due to wind conditions, further testing was not done on this machine.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field.

When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

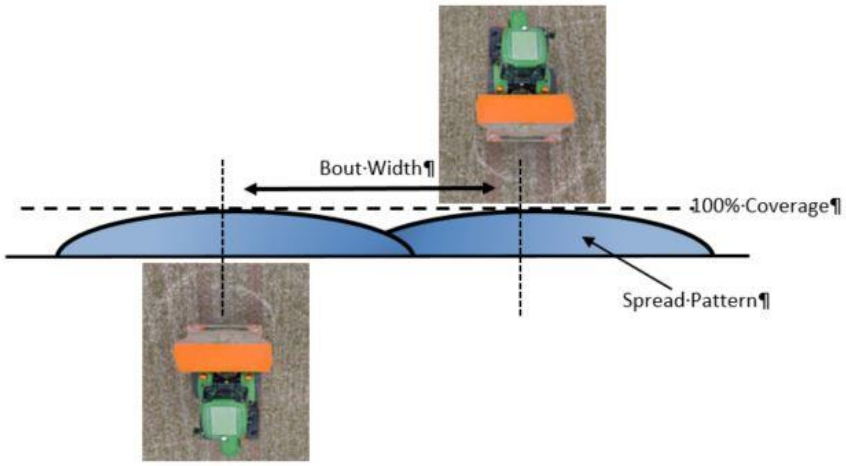

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

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Bredal

Results Test 1:
Fertiliser - Urea

ID	6	Spinner RPM	PTO 930
Date	16-Sep-17	Spinner type	H GB120 DP8
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	BREDAL	Truck Rego	

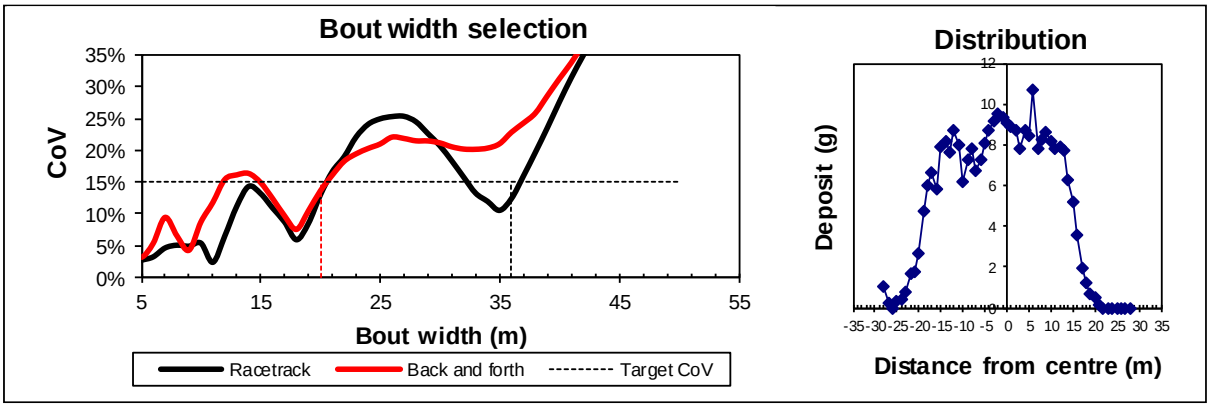

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 20m, for Back and Forth driving pattern.

This was the first test of the day and was affected either by wind or a data collection error (centre cups being mixed up). This effect has caused the centre line to be out by about 2m (Figure 2, Distribution Graph), hence the separation of the red and black lines in Figure 1 (Bout width selection). A second test was conducted but there was no change in spreader settings.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field.

