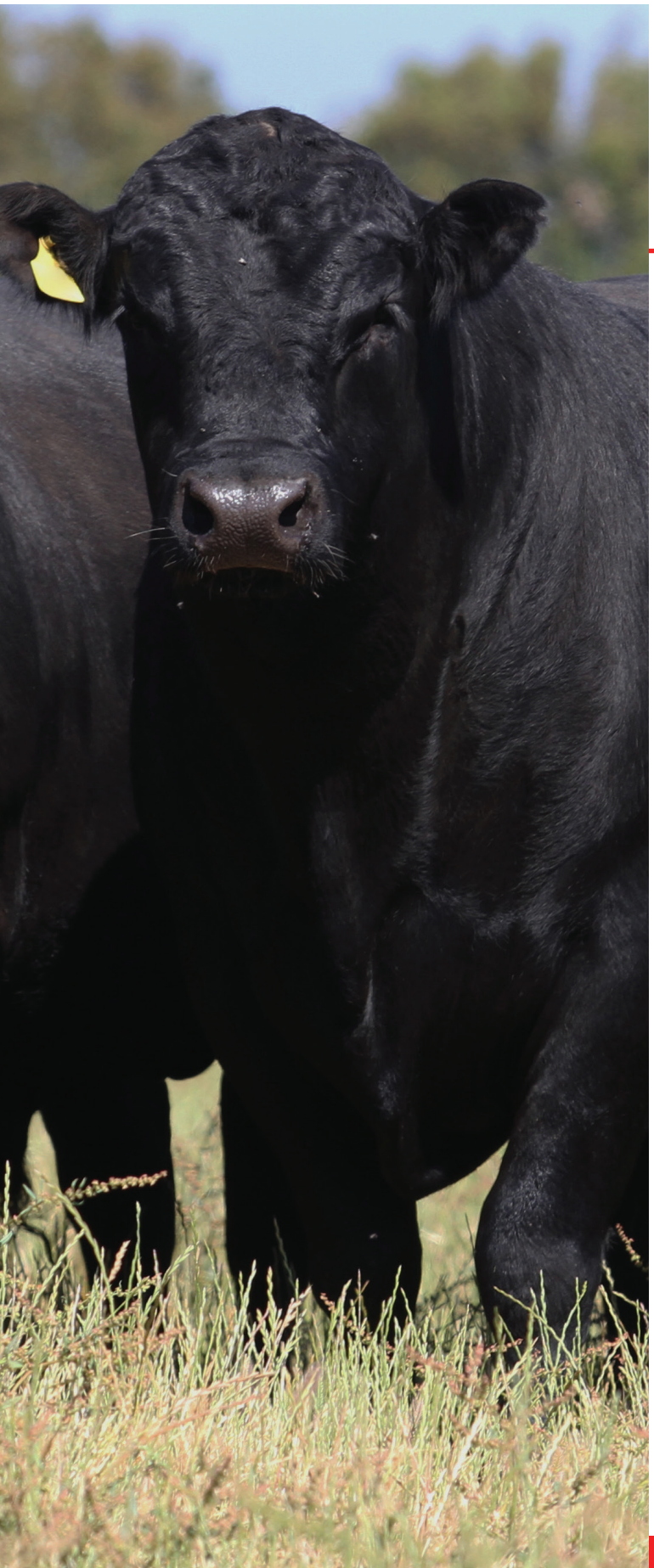
MateSel

An educational guide for
Australian Angus breeders

ANGUS
AUSTRALIA

MAKE THE MOST OF YOUR MATING DECISIONS WITH MateSel



WHAT IS MATESEL?

MateSel stands for Mate Selection — a powerful tool developed by Brian and Sandy Kinghorn, to support structured, data-driven mating decisions. MateSel is used across a range of livestock industries globally and is now increasingly applied in Australian beef breeding, including the Angus breed.

MateSel takes the hard work out of balancing genetic gain and inbreeding by helping breeders generate an optimised list of suggested and backup matings based on their herd data and specific breeding goals.

UNDERSTANDING THE AIMS OF A BREEDING PROGRAM

Modern breeding programs are built around the challenge of balancing several key goals:

- **Genetic improvement** of economically important traits
- **Improved uniformity**, creating more consistent performance and product quality for end consumers
- **Genetic diversity**, ensuring continued genetic progress across generations

To achieve these aims, structured programs often concentrate selection pressure on a small number of elite animals. While this approach can accelerate short-term gains, it also leads to a greater accumulation of relatives within the herd. Over time, this reduces genetic variation — limiting future selection options and potentially limiting long-term genetic progress.

The solution lies in managing genetic diversity, while still making gains in the traits that matter. This is one of the most difficult but essential parts of breeding program design.

Traditionally, planning matings to achieve this balance has been time-consuming and complex, requiring manual sorting, spreadsheet modelling, and subjective judgment. MateSel simplifies this process — delivering quick, data-driven solutions that consider all available pedigree, EBV, and selection index information.

MateSel is specifically designed to help breeders navigate the competing priorities of genetic gain, inbreeding control, trait improvement, and herd structure — providing an optimal balance to support long-term, sustainable genetic gain.

BENEFITS OF MATESEL FOR ANGUS BREEDERS

Set your breeding direction with confidence: Nominate the Selection $Index that best reflects your production system, and include additional traits for further optimisation.

Maximise genetic gain while managing inbreeding: Achieve faster progress without compromising long-term genetic gain and consider genetic condition frequencies alongside inbreeding as well.

Make data-driven decisions: MateSel objectively uses pedigree, EBVs and selection indexes to inform optimal mating outcomes.

Save time and streamline planning: Eliminate hours spent compiling mating lists manually or juggling spreadsheets.

Optimise your genetic investment: MateSel supports smarter decisions around semen purchases, backup sire selection, and culling or retention of females.

Stay in control: You set the breeding objectives; MateSel finds the best path to achieve them.

HOW MATESEL HANDLES COMPLEXITY

MateSel allows you to incorporate a range of real-world constraints and opportunities into your mating decisions, such as:

- Available sires and females
- Semen straw availability for AI sires
- Incorporating current catalogued sale bulls
- Number of matings to be made per female or male
- Considering embryo transfer programs
- Paddock groupings and joining structure
- Backup natural service sire use

PROGENY INDEX AND GENETIC DIRECTION

MateSel doesn't just help you select sires and dams — it gives insight into **long-term herd direction.**

The Progeny Index
The Progeny Index reflects the average genetic merit of the next generation based on your mating decisions.

MateSel's analysis considers multiple objectives simultaneously:

- Trait improvement (e.g., Carcase Weight, Days to Calving, IMF)
- Avoidance of genetic conditions
- Minimisation of inbreeding
- Logistical constraints (e.g., mob structure)

COANCESTRY: A BETTER WAY TO MANAGE INBREEDING

While inbreeding coefficients tell you how closely related the parents of an individual are, coancestry tells you how related the herd is — and that's the real lever for managing long-term inbreeding.

