ANGUS HeiferSELECT

An advanced genomic tool to inform the selection of replacement heifers for commercial Australian Angus breeders

Angus AUSTRALIA

CSIRO

A product of Angus Australia, developed with CSIRO and delivered in collaboration with Zoetis and Neogen

zoetis

NEOGEN Australasia

DEVELOPED FOR AUSTRALIAN ANGUS CATTLE

What is Angus HeiferSELECT

Angus HeiferSELECT is a genomic selection tool to help inform the selection of Angus replacement females (87.5% Angus content or greater) in a commercial beef breeding operation.

Angus HeiferSELECT provides:

- Genetic predictions for thirteen (13) maternal, growth, feed intake, carcase and resilience traits
- Genetic prediction for cow-calf value, feedlot-carcase value and total breeding value (with star rating)
- Angus BreedCHECK - genomic breed composition prediction
- Sire assignment*

Angus HeiferSELECT complements other sources of information that may be used in commercial replacement heifer selection, such as phenotypic evaluation, age, weight and pedigree information, and provides valuable insight into the genetic potential of heifers, particularly for traits that are otherwise difficult, time consuming or expensive to measure using traditional methods.

* Optional – Possible sires must be registered with Angus Australia and have genomic profiles available

Benefits of Angus HeiferSELECT

Angus HeiferSELECT facilitates superior selection decisions when managing the genetics in a commercial Angus beef breeding enterprise.

• Selecting Replacement Females

Identify females who possess genetics that are most aligned with your breeding objective, and who are the most suitable to retain as replacement heifers.

• Culling Decisions

Identify females that are genetically inferior and who are the best choice for culling

• Understanding Breed Composition

Utilise Angus BreedCHECK information to understand the breed composition of your potential replacement heifers

• Inform Bull Purchasing Decisions

Utilise results from heifers tested with Angus HeiferSELECT to better understand the genetics in your herd, and identify the priorities for your next bull purchasing decision.

• Understanding Bull Reproductive Performance

Use sire information to identify those bulls in your sire team that have produced low numbers of progeny, and remove these bulls from your breeding program.

• Management of Inbreeding

Use sire information to avoid inbreeding and the associated depression in performance

• Marketing Decisions

Utilise results from heifers tested with Angus HeiferSELECT to help inform commercial marketing opportunities of surplus heifers or future steer progeny

• Compatible with BVDV Testing

Add-on BVDV testing facilitates the identification of animals persistently infected with Bovine Virus Diarrhoea Virus (also known as Bovine Pestivirus)

DEVELOPED IN AUSTRALIA, BY AUSTRALIANS, FOR AUSTRALIAN ANGUS CATTLE

Through utilisation of Angus Australia's genomic and phenotypic database, Angus HeiferSELECT provides the most accurate genetic predictions possible for the selection of commercial Australian Angus females.

Angus HeiferSELECT genetic predictions are calculated based on analysis of Angus Australia's extensive genomic and phenotypic database. Collated over many years, this database combines the DNA profiles of Australian Angus animals with comprehensive performance measurements collected in Australian beef production systems.

Modern scientific knowledge, developed by CSIRO, enables the association between the DNA profiles and performance measurements to be analysed, and genetic predictions to be calculated from the DNA profiles of the heifers tested with Angus HeiferSELECT.

Understanding Angus HeiferSELECT Results

Angus HeiferSELECT provides genetic predictions for thirteen (13) maternal, growth, feed intake, carcase and resilience traits, along with genetic prediction for cow-calf value, feedlot-carcase value and total breeding value (with star rating).

Angus HeiferSELECT genetic predictions are reporting using an intuitive 0 – 100 scoring system, with a score of 50 representing the average genetic merit of commercial Angus heifers tested with the Angus HeiferSELECT product.