When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

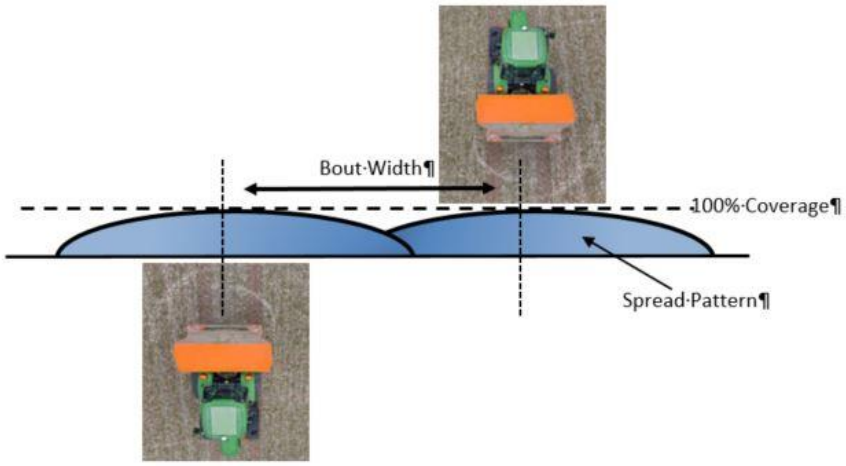

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Results Test 2:

Fertiliser - Urea

ID	6	Spinner RPM	930
Date	16-Sep-17	Spinner type	H GB120 DP8
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	BREDAL	Truck Rego	

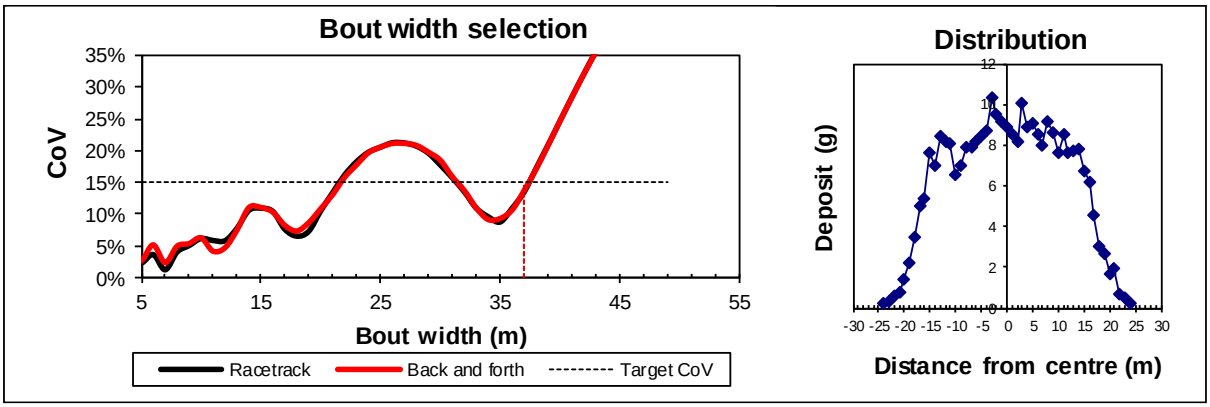

Figure 4: Bout Width Selection*

Figure 5: Distribution

For the 2nd test, the same settings as test one and the machine just tested again to which it achieved a near perfect spread pattern, 37 meters, maximum CoV is only 20%, the centre has been filled and is relatively even, with a spinner speed of 930, drop point 8 and gear box position (shifting the deck) of 120 (ie 120mm back from a point of zero).

Adjustments: To adjust the settings on a Bredal spreader you can change the spinner speed, shift the deck (Gear box (GP)) or you can shift the drop point by the slides on the back.

Figure 6 shows the deposits across the paddock when a bout width of 36m is used with this spreader. Wind conditions were directly behind the spreader.

