

Collecting Abattoir Carcase Information

Abattoir carcase information, along with live animal ultrasound scanning measurements and genomic information, is used to calculate Carcase EBVs within BREEDPLAN.

This fact sheet outlines the requirements for the collection and submission of abattoir carcase information for BREEDPLAN.

Why Collect Abattoir Carcase Information?

Traits such as carcase yield and meat quality are some of the most economically important traits in the beef supply chain.

While the collection of carcase information from ultrasound scanning and genomic tests provides useful information on live animals, abattoir carcase information is of particular value for genetic evaluation as it represents a direct measure of the attributes of a beef carcase.

Obtaining direct abattoir carcase measurements can add considerable accuracy to the Carcase EBVs calculated within BREEDPLAN, and consequently provides a valuable source of information when attempting to identify animals with superior carcase genetics for use in a beef breeding program.

How Much Effort is Involved?

Those who are considering embarking on the collection of abattoir carcase information for BREEDPLAN need to be aware that the collection of abattoir information can be challenging, expensive and time consuming.

The rewards however are significant and if useful abattoir information can be collected, the benefits can be considerable.

What Abattoir Carcase Information will be Accepted?

Abattoir carcase information must meet certain requirements in order to be accepted for inclusion in BREEDPLAN. These requirements have been put in place to ensure any abattoir carcase information that is analysed within BREEDPLAN meets appropriate data integrity standards.

The most valuable carcase data for inclusion in a BREEDPLAN analysis meets the following requirements:

- ❑ It has been collected as part of a structured progeny test program.

- ❑ Appropriate measurement collection protocols have been followed to ensure the carcase measurements that are collected are of suitable quality for genetic evaluation.
- ❑ Animals are between 300 and 1000 days of age at slaughter (i.e. 10 – 33 months).

Where carcase data is collected from a commercial slaughter it is important that they are in a valid contemporary group. This means that they must have been reared together and have been treated the same way during backgrounding and finishing and slaughtered on the same day. It is important that animals have not been harvested from a larger group based on their weight and fatness.

Abattoir carcase information that does not meet the above criteria, such as kill sheets for small groups of steers or cull heifers, or information collected as part of a carcase competition, is not suitable for analysis in BREEDPLAN.

Establishing a Progeny Test for the Collection of Abattoir Carcase Information

It is essential that any abattoir carcase information collected for inclusion in BREEDPLAN is from a structured progeny test program in order to ensure that the amount of useful information generated is maximised.

Number of Effective Progeny per Sire

Ensuring that there are an adequate number of effective progeny by each sire is an important consideration when designing a progeny test program.

The number of effective progeny per sire (EPN) takes into account not only the number of progeny by each sire, but how useful the information collected on those progeny are for genetic evaluation.

The number of effective progeny for an individual sire can be calculated by considering the number of progeny within a contemporary group that are by the sire compared with the number of progeny in the contemporary group sired by other bulls.

A contemporary group can be considered to be animals of the same sex which are born within an individual herd in a 60 day period and are managed together as one mob under the same conditions until slaughter.

Specifically, the number of effective progeny for a sire can be calculated as follows:

$$\text{EPN} = \text{No. of Sire's Progeny} \times \frac{\text{No. of Progeny by Other Sires}}{\text{No. of Animals in Contemporary Group}}$$

For example, if a sire has 5 progeny in a contemporary group of 10 animals, then the effective progeny number would be $5 \times (5/10) = 2.5$ progeny.

Table 1 provides a guide to the impact on the effective progeny number as the number of progeny by a sire, and the number of progeny by other sires changes within a contemporary group.

Table 1 : Effective Progeny Number In Different Scenarios				
Number of Sire's Progeny	Progeny by Other Sires	Effective Progeny Number	Approx. EBV Accuracy	
			Heritability of Trait 20%	30%
5	5	2.5	0.33	0.40
10	5	3.3	0.38	0.45
15	5	3.8	0.40	0.47
20	5	4.0	0.41	0.48
25	5	4.2	0.42	0.49
30	5	4.3	0.42	0.49
5	10	3.3	0.38	0.45
10	10	5.0	0.45	0.52
15	10	6.0	0.48	0.56
20	10	6.7	0.50	0.58
25	10	7.1	0.51	0.59
30	10	7.5	0.52	0.60
5	15	3.8	0.40	0.47
10	15	6.0	0.48	0.56
15	15	7.5	0.52	0.60
20	15	8.6	0.55	0.63
25	15	9.4	0.56	0.64
30	15	10.0	0.58	0.65
5	20	4.0	0.41	0.48
10	20	6.7	0.50	0.58
15	20	8.6	0.55	0.63
20	20	10.0	0.58	0.65
25	20	11.1	0.60	0.67
30	20	12.0	0.61	0.69
5	25	4.2	0.42	0.49
10	25	7.1	0.51	0.59
15	25	9.4	0.56	0.64
20	25	11.1	0.60	0.67
25	25	12.5	0.62	0.70
30	25	13.6	0.64	0.71
5	30	4.3	0.42	0.49
10	30	7.5	0.52	0.60
15	30	10.0	0.58	0.65
20	30	12.0	0.61	0.69
25	30	13.6	0.64	0.71
30	30	15.0	0.65	0.73

Ideally sufficient females should be joined within the progeny test program to obtain a total effective progeny number of at least 10 - 15 per sire. This should give an EBV accuracy above 65-70% for a carcass trait with a heritability of 30%.



