

Sheep & Goat HEALTH REPORT

A National Institute for Animal Agriculture Publication

Fall 2005

Research Yields a Scrapie Genetic 'Surprise'

Scientists know that genetics determine a given sheep's basic susceptibility or resistance to scrapie, but more details are being learned all the time.

For example, research now shows that in some triplet pregnancies, some fetuses with a genotype of AAQR (AA at codon 136 and QR at codon 171 of the prion protein gene; the gene that determines scrapie resistance) – which ordinarily would be expected to be genetically resistant based on their genotype – may actually be susceptible.

This is according to a research report presented by Dr. Janet Alverson of the USDA's Agricultural Research Service Animal Disease Research Unit in Pullman, Wash.

Susceptibility to scrapie is determined in large part by a sheep's genotype at codons 136 and 171. Codons are made up of nucleotides that code for amino acids in proteins.

Codon 171 can code for several different amino acids written as Q, R, H, or K on genetic tables (H and K are rare and are treated the same as Q for regulatory purposes), while codon 136 amino acids are labeled V and A. Because an animal gets a copy of each codon from each parent, both parents determine the susceptibility of an individual.

Scrapie genotypes are commonly written in combinations of four letters with the letters for the amino acids at codon 136 written first, such as AARR. Altogether, there are nine common scrapie susceptibility genotype combinations that sheep can have. Any combination with an R at codon 171 is considered to be "resistant or rarely susceptible" and any combination without an R, such as AAQQ, is considered susceptible.

Most cases of scrapie in the U.S. are caused by non-valine scrapie where susceptibility is primarily controlled by codon 171 (QQ—susceptible; QR—rarely susceptible; RR—resistant). Typically, the incubation time for this type of scrapie is three years, with detection in the lymph nodes at about one year and in the brain at about two to three years.

Valine scrapie, where susceptibility is controlled primarily by codon 136 is uncommon in the U.S. but can occur in VVQQ, AVQQ and AVQR sheep. It has a shorter incubation time, often as little as two years, and can be detected in lymph nodes as early as four to six months of age and in the brain by as early as one year.

Alverson found that with triplets, an AAQR placenta can be scrapie pos-



itive when it shares the uterine horn with an AAQQ positive placenta. In placentas of twins where each horn contains a single fetus, and where the AAQQ fetus had a positive placenta, the AAQR twins' placenta has, to date, always tested negative. At this time, it is unknown if the AAQR twins that have positive placentas will become infected with scrapie. These twins will be maintained and tested when they are older to determine if they are infected.

Alverson said this unexpected result might be because there is some sharing of blood and possibly stem cells between placentas of fetuses on the same side of the uterine horn. Some expression of the Y chromosome in the placentas of a female twin sharing a uterine horn with a male fetus provides evidence for this theory.

In the next phase of her research, Alverson will be working to determine what cell types are involved in the exchange.

The paper was presented in November at the U.S. Animal Health Association's annual meeting in Hershey, Pa. ●

By Gale Johnson, contributing writer

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Better Testing Reagent Needed for Ram Epididymitis

Better testing for ram epididymitis, a disease that causes infertility, was a main topic of discussion at the meeting of the U.S. Animal Health Association (USAHA) Committee on Sheep and Goats during the association's annual meeting in early November.

Committee members called on USDA's National Veterinary Services Laboratories (NVSL) in Ames, Iowa, to develop a better standard antigen for conducting

the *Brucella ovis* test, used for detecting ram epididymitis. The six laboratories in the United States that run tests for this disease have been getting a number of aberrant test results due to problems with the current antigen. This is an important trade issue because 70 percent of the western states require a negative test for entry of rams from other states. NVSL officials at the meeting said they were committed to resolving the problem.

Epididymitis is a disease of sheep. It is characterized by both acute and chronic inflammation of the testicle and epididymis. The disease results in economic losses for producers because of reduced fertility, shortened breeding life, necessary inspection, expensive immunization and increased labor. The most significant economic impact is a lowered concep-

tion rate, extended duration of the lambing period, failure of a high percentage of ewes to conceive, occasional abortions and weak lambs.

