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January 2017

- February 1-3— NCBA Convention, Nashville, TN
- February 10-11—MCA Convention, Jackson, MS
- March 1—BCIA Annual Meeting and Supper
- March 2– BCIA and Hinds Community College Bull Sale, Raymond
- March 9—BQA, Prentiss
- March 14—BQA, MSU, Starkville
- March 16-18– MSU AI School, Starkville
- April 6—BQA, Meridian
- April 21—Beef Cattle Boot Camp, MSU
- April 29– MSU Beef Unit Field Day, Starkville,

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Save the date for the Spring HCC/BCIA Bull Sale

Happy New Year! Time is ticking to get your nomination forms in for the 2017 Spring BCIA Sale that will be held with the Hinds Community College Bull Test in Raymond, Mississippi on March 2, 2017. **Breeders interested in nominating bulls to the Spring BCIA Bull Sale should submit the nomination forms to the MBCIA office by January 31, 2017.**

The Mississippi BCIA will host its annual membership meeting at the sale site starting at 6:00 p.m. on Wednesday, March 1, 2017. A sponsored meal and educational program will be provided along with an opportunity to view the sale cattle. The supper and program are open to the public. **Please RSVP to Mari Quinn at m.quinn@msstate.edu or 662-325-3516 if you plan to attend the Wednesday evening activities.**

Bulls should arrive at the sale facility by 12:00 p.m. and will be available for viewing after check in. We are expecting an outstanding set of herd sire prospects, so help us promote this sale to your friends and neighbors. From calving ease to growth & carcass specialists, the HCC/ BCIA Bull Sale will have what you're looking for.

Spring AI School

We have very few openings available for the spring Artificial Insemination School that will be held March 16-18. A.I. School is a chance for 1 on 1 instruction and multiple opportunities to palpate cattle. Pre-registration is required. For more information on AI School visit our website at extension.msstate.edu/beef.

Extension Social Media

Are you among the millions who log into a social media account on a daily basis? If so, you can connect with the Mississippi State Beef Extension team on Facebook, Twitter, and YouTube!

Facebook.com/
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Look to these social media venues for near daily updates. Be sure to share our posts and help spread the word about or programs and events!

Debbie Rutherford

Parentage Testing

Megan Rolf - Kansas State University (accessed from ebeef.org)

Summary: Parentage testing can be a valuable tool for both seedstock breeders and commercial producers. This fact sheet covers how parentage testing works and tips for using parentage testing successfully.

Parentage testing is often thought of as a tool that is only applicable to seedstock producers, but in fact there are benefits to commercial producers as well. Parentage testing not only ensures correct pedigree, but can provide information to make important management decisions for commercial producers. Knowing some of the basics of parentage testing and how it works can help a producer understand the benefits of testing.

While the need to verify parentage for embryo calves may be obvious, the benefits of parentage testing outside of this unique situation might not seem quite so obvious. Take a producer who runs multiple bulls in one pasture. Although all sires may have acceptable calving ease EPD, there may be some calving difficulty. Knowing the most likely sire of each calf allows producers to make more informed decisions relative to future grouping of bull batteries based on calf performance including potential calving difficulties. Additionally, producers using AI followed by natural service sires may have some calves with birth dates that are too ambiguous to determine the sire, and the only way to determine this correctly is by using parentage testing. This knowledge aids commercial producers who wish to retain only AI sired heifers as replacements or seedstock producers who rely on accurate pedigree information for EPD prediction.

The concept behind using genetic markers for parentage testing is based on the fact that each animal receives one copy of each gene, called an allele, from each parent. We can genotype an animal to determine what markers they have and compare that to potential parents to determine if those markers are consistent with that individual being a parent of the offspring in question. One common misconception of parentage testing is that the test confirms parentage absolutely based on matching DNA of offspring to their parents. Rather, parentage testing is about excluding animals that cannot be the parents of a particular offspring, rather than proving that an animal is the parent. In the simplest terms, we use the genetic markers to exclude animals as a possible parent, leaving those remaining (hopefully only one) as the most likely parent for that offspring. To illustrate this concept, let's look at an example.