Higher values identify females carrying genetics that will produce "more" of a trait, which may or may not be preferred, subject to your breeding objective. For example, a female with a Yearling Weight genetic prediction of 80 would be expected to produce progeny that are heavier at 13-14 months of age than a female with a Yearling Weight genetic prediction of 30, all other things being equal.

	Trait	Description
Cow-Calf Traits	Calving Ease	Higher Calving Ease (CE) genetic predictions indicate the animal is expected to experience lower birth weight and fewer calving difficulties (i.e. greater calving ease).
	Weaning Weight	Higher Weaning Weight (WW) genetic predictions indicate the animal is expected to produce progeny with heavier live weights at 200 days of age, due to superior growth potential.
	Milk	Higher Milk genetic predictions indicate the animal is expected to produce progeny with heavier live weights at 200 days of age, due to superior maternal attributes (i.e. more milk).
	Yearling Weight	Higher Yearling Weight (YW) genetic predictions indicate the animal is expected to produce progeny with heavier live weights at 400 days of age.
	Mature Cow Weight	Higher Mature Cow Weight (MCW) genetic predictions indicate the animal is expected to have a heavier weight at 3.5 years of age, and produce female progeny that are heavier. Heavier mature weights are associated with higher feed and maintenance costs, but conversely higher returns for cull cows.
Feedlot Traits	Average Daily Gain	Higher Average Daily Gain (ADG) genetic predictions indicate the animal is expected to produce progeny with higher rates of weight gain during feedlot finishing, due to superior growth potential.
	Daily Feed Intake	Higher Daily Feed Intake (DFI) genetic predictions indicate the animal is expected to produce progeny that eat more during feedlot finishing, and may be considered less efficient.
Carcase Traits	Carcase Weight	Higher Carcase Weight (CW) genetic predictions indicate the animal is expected to produce progeny with heavier carcase weights.
	Eye Muscle Area	Higher Eye Muscle Area (EMA) genetic predictions indicate the animal is expected to produce progeny with more muscle and larger eye muscle area.
	Rib Fat	Higher Rib Fat (RIB) genetic predictions indicate the animal is expected to produce progeny with greater fat depth.
	MSA Marbling	Higher MSA Marbling (MBL) genetic predictions indicate the animal is expected to produce progeny with higher marbling scores and more intramuscular fat
	Ossification	Higher Ossification (OSS) genetic predictions indicate the animal is expected to produce progeny with higher levels of ossification, or physiological maturity, in the carcase which is antagonistic to eating quality.

	Trait	Description
Resilience	ImmuneDEX	Higher ImmuneDEX (IMM) genetic predictions indicate the animal is expected to produce progeny with higher levels of general disease resilience, as measured by cell-mediated and antibody mediated immune response.
Overall Value	Cow-Calf Value	Higher Cow-Calf Value genetic predictions identifies animals that will improve profitability through the traits related to the cow-calf production system.
	Feedlot-Carcase Value	Higher Feedlot-Carcase Value genetic predictions identifies animals that will improve profitability for the traits related to feedlot and processor performance, along with consumer expectations.
	Total Breeding Value	Higher Total Breeding Value genetic predictions identifies animals that will improve overall profitability in the majority of commercial, self-replacing, grain finishing beef production system.
	HeiferSELECT Stars	Presents Total Breeding Value as an easy to understand 0 – 5 star rating, with more stars representing animals with higher Total Breeding Value

Balanced Selection

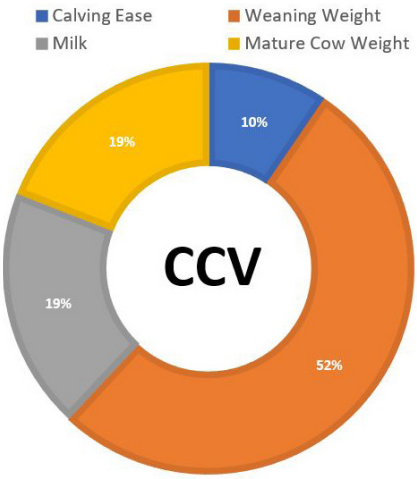
Angus HeiferSELECT provides three values based on economic selection index modelling being:

- **Cow-Calf Value**: Cow-Calf Value (CCV) estimates the genetic differences between animals in net profitability in a typical commercial Angus self replacing herd, focusing on the traits related to the cow-calf production system.