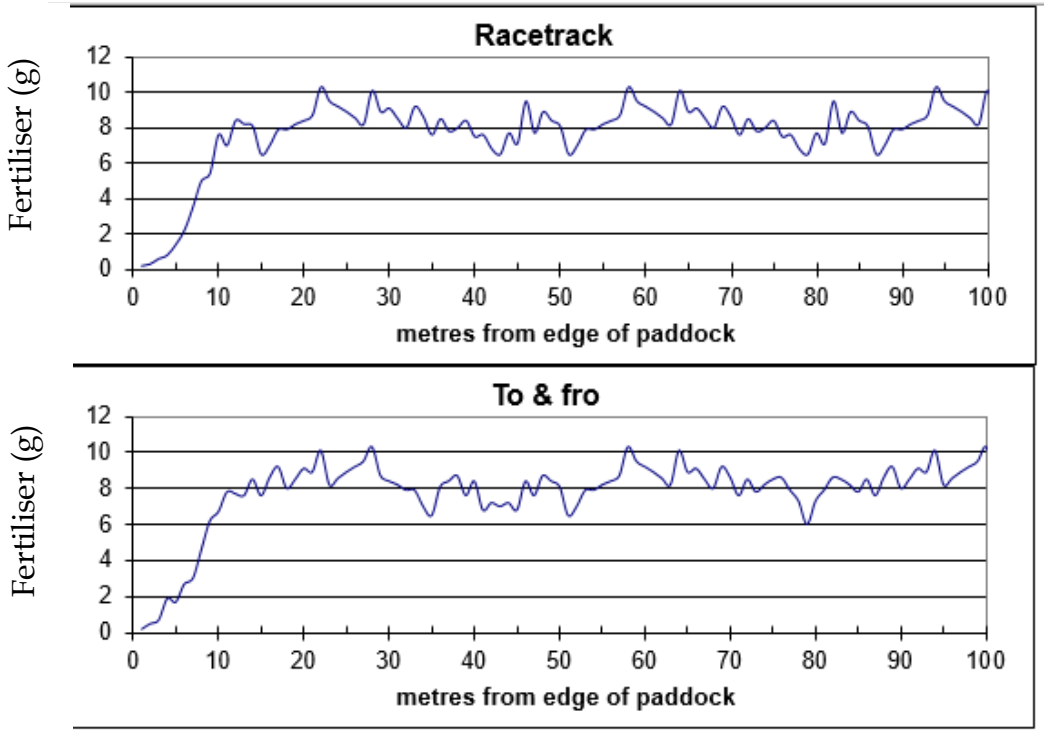

Figure 6: Fertiliser deposits across the field with bout width of 35m.

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Bredal

Results Test 1:
Fertiliser – Urea

ID	7	Spinner RPM	900
Date	28-Sep-17	Spinner type	H DECK 110 DP 6
Fertiliser type	UREA	Tag number	
Fertiliser rate	400 KG/HA	Screen test%	
Truck make	BREDAL	Truck Rego	

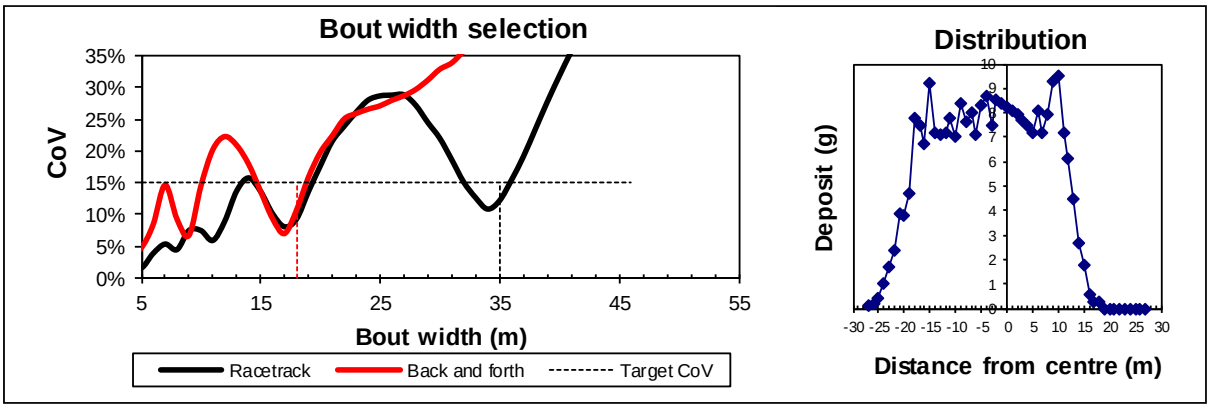

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 20m. Increasing the bout width would result in a sub-optimal urea spread pattern for this machine.

