Comments from Jaydee Hanson, Senior Policy Analyst for Cloning and Genetically Engineered Animals

To National Organic Program, US Department of Agriculture

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Cattle Pedigrees Can Be Used to Track and Exclude Cloned Animals from Organic Production

I appreciate this chance to talk with the National Organic Program about what I think is a way to implement the National Organic Standards Board March 2007 recommendation on excluding farm animal clones and their offspring from the organic market.

I have a lifelong interest in cattle breeding, so I am presenting you a table of some of the cattle breeding associations that already have adopted policies requiring information on whether an animal is a clone or desended from a clone. Pig registries and goat registries also require cloning status, but given that most of the cloned farm animals are cattle, I think this chart and the accompanying appendix, including the text of the cloning registry requirements for many of the breeds, is a good example of how tracking of clones and their offspring are being tracked by the breeding associations.

Moreover, all of the beef breeds with large numbers of animals going to market: Angus, Herefords, and Texas Longhorns-have requirements for tracking clones and their progeny. All four of the major Dairy breeds—Jersey, Holstein, Guernsey, and Brown Swiss have similar requirements.

Many organic farmers already keep pedigrees on their animals and for the ones that do not, a requirement that they verify the pedigree of an animal is no more complicated than other requirements that they implement to have their products certified as organic.

It will be more and more important that the US National Organic Program implement the recommendation of the NOSB on clones and their progeny. The Canadian Organic Standard was amended to exclude clones and their offspring from organic in 2008. The Soil Association of the UK, which administers organic standards for the UK, has a campaign to get Europe to ban clones and their offspring altogether. Indeed, the new European rules on novel foods were derailed this year due to a conflict between the European Parliament and the European Commission on whether clones and their offspring should be permitted in the EU marketplace.

US organic farmers who export meat and milk products to other countries will be disadvantaged if the US National Organic Program fails to adopt a clear exclusion of clones and their offspring from the

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market. I believe that clones and their offspring could be easily tracked through pedigrees. The few herd registries that do not track cloning status, could easily adopt the rules that other breeding associations have already adopted.

This is the simplest way to implement the recommendation of the National Organic Standard Board from March 2007. I and my colleagues would be glad to help you in any way we can.

Name of Association	Rules
BEEF	Register Clone status in Pedigree
American Angus Association	Yes
Beefmaster Breeders United	Yes
American Akaushi Association	Yes
American Brahman Breeders Association	Yes
American Chianina Association	Yes
American Gelbvieh Association	YES
North American Limousin Foundation	Yes
American Maine-Anjou Association	Maybe
Red Angus Association of America	Yes
American Red Brangus Association	Yes
American Salers Association	Maybe
Santa Gertrudis Breeders International	Maybe
Senepol Cattle Breeders Association	Maybe
American Shorthorn Association	Yes
American Simmental Association	Yes
Texas Longhorn Breeders Association of America	Yes
American Hereford Association	Yes
DAIRY	
Holstein Association, USA Inc.	Yes
American Guernsey Association	Yes
American Jersey Cattle Association	Yes
Brown Swiss Cattle Breeder's Association of the U.S.A., Inc.	Yes

American Angus Association
Angus Information Management Software requires information on cloning status for both born calves and embryos. http://www.angus.org/Aims/helpfiles/UsersManual_Interactive.pdf
American Angus Association charges an additional $50 to register a clone.
http://www.angusbeefbulletin.com/ArticlePDF/AJ0405_Assnhighlights.pdf
And separate registration of clones is required: http://www.angus.org/Pub/brg_part4.pdf
Registration applications for cell-clone animals also are available upon request from the American Angus Association. http://www.angus.org/Pub/brg.pdf

Form of application. A registration application must contain the following information:
• Sex of animal to be registered.
• Date of birth.
• Name of the animal.
• Indication of whether or not the animal is the product of Artificial Insemination.
• Permanent identification marks.
• Registration number of the Sire.
• Registration number of the Dam.
• Name, location and Member Code of the First Owner.
• Completion, including signature, of the Breeder's Certificate, if required [see Rule 102(d)(3)].
• Completion, including signature, of the Bull Permit, if required [see Rule 102(d)(4)].
• Indication of whether the animal is a twin or of other multiple birth.
• AI Service Certificate, if required.
• Indication of whether the animal is a result of an embryo transplant.
• Completion date of embryo removal if the calf is the result of an embryo transplant, as well as indication of whether the calf resulted from split or cloned embryos.
Each registration with the Association shall be assigned a registration number.

