Biography:
Dr. Colin Palmer is an Associate Professor of Theriogenology (Animal Reproduction) at the Western College of Veterinary Medicine. Originally from Nova Scotia, Dr. Palmer worked in mixed practices in Ontario and British Columbia and has owned/operated a practice in Saskatchewan. Dr. Palmer along with his wife Kim and children Lauren, Emily and Carter run a herd of purebred Red Angus cattle under the KC Cattle Co. name.

A Breeder's... Veterinary Perspective

Understanding and Using EPDs

Expected Progeny Difference (EPD) numbers are a valuable tool when selecting breeding stock. Where do these EPD numbers come from? How do I use them? To the uninitiated, the number of EPD values available can seem overwhelming. Counting carcass and ultrasound traits which have subcategories such as marbling, ribeye area etc. there are over a dozen different traits that you can select for using EPDs and that number is likely to grow. They can be as daunting as looking at a financial statement if you don't know what the numbers mean or how they were generated.

Some may believe that EPDs are yesterday's news; genes/genetic markers are the way to go! EPDs have been around since the 1980's and are made possible only because of incredible advances in computer technology. The identification of genes and EPDs both have a place in animal selection, but represent different branches of the science of genetics. EPDs fall into what is known as quantitative genetics; whereby, through complex calculations the genetic component of measurable traits like body weight is determined. Identifying and studying the influence of individual genes is molecular genetics which is a much newer and rapidly expanding field that looks at the function and interactions of genes. In many cases the molecular side is helping to explain differences in EPDs, but we still have only hit the tip of the iceberg in molecular genetics. EPDs are more of a big picture tool for genetic selection and will remain so until we figure out how all of these genes interact and how they interact in various environmental situations.

A common misunderstanding is that EPDs predict actual performance of the animal. Two key words are average and progeny! They actually predict the average performance of the animal's progeny. They are not designed to predict the animals own performance and they will not predict uniformity in the calf crop. In other words, you can still have great calves and not-so great calves, but on average the calves from a bull with a higher EPD for a growth trait than his same-breed contemporary should perform better. You also can't compare EPDs between breeds; only within a breed.

How animals perform is determined not only by genetics, but also by how they are raised. Pasture, creep feeding, how the dam milks, weather, disease, parasites and so on can all play a role in how fast the calf grows. Calves from a single AI sire in one herd may weigh more at weaning than calves from the same bull in another herd, so it is important that groups of calves are compared as fairly as possible, accounting for these differences in management. Within your own herd this is usually pretty straight-forward if all calves go to the same pasture, just don't forget to compare bulls, heifers, steers and twins separately. However, to calculate EPDs, this information must be entered into a computer program designed to account for these differences and to keep track of all of this animal's relatives. Heritability of trait is also considered when calculating EPDs and is a scientifically determined estimate of, for example, how much the difference between the yearling weights of two calves is due to genetics. So for yearling weight the heritability is approximately 40%; therefore, 60% of the difference is due to feeding etc. If a yearling bull has an adjusted 365 day weight that is 100 lbs heavier than the average of the others in the evaluation then only 40 lbs of that difference is consider to be due to genetics. Now that young bull will only account for ½ of the genetic makeup of his calf-crop so his EPD for yearling weight is only +20 lbs based on his performance information alone. However, this is only part of the story. Calculating EPDs' requires performance information from not only the animal in question, but also as many relatives as possible. As the animal matures and has progeny of its own that information is included and really enhances the accuracy of the EPDs. EPDs are recalculated with every calf crop and the more information that is received from successive generations the more accurate or reliable the EPDs become. Traits like birth weight, weaning weight and yearling weight are correlated so that must be accounted for too. Accuracy values are often listed below the respective EPD. The higher the number the less chance there is that the EPD will change very much with subsequent calf crops which means that the average performance of that animal's calves is not going to vary much from what was seen previously. Young bulls will have EPDs with low accuracies so it is not uncommon to see their EPDs change over time. Sometimes for the better; sometimes not. Sires with large numbers of progeny as is often the case with AI sires will have the most accurate EPDs. If you maintain a herd of purebred cattle composed of relatively obscure cow families and never submit any performance information then EPDs for your animals are not going to be very useful to anyone. There is simply not a lot there to substantiate those numbers.

For most commercial cattlemen, there are really only four EPDs they need to look at: birth weight (BW); weaning weight (WW); yearling weight (YW); and milk. The others, with perhaps the exception of the carcass traits, are more useful for purebred breeders. Birth weight is the best predictor of calving ease and the birth weight EPD is more reliable than looking at the bull's own birth weight. A bull with a 65 lb birth weight may have been born early, may be a twin or could have been born to a heifer. These sorts of things are accounted for in the EPD calculation. Weaning weight and yearling weight are easily measured performance traits. A bull with a 10 lb higher weaning EPD another bull of the same breed will sire calves that weigh an average of 10 lbs more at weaning. The milk EPD is a maternal EPD. What this means is that it is predicting theperformance of the animals daughters, not the sons. The daughters of a bull with a +20 milk EPD would be expected to wean calves that weigh 10 lbs more than a bull with a +10 milk EPD. Obviously, the sons don't produce milk, but they can pass on superior traits to the next generation. If you want more milk in your herd choose sires with higher milk EPDs.

Comparing animal to animal when looking through the sale catalogue is one way to use EPDs; another is to compare to the breed average usually also posted in the sale catalogue. It is important to realize that the breed average does not mean that the average animal possesses that particular set of numbers rather that is the average for each individual trait. If you are looking for a heifer bull then compare the birth weight EPDs to the average birth weight EPDs for the breed.

One of the most common mistakes I see is the tendency to focus on only one trait when selecting bulls versus balanced trait selection. Cattlemen in the market for a heifer bull will focus on a calving ease breed and then look for a bull with a low birth weight EPD. Likewise, I have seen bulls selected for use on heifers with breed leading WW and YW EPDs. With the exception of what we call curve benders these traits are related. Bulls with really high WW EPDs generally have BW EPDs well above average. Determine which traits are important to you, then choose acceptable EPD ranges for those traits, and realize that tradeoffs may have to be made.