The Back and Forth pattern has been affected by the cross wind on the day (lopsided pattern shown in Figure 2) and we were unable to change spreading direction due to bed formation Wind prevented further testing.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth

driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

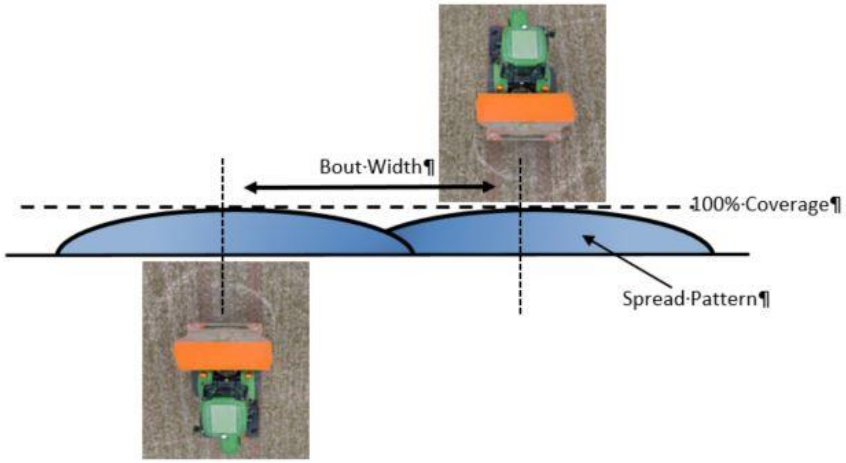

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Figure 4 shows the deposits across the paddock when a bout width of 36m is used with this spreader. Note, as previously mentioned the To and Fro pattern has been affected by the cross wind on the day, so we were unable to change spreading direction due to bed formation (lopsided pattern).

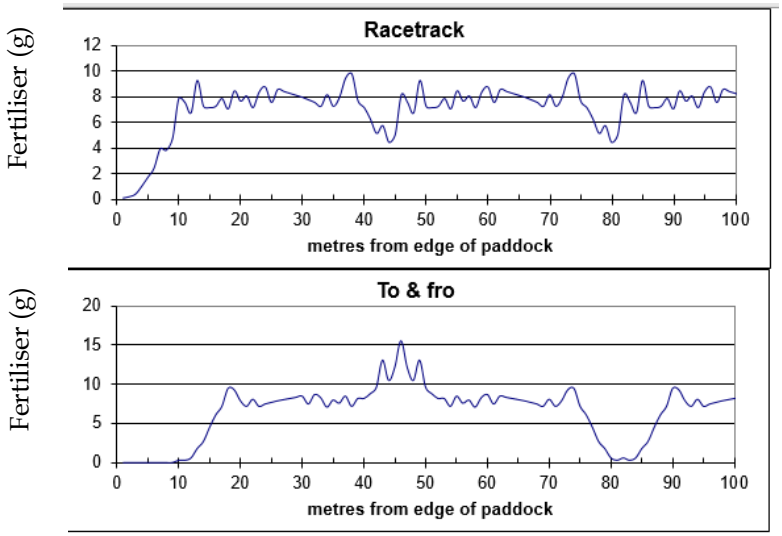

Figure 4: Fertiliser deposits across the field with bout width of 35m.

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Marshall

Results Test 1:
Fertiliser - Urea

ID	8	Spinner RPM	PTO 540
Date	27-Sep-17	Spinner type	MARSHALL 3 BLADE
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-O
Truck make	MARSHALL	Truck Rego	