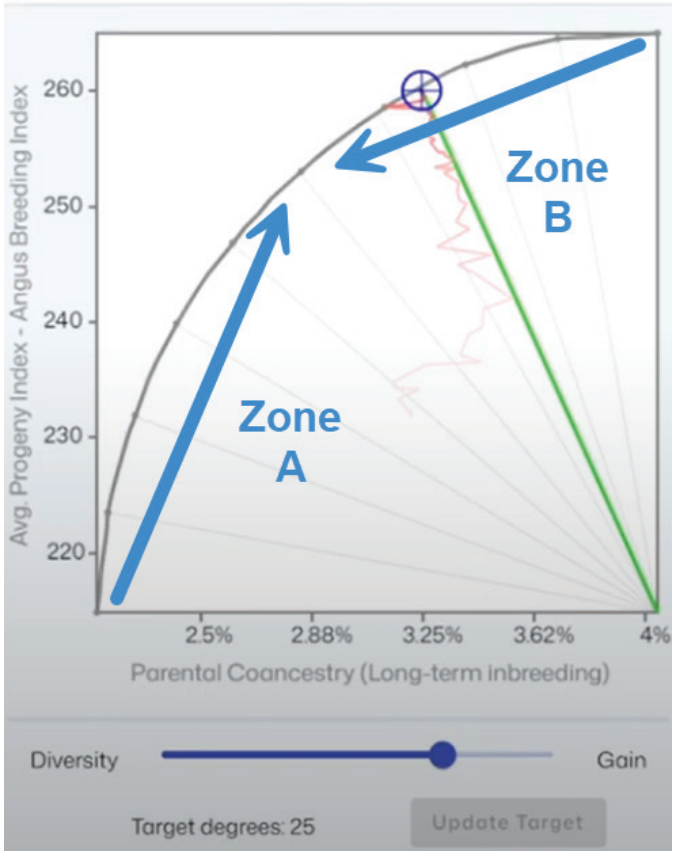
Example: A sire with a moderate inbreeding value, but no relation to your cows, may result in zero inbreeding in their progeny. However, using that sire extensively will make the next generation highly related, limiting your future mating options.

MateSel uses parental coancestry to manage genetic relationships across the herd. It's a more effective way to safeguard future genetic diversity and genetic gain.

VISUALISING THE FRONTIER OF GENETIC IMPROVEMENT

MateSel helps breeders visualise the trade-off between genetic gain and inbreeding.

- The Frontier (black line) shows the maximum genetic progress possible at different coancestry levels.
- The Crosshair (blue) indicates your herd's current balance of genetic gain vs inbreeding.
- The Red Trail shows how MateSel reached its final solution.
- In most cases the most favourable optimisation of gain and diversity is toward the top left of the graph, between Zone A and Zone B.
- Zone A represents potential solutions where very little increase in future inbreeding results in a relatively large increase in progeny genetic merit. Zone B represents potential solutions where a large increase in future inbreeding results in relatively little further increase in progeny genetic merit.



TRAIT MANAGEMENT TOOLS

MateSel includes trait management options that let you apply emphasis to specific EBVs — for example:

- Increasing Carcase Weight or IMF
- Reducing Days to Calving
- Maintaining moderate Birth Weight

You can even set minimum, maximum or average EBV thresholds — for example, ensuring no progeny from your matings have Carcase Weight EBVs below 15kg. The tool visually shows the average parental values vs the expected progeny outcomes, so you can easily assess the impact of your strategy.

ACCESSING MATESEL THROUGH ANGUS AUSTRALIA

As MateSel optimises the genetic merit of the mating based on the nominated $Index, EBV and pedigree information, MateSel can only be utilised by Angus Australia members which are enrolled in TACE. Additionally, it will only be available for the use with registered animals which have EBVs and $Index values available.

Free for the 2025 Spring Mating Season
To support members in exploring this innovative tool, MateSel is free to use for the upcoming 2025 spring mating season. From 2026, it will be offered as a fee-for-service product.

This is a valuable opportunity to try MateSel and see how this technology can enhance your herd's genetic progress—whether you're targeting specific traits or seeking balanced, long-term improvement.

HOW IT WORKS

WATCH THE VIDEO

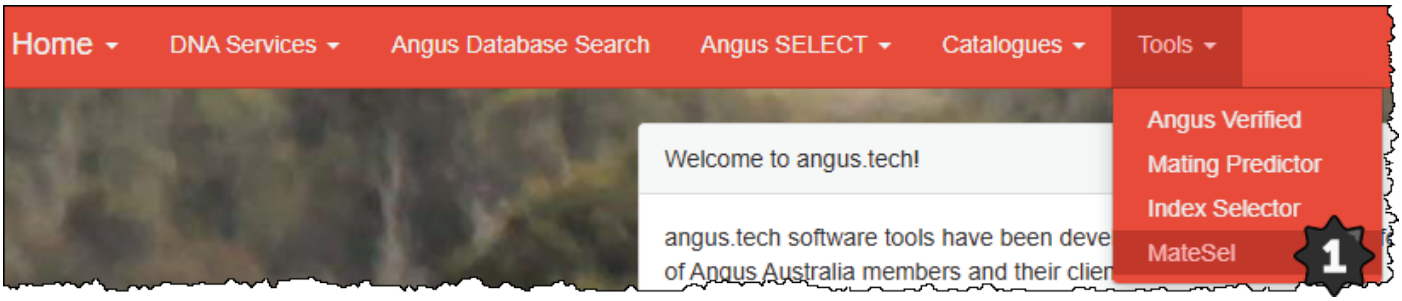
MateSel generates optimal mating recommendations tailored to your own herd and breeding objectives for a list of candidate animals based on information and trait parameters set by you.

MateSel puts you in the driver's seat. Through an interactive graphical interface, you guide the program towards the solutions that suit your herd. If the initial plan doesn't align with your vision, you can adjust the parameters — "move the goalposts"—and MateSel will generate a new plan that reflects this updated direction. Ultimately, you make the decisions—not the program—but MateSel does the hard work behind the scenes.