  The Cow-Calf Value assists in making "balanced" selection decisions, taking into account the relevant calving ease, growth and maternal attributes to identify animals that are most suitable for use within a particular commercial enterprise.

  Higher Cow-Calf value genetic predictions identifies animals that will improve overall profitability in the majority of commercial systems selecting Angus females.

  The Cow-Calf Value is a sub-index (i.e. component) of the Total Breeding Value.



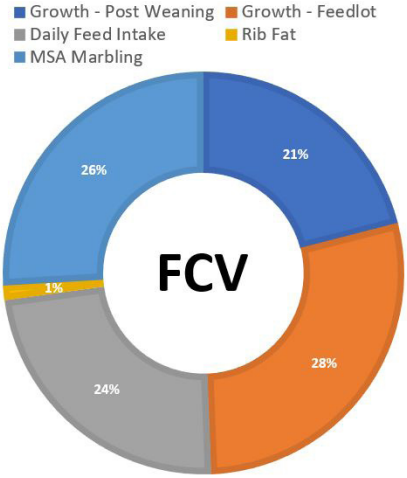
Trait Emphasis for the Cow-Calf Value (CCV)

- **Feedlot-Carcase Value**: Feedlot-Carcase Value (FCV) estimates the genetic differences between animals in net profitability in a typical commercial Angus self-replacing herd, focusing on the traits related to feedlot and processor performance, along with consumer expectations.

  The Feedlot-Carcase Value assists in making "balanced" selection decisions, taking into account the relevant growth, feed intake and carcase attributes to identify animals that are most suitable for use within a particular commercial enterprise.

  Higher Feedlot-Carcase Value genetic predictions identifies animals that will improve overall profitability in the majority of commercial systems selecting Angus females with progeny entering grain finishing supply chain.

  The Feedlot-Carcase Value is a sub-index (i.e. component) of the Total Breeding Value.



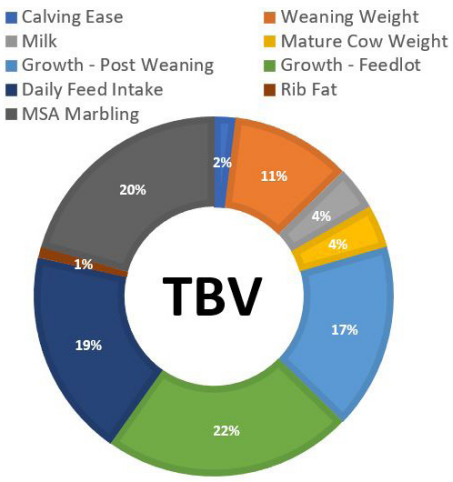
Trait Emphasis for the Feedlot-Carcase Value (FCV)

- **Total Breeding Value**: Total Breeding Value (TBV) estimates the genetic differences between animals in net profitability in a typical commercial Angus self-replacing herd with progeny entering the grain finishing supply chain.

  The Total Breeding Value assists in making "balanced" selection decisions, taking into account the relevant calving ease, growth, feed intake and carcase attributes to identify animals that are most suitable for use within a particular commercial enterprise.

  Higher Total breeding value genetic predictions identifies animals that will improve overall profitability in the majority of commercial systems selecting Angus females.

  The Cow-Calf Value and Feedlot-Carcase value are sub-indexes (i.e. components) of the Total Breeding Value.