There are three potential sires for a calf with a known dam. For this example, we will be using 5 different genetic markers, in this case A through E, which we hope will be enough to exclude all but one of the possible sires. We will genotype the calf, the dam, and each of the 3 possible sires on a parentage panel where each genetic marker can have 2 possible alleles (a capital or lowercase letter) and 3 possible genotypes (two capital letters, two lowercase letters, or one of each). The results are shown in the table below (check marks indicate consistent inheritance).

Table 1. Example of SNP parentage testing with five loci.

	Locus A	Locus B	Locus C	Locus D	Locus E
Calf	**Aa**	**BB**	**cc**	**Dd**	**ee**
Dam	AA	Bb	cc	DD	ee
Sire 1	Aa ✓	BB ✓	Cc ✓	DD	ee ✓
Sire 2	Aa ✓	Bb ✓	Cc ✓	dd ✓	ee ✓
Sire 3	aa ✓	bb	Cc ✓	DD	ee ✓

In order to determine whether we can exclude one of the sires, let's start with locus A. If you'll recall, animals get one allele (genetic marker) from each parent, so the first thing to do is to figure out which allele the calf possesses came from the dam. At locus A, the calf's genotype is Aa and the dam's is AA. Because the dam can only provide an A allele regardless of which chromosome she passes on, the calf's A (pronounced big A or capital A) had to have come from the dam, which means that the a (pronounce little a or lowercase a) came from the sire. If we look at the 3 sire genotypes at locus A, each one has at least 1 a allele, so any of them could have been the sire and we cannot exclude any of the potential sires. Now let's look at locus B. The calf is BB, and the dam is Bb, so she had to have passed on her B allele to her calf. So the other B allele came from the sire. Sire 1 and sire 2 both have B alleles, but sire 3 does not, so we can exclude sire 3 as the possible sire of this calf. If we continue this process for all 5 loci, we can see that the C locus doesn't let us exclude any possible sires because they all have c alleles and the E locus is also uninformative for this parentage test. However, if we look at locus D, we can see that the dam passed on a D, so the calf's d allele came from his sire. The only bull with a d allele is sire 2, so sire 3 (which was already excluded at locus B) and sire 1 can be eliminated, and we could conclude that the most likely sire of the calf is sire 2.

In reality, parentage panels have many more than five genetic markers. SNP (or single nucleotide polymorphism) panels, which are the newest type of parentage panel, typically have around 96 markers. To account for genotyping errors, you can typically have one exclusion out of all the markers in the panel and still determine parentage. Two to three exclusions would indicate a need to re-test the sample to rule out contamination, poor DNA quality, or poor genotyping results. More than three exclusions will lead to excluding that animal as a potential parent of the animal in question. Microsatelllite panels (an older type of parentage panel with a different type of marker), typically have a smaller number of markers. New research has

shown that parentage can be determined with greater specificity with a larger number of SNP markers (around 400), but at a greater cost. A balance between cost effectiveness and having a reasonable ability to eliminate animals that could not have been the parents must be achieved.

It is easier than ever before to perform parentage testing. Some genomic tests for performance traits, such as the GeneMax tests designed for use on commercial Angus cattle, incorporate parentage testing into the product. To obtain parentage results for GeneMax tests, the potential sires must have been genotyped on the 50K SNP chip. If you are interested in parentage testing, consider the following tips for success:

1. *Make sure your marker panels are consistent*

Markers can be utilized across many genotyping products, such as the 50K, 80K, 150K, or a parentage panel alone. However, it is important to remember that all of the animals being compared need to be genotyped with the same type of marker panel. Older animals that might have been genotyped on a microsatellite panel might need to be re-genotyped on a SNP panel if the genotypes are needed for a parentage test on a younger animal.

2. *It is essential to genotype all possible parents*

If an individual that could have been a parent is not included in the comparison, it is possible that parentage may be incorrectly assigned. Ideally collect DNA from all herd sires BEFORE they go out with the cows for the breeding season.

3. *Don't include any animals that couldn't possibly be the sire or dam of the individual in question due to their location or other factors*

Because parentage testing is about excluding animals that could not possibly have been the sire or dam of the individual in question, you risk an inconclusive result if two or more individuals cannot be excluded. This is more likely to occur if the animals are close relatives. It results in an additional expense to genotype an animal that could not be a potential parent. For example, even if you have run parentage panels on all of your herd sires, do not include all of them just because you possess the information, even though one or more might have been in different pastures and could not possibly have sired the calf in question.