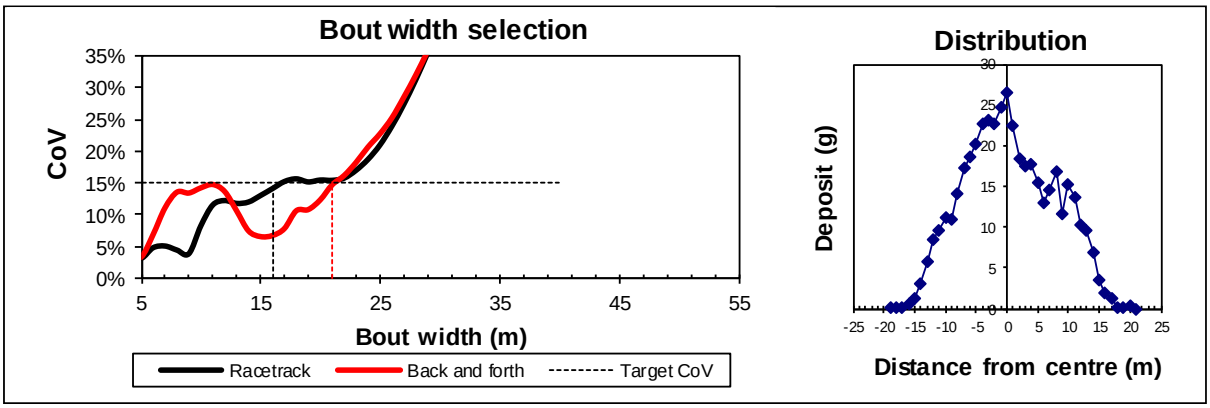

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. The recommended maximum spread width for back and forth is 20-23m. Increasing the bout width wider, say 36m would result in a poor and uneven application of fertiliser. Increasing the bout width wider to 36m at the current settings, would result in a poor and uneven application of fertiliser.

Accu-Spread graphs explained

Accu spread testing allows operators to determine what bout width to drive at to achieve the industry standard for spread pattern which is <= 15% Coefficient of Variation (CoV) for fertilisers.

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

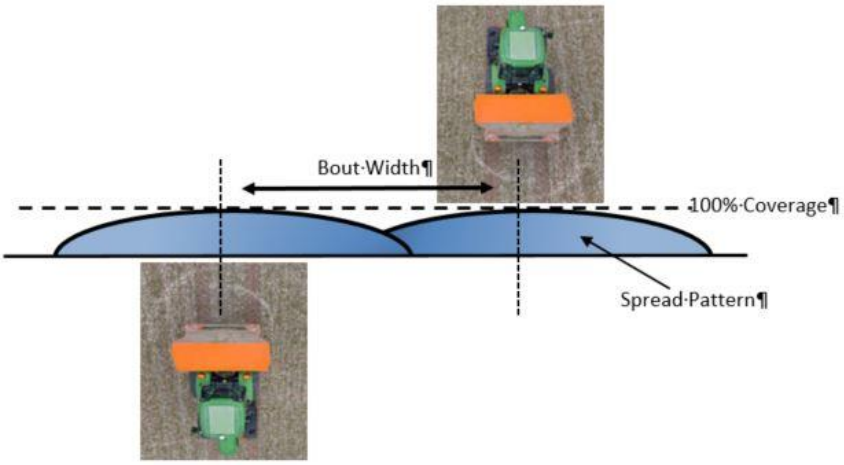

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Figure 4 shows the deposits across the paddock when a bout width of 21m is used with this spreader.

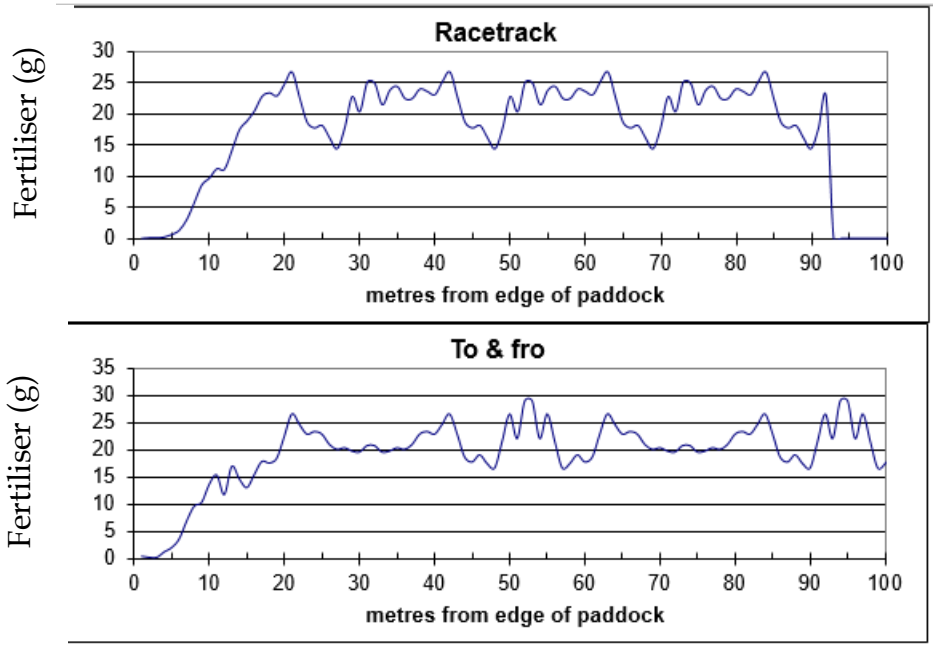

Figure 4: Fertiliser deposits across the field with bout width of 21m.

