CHAPTER 9: Guidelines for the allocation of animals to contemporary groups

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Contemporary groups, also called treatment groups, represent the set of "environmental effects" that have an influence on the measurements between animals. If the genetic merit of animals is to be determined, no matter in what way, these effects need to be clearly defined and animals of which the performance is affected equally, have to be placed in the same group. The correct definition of contemporary groups is essential for accurate, stable breeding values. This is the basis of the measurement to be taken, and if something goes wrong here, it not only affects the breeding value prediction of the animal, but also of the animal's parents, other relations and other animals in the contemporary group. If, for example, the environment for all animals in a contemporary group is not the same, environmental differences are attributed to genetics, leading to suspicious breeding value prediction for such an animal.

Incorrect composition of contemporary groups also causes instability in breeding value prediction. Breeding values are regularly recalculated to become more accurate as new information is gathered. For example, a bull that received a too high breeding value prediction by virtue of his own performance, as a result of incorrect contemporary group composition, may have calves that will perform poorer than expected, causing the bull's breeding value prediction to decline. It would then appear that the breeding value was predicted "incorrectly", while it actually was the composition of the contemporary group that was incorrect.

Thus the first question always is: "What set of environmental conditions could have influenced a specific animal to perform differently from his/her peers?" These differences can be addressed in two possible ways, namely:

- Inclusion of the known environmental effects in the models that are used to determine genetic merit of animals; these are effects that are noticed with normal record-keeping and for which the breeder does not need to make provision, for example, gender, age, etc.
- Allocating animals in different treatment groups (where the models have no or not enough provision for environmental effects); these are effects that only the breeder knows, and therefore are very important to record, because these are the breeding values that may influence the animal, his peers and their family.

Known environmental effects (fixed effects), which are normally included in the models, and not to be used by the breeder to allocate animals to different groups are:

- Gender (males usually grow faster than females).
- Age of the animal (usually included as some regression to allow for the fact that not all the animals are measured or weighed at exactly the same age).
- Age of the animal's mother (also usually included as some regression to allow for the expected differences in measurements; especially traits that are affected maternally, such as birth and weaning weight, are involved, but the "domino effect" can still apply for traits such as post wean weight).
- Parity (this refers to the calving number, for example first-calf cows are considered separately, versus the rest; the inclusion of this in the model thus makes an "over and above" provision for possible measurement differences between the offspring of cows, regardless of the inclusion of maternal age).
- Period in the season (refers to the number of days that have elapsed since the start of the season and is mainly included as regression for a trait such as birth weight; the inclusion therefore provides for environmental effects which, over time, may cause weight differences).
- Herd X year of birth X season of birth (the composition provides for the actual physical environment effects).

Known additional (genetic or other random) effects that can automatically be included in models, depending on the trait, are:

- Additive maternal effects (including this effect allows for the differences between animal measurements, mostly weights, because of genetic differences between the mothers of the animals in traits that are affected maternally; typically, these are features such as birth and weaning weight, but there may also be a "domino effect" to post wean).
- Permanent maternal environmental effect (besides the additive maternal effect, maternal impressionable traits are also repeated traits for the cow, which means that the environmental impact created by the cow for one calf will be in the same order for all her calves, which necessitates the inclusion of a "second" maternal effect that is non-additive in nature).
- Genotype X environment interaction effect (this effect is usually included in the form of bull X herd X year X season and allows for the possibility that the calves of some bulls may have received preferential treatment, which is not recorded, and therefore are not placed in other contemporary groups, or for a real genotype X environment interaction – this is where the impact of a certain environment is different on the progeny of different bulls and therefore causes differences in variation, even rearranging hierarchies – which is highly unlikely).
- Herd of origin effect (this usually applies for growth tests, where animals from different areas are joined in a single growth test, whether in central tests, or multiple herd growth tests on farms, which provides for possible variation or actual differences in performance due to the effect of origin).

Treatment effects that the breeder should take into account (and thus can only be allocated into different contemporary groups by the breeder):

If there is any other effect that, after the inclusion of the above-mentioned effects, may still influence the performance measurement of an animal non-genetically, and the breeder is aware of, it should be included as an additional treatment effect in the breeding value model. The breeder indicates, during production measurement, which animals had been treated equally by marking them with the same treatment code. Typical effects are:

- Differences in supplement (where, for example, only certain animals have received supplements, licks or creep feed).
- Different farms or diverse types of camps (where it has an effect on differences in performance between animals).
- Groups of animals that have received special treatment (e.g. embryo programme or additional attention prior to an auction), in such a way that they performed differently than the rest.
- Animals that will perform differently (weaker) than expected, as a result of any illness.
- Purchased cows with calves coming from another farm.
- Show animals that have been treated differently.
- Animals that are/were raised in a non-normal or unnatural way, e.g. multiples, death of the mother or being fostered by another animal.
- Any other environmental effects that may have a significant impact on the performance of any animal or group of animals, such as injuries, caught in a trap, surviving a predator attack, snakebite, illness of the mother, metabolic disorder, etc.