THE PROCESS INVOLVES:

Login to Angus.Tech

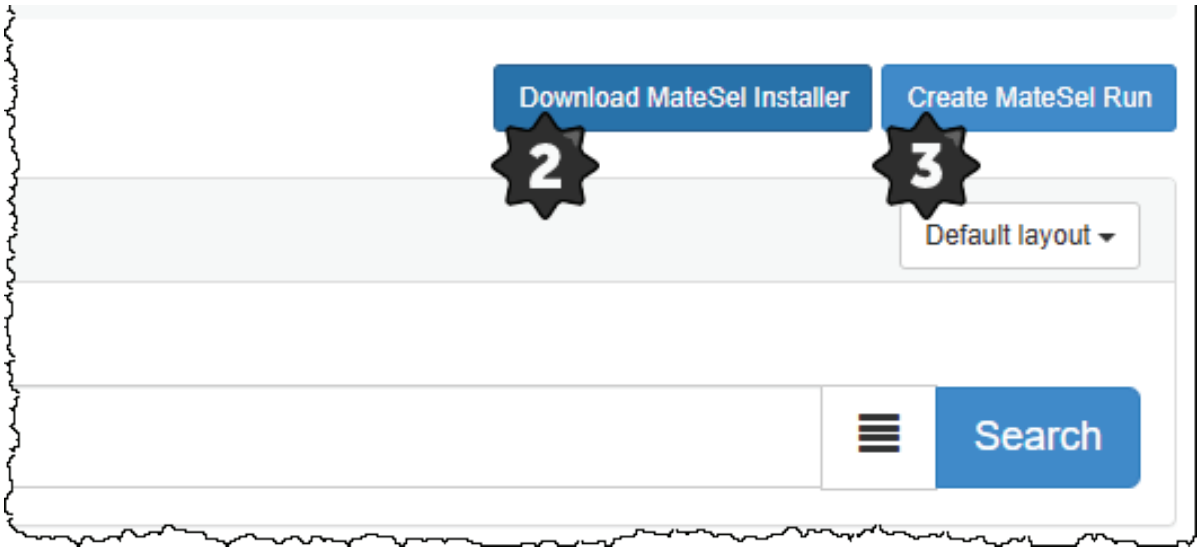
1. Access MateSel under the Tools dropdown menu



2. First time users will need to select: **"Download MateSel Installer".** This will download MateSel which you need to install on your computer. Follow the prompts and close the window at the end of the installation process.

CREATING A MATESEL RUN

3. Select the **"Create a MateSel Run"** button. This will create a pop-up window which will allow to select your candidate animals.



4. Selecting Candidate Animals

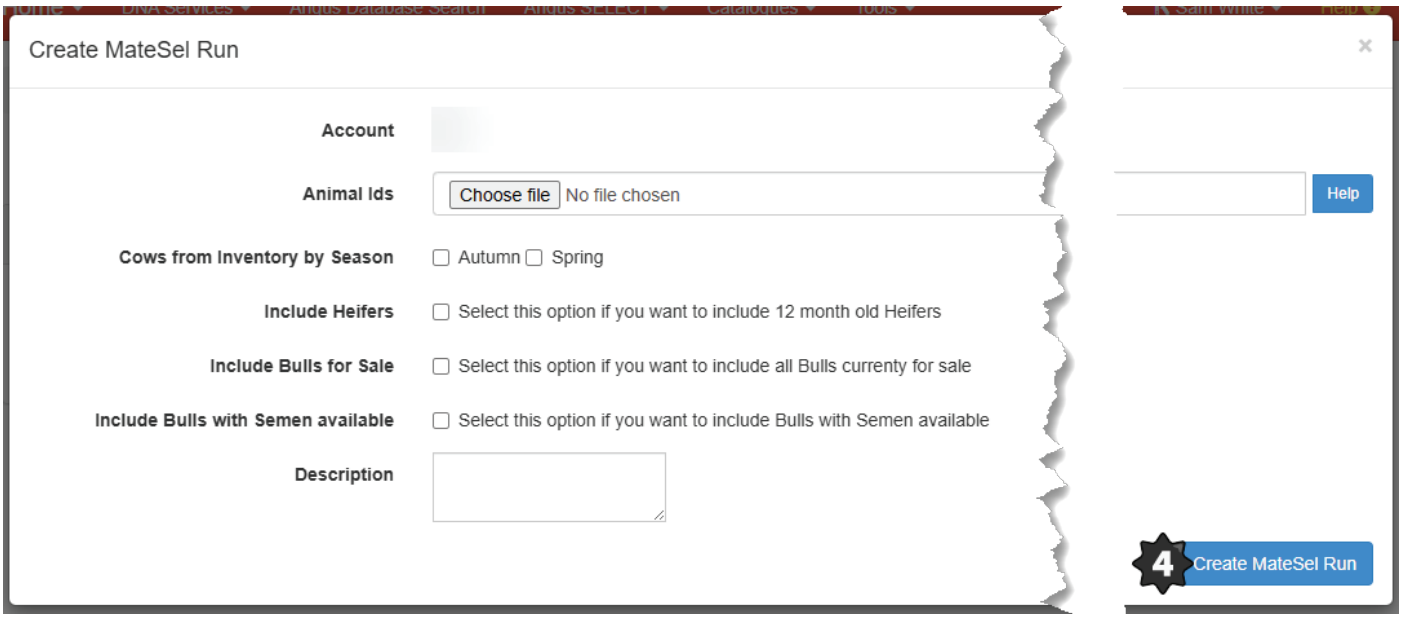
a. **Import Animals** – a file containing IDs of cows and bulls you wish to include in the MateSel extract. For further information on how to structure this file see the **"Help" button**.

Please note: Any cows in the list must be in your ownership to be extracted.

b. Tick Boxes – Select active within either your autumn or spring inventory, whether you wish for heifers to be included or not, and whether you wish to include semen sires and/or sale bulls.

c. Description – This is the naming field, allowing for traceability if you wish to review results again in the future.

d. Creating a MateSel Run – Once all candidate animal details are supplied, select "Create MateSel run" to complete the data transfer process. A pop-up window will provide you with the progress of the data transfer process between Angus.Tech and MateSel.

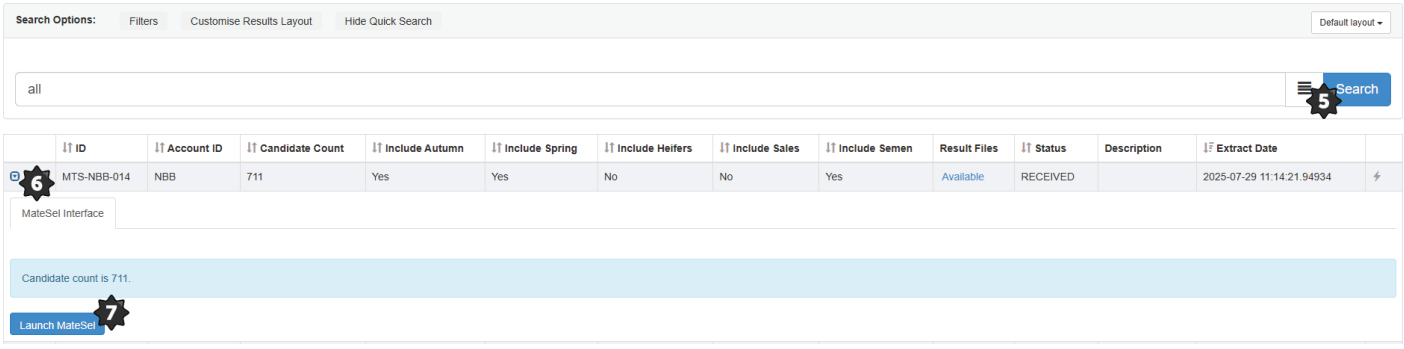


LAUNCHING MATESEL

5. Select "Search" to open all your MateSel Runs.

6. To display the launch MateSel button, click the arrow on the left-hand side of the corresponding run you which to open.