4. *Dam genotypes are helpful, but not essential, to determine the most likely sire of a calf*

To illustrate this point, let's look at the same example we used previously, where we determined that sire 2 was the most likely sire for this calf. If we remove the dam genotypes, we can save the expense of genotyping the cow, and we can still exclude sire 3 because he does not have a B allele at locus B, However, we cannot exclude sire 1 or sire 2 based on the information we have available. We would either need to obtain information on a larger number of markers, or the test would be inconclusive. This is why SNP parentage panels include a larger number of markers. It is also important to note that dam genotypes can also be uncertain, such as when calves are switched at birth.

5. *It is harder to resolve parentage when using related sires/ animals*

Because related animals tend to share the same chromosomes, and thus have the same genotype at genetic marker loci, it is harder to resolve parentage when potential sires are related. This may be especially important to remember when using related sires (such as full-sib flush mates or half-sibs out of the same sire) in multi-sire pastures if your intention is to parent-verify the calves. Because their genotypes are often similar, it becomes more difficult to exclude close relatives as potential sires, especially in the absence of dam genotypes.

Parentage testing can be utilized to confirm the accuracy of pedigrees and paternity information which is particularly useful information for embryo transfer calves and producers who utilize multiple sire mating pastures. Understanding the basics of testing is important to understand how parentage testing might best be used in your herd.

References:

International Society for Animal Genetics. (2012). Guidelines for cattle parentage verification based on SNP markers. http://www.isag.us/Docs/Guideline-for-cattle-SNP-use-for-parentage-2012.pdf. Accessed 12/16/2016.

SAVE THE DATE!

January 2017 — Management Calendar

GENERAL

Continue the winter-feeding program. Watch body condition, and utilize winter-feeding groups according to cattle nutritional demands and feed and forage supplies. Lush winter grazing may work well for stockers, heifers, and fall pairs. Manage winter annual pastures to maintain at least four inches of stubble height to keep from limiting winter production. Keep proper freechoice minerals available for cattle at all times. High magnesium mineral supplements should be used for cows on lush winter pastures to prevent grass tetany. Vitamin A supplementation should be an important part of the nutritional program, particularly if frosted grass, weathered hay or by-products are the primary feedstuffs. Start gathering records for tax purposes, continuing good production and financial record keeping. Now is a good time to set yearly and long-term goals for the farm.

SPRING CALVING—January, February, March

Continue supplementation of pregnant females so that they will be in good condition at calving. Have calving supplies on hand including calving record books, ear tags, obstetric equipment, disinfectants, calf scales, and colostrum. Check expected calving dates, and observe bred cattle closely as calving approaches, giving heifers extra attention. Make sure calves receive colostrum during the first six hours of life. If calves do not nurse, administer colostrum with a bottle or stomach tube. Separate lactating cows from dry cows after calving to feed more efficiently. After calving, move pairs to clean pasture, and watch calves for scours. Consult with a veterinarian for advise on scours prevention and treatment. Tag, castrate, dehorn, and implant calves as appropriate. Always maintain good calving records including calf birth weights. Consult with a veterinarian to schedule prebreeding vaccinations or order vaccines. Gather information about bulls at central test stations and in purebred herds to locate potential herd sires. Check sale dates and review bull performance information. Line up breeding soundness evaluations, and make sure bulls are in good condition prior to the breeding season.

FALL CALVING—October, November, December

Fall calving season should be completed. Calculate fall calving percentage. Cow nutrient needs increase dramatically after calving, so use the best hay and feeds for lactating cows now. A forage analysis allows more precise matching of feed nutrients and cattle nutrient needs. Monitor breeding activities in herds exposed for fall calving, and be prepared to remove bulls after a controlled breeding season. If a high percentage of cows return to heat after 40 days of breeding, have bulls rechecked for breeding soundness, consult with a veterinarian on possible reproductive disease problems, and re-evaluate the nutritional program.

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Membership Application

Name:_____

Address:_____

City:_____

County:_____ State:_____ Zip:_____

Phone:_____ Email:_____

(Check one) Seedstock:____ Commercial:____

Cattle breed(s):_____

Completed applications and $5 annual dues or $100 lifetime dues payable to Mississippi BCIA should be mailed to:

Mississippi Beef Cattle Improvement Association
Box 9815, Mississippi State, MS 39762