Genetic Linkage (within Progeny Test)

In progeny tests where there are multiple contemporary groups (either within a single herd or across different herds), it is important to ensure that there are adequate genetic links between contemporary groups.

Genetic linkage enables the abattoir carcass measurements collected on animals in the different contemporary groups to be compared, while also enabling adjustment for differences in the genetic merit of the females to which the bulls are joined in each contemporary group.

If it is not possible for common sires to be represented in each different contemporary group, a minimum requirement would be to ensure that at least some of the bulls used have common sires, hence creating genetic linkage between contemporary groups through common grand-sires.

Genetic Linkage (with BREEDPLAN Analysis)

If the bulls being progeny tested are largely of unknown genetics, it is important that reference sires are included in order to enable the abattoir carcass measurements to be linked to the carcass information that has been collected for other animals within the breed.

The reference sires should ideally be “proven” bulls that have Carcass EBVs with at least 80% accuracy.

Allocation of Dams

It is important to carefully consider the dams to which the bulls will be joined in any progeny test program for the collection of abattoir carcass information.

- ❑ Ideally the sires being progeny tested will be joined to dams of known carcass genetics (e.g. registered or previously registered females with Carcass EBVs).
- ❑ If dams of unknown carcass genetics are being joined (e.g. commercial females), it is important that dams are randomly allocated to each sire (i.e. no selective mating).
- ❑ Where females of several age classes are used, it is important to allocate females evenly across the age classes.
- ❑ Dams should ideally be the same breed as the bulls, but cows of another breed or crossbred cows can also be joined as part of a progeny test. It is however important that all cows joined are of the same breed (or similar cross).
- ❑ At a minimum, all dams should be individually identified (i.e. tagged), with the year of birth and breed composition of each dam recorded with the relevant breed society to account for age of dam and breed effects.

Animal Identification

It is important that all animals within the progeny test are clearly identified. This includes the dams to which the sires will be joined, plus all progeny.

Ideally, two forms of identification should be used to enable animals to be identified when tags are lost. For example, progeny may be tagged with a management tag at or shortly after birth, followed by a NLIS tag at marking.

Recording Birth Date Information

It is important that appropriate details are recorded on all progeny at birth to enable the most effective analysis of the abattoir carcass information that is collected.

- ❑ The birth date of all calves needs to be recorded as accurately as possible. BREEDPLAN will make adjustments to the abattoir carcass measurements to account for any differences in age between animals.
- ❑ The dam of each calf needs to be recorded. BREEDPLAN will make adjustments to the abattoir carcass measurements to account for differences in the age and breed of the dam.
- ❑ If any calves have been bred by embryo transfer (ET), details of the recipient dam need to be recorded. BREEDPLAN will make adjustments to the abattoir carcass measurements to account for any maternal differences between recipient dams (e.g. age, breed).
- ❑ The birth number of each calf needs to be recorded. That is, whether the calf is a single or twin calf. BREEDPLAN will not directly compare the abattoir carcass measurements of single and twin calves together, and in general, twin calves should be removed from the progeny test.

Maintenance of Contemporary Groups (On Farm)

Where practical, all animals within a contemporary group (i.e. animals of the same sex which are born within an individual herd in a 60 day period) need to be managed together as one mob under the same conditions from birth until slaughter.

Splitting contemporary groups into different mobs will reduce the effectiveness of the abattoir carcass information that is collected. Likewise, “culling” any animals from the progeny test will potentially bias the abattoir carcass information.

Maintenance of Contemporary Groups (At Slaughter)

All animals within a contemporary group should be slaughtered on the same day and at the same abattoir.

Animals within a contemporary group should not be “harvested” and slaughtered on different days as different portions of the contemporary group meet market specifications.

Harvesting animals as they meet market specifications will bias the Carcase EBVs that are calculated from the abattoir carcase information, with the information not accurately reflecting the variation in performance within the contemporary group, while also influencing sire representation in each sub-group.

Splitting Management Groups

If it is necessary to split contemporary groups either on-farm or for slaughter on different days then it is important that each sire is equally represented in each sub-group. For example, if a contemporary group needs to be split into 3 sub-groups then 1/3 of the progeny by each sire should be randomly selected for each sub-group.

