



# Collection of Biological Material for Commercial Genomic Testing in Beef

*Dr. Matthew Garcia*, Beef Specialist

*Kevin Heaton*, Extension Professor

*Linden Greenhalgh*, Extension Associate Professor

## Introduction

Through the advent of the bovine sequencing project and the advancement of genomic research, genetic selection tools have changed substantially during the last decade. The development of genomic tests has the potential to assist beef producers by increasing accuracy of selection. Genomic testing for quantitative traits (growth, marbling, tenderness, etc.), qualitative traits (horns, hide color, etc.) and parentage are currently being offered. Although these tests are readily available for producers to utilize, it is important that producers understand how to properly collect samples for future DNA extraction. Furthermore, it is important that individuals contact their chosen laboratory prior to collection of material to determine what type of tissue sample the lab prefers to utilize for DNA extraction and subsequent genomic testing.

## Materials

Depending on the type of biological sample (blood, hair, tissue) the laboratory requires, will

determine the type of materials necessary for collection (Figure 1). If the lab will accept a tissue sample, an ear notch tool typically utilized in pigs and some type of storage container (i.e. sealable tube) will be sufficient to obtain a cartilage ear notch sample for extraction. If the laboratory requires blood, then the materials might be expanded. For example, blood cards can be utilized, as well as needles and vacutainer tubes. If the company requires hair samples, there needs to be a method to ensure that hair is stored properly (tube, or collection card) and that each collection is unique to avoid cross contamination.

## Methods of Collection

### *Blood Collection*

Although there are multiple blood collection methods, each method requires a certain amount of skill and training to be efficient. The most common method of tail bleeding is illustrated in Figure 2. This method involves lifting the tail and obtaining blood via venipuncture of the tail vein. The second method is via jugular venipuncture or obtaining

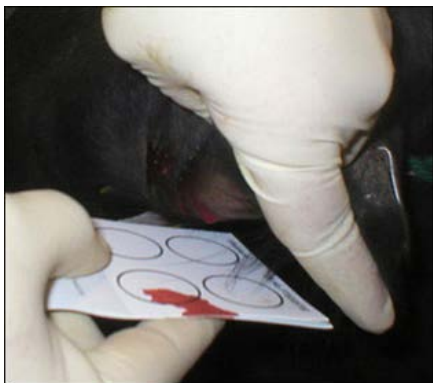


**Figure 1.** Materials needed for biological tissue collection.



**Figure 2.** Blood collection via tail bleeding with vacutainer tube

blood from the neck. The last method is utilizing blood FTA cards. This is probably the easiest method, as blood can be obtained by scratching the back of the ear or poking the vein on the ear to obtain blood droplets to fill the card requirements (Figure 3). Although all these methods are acceptable for obtaining blood for DNA extraction, each method requires that the animal be restrained for the safety of the individual doing the collection, and blood collection materials are required. It is important to contact the laboratory and determine how they would like the samples stored or processed prior to shipment.



**Figure 3.** Blood collection using FTA blood cards.

### ***Ear Notching or Tissue Collection***

The process of collecting tissue, i.e., ear notching is probably one of the easiest methods to obtain biological material for genetic testing. The process requires little training and samples can be quickly collected. In this process the animal is

restrained in a chute and using a pair of notching pliers, one or two triangle samples are cut from the ear (Figure 4). The tissue samples then need to be stored individually in an appropriate container (cryogenic tube, tissue bag, etc.), labeled with the animal ID and stored appropriately. While this method is relatively easy, the animal must still be restrained for the safety of the individual collecting the tissue sample. Furthermore, there must be a method (i.e., nolvasan soak, alcohol soak, multiple ear notchers) to ensure sanitary conditions and that the notchers can be cleaned after every collection to ensure that no cross contamination occurs.



**Figure 4.** Using ear notching pliers to collect tissue samples.

### ***Hair collection***

Hair collection for DNA extraction for genetic testing is quite possibly the easiest method to collect biological material. There are two main methods for collecting hair. The first is to take hair from the tail switch of the cow. While this method is very effective, the tail switch often has a large amount of contaminants (dirt, urine, feces, etc.). The second method, which is slightly more sanitary, is to take a sample of hair directly from the tail head of the animal. The most important factor with each collection method is that the root bulbs of the hair are collected with each sample (Figure 5). Samples can then be individually bagged or placed on hair cards for submission to the testing laboratory.



**Figure 5.** Proper hair collection containing the root bulbs at the end of the hair sample.

### Shipping and Storage Conditions

The collection of biological material for genetic testing is only the first step in the process. Samples must be stored properly and shipped properly to ensure that accurate testing can occur. With the exception of the FTA blood cards and hair cards, refrigeration or freezing is essential to maintain sample quality. Blood cards and hair samples can be maintained at room temperature and will remain stable for an indefinite period of time. However, if collecting blood or tissue it is essential

that samples be refrigerated or frozen. Specifically, if sending ear notch samples, it is recommended that the samples be frozen. When shipping blood or tissue samples it is recommended they be placed in an insulated package to maintain a cooled temperature. The package should contain dry ice, be sent by expedited shipping, and should be shipped early in the week to ensure samples arrive in suitable condition.

### Image Citations

Figure 1. <https://www.qcsupply.com/140018-ear-notcher-u-notch.html>

<http://extension.missouri.edu/p/G2140>

Figure 2. <http://www.vvcvets.com/proper-blood-drawing-technique.html>

Figure 3. <http://extension.missouri.edu/p/G2140>

Figure 4. <http://www.swansvet.com/ent.php>

Figure 5.

[https://www.google.com/search?q=hair+sample+collection+cattle&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjQrOm5\\_N7UAhVBjlQKHdzMCG8QAUICygC&biw=1920&bih=971#imgrc=uqV5D5bMyoie7M](https://www.google.com/search?q=hair+sample+collection+cattle&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjQrOm5_N7UAhVBjlQKHdzMCG8QAUICygC&biw=1920&bih=971#imgrc=uqV5D5bMyoie7M):

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions. Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities. This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Ken White, Vice President for Extension and Agriculture, Utah State University.