

# DNA Rules & Regulations

## Excerpt from NALF Rules and Regulations Section II, 1.

### F. Parentage Verification Requirements

The North American Limousin Foundation will accept parentage results from Zoetis (formerly Pfizer Animal Genetics), and GeneSeek, Inc. laboratories for parent verification.

#### 1) The following rules apply to all AI sires:

- a) Sires born prior to July 1, 1987 must have an identification blood or DNA type on file at the North American Limousin Foundation office.
- b) Sires born between July 1, 1987 and December 31, 1990 must be sire verified through blood or DNA typing.
- c) Sires born after December 31, 1990 must be parent verified to both sire and dam through blood or DNA typing.
- d) Sires born on or after January 1, 2001 must have a DNA type on file and be parent verified through blood or DNA typing. If blood typing is used for parentage verification, sires must have both a DNA type and a blood type on file for offspring to be eligible for registration.
- e) Sires born on or after January 1, 2002 must have a DNA type on file and be parent verified through DNA typing. In cases where one or both parents are deceased and no sample is available for DNA typing, blood typing may be used for parentage verification.
- f) Sires born after January 1, 2009 must be parent verified through STR or SNP typing. If STR typing is used for parentage verification, sires must have both a STR and a SNP type on file for offspring to be eligible for registration.
- g) Sires born on or after January 1, 2011 must have a SNP type on file and be parent verified through SNP typing. In cases where one or both parents are deceased and no sample is available for SNP typing, STR typing may be used for parentage verification.

*In cases where an AI sire is already registered with the North American Limousin Foundation, is parent verified through STR typing, and has registered progeny from an AI service - the sire must have a SNP type on file and will be allowed to continue as an AI sire.*

- h) New AI sires born on or after January 1, 2015 will be required to have a high density (50k or greater) SNP profile on file in addition to parent verification.

All sires used in multiple sire embryo transfer programs must be typed according to the rules above prior to breeding. Donor dams may be bred to no more than two (2) sires per flush. Prior to breeding, the North American Limousin Foundation's official laboratory must determine if the resulting offspring can be identified back to the specific AI sire. Limousin and Lim-Flex AI sires used to produce Lim-Flex offspring are subject to the same parentage verification requirements as for Limousin and Lim-Flex AI sires used to produce registered or recorded fullblood, purebred or percentage Limousin offspring. AI sires of other breeds used to produce Lim-Flex offspring are subject to the parentage verification requirements of the sire's breed association of record.

#### 2) The following rules apply to all embryo donor dams:

- a) Donor dams born prior to July 1, 1987 must have an identification blood or DNA type on file at the North American Limousin Foundation office.
- b) Donor dams born on or after July 1, 1987 must be sire verified through blood or DNA typing.
- c) Donor dams born on or after January 1, 2001 must have a DNA type on file and be sire verified through blood or DNA typing. If blood typing is used for sire verification, donor dams must have both a DNA type and a blood type on file for offspring to be eligible for registration.
- d) Donor dams born on or after January 1, 2002 must have a DNA type on file and be sire verified through DNA typing. In cases where the sire is deceased and no sample is available for DNA typing, blood typing may be used for sire verification. In cases where

the sire is deceased and no blood type or DNA tissue is available, the sire must be marked dead in the herd book and the donor dam must have an identification DNA type on file at the North American Limousin Foundation office.

e) Donor dams born on or after January 1, 2009 must be sire verified through STR or SNP typing. If STR typing is used for sire verification, donor dams must have both a STR and a SNP type on file for offspring to be eligible for registration.

*In cases where the donor dam has a blood type on file and was sire verified through blood typing, the donor dam and the donor dam's sire are deceased, and no sample is available for STR or SNP typing the donor dam's sire – the ET calf must have a SNP type on file and will be allowed registration using sire verification through STR or SNP only.*

f) Donor dams born on or after January 1, 2011 must have a SNP type on file and be sire verified through SNP typing. In cases where the sire is deceased and no sample is available for SNP typing, STR typing may be used for sire verification.

*In cases where a donor dam is already registered with the North American Limousin Foundation, is sire verified through STR typing, and has registered ET progeny - the donor dam must have a SNP type on file and will be allowed to continue as a donor dam.*

*In cases where the donor dam's sire is deceased and no sample is available for STR or SNP typing, the ET calf can be registered using sire verification through STR or SNP only and must have a SNP type on file.*

g) New donor dams born on or after January 1, 2015 will be required to have a high density (50k or greater) SNP profile on file in addition to sire verification.