American Chiana Association
http://www.chicattle.org/images/2011/pdf/ACAAppforRegistration.pdf
Clone status required for herd registration.
American Akaushi Association
https://americanakaushiassociation.com/uploads/American_Akaushi_Assn_Rules_Rev._2-01-10.pdf
American Gelbviah Association
http://www.gelbvieh.org/goopages/pages_downloadgallery/downloadget.php?filename=13564.pdf&orig_name=gv_rules_9_2009_final.pdf
Calves Resulting from Cell-cloned Transplants.
1. Only replication cell-cloned animals shall be eligible for registration. Genetically modified animals shall not be eligible for registration.
2. The cell-donor animal and the cell-cloned animal must be DNA-marker-typed.
3. The breeder of the cell-donor animal must be identified as the breeder of the cell-cloned offspring.
4. The owner of record of the cell-donor, on the date of biopsy removal, will be identified as the first owner, unless the calf is a result of a pregnant recipient, purchased embryo, fresh or frozen, in which case the purchaser may be identified as the first owner.
5. DNA-marker-typing of the recipient dam may be required by the Association.
6. Calves conceived after death of cell-donor animals shall be eligible for registration under the same conditions and provisions governing the eligibility of calves prior to the death of said animal.
7. Registration of cell-cloned transplants shall be made on a special form, provided by the Association, at the regular fee, plus an additional fee as determined by the Board of Directors.
8. Registration certificates issued for cell-cloned transplants shall be so designated. The registration number of the animal, which is being cell cloned, shall also be stated on the certificate of registration. Nothing set forth in this Rule 104(c) should be construed as an indication that the Association takes any position as to the ownership rights, if any, of retained

cell material. That is a separate matter reserved for discussion or negotiation between the buyer and seller. Cell-cloned transplants
The following requirements shall apply to the registration of calves resulting from cell-cloned transplants.
1. Only replication cell-cloned animals shall be eligible for registration.
2. The cell-donor animal must be DNA-marker-typed by the official DNA testing laboratory of the AGA prior to harvest of genetic material. DNA-marker-typing of the cell cloned animal, and/or recipient dams, may be required by the Association.
3. The suffix • \ETN. shall be added to the names of offspring resulting from cloning or other advanced reproductive technology. If cloned offspring are registered with the same name as the source animal, the name of each clone will be distinguished by a consecutive Arabic number preceding the suffix of • \ETN. starting with the digit • \2. (i.e., 2ETN or 3ETN). The sire and dam of a clone will be shown on the registration certificate as being the same as the sire and dam of the source animal, fetus or embryo.
4. When cloned calves are registered, the breeder of the entity from which the nuclear material originates will be recorded as the breeder of all resultant offspring and that breeder • fs prefix will be used in the naming of each clone.
5. The owner of record of the cell-donor on the date of biopsy removal, shall be identified as the first owner, unless the calf is a result of a pregnant recipient, purchased embryo, fresh or frozen, in which case the purchaser will be identified as the first owner. If the applicant for registration is other than the breeder, the written transfer of ownership of the cell-cloned animal from the breeder to the applicant must be documented as required by the Association.
6. Calves conceived after death of nuclear material-donor animals, shall be eligible for registration under the same conditions and provisions governing the eligibility of calves prior to the death of said animal.
7. Registrations of cell-clone transplants shall be made on special forms provided by the Association, at the regular fee, plus an additional fee as determined by the Board of Directors.
8. Registration certificates issued for cell-cloned transplants shall be designated. The name and registration number of the animal which is being cell-cloned, shall also be stated on the certificate of registration.
9. The Association shall not be responsible for determining the ownership rights of any retained cell material, if any. Ownership rights shall be determined by the original written agreement between the owner of the cloned animal and the purchaser of the cell-cloned transplant(s).
10. Even though clones will share the same genetic information, only those production and classification records from each specific animal will be displayed on its own performance products.
11. All other requirements for the registration of offspring resulting from embryo transfer not inconsistent with these rules and rules regarding the sale and transfer of embryos will also apply to cell-cloned transplant(s).
12. The Association shall develop forms necessary to identify the source of the nuclear DNA, the host cytoplast/oocytes and a certificate of embryo production from the combination of such nuclear material and host cytoplast/oocytes.