Trait Emphasis for the Total Breeding Value (TBV)

Additional notes to interpret the CCV, FCV and TBV emphasis graphs:

- The weighting emphases shown are based on an average commercial Angus heifer and herd.
- There are several non-linear trait functions included, specifically for calving ease, milk and marbling. For this reason, the trait emphases will vary slightly depending on the genetic prediction value for the animal. For example, a heifer with lower calving ease genetic predictions will see more emphasis applied to calving ease in the CCV and TBV calculations.
- Growth – Post Weaning: includes weaning weight and yearling weight genetic predictions
- Growth – Feedlot: includes yearling weight and carcase weight genetic predictions.

Angus HeiferSELECT Genetic Effects Table

The Angus HeiferSELECT genetic effects table enables you to assess genetic differences between heifers tested with Angus HeiferSELECT in real terms by providing the predicted genetic difference per ten (10) unit change in Angus HeiferSELECT value.

Angus HeiferSELECT Genetic Effects Table

CE (kg)	WW (kg)	YW (kg)	Milk (kg)	MCW (kg)	ADG (kg/day)	DFI (kg/day)	CW (kg)	EMA (cm^2)	RIB (mm)	MBL (score)	OSS (score)	CCV ($)	FCV ($)	TBV ($)
-0.67	2.1	3.5	1.3	6.7	0.03	0.23	6.1	1.4	0.5	17.9	1.6	12.9	36.3	39.7

The genetic effects table can be used to predict the difference in progeny performance between two females. For example, a female with a Carcase Weight genetic prediction of 80 would be expected to produce progeny that are, on average, 15.25 kg heavier at around 2 years of ag, compared to a female with a Carcase Weight genetic prediction of 30, all other things being equal.

[Working: 6.1 kg genetic difference per 10 unit HeiferSELECT value, 30.5 kg (6.1 x 5) genetic difference per 50 unit HeiferSELECT value, 15.25 kg (30.5 / 2) progeny difference (as females only contribute half of the genetics to the progeny, with the remainder coming from the sire to which they are joined)]

Also note:

- Calving Ease is presented in birth weight units of kgs, with higher CE genetic predictions resulting in lower birth weight, a major contributor to overall calving ease.
- The CCV, FCV and TBV are based of economic modelling underpinned by current day parameters therefore Australian dollar ($) units apply.

Angus BreedCHECK

Angus BreedCHECK is a genomic (DNA) based system that estimates breed composition (from 11 breeds), with a particular focus on Angus content.

Heifers that are 87.5% (or 7/8th) or greater Angus content receive the Angus BreedCHECK tick. Heifers that are below 87.5% Angus content are flagged with an Angus BreedCHECK cross and provided with additional information to further understand their breed background. This includes the percentage (%) content value estimate for:

- Angus
- Non-Angus
- British (including Angus, Hereford, Shorthorn and Murray Grey)
- Indicus (including Brahman and Santa Gertrudis)
- European (including Charolais, Simmental and Limousin)
- Other (including Holstein and Wagyu)

Angus HeiferSELECT genetic predictions are provided on all animals that are greater than 50% Angus content. Caution should be applied when using the Genetic Predictions for animals less than 87.5% Angus as the associated reference population is based on straight bred Angus animals.

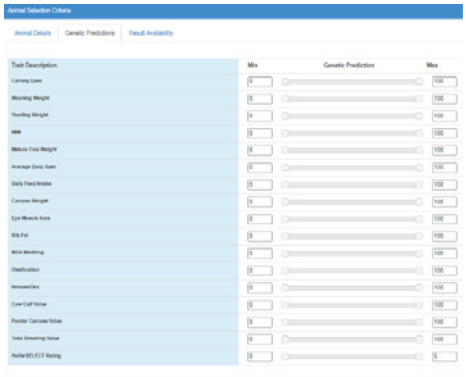
Powerful Online Report Centre

Angus HeiferSELECT results are made available via a powerful reporting facility on the Angus Australia website.