Limousin and Lim-Flex donor dams used to produce Lim-Flex embryo transfer offspring are subject to the same parentage verification requirements as for Limousin and Lim-Flex donor dams used to produce registered fullblood, purebred or percentage Limousin embryo transfer offspring. For donor dams of other breeds used to produce Lim-Flex embryo transfer offspring, the North American Limousin Foundation will recognize and record identification blood and DNA types from Zoetis (formerly Pfizer Animal Genetics), and GeneSeek, Inc. or that of the donor dam's breed association of record. Donor dams of other breeds used to produce Lim-Flex embryo transfer offspring are subject to the parentage verification requirements of the donor dam's breed association of record.

3) The following rules apply to all embryo transfer (ET) calves in order to be eligible for registration:

a) ET calves born prior to January 1, 2003 must be parent verified to both sire and dam through blood or DNA typing.

b) ET calves born on or after January 1, 2003 must be parent verified to both sire and dam through DNA typing.

c) ET calves born on or after January 1, 2014 must be parent verified to both sire and dam through SNP typing.

Please refer to 2e and 2f for special situations.

Sires and donor dams of Lim-Flex ET calves are subject to the parent verification requirements of their breed association of record and their blood, STR, or SNP type must be on file at the North American Limousin Foundation office.

4) Random Parent Verification Program

As a means of maintaining the integrity of the North American Limousin Foundation's herd book, the Foundation "randomly" chooses animals that must be parent verified. Beginning May 1, 2002, every 2000<sup>th</sup> animal that is entered into the North American Limousin Foundation herd book must

be parent verified through SNP typing. All SNP typing costs are paid by the Foundation. The animal will not be registered and its registration certificate will not be released until parent verification has been completed.

## **2. Breeding Restrictions**

All bulls used in natural mating multiple sire groups must be registered with the North American Limousin Foundation and have DNA identification types on file. Progeny from multiple sire matings (matings using more than one bull per breeding group) are not eligible for registration until positive evidence of sire is furnished through DNA typing. In some situations, both the sire and the dam of the offspring may have to be DNA tested to establish paternity.

## **3. Foundation Cows**

Foundation cows shall be cows of any recognized breed, beef or dairy, or any combination of these breeds. When recording Limousin-sired progeny out of foundation cows, the amount of Limousin blood in any foundation cow shall be assumed to be zero (0). The percentage blood of other breeds is determined by allocating 12.5 percent for each character in the foundation cow's 16-character breed code (2 characters per 1/8) supplied at the time of her calf's registration. All foundation cows must be identified by an individual number suitably placed on the cow as a tattoo, hot brand, freeze brand or ear tag.

In recent years, several major breed associations have identified several deleterious mutations in their respective breeds. The American Angus Association has identified Arthrogyrosis Multiplex (AM), Neuropathic Hydrocephalus (NH), and Contractural Arachnodactyly (CA). The Red Angus Association of America has identified Osteopetrosis (OS). Tibial Hemimelia (TH) and Pulmonary Hypoplasia with Anasarca can be found in the Shorthorn, Maine Anjou, and Chianina breeds. These genetic defects are simple recessive in nature and result in calves that are either born dead or die soon after birth with the exception of CA. CA causes calves that are phenotypically impaired and are typically poor performing throughout their lives.

In order to protect the integrity of the NALF herd book and its members from unknowingly introducing genetics with known defects into the population, cows with undocumented parentage, currently known as foundation cows, that enter the Limousin herd book will be subject to the following rules.

Effective January 1, 2012, any sexually intact offspring of cows with undocumented parentage must meet one of the following requirements to enter the herd book:

- A.** The undocumented dam must be tested *free* of above genetic defects (AM, NH, OS, CA, TH and PHA), or the offspring must be tested *free* of any defect the undocumented dam proves to carry and given that the sire of the offspring is also tested *free* or *free* by pedigree for known genetic defects.
- B.** The offspring of an undocumented dam who has not been tested may enter the herd book if tested *free* of listed genetic defects (AM, NH, OS, CA, TH and PHA).\*

\* Steers may be registered out of an undocumented dam without the above requirements.