7. Select "Launch MateSel". A new MateSel run window will open on your computer. Defining a breeding objective (Basic Settings)

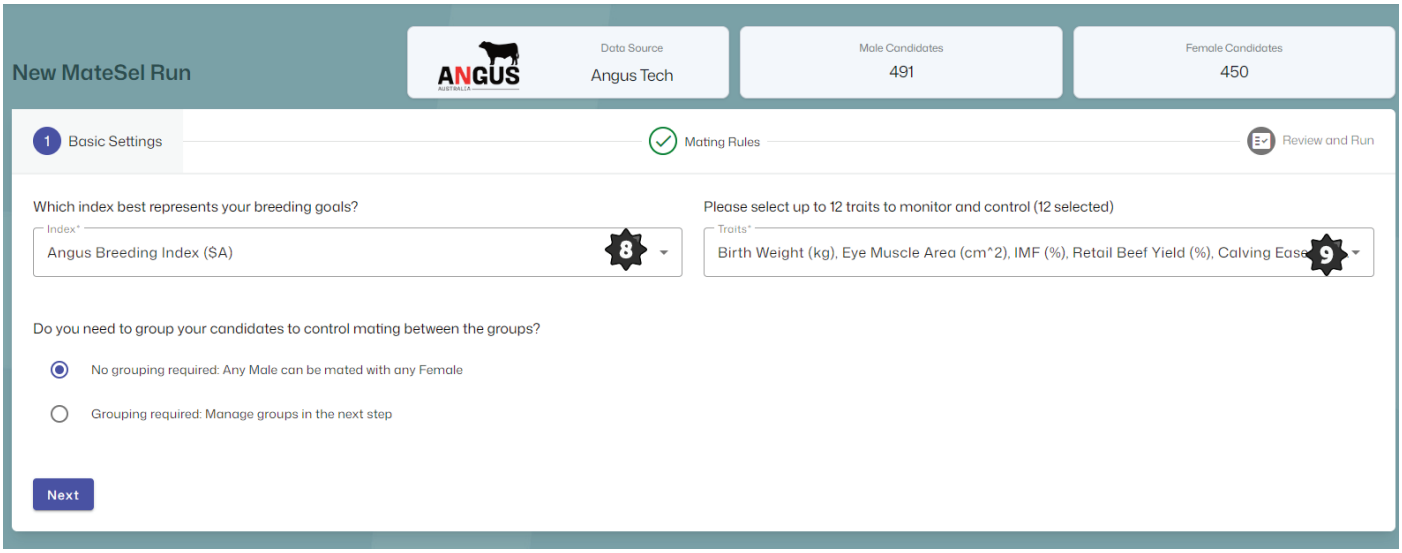


DEFINING A BREEDING OBJECTIVE (BASIC SETTINGS)

8. Select the most suitable selection index for your breeding herd that will be used for the optimisation of matings, e.g. $A, Angus Breeding Index.

9. Select up to 12 traits to monitor and show progeny distributions for. Click on the list of traits at the top to close the dropdown list and show the "Next" button.

Select the "Next" button.



DEFINING MATING RULES

10. Number of Matings Required: Enter the number of matings required, this will automatically populate with the number of dams in the file. However, it can be reduced (considering females to cull) or increased (considering potential donor dams).

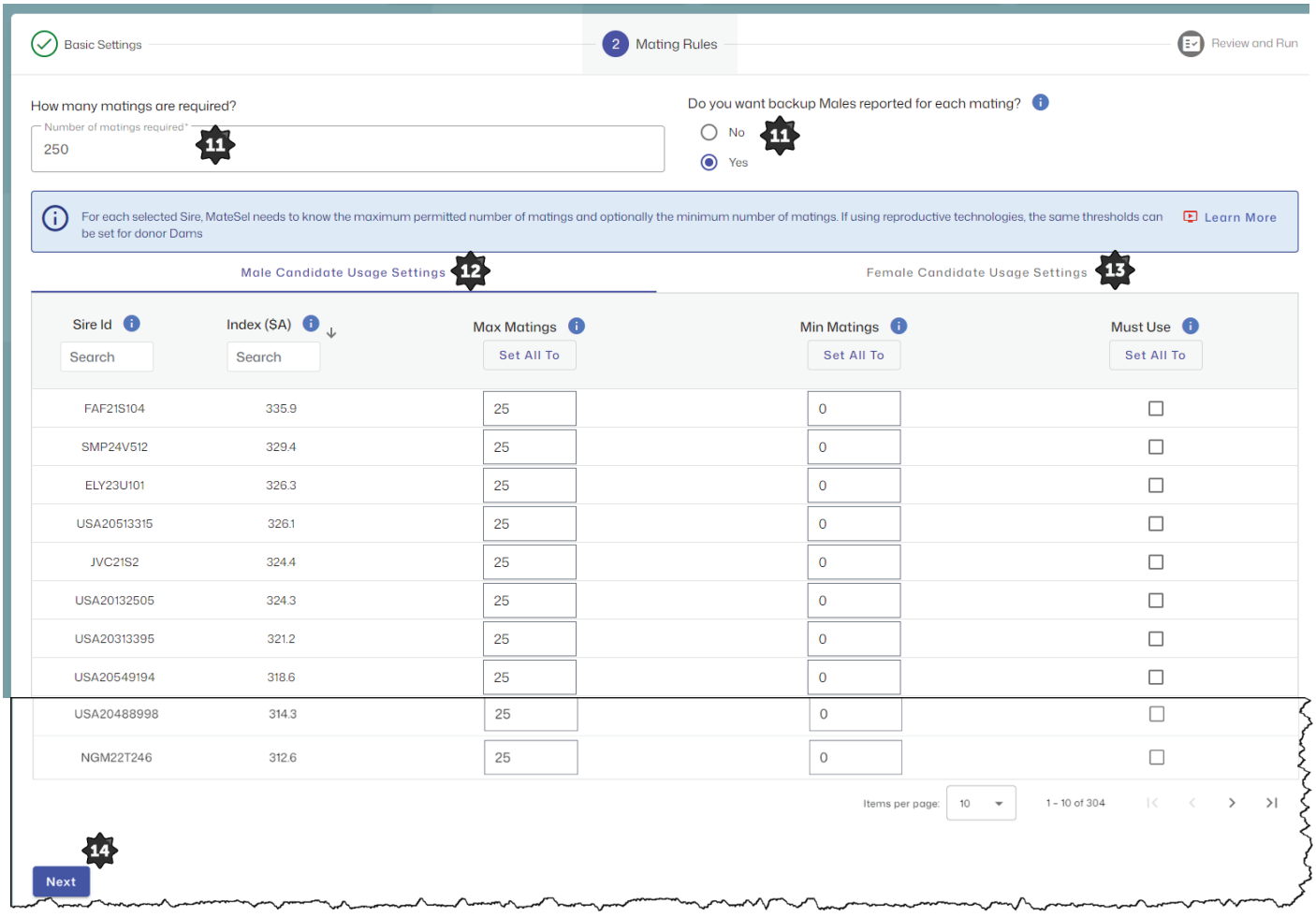
11. Backup (replacement) bulls: MateSel provides 4 alternative options, in addition to the optimised mating. If you would like additional backup (replacement) bulls, select "Yes".