Other factors to consider when setting contemporary groups and allocation of animals in these groups:

- Without favouring or harming any animal at the expense of his/her contemporaries, one should attempt to compare the maximum number of animals in a contemporary group. As a result, comparisons of less than 4 animals are not taken into account with breeding value predictions.
- Always make sure to measure the progeny of more than one bull in each contemporary group, in order to establish a basis of comparison. Examples:
    - Put cows mated to different bulls in the same herd after mating, so that they will calve and raise their calves together.
    - In the case of small herds, a few cows may be artificially inseminated.
    - If possible, cow groups should not be kept the same year after year.
- Be aware of the environmental factors that are already part of the genetic analysis form (included in the model) and already provide for a proper comparative basis.
- Only if there is evidence that the inclusion of effects in the genetic analysis models does not adequately provide for environmental effects, animals may be further divided into different contemporary groups – but always keep group size in mind. Examples could include one of the following:
    - A separate group of first-calf cows, especially if they were very young when they were mated. Note that the model allows for this, but there may be cases where it is not enough for a specific set of circumstances. Note that it may also have a drastic effect on the group size and it may harm the comparative basis (consider e.g. that bull calves and heifers are already in two separate groups).
    - The separation of birth weight contemporary groups as the season progresses, especially in the case where there is a drastic difference due to sudden green pastures (early rain), that results in noticeably heavier birth weights, and the appropriate regression does not make proper provision for this. Note again that group size should not be so small that it will be harmful to the comparative basis.
    - Temporary setbacks of certain animals that take place shortly before the measurement date, such as diarrhoea shortly before weaning, that does not provide enough time for recovery.

- Faulty contemporary groups are also found in selective measurement, where only a portion of the herd or group of calves is measured – usually the best animals. For example, breeders often think that they do not have to weigh weak calves, which will be culled anyway. It is, however, very important information in breeding value prediction – if poor performance is not included, the good performance of the other animals in the group is impaired. Information about the sires of these calves, especially, is also important for accurate breeding value prediction.
- Breeding seasons are better for the assessment of the animals' breeding values, because it gives more uniform and larger contemporary groups.
- Faulty composition can be a critical mistake if the contemporary group is too small – large groups are more tolerant.
- Pedigree information will also result in faulty measurement: if a calf, for example, performed exceptionally well in a contemporary group, but its parents performed poorly, its breeding value will not be as high as, for example, that of another calf from a family who does not perform well. He will, however, still receive a high breeding value, which will seem unstable when his progeny is measured.
- Missing pedigree information also has an effect on the accuracy and stability of breeding value prediction. If only some parents of animals measured in a contemporary group are known, the others are measured against a so-called "genetic group" and not against other real parents. It could also have a material effect on the stability of breeding value prediction. A classic example is where multiple sire breeding is used and paternity has not yet been resolved during the measurements (especially for birth weights). Thus, the breeding value prediction of these bulls can change when the information is determined.

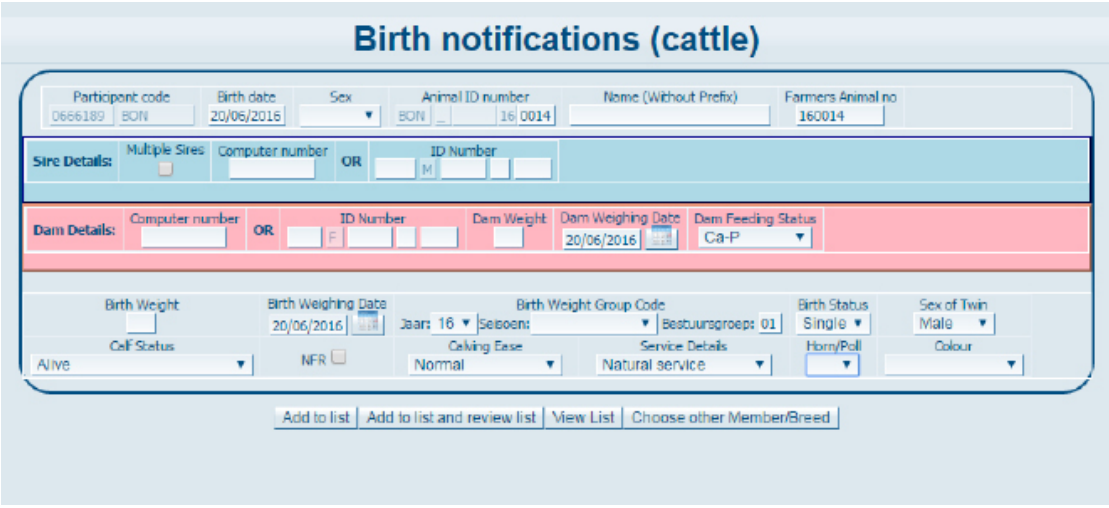
Using resources to allocate animals in contemporary groups