## **Excerpt from Section VII**

### **Genetic Defects and Abnormalities**

#### **1. Reporting**

In order to maintain a viable breed relatively free of undesirable genetic factors or other conditions, and to ensure that today's breeding practices will help tomorrow's animals stay free of undesirable traits, every Foundation member or owner of animals registered with the Foundation, shall have the duty to report to the Foundation any

occurrence or evidence of any abnormal condition or genetic defect in such person's animals. The duty to report arises upon the receipt by or knowledge of an owner of any information that would lead a person to inquire into the possibility that an animal carries or possesses a genetic defect or other condition.

## **2. Monitoring**

The North American Limousin Foundation shall receive, keep on file and monitor all information concerning genetic abnormalities or other conditions of any animal registered with the Foundation. The file shall be cross-referenced by sire, by breeder and by abnormality. The North American Limousin Foundation may designate animals as "Under Investigation" in any manner it deems necessary or convenient. This is not a final action and does not designate an animal as a proven carrier.

Each case will be handled on an individual basis. The owner reporting a genetic abnormality or other condition, and the Foundation, will be informed of any findings, diagnosis or test results. An effort will be made to diagnose all cases whether the problem is genetic or caused by other factors or conditions.

## **3. Definition and Special Action**

A deleterious genetic factor or other condition is defined as one that causes death or impairment of the usefulness of the animal. The North American Limousin Foundation board of directors shall, from time to time, based upon the advice of its scientific advisors, determine what deleterious genetic factors or other conditions will receive special attention and monitoring.

## **4. Classification**

The Foundation shall release or publish, in any convenient or necessary manner as it determines, information regarding any animal that has been classified as a "proven carrier" of a deleterious genetic factor or factors the animal possesses. Without the Foundation or any of its officers, directors, employees or agents becoming liable for damages or otherwise for such release and disclosure, the Foundation may release and disclose such information to any of its members, to others who register animals, transfer registration certificates or otherwise use the privileges of the Foundation and who may request the same.

**A.** The North American Limousin board of directors, with the advice of its scientific advisors, will determine the criteria by which an animal shall be classified a "proven carrier" for each deleterious genetic factor or other condition.

**B.** The expense of any test or tests to determine whether an animal is "proven clean" or a "proven carrier" will be the responsibility of the owner of the animal.

## **5. Ethics**

The Foundation considers it an unethical practice to offer for sale a breeding animal or semen from an animal registered with the Foundation which is known to carry a deleterious genetic factor or other condition, as defined by the Foundation, without first informing the potential buyer or buyers of this fact. Any advertising, descriptive material or pedigree initiated by the owner of any animal which is a "proven carrier" of a detrimental genetic factor or condition, as defined by the Foundation, shall include a statement identifying the deleterious genetic factor or other condition which the animal in question possesses. Any effort to conceal such information is considered to be equally unethical. Any person who had engaged in such unethical practice may be subject to suspension or expulsion from membership and from denial of use of the Foundation.

## **6. Specific Defects**

### **A. Identifying Suspect Animals**

1. Any animal with a documented carrier of AM, CA, NH, OS, TH, PHA, or

protophyria in the pedigree, unless the intermediary ancestors are tested-free or designated pedigree-free

2. Any sire or embryo donor dam with 1/8 blood or more of the defective gene source (breed, line, herd) unless the intermediary ancestors are tested-free or pedigree-free

#### B. Required Testing

1. 50 most-used sires (managed and paid by NALF)
2. All suspect A.I. sires
3. All suspect natural sires
4. All progeny of suspect sires, if the suspect sire DNA is unavailable for testing.
5. All suspect donor dams

#### C. Managing these policies

1. Genetic abnormality designations will be real-time. Test completions (DNA determination of carrier or free) will affect animals in downstream pedigrees

2. Progeny (If untested suspect sires or suspect donor dams) that has performance data submitted or request to be registered requires compliance (DNA testing)

3. For any untested donor or donor dam, 1/8 or more suspect breed, with pedigree suspects not tested defect-free or their pedigree not traceable to designated-free ancestors will be defined as suspect

We recognize this allows tested-carrier and potential-carrier females (1680 daughters for example) to enter the NALF database as "commercial Angus cow" and avoid the suspect label. However, labeling commercial Angus females as suspects would create exceptional processing resources and member testing expenses. By a very wide margin, the most cost-effective method to manage genetics is through sire testing. The above recommendations put almost all NALF policy pressure and member social pressure on the bulls where results will be most effective.