Recording Management Group Information

It is important that any animals within a contemporary group whose performance may have been affected by different non-genetic factors are clearly identified by specifying a different management group (or kill group) for the animals when submitting the abattoir carcase information to BREEDPLAN. For example, animals that may have been split into a different mob for management purposes, or animals that have been affected by injury or sickness.

It is important to record a management group if animals have been affected by non-genetic factors at any time from birth up until slaughter. If animals are being finished in a feedlot, this includes details of any animals who may have been shy feeders, or who may have been removed from the group for health treatments.

Abattoir Measurement Collection Protocols to Ensure Data Integrity

When obtaining abattoir carcase information for inclusion in BREEDPLAN, it is important to investigate how the carcasses will be processed at the abattoir and how the carcase measurements will be collected to ensure that any information collected is useful for genetic evaluation.

In reality this can be difficult when carcasses are being processed through commercially operated abattoirs, however abattoir measurements that have not been collected in accordance with appropriate measurement collection protocols can lead to considerable bias in the Carcase EBVs that are calculated for animals within BREEDPLAN.

Use of MSA Accredited Graders

Where possible, animals should be processed at a Meat Standards Australia (MSA) licensed abattoir and have measurements collected by an MSA accredited grader. A list of MSA licensed abattoirs is available from the Meat & Livestock Australia (MLA) website.

It is important that the same MSA accredited grader collects carcass measurements on all animals within a contemporary group. Where carcass measurements are collected by different graders, a different management group (or kill group) should be specified for the carcasses assessed by each grader.

Animal Identification in the Abattoir

Loss of individual animal and carcass identification is a common problem when collecting abattoir information for genetic evaluation.

All animals will have a management tag and NLIS tag at slaughter, with abattoirs routinely recording NLIS tag and body number. It is important that all identification information is carefully cross referenced to ensure that the abattoir measurements collected are appropriately assigned to the correct animals.

Processing of Carcasses

Several carcass processing procedures routinely practiced in commercial abattoirs can lead to a reduction in the usefulness of any abattoir carcass measurements for genetic evaluation.

- ❑ Hide puller damage - Fat can inadvertently be stripped from the carcass when the hide is being removed and can considerably bias the rump and rib fat measurements subsequently collected on the carcass. Fat measurements should not be submitted to BREEDPLAN from carcasses where considerable hide puller damage has occurred.
- ❑ Trimming – Fat will routinely be trimmed from carcasses using a whizzer knife prior to carcass measurements being collected, especially from the rib fat measurement site. Rib fat measurements should not be submitted to BREEDPLAN from carcasses that have been trimmed.
- ❑ Carcass damage/Bruising - Carcasses that may have considerable damage, bruising or abscesses can have portions removed during processing. Any measurements from these carcasses should be carefully scrutinised and only submitted to BREEDPLAN if the processing of the carcass has not biased the measurements collected.
- ❑ Quarter site – Carcasses may be quartered at different sites. It is important that all carcasses from animals in a contemporary group are quartered at the same site,

and ideally at the 12/13th rib site. Where carcasses have been quartered at a different site, a different management group (or kill group) should be specified.

- ❑ Spencer rolling – Some abattoirs undertake a practice known as “spencer rolling” to make the carcass easier to bone out. By design, spencer rolling changes the shape of the eye muscle and makes it difficult to accurately measure eye muscle area (EMA). EMA measurements should not be submitted to BREEDPLAN from carcasses that have been subject to spencer rolling.
- ❑ Electrical stimulation – All carcasses from animals within a contemporary group should be subject to the same electrical stimulation process. This is particularly important when meat samples will be collected for analysis of meat tenderness.

Collection of Meat Science Laboratory Results

In addition to carcass measurements collected in the abattoir, meat samples can be collected from carcasses for further analysis in the meat science laboratory for traits such as intramuscular fat (IMF), meat tenderness and meat colour.

Meat science laboratory measurements are expensive and are normally only collected in research trials; however those interested in obtaining meat science laboratory measurements should contact staff at BREEDPLAN to discuss what is involved.

Submitting Abattoir Carcass Information to BREEDPLAN

Abattoir carcass measurements should be submitted directly to BREEDPLAN using a specific Microsoft Excel template.

A copy of the template that needs to be used can be obtained from staff at BREEDPLAN.

BREEDPLAN currently includes carcass weight, rump fat, eye muscle area, MSA marble score and intramuscular fat measurements in the calculation of Carcass EBVs, however other measurements that have been collected can be submitted for storage and possible future analysis.

Prior to submission to BREEDPLAN, it is important that any abattoir carcass measurements are carefully scrutinised. Specifically, the measurements should be reviewed to ensure they fit within normal expected ranges, and that the variation between measurements reviewed to ensure that measurements follow a normal expected distribution.

For more information regarding the collection of abattoir carcass data, please contact staff at BREEDPLAN.