In Logix

To allocate animals into the correct treatment groups can sometimes be frustrating for participants. Logix offers some user-friendly facilities to easily identify weight groups and contemporary groups and allocate them into the correct treatment / contemporary groups.

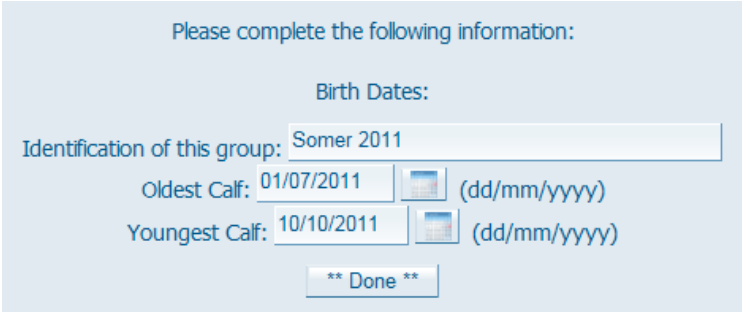
Recording Contemporary Groups for Birth Weight

The Logix birth notification screen allows for the contemporary group code when a birth weight, item 17, is entered and the system forces you to define the group, item 20.



Calculate Weighing Date Limits

Logix makes it easy to calculate the dates on which certain animals must be weighed for a certain weight type. Click on Services, then Tools and then Calculate weighing date limits. Name the group, for example, Summer 2011 and enter the birth dates of the oldest and the youngest calf. This will help to identify the possible contemporary group.



The system will ensure that the animals' ages do not fall beyond the standard 100 days difference between the oldest and youngest. The system then calculates the earliest, latest and best date for the type of weight for the group of animals.

Birth dates from:	Prewean	Wean	12-months	18-months
Oldest Calf		09/03/2012	07/07/2012	03/01/2013
01/07/2011	**to**	**to**	**to**	**to**
Youngest Calf		27/03/2012	23/09/2012	26/03/2013
10/10/2011	**Best:**	**Best:**	**Best:**	**Best:**
		18/03/2012	15/08/2012	13/02/2013

The weights are recorded on the screen under Data recording, Performance, Prewean, Wean and Post wean weights.

Contemporary groups for weighing groups

Logix's Performance data recording screen is developed that you can select the weight type, for example, wean weight, and then enter the weighing date. The system will recall and list the valid animals for that weight type on that date. This group can then be divided further, according to Raising Status, Feeding status, Dam's feeding status and Comment, into the different treatment groups, i.e. contemporary groups.

Logix Reports

The Kraal list can easily and quickly be used to identify the animals without weights; according to this list the animals can be allocated to the age groups for weighing. Go to Reports, click Production and pedigree reports and select Kraal list.

In Beefpro

Recording Contemporary Groups for Birth weight

If you are a stud breeder and weigh calves at birth, it is necessary that you set up Birth Contemporary Groups. This code is used to allocate animals to the appropriate contemporary groups for estimating birth weight breeding values. Go to Setup> Birth Contemporary Groups and click on the "+" (right lower corner of the screen) to create a new group code. The appropriate group can then be selected on the calving screen (under the calf's birth weight date). This code is then the electronically sent, along with the birth notice, to SA Stud Book for use in the BLUP analysis. For more information about contemporary groups for birth weight, go to www.beefpro.net > Beef Cattle Articles > English > Contemporary Groups for Birth Weight (Source: BeefPro Newsletter 8/2012).

Contemporary Groups for weight groups

Calf seasons can easily be defined, as well as the performance test groups (treatment groups) that facilitate the allocation of animals into contemporary groups. The programme is written in such a way that the age limits for each weighing are checked before a test can be sent for processing.