This is not an Accu-Spread certification. Accu-Spread certification is available to professional contractors whose operators hold a Fertcare Level A certificate (Product Knowledge and Spreading) along with independent testing of their equipment by an authorised Accu-Spread tester. Go to www.fertcare.com.au

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KUHN SPREADER

Results Test 1: Drop point 5.5
Fertiliser - Urea

ID	9	Spinner RPM	PTO 560
Date	16-Sep-17	Spinner type	S6 DP5.5
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-0
Truck make	KUNN	Truck Rego	

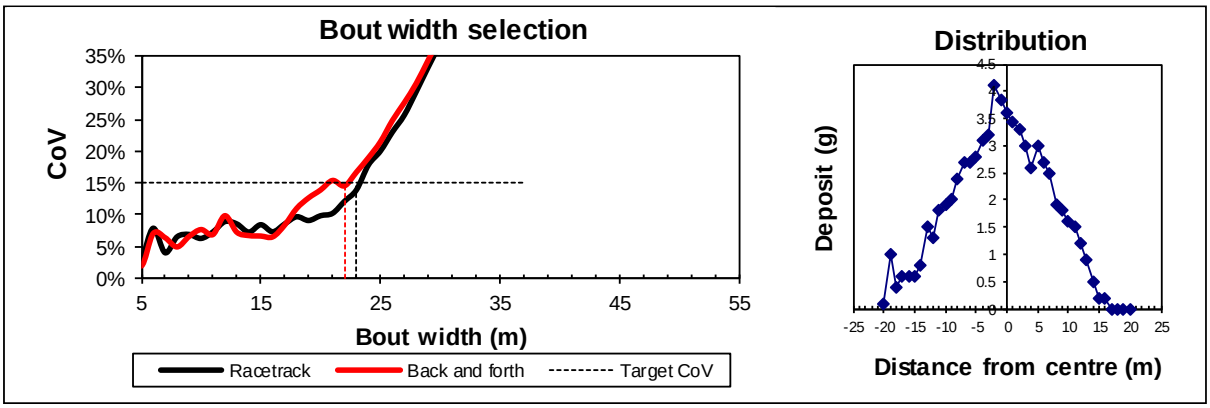

Figure 1: Bout Width Selection*

Figure 2: Distribution

*The bout width is the distance between spreader runs

The machine as tested, can be operated at any width where the graph line is below the 15% coefficient of variation (CoV) (Figure 1) and still achieve an acceptable level of variation across the spread pattern. That is, the bout width up to 22m for the Back and Forth driving pattern and 23m for the racetrack (Figure 1). The Grower wants to spread to 24m so his Kuhn Spreader only has S6 spinners on it. The maximum you will get out of S6 spinners is 30m. It is currently running at a drop point of 5.5, 560Revs on PTO shaft which spreads to 22-23m.

Accu-Spread graphs explained

Figure 1 plots the Coefficient of Variation (CoV) against the bout width. The bout width is the distance between spreader runs to provide an overlap for even application of fertiliser. The CoV is provided for two driving patterns, race track and back and forth across the field. When the race track pattern is employed, opposite sides of the spreader discharge are overlapped ie the right discharge gets placed on top of the left discharge. For back and forth driving pattern, the spreader discharge from the same side is overlapped ie the right discharge gets placed on top of the right discharge (refer Figure 3).

The distribution graph (Figure 2) show the evenness of spread in a single pass behind the machine. The zero on the horizontal axis represents the centre line of the spread and each point on the graph is the amount of fertiliser dropped into the trays either side of the centre line. Typically, a single pass of a broadcast spreader produces higher application rates close to the centre line and lower rates further away from the centre line of spread. An even application across the field is achieved by overlapping the spread pattern of the previous run (Figure 3).