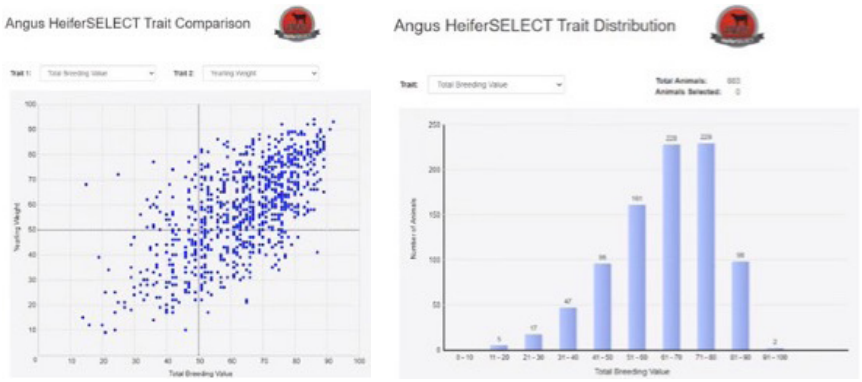
The Angus HeiferSELECT reporting facility enables you to view, search, sort, and analyse the Angus HeiferSELECT results for your females. Results can also be exported in csv format for upload into programs such as Microsoft Excel, or downloaded in a series of print friendly pdf reports.

ID	Year	Sire ID	Angus BreedCHECK	CE	WW	YW	Milk	MCW	ADG	DFI	CWT	EMA	RIB	MBL	OSS	IMM	CCV	FCV	TBV	HeiferSELECT Stars
PBHR362	2020	VTMN723		45	80	84	55	68	82	80	60	77	48	61	23	81	78	50	60	
PBHR363	2020	VTMN215		76	74	71	79	61	55	52	81	72	51	84	52	30	75	87	89	
PBHR386	2020	VTMN723		79	57	70	44	46	43	52	48	45	31	47	36	37	63	55	58	
PBHR395	2020	VTMN215		69	26	38	54	28	43	56	60	51	87	73	56	39	40	71	66	
PBHR403	2020	VTMN1472		52	83	68	30	46	60	62	78	51	42	48	63	60	79	60	69	
PBHR404	2020	VTMN215		68	33	26	73	70	78	74	81	70	87	61	53	72	33	65	59	
PBHR409	2020	VTMN215		73	47	36	83	48	52	64	47	70	73	73	63	24	55	48	50	
PBHR417	2020	VTMN215		71	51	37	47	28	48	42	38	57	63	49	48	22	64	39	45	

Angus HeiferSELECT results are displayed in a user friendly, easy to read format



Heifers with superior genetics can be easily identified using interactive slider bars to set desired selection criteria



Trait comparison and distribution plots enable thorough analysis of Angus HeiferSELECT results

ORDERING ANGUS HEIFERSELECT

Angus HeiferSELECT can be ordered exclusively from Angus Australia.

Getting Ready

Before ordering Angus HeiferSELECT tests, you should:

- Ensure that you are a current, financial member of Angus Australia and have nominated that you wish to utilise Angus Australia's genetic evaluation services. Membership application forms are available from the Angus Australia website, or by contacting staff at Angus Australia on +61 2 6773 4600.
- Obtain an Angus HeiferSELECT Order Form. Order forms can be downloaded from the Angus Australia website.
- Obtain DNA sample collection kits from either Angus Australia, Zoetis Animal Genetics or Neogen Australasia. DNA samples can be provided as either tail hair, or tissue using the Allflex Tissue Sampling Unit (TSU) technology.
- Ensure that a DNA profile is recorded with Angus Australia for the sires of any heifers for which you wish to obtain DNA sire identification.

Collating DNA Profiles for the Sires

DNA sire identification is available as part of Angus HeiferSELECT providing the sires are registered with Angus Australia and have a genomic profile available.