12. Male Candidate Usage Settings: It is possible to add maximum, minimum and must-use criteria for individual bulls. Additionally, these criteria can also be applied to all via the "Set all to" buttons.

Tip: This is useful where you have certain bulls you would like to ensure their use within this mating season e.g. semen straws to be used or certain natural bulls.

13. Female Candidate Usage Settings: Select whether you will be using reproductive technology. If using either IVF or MOET, it is possible to add maximum, minimum and must-use criteria for individual females as well. Again, these criteria can also be applied to all via the "Set all to" buttons.

14. Select the "Next" button at bottom of page.

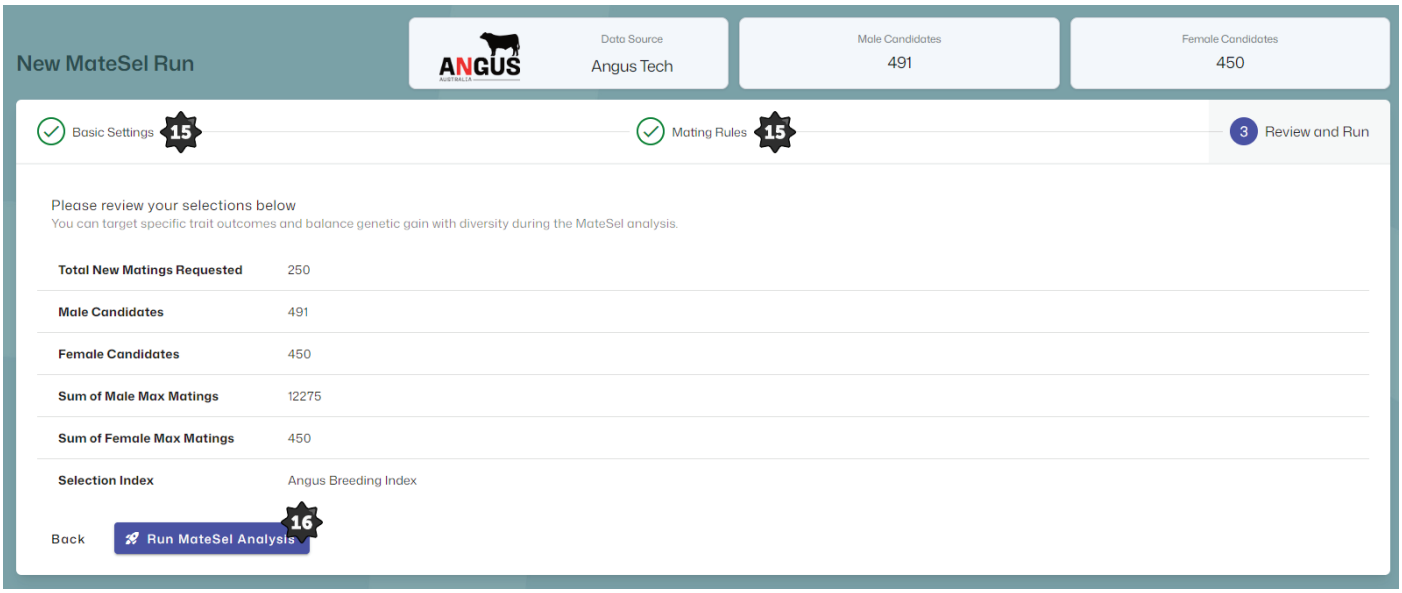


REVIEW AND RUN

15. Review your criteria applied and confirm selections.

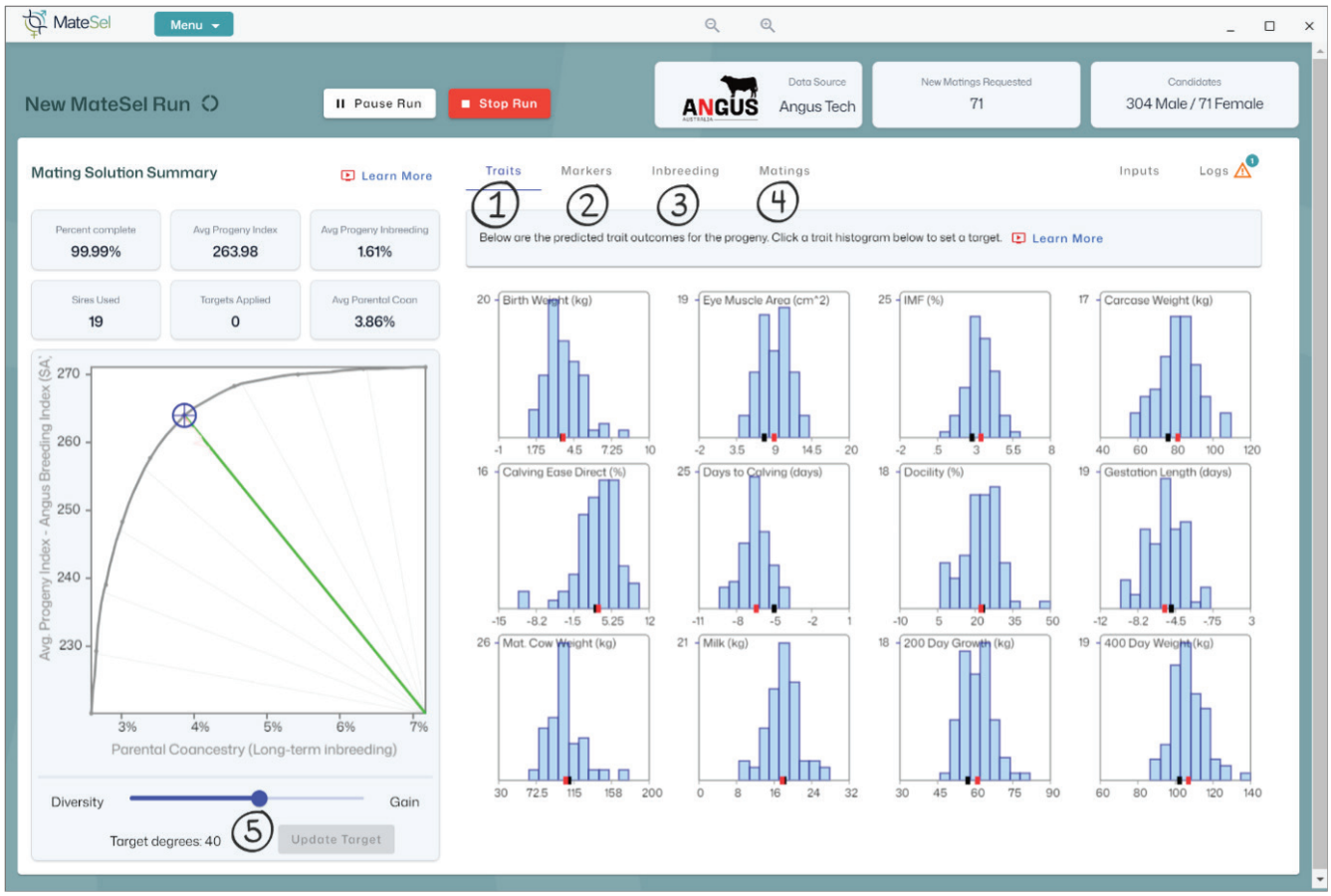
- If you would like to make changes, select “Basic Settings” or “Mating Rules”.