Beefmaster Breeders United

http://www.beefmasters.org/PDFs/2009/Policies%20and%20Procedures/Procedures%20Handbook/Member%20Handbook%20Policies%20&%20Procedures%202009.pdf

CLONES: Only BBU replication cell-cloned animals shall be eligible for registration and eligible to sell in BBU Voluntary Approved Sales. Genetically modified animals shall not be eligible for registration and cannot sell in BBU Voluntary Approved Sales. Cloned animals shall be guaranteed by the seller(s) to be breeders under the same terms of this agreement for females and bulls. ALL ADDITIONAL GUARANTEES WITH RESPECT TO CLONES SHALL BE A SEPARATE AGREEMENT BETWEEN BUYER AND SELLER.
BULLS: If within one-hundred twenty (120) days from

American Hereford Association

http://hereford.org/static/files/HB11_4_AHARulesAndRegs.pdf

SECTION VIII: RULES REGARDING CLONES
Rule 1. ONLY REPLICATION CELL-CLONED animals shall be eligible for registration.
Rule 2. THE CELL DONOR animal must be DNA-marker typed.
Rule 3. THE BREEDER of the cell-donor animal must be identified as the breeder of the cell-cloned offspring.
Rule 4. THE OWNER OF RECORD of the cell-donor, on the date of biopsy removal, will be identified as the first owner, unless the calf is the result of a pregnant recipient, purchased embryo — fresh or frozen — in which case the purchaser may be identified as the first owner.
Rule 5. DNA MARKER typing of the cell-cloned animal, or recipient dams, may be required by the Association.
Rule 6. CALVES CONCEIVED AFTER DEATH of cell-donor animals shall be eligible for registration under the same conditions and provisions governing the eligibility of calves prior to the death of said animal.
Rule 7. REGISTRATION OF CELL-CLONED transplants shall be made on a special form, provided by the Association, at the regular fee, plus an additional fee as determined by the Board of Directors.
Rule 8. REGISTRATION CERTIFICATES issued for cell-cloned transplants shall be so designated. The registration number of the animal, which is being cell-cloned, shall also be stated on the registration certificate.
Rule 9. NOTHING SET FORTH herein should be construed as an indication that the Association takes any position as to the ownership rights, if any, of retained cell material. That is a separate matter reserved for discussion and/or negotiation between the buyer and seller.
Rule 10. INITIAL BREEDING VALUES – EXPECTED
PROGENY DIFFERENCES (EPDs) generated from National Cattle Evaluation for a cloned animal shall be the same values asthe cell-donor animal. All data of future progeny from a cloned animal will be pooled with the cell-donor progeny data for genetic evaluation.

American Jersey Cattle Association

http://www.usjersey.com/Programs/regrules.htm#Top

Sec. 11. Application for registration of animals must give:

(a) The sex of the animal.
(b) The name desired for the animal.
(c) The date of birth.
(d) The animal's permanent identification.
(e) Whether the animal resulted from artificial insemination.
(f) Whether or not the animal is a twin.
(g) Whether the animal is polled or horned.
(h) Whether or not the animal is the result of embryo transfer or clone.
(i) The name and Herd Register number of the sire.
(j) The name and Herd Register number of the dam.
(k) Signature and owner number of the applicant who shall be the first owner of the animals, defined in Rule II.

Holstein Association, USA

http://aipl.arsusda.gov/publish/other/2002/submit_7wc_norhowp.pdf

Holstein Association USA first registered calves from embryo splitting in 1982 and from nuclear transfer in 1989. Although nuclear-transfer clones are expected to have nearly identical nuclear DNA, their mitochondrial DNA will differ. Unfortunately, almost no recording has been made of the identity of recipient cells.