In many cases, a genomic (DNA) profile will have previously been recorded with Angus Australia for your sires (by the breeder or a previous owner) and can be used to conduct the DNA sire identification component of the Angus HeiferSELECT testing. Details of whether a DNA profile is stored for each registered sire can be viewed on the Angus Database Search facility on the Angus Australia website.

If a genomic profile has not previously been recorded, you can collect a DNA sample for the sire and request a genomic profile from Angus Australia. DNA test request forms are available from the Angus Australia website.

DNA tests can only be ordered for animals that you own, and so you will need to ensure that all registered bulls have been transferred into your ownership on the Angus Australia database prior to requesting the genomic profile.

Animals for which Angus HeiferSELECT can be ordered

Angus HeiferSELECT tests can be ordered for straight-bred, commercial Angus females (recommended for heifers that are 87.5% or greater Angus content).

Angus HeiferSELECT tests can not be ordered for females that have been previously recorded with Angus Australia, such as females recorded on the HBR, APR, ACR or MBR registers.

Collecting DNA Samples

DNA samples can be provided for Angus HeiferSELECT testing as either tail hair, or tissue using the Allflex Tissue Sampling Unit (TSU) technology. All samples must be provided in the appropriate DNA sample collector kits.

DNA sample collector kits are available from Angus Australia (tail hair only), Zoetis (TSU and tail hair) and Neogen (TSU only).

A fact sheet containing further instructions for collecting DNA samples is available from the Angus Australia website.

Ordering Angus HeiferSELECT Tests

Once you have collected DNA samples and completed the Angus HeiferSELECT Order Form:

- A copy of the order form should be emailed to regos angusaustralia.com.au
- A printed copy of the order form, and the DNA samples should be mailed to:

  Angus Australia
  Locked Bag 11
  ARMIDALE NSW 2350

Angus HeiferSELECT results will be available approximately 6 – 8 weeks after the order form is received at Angus Australia.

Nominating the DNA Testing Laboratory

The DNA testing required for Angus HeiferSELECT can be conducted by either Zoetis Animal Genetics or Neogen Australasia. A designated Angus HeiferSELECT Order Form for both laboratories is available for download from the Angus Australia website.

Fees and turnaround time for Angus HeiferSELECT may vary subject to the DNA laboratory that is utilised. For a listing of the latest fees, refer to the Angus Australia website.

BVDV Testing

BVDV testing can be conducted in association with Angus HeiferSELECT as an optional add-on from both Zoetis (TSU samples only) and Neogen (TSU and tail hair samples).

If BVDV testing is required, this should be nominated on the order form. Angus HeiferSELECT and BVDV testing can be conducted from the same DNA sample.

Receiving Angus HeiferSELECT Results

Angus HeiferSELECT results are reported via a powerful online reporting facility on the Angus Australia website.

To access results for your herd, you need to sign into the Angus HeiferSELECT reporting facility using a username, usually your mobile phone number, email address or Angus Australia member ID, and a password.

If you do not have an existing username linked to your Angus Australia Member ID, a username and password will be forwarded to you shortly after your Angus HeiferSELECT order is received.

The Angus HeiferSELECT reporting facility enables you to view, search, sort, and analyse the Angus HeiferSELECT results for your females. Results can also be exported in csv format for upload into programs such as Microsoft Excel, or downloaded in a series of print friendly pdf reports.

Invoicing for Angus HeiferSELECT Testing

All invoicing for Angus HeiferSELECT is undertaken by Angus Australia. Invoices will be generated for Angus HeiferSELECT tests shortly after the order form and samples are received at Angus Australia. Invoices are generated based on the number of females for which Angus HeiferSELECT tests are requested, and still apply if results can not be generated for an individual female. For example, if the DNA result for a female reveals that she is 50% or less Angus content.

Further Information

To further discuss the utilisation of Angus HeiferSELECT in your enterprise, please contact:

Angus Australia – (02) 6773 4600 · Zoetis Animal Genetics – 1300 768 400 · Neogen Australasia – (07) 3736 2134