16. To start MateSel run, select “Run MateSel Analysis”



MATESEL ANALYSIS

After some data preparation the analysis will start and display the following window which display the frontier and progeny trait distributions.



Dashboard results:

i. Percent Complete: Indicates the percentage of completion for the run. Criteria for stopping the run are set to 99%, however, if at any stage you are happy with the results, you can also select the "Stop Run" red button.

ii. Average Progeny Index: Displays the mean index value for the selection index originally selected in Step 5. "Defining a Breeding Objective (Basic Settings)".

iii. Average Progeny Inbreeding: Displays the mean inbreeding coefficient of the progeny as a percentage value.

iv. Sire used: Displays the number of sires utilised from the list of candidates.

v. Targets applied: Displays the number of targets or criteria supplied to MateSel to refine the breeding objective.

vi. Average Parental Co-ancestry: Displays the mean level of co-ancestry between the selected parents from the candidate list.

Reviewing analysis results, to view select the corresponding tab.

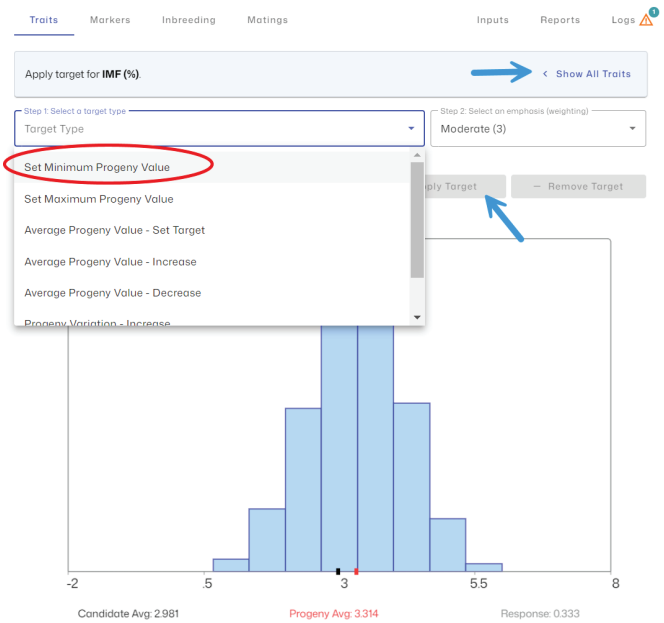
1. Traits – Displays the distribution of the EBVs of the resultant progeny for the 12 traits selected in step 5. "Defining the Breeding Objective (Basic Settings)". The black marker indicates the progeny mean based on random mating, the red marker indicates the shift as a result of MateSel optimised mating selection.

(Note. These estimates are the expected mean of progeny and do not guarantee the EBV result of the resulting progeny).

Adding additional trait targets:

To add an additional target to one of the traits, select the corresponding histogram. Then choose the Target Type (e.g. minimum, maximum or average progeny values) and the emphasis (weighting). To apply the new target, select "Apply target".

To return to the view with all 12 traits, select "Show all Traits".



2. Markers – Displays the distribution of the Genetic conditions of the resulting progeny. For:

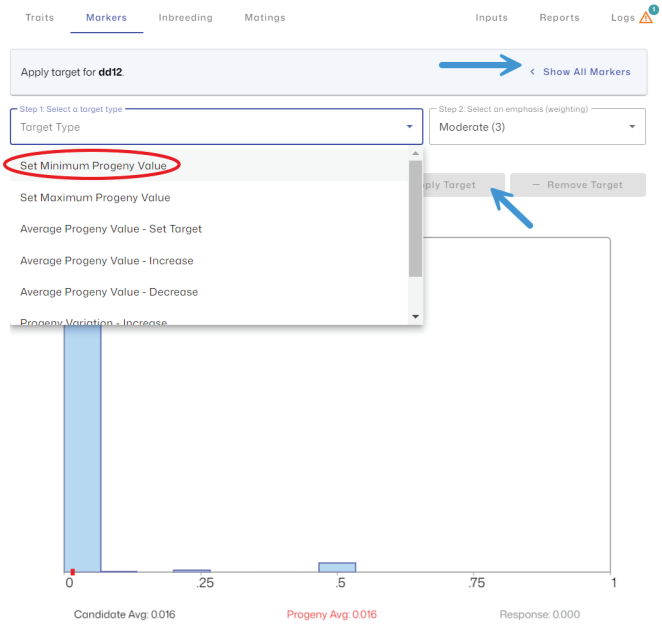
- Free progeny, displayed as 11
- Carrier progeny, from dam, displayed as 12
- Carrier progeny, from sire, displayed as 21
- Affected progeny, displayed as 22

The black marker indicates the progeny mean based on random mating, the red marker indicates the shift as a result of MateSel optimised mating selection.

Adding additional marker, or genetic condition constraints:

To add an additional target to one of the markers (genetic conditions), select the corresponding histogram. Then choose the Target Type (e.g. minimum, maximum or average progeny values) and the emphasis (weighting). To apply the new target, select "Apply target".

To return to the view with all markers or genetic conditions, select "Show all markers".



3. Inbreeding – Displays the distribution of the inbreeding coefficients of the resulting progeny.

The green marker indicates the progeny mean based on random mating, the red marker indicates the shift as a result of MateSel optimised mating selection.

