Recording of fertility traits: a long-term investment

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Fertility remains the number one trait for success in stud breeding and in any commercial cow-calf operation. It is four times more important than any other group of traits when it comes to genetic improvement for the stud breeder as well as profitability for the commercial farmer. As often said by many a breeder "a dead calf can't grow"; all the emphasis on selection for growth is worth nothing without the fertile cow to produce the calf that need to grow! In addition, fertility determines the number of progenies for the next generation from which selection must take place. A higher number of calves born, provides a larger genetic pool for selection for the next generation.

Fertility is well known as a complex trait - the reason being that fertility is not a single trait that breeders can easily measure. It is composed of several traits that should be measured throughout the lifetime of the female.

A number of traits are relatively easy to measure or record on farm such as the age at first calving or calving date, while ovulation tempo may be an important trait, but not a practical one. In addition, fertility is influenced by a number of non-genetic or environmental and management factors of which nutrition is probably the most important.

Fertility traits poses some challenges which often leads to less recordings compared to easily measured traits such as weight traits. Animal breeders do their best to account for the known variation such as seasonal variations, different herds/groups kept in camps with significant vegetation differences – all these factors are important and if recorded can be accounted for in contemporary groups. Unknown environmental influences could be anything from heat stress, nutritional deficits or a sub-clinal disease. The large unaccounted variation for fertility traits results in low heritability estimates. Some of the traits are binary traits such as a cow being pregnant or easy of calving recorded with a score. This does not mean that there is no genetic variation for these traits, it just calls for a bit more effort in recording of the different traits and recording of potential non-genetic factors which need to be considered in compilation of the contemporary groups. Mating lists for example are most useful for adding information for evaluation of fertility.

In table 1 is a summary of fertility traits in beef cattle with the estimated heritability. Most of the female traits tend to be lowly heritable due to the environmental effects, while scrotal circumference in males is a relatively easy traits to record and moderately heritable traits for effective selection.

For effective selection of fertility, some traits benefit from direct selection, while for some traits indirect selection works best. Age at first puberty is determined by the formation of the corpus luteum and can only be confirmed with a blood test. Therefore, not a practical measure, although regarded as a measure of heifer fertility. Age at first calving is easy to record and has a high

» **Table 1** Selected fertility traits in beef cattle (adapted from Cammack *et al.*, 2009)

Trait	Measure	Heritability
Age at puberty	Not an easy measure	<0.10
Age at first calving	Record the date – easy	0.20 -0.30
Calving date	Record the date – easy	0.20 – 0.30
Days to calving	Dates	<0.10
Ease of calving	Score	< 0.05
Scrotal circumference	cm^2	0.30 – 0.35

genetic correlation with the following calving events and can also be used as an indicator of heifer fertility. Calving interval, as the days between two successive calving events can also be easily recorded and used as a female fertility indicator. It should be noted that calving date is a preferred measure and can be recorded accurately. Calving ease is important for cow and calf survivability and recorded with a score. These traits must be carefully managed with cow weight and birth weight, especially when sire selection is done.

What else determines a fertile cow? A fertile cow is usually an adapted cow to the specific environment with regard to size and conformation. Overall functionality, which is visually scored or observed remains just as important as the objective traits mentioned here. Udder conformation, teat length, sound legs and feet and pigmentation are all type traits that contribute to the general functionality and therefore important for having a fertile cow that can reproduce efficiently. Cow size and maintenance requirements will be important for maintaining fertility and will depend on the geographical area, the breed and the production system.

Fertility traits recorded and submitted for genetic evaluations provide the breeder with breeding values in selection. The accuracy of the EBV's will be influenced by the number of recordings and the accuracy of the contemporary groups. It is therefore worth the time to put effort in recording of fertility traits.