Red Angus Association of America

www.redangus.org/node/105/Rules_and_Regulations.pdf

CLONE CALVES
1.DNA Authentication – To be eligible for registration, both the genetic donor and clone must be DNA typed. The DNA of the clone must be compared to the DNA of the original animal, meeting the probability of exclusion values.
2. Name – Cloned animals will carry a unique name designated by the first owner of the clone but must carry the suffix of CLN (maximum of 28characters including the CLN suffix).
3. Recorded Breeder – Breeder of the clone should be listed as the breeder of the genetic donor at the time the original animal was conceived.
4. Recorded Owner – Owner of the clone should be listed as the first ownerof the cloned animal.
5. Registration Certificate – The word clone and the registration number of the genetic donor will be displayed on the registration certificate.
6. Consent – For a breeder to have the right to clone an animal, they must have written consent from all the owners of the genetic donor who are current members of the association. Written consent must accompany the cloned animal(s) application for registration.

American Brahman Breeders Association
http://www.brahman.org/PDFs/Join-ABBA/2011/rules-revised-2011.pdf
CELL-CLONED TRANSPLANTS

The following requirements shall apply to the registration ofcalves resulting from cell-cloned transplants.

The registering breeder must be a member of the American Brahman Breeders Association.

Only replication cell-cloned animals shall be eligible for registration. Genetically modified animals shall not be eligible forregistrations.

The cell-donor animal must be DNA Marker typed.

The breeder of the cell-donor animal must be identified as the breeder of the cell-cloned offspring.

The owner of record of the cell-donor, on the date of biopsy removal, will be identified as the first owner, unless the calf is a result of a pregnant recipient, purchased embryo, fresh or frozen, in which case the purchaser may be identified as the first owner.

DNA Marker typing of the cell-cloned animal, or recipient dams,may be required by the Association.

Calves conceived after death of cell-donor animals, shall be eligible for registration under the same conditions and provisions governing the eligibility of calves prior to the death of said animal.

Registration of cell-cloned transplants shall be made on a special form, provided by the Association, at the regular fee, plus an additional fee as determined by the Board of Directors. Registration certificates issued for cell-cloned transplants shall be so designated. The registration number of the animal, which isbeing cell cloned, shall also be stated on the certificate of registration.

Nothing set forth herein should be construed as an indication that the Association takes any position as to the ownership rights, if any, of retained cell material. That is a separate matter reserved for discussion or negotiation between the buyer and seller.

American Shorthorn Association
http://www.shorthorn.org/Images/registration/rules/Rules%20%20Regs%20Aug15%202020 11_.pdf
CLONE ELIGIBILITY: The following points represent the ASA policy for the registration of cloned animal:
1. Only replication cell-cloned animals shall be eligible for registration. Genetically modified animals shall not be eligible for registration.
2. The cell donor animal and the cell-cloned animal must have a DNA genotype and genetic defect status on file with the ASA and be included on the ASA Genetic Defect Status List (consistent with Rule III, Section 8 of this document).

Brown Swiss Cattle Breeder's Association of the U.S.A., Inc.

http://www.cyagra.com/brownswissreg.htm

RULE 3 - REGISTRATION

O. Embryo Transplants:

1. The recorded owner of the transplanted embryo at the time of birth of the resulting calf shall be eligible to apply for a Certificate of Registry.

2. A suffix must be included in the name of animals resulting from embryo transplants.

a. Animals resulting from single whole embryos must include the suffix ET in their name.

b. Animals resulting from split embryos must include the suffix ETS in their name.

c. Animals resulting from nuclear (cloning) embryos must include the suffix ETN in their name.

American Guernsey Association
http://www.usguernsey.com/sales/national081315.pdf

This link shows the sale of cloned Guernsey embryos. They are required to be named with the same name as the original animal with the prefix "CLX" following the name, where X = the number of clones in existence, i.e. the first clone would be CL2, the next CL3 etc.

The association, also, has policy on clones governing how pedigrees are printed that says that the original animal's genetic and performance data is used for young clones and then their own data is used when it is available.

North American Limousin Foundation

Now Lists Clone status in the pedigrees of animals it registers.