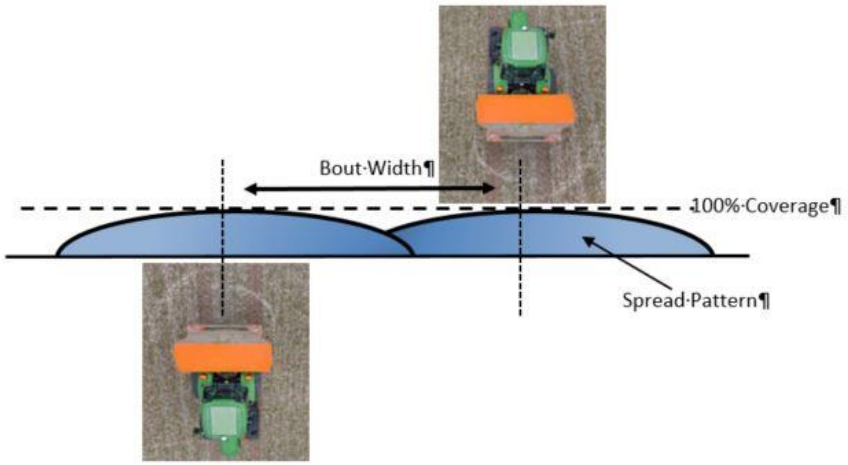

Figure 3: Bout width and shape of spread pattern with overlaps to achieve an even spread of fertiliser across a field.

Test 2: Drop Point 6.5

ID	9	Spinner RPM	PTO 560
Date	16-Sep-17	Spinner type	S6 DP6.5
Fertiliser type	UREA	Tag number	
Fertiliser rate	100 kg/ha	Screen test%	2-60-38-0
Truck make	KUHN	Truck Rego	

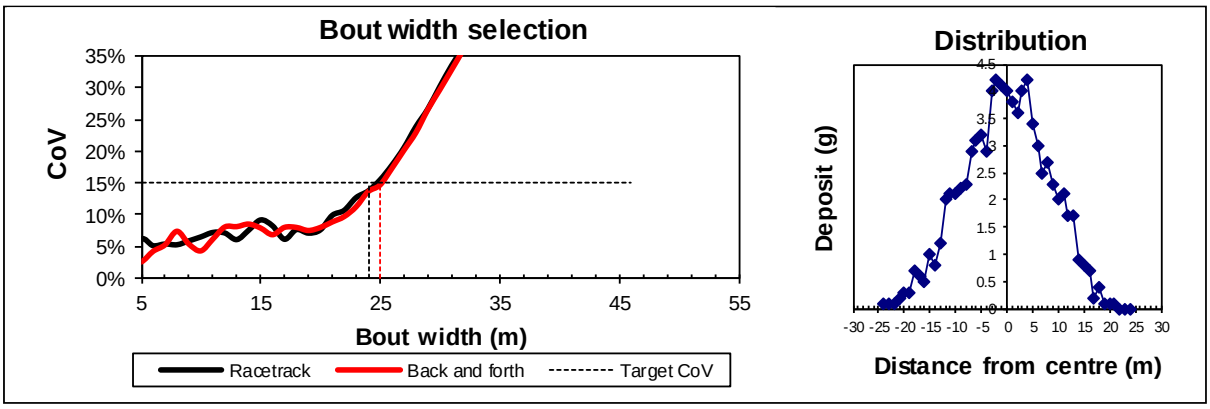

Figure 4: Bout width selection

Figure 5: Distribution

The drop point was changed to 6.5 to get a little bit more width (5.5 to 6.5, 10-15mm on the scale) and the test came up with a bout width of 24-25m (Figure 4). All the difference is just a little bit more width across the top of the pyramid (flattened out the top a little) as shown on Figure 5. The further you move the drop point, the more the point on the graph will flatten out and throw fertiliser wider, up to a drop point of 9 (Kuhn has a drop point scale from 1 to 10) then you have to go to the next sized spinner and start back at a drop point of zero again. S6, S10 or S12 is all the spinner sizes you would need, don't need S8. Push S6 to 30m, then S12 would go out to about 39m.

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