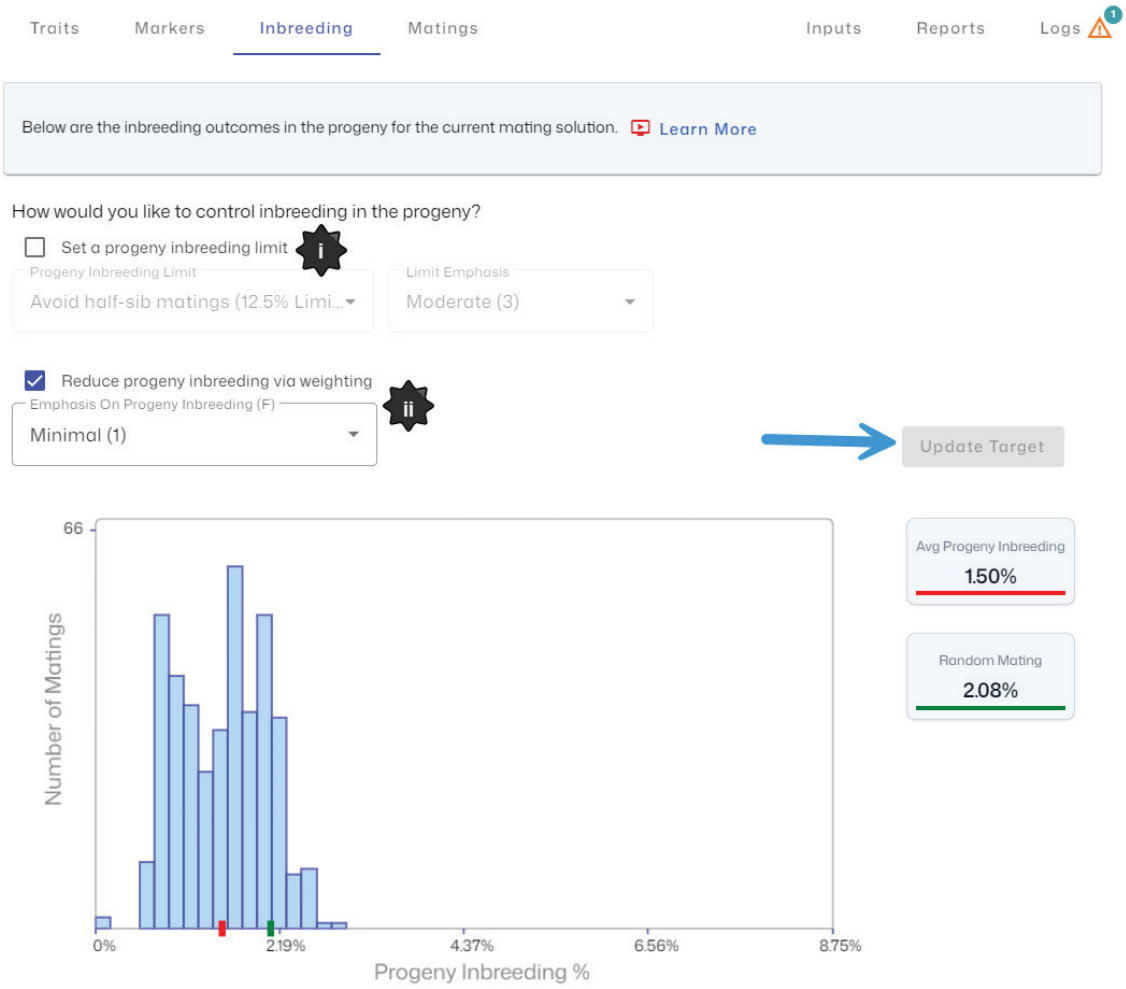
Adding additional inbreeding constraints:

There are 2 methods for controlling inbreeding in the progeny:

i. Set a progeny inbreeding limit: Either enter into field or manually select on the histogram. Then add the emphasis level.

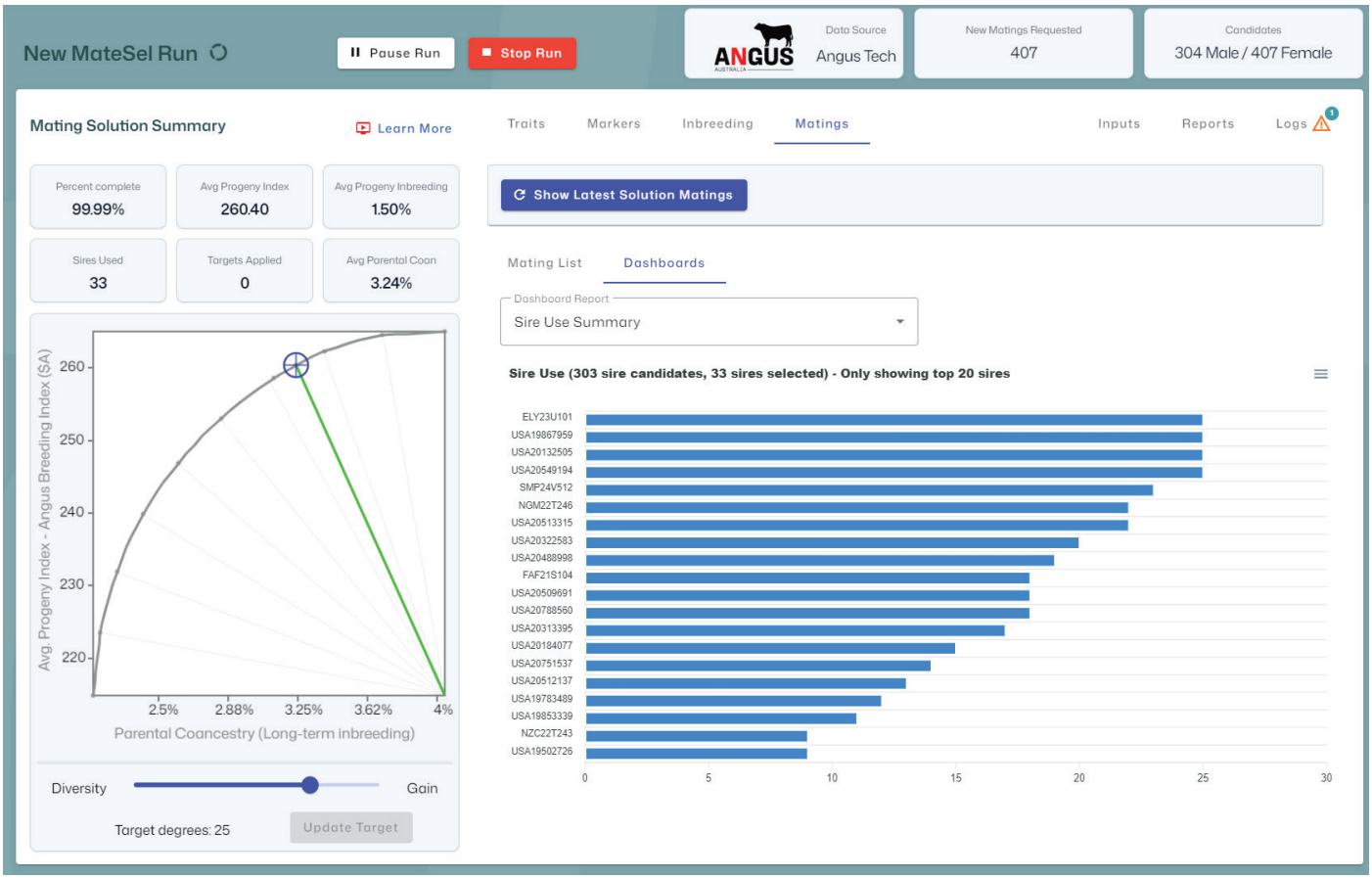
ii. Reduce progeny inbreeding via a weighting: Place additional emphasis on the reduced of progeny inbreeding. Select your emphasis level.