2011 - Young Sire Trait Leaders - YW North American Limousin **...**
www.nalf.org/pdf/2010/dec29/YSTLYWT.pdf
COLEMAN LIMOUSIN RANCH. **CLONE**-COLE FIRST DOWN 46D. 0.19. 0.35. 0.30. 0.24. 0.15. 0.18. P+. P. 0.19. 0.17. 0.17. 0.17. 03/12/2009. CHARLO, MT. 70 * **...**

Registration Certificate

- *Registration Prefix and Number: NALF assigns each clone its own unique registration number with a prefix of CLN indicating a clone.*
- *Blood Type Case Number: For clones, this number indicates DNA authentication case number. Information as to the specific DNA markers used for validation is included in the case documentation.*

- *Name of Animal: NALF assigns names to clones using the name prefix CLONE- followed by the first 19 letters and spaces of the original animal from which the clone was developed.*
- *Calf Herd ID: Same as for non-cloned animals - assigned by breeder.*
- *Birth Date: Birth date of specific clone.*
- *Prefix, Tattoo, Location: Same as for non-cloned animals - unique tattoo assigned by breeder according to NALF rules for herd prefix, year letter and location.*
- *Ownership Date: Same as for non-cloned animals.*
- *Breeder: The breeder of a clone is the owner of the dam of the original animal at the time the original animal was conceived.*
- *Original Applicant: The original applicant of a clone is the person owning the original animal at the time the tissue sample is collected from which specific clones are produced.*
- *Note: The registration certificates for offspring of clones (sires and dams) identify the clone from which the offspring were produced through the cloned parent(s) name and registration number on the certificate.*

American Simmental Association

http://www.simmental.org/userimages/Rules%20Bylaws%202011.pdf

3. Registration of Clones:
a. General Definition of a Clone. A clone is a genetic copy of an existing genotype arising from (a) splitting a fertilized egg; or (b) the fusion of a donor animal's cell nucleus with a recipient oocyte (unfertilized egg). Clones transmit nearly identical genetic value to their offspring as compared with the original animal.
b. Eligibility for Registration.
1. Only clones created via replication of cells shall be eligible for registration. Genetically modified animals shall not be eligible. A clone must meet all other applicable ASA standards for registrations.
2. Clones may be created from fertilized eggs, cells from live animals or cells from deceased animals.
3. The original animal or embryo must be DNA tested and registered with the ASA.
4. A clone must be DNA typed to the original animal or embryo in the manner determined by the ASA to be eligible for registration.
c. Identification of Breeder. The breeder of the cell-donor animal or embryo will be identified as the breeder of the cloned offspring.
d. Identification of Owner. For clones obtained via nuclear transfer, the owner of record of the original animal, on the date of cloning, will be designated as the first owner of the clone. For clones obtained via the division of a fertilized egg, the owner of the divided embryo will be designated as the first owner of the clone.
e. Registration.
1. The first owner will be responsible for the registration and DNA verification of the original animal and clone.
2. Registration of clones shall be made on a special application for registration and the owner must designate that the animal is a clone. All cloned animals will be charged regular registration and transfer fees plus an additional fee as determined by the Board of Trustees.

3. Registration certificates for clones shall be so designated. The registration number of the original animal shall also be identified on the registration certificate.
4. The registered name of individual clones must include the cell-cloned family name.
5. All other standard registration requirements must be met.
f. Retained Genetic Material. Nothing set forth herein should be construed as an indication that the ASA takes any position as to the ownership rights, if any, of retained cell material. That is a separate matter reserved for discussion or negotiation between the buyer and seller.