Once you have determined your new refined target, select "Update Target".



4. Matings – Provides:

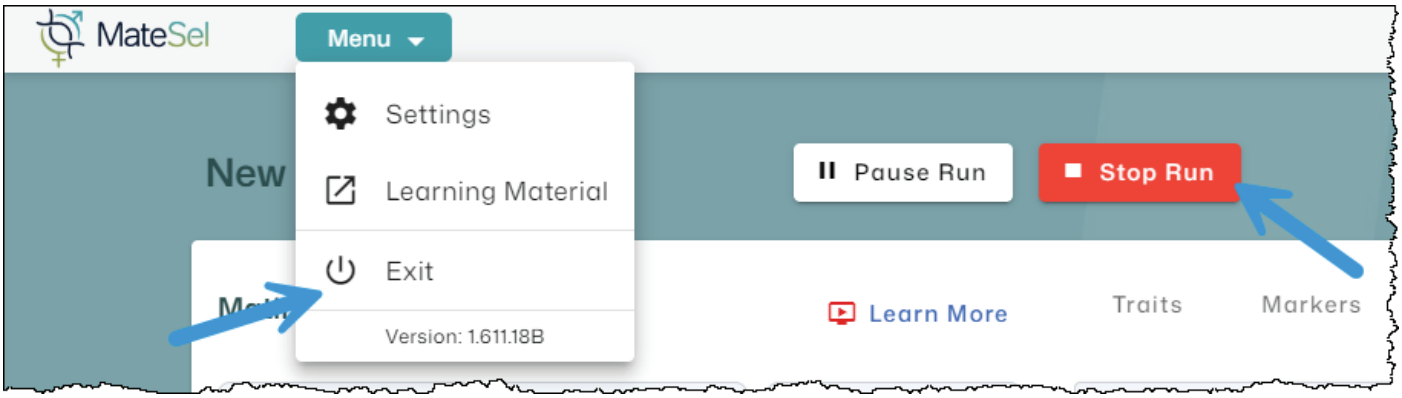
- Mating List – Provides a list of the optimised matings, with males, females, the estimated resulting progeny's selection index and inbreeding coefficient (Note. These estimates are the expected mean of progeny and do not guarantee the Selection index result of the resulting progeny).
- Dashboards – Provides simple dashboard reports e.g. sire use summary



5. Target Degrees – This slider bar allows you to manage your optimisation towards genetic gain or genetic diversity. Once you have determined your new optimum balance select "Update Target" to rerun the MateSel analysis with this updated target.

EXIT MATESEL & COMPLETE RUN

Once you are happy with your matings, hit stop run, and then close the MateSel window by clicking on "Menu" and the "Exit".

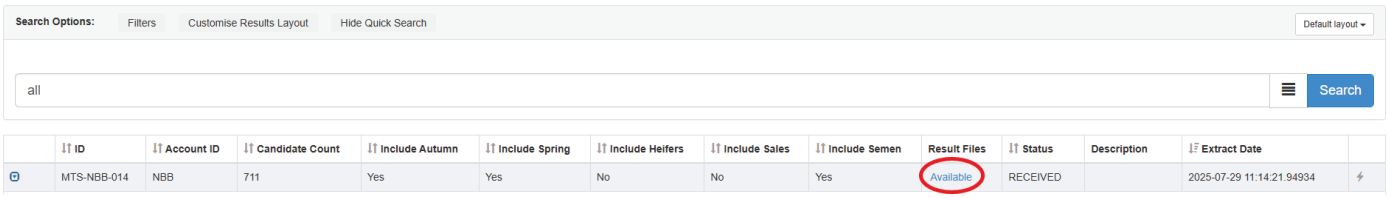


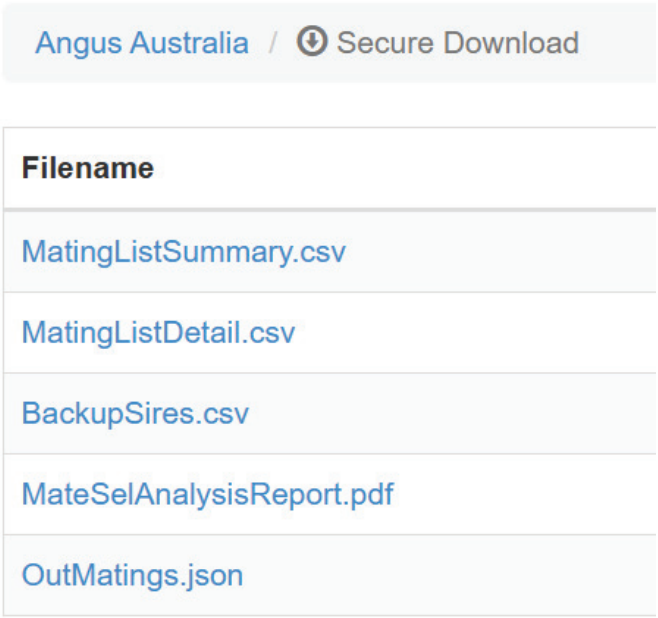
ACCESSING YOUR MATING RESULTS

Once the analysis is run, MateSel provides a suggested mating list that balances your targets with inbreeding management and shows your expected herd progress. These are located in the Matings tab of the result dashboard and additionally will be available in Angus.Tech once you have stopped the run or it is completed.

Result Files – Provides downloadable csv and pdf reports.
- Mating List Summary (csv)
- Mating List Detail (csv)
- Backup Sires (csv)
- MateSel Analysis Report (PDF)

The result files are available via in Angus.Tech by clicking on the "Available" link in the 'Results Files' column.





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