Texas Longhorn Breeders Association of America
This association makes clear on its registration form that cloning status is to be included in the pedigree of the animal. See the form below:
http://www.tlbaa.org/registration/forms/Registration%20Application.pdf
Rules on cloning are here:
http://www.tlbaa.org/tlbaa/TLBAA%20Handbook%202010.pdf
F. TLBAA Rules of Registration of Clones
The following requirements shall apply to the registration of calves resulting from cell-cloned transplants:
1. Only replication cell-cloned animals shall be eligible for registration. Genetically modified animals shall not be eligible for registration. 2. The cell-donor animal must be DNA-marker-typed. A report of the results of DNA tests performed by the laboratory recognized by the TLBAA must be on file in the Association office prior to the registration of clones.
3. Before individuals can be registered as clones, the clonal family (A clonal family is a group of individuals that have the same genotype; that is, all individuals are derived from the same cell line) must be certified with the TLBAA and given a TLBAA certification number. If it is determined that an animal appears in the lineage of a cell-donor animal, requesting Clonal Family Certification, that is eligible for TLBAA registration but cannot be traced within the TLBAA E.T. or
A.I. certification requirements, the requesting cell-donor animal would not be eligible for certification.
4. Clonal Family Certification requests submitted after October 1, 2006 will be subject to TLBAA Board approval.
5. The TLBAA reserves the right to inspect any TLBAA registered animal identified as the cell-donor in all requests for a Clonal Family Certification with the cost of the inspection to be borne by the party seeking the clonal Family Certification.
6. A clonal family must be established for each individual TLBAAA registered animal identified as the cell donor.
7. Individual clones must be DNA (Deoxyribonucleic Acid) typed to the clonal family.
8. The registered name of individual clones must include the TLBAA Clonal Family Certification number. All other standard registration requirements must be met.
9. The breeder of the cell-donor animal must be identified as the breeder of the cell-cloned offspring.

10. The owner of record of the cell-donor, on the date of the biopsy removal, will be identified as the first owner; unless, the calf is a result of a pregnant recipient or purchased embryo (fresh or frozen) in which case the purchaser may be identified as the first owner.
11. Calves conceived after death of cell-donor animals, shall be eligible for registration under the same conditions and provisions governing the eligibility of calves prior to the death of said animal.
12. Calves resulting from multiple sire breeding, using only sires .. registered in the same clonal family, are eligible for registration. Resulting calves will be registered, using the Clonal Family ..... Certification number. Individual registration numbers of all cloned sires must be provided at the time of registration of the calves.
13. Registration of cell-cloned transplants shall be made on a TLBAA registration form, provided by the Association, at the regular fee, plus an additional fee as determined by the Board of Directors.
14. Registration certificates issued for cell-cloned transplants shall be so designated. The Clonal Family Certification number of the animal, which is being cell-cloned, shall also be stated on the certificate of registration. Offspring of a registered clone, conceived by natural reproduction, shall be duly recorded in the Association herd book but shall carry a designation to denote clonal ancestry. Additionally, all TLBAA registered animals, with a lienage containing a cell-cloned transplant, will be identified with the designation in their TLBAA registration number.
15. Nothing set forth herein should be construed as an indication that the Association takes any position as to the ownership rights, if any, of retained cell material. That is a separate matter reserved for discussion or negotiation between the buyer and seller. It shall be considered unethical and improper, at the time of sale of an animal, 27 Texas Longhorn Breeders Association of America to fail to fully disclose all information pertaining to ownership rights of retained cell material and/or cell line. A box on the TLBAA transfer form will be designated for the disclosure of any retained cell material and/or cell lines by the seller or previous owners of said animal.
16. In order to compile performance data, owners of all cell-cloned transplants will be encouraged to submit to the TLBAA: birthweight, and weight and horn measurements at six (6) month ..intervals until 3-years of age.

SOME CANADIAN AND EUROPEAN BREEDS WILL NOT REGISTER CLONES
Canadian Brown Swiss and Braunvieh Association
http://www.clrc.ca/13by-laws.pdf

The following Brown Swiss dairy animals are eligible for registration in the Brown Swiss Section of the Association Herd Book. No animals produced via clone or gene manipulation shall be eligible for registration.

Aberdeen-Angus Cattle Society (UK)
http://www.aberdeen-angus.co.uk/wp-content/uploads/ByeLaws2011.pdf
Cloning *Any animal which is born as a direct result of cloning technology will not be eligible for entry into the Herd Book. Whilst it is acknowledged that cloned animals are entered into Herd Books of overseas societies, such animals will not be eligible for transfer into the Society's Herd Book. Progeny from such animals whether resulting from natural serv-ice, A.I. or E.T. will be eligible for entry into the Herd Book and their pedigree certificate marked accordingly.*

CANADIAN ORGANIC STANDARDS PROHIBIT CLONES & THEIR OFFSPRING
http://www.ocia.org/ResourceCenter/Training/COR_SP/COR_Stds_Final.pdf
1.4 Prohibited Substances, Methods or Ingredients in Organic Production and Handling

k. cloned farm animals and their descendants. A producer shall know the lineage of any non-organic animal brought under organic management.