Clinical signs of epididymitis are confined to contents of the scrotal sac. Acute cases start with swelling of the epididymis (unilateral) without testicular involvement. Later the tail of the epididymitis becomes a hard, fibrous mass. The demarcation between the testicle and tail of the epididymis is obliterated. Abscesses may develop at any time during this disease process. Eventually, the testicle on the same side as the infected epididymis atrophies and becomes soft. ●



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ASI, NLFA Convention Deadline Nears

The American Sheep Industry Association (ASI) and the National Lamb Feeders (NLFA) Annual Convention is scheduled for Jan. 25 to 28 in Phoenix, Ariz. Pre-registration forms should be post-marked by Jan. 9, however registration will be accepted after that at an increased rate.

This year's meeting will celebrate two key milestones: the ASI's 140th anniversary, and the first growth in sheep numbers since 1990. "Strength in Numbers" is the theme for the meeting.

Other special events scheduled for the event, to be held at the

Phoenix Marriott Mesa, include a scrapie stakeholders meeting, an animal identification update, prescribed grazing symposium, RightRisk™ management risk simulation workshop, idea exchange forum for state leaders and a loan preparation workshop. ASI and NLFA have also scheduled other leisure tours, in addition to the number of other committee meetings and informational sessions.

For more information, including registration, log on to the Internet at www.sheepusa.org or call (303) 771-3500, ext. 0. ●

Regulations Proposed for MUMS Designation

The Minor Use and Minor Species (MUMS) Animal Health Act of 2004 amended the Federal Food, Drug, and Cosmetic Act to authorize the Food and Drug Administration (FDA) to establish new regulatory procedures intended to make more medications legally available to veterinarians and animal owners for the treatment of minor animal species as well as uncommon diseases in major animal species. FDA is issuing proposed regulations to implement the "Designation" provisions of the MUMS Act.

Minor use drugs are drugs for use in major species (cattle, horses, swine, chickens, turkeys, dogs, and cats) that are needed for diseases that occur in only a small number

of animals either because they occur infrequently or in limited geographic areas. Minor species are all animals other than the major species, for example, zoo animals, ornamental fish, parrots, ferrets, and guinea pigs. Some animals of agricultural importance are also minor species. These include animals such as sheep, goats, catfish, and honey bees.

The "Designation" section of the MUMS Act has been incorporated into the Federal Food, Drug, and Cosmetic Act (the Act) as Section 573. This Section of the Act is similar to the "Orphan Drug Act" for humans, which provides incentives to pharmaceutical firms that develop drugs for rare diseases or conditions. The proposed rule

provides the functional requirements for drug sponsors requesting MUMS designation for proposed new animal drugs. The rule also describes "exclusive marketing rights" which is one of the primary incentives for MUMS designation. Companies that gain approval for designated new animal drugs will be granted seven years of exclusive marketing rights.

The proposed rule was published in the Sept. 27 *Federal Register* at www.fda.gov/OHRMS/DOCKETS/98fr/05-19196.htm. FDA will review written comments before moving ahead with a final rule.

Additional information is included in the September 27, *Federal Register*. ●

USDA releases U.S. Animal Health Report

The U.S. Department of Agriculture (USDA) released the 2004 U.S. Animal Health Report on Oct. 7, a national overview of domestic animal health in the United States, which is the first report of its kind.

The report addresses the many components of the U.S. animal health infrastructure, animal population demographics, new initiatives and approaches to foreign animal disease surveillance. The report is a direct result of an external review of the nation's animal health safeguarding system. The animal health safeguarding review, which was released in November 2001, assessed the performance, processes and procedures used to ensure mission success for the USDA's Animal and Plant Health Inspection Service; (APHIS) specifically its veterinary services program as well as industry partners. The mission: to protect and to improve

the health, quality and marketability of the nation's animals, animal products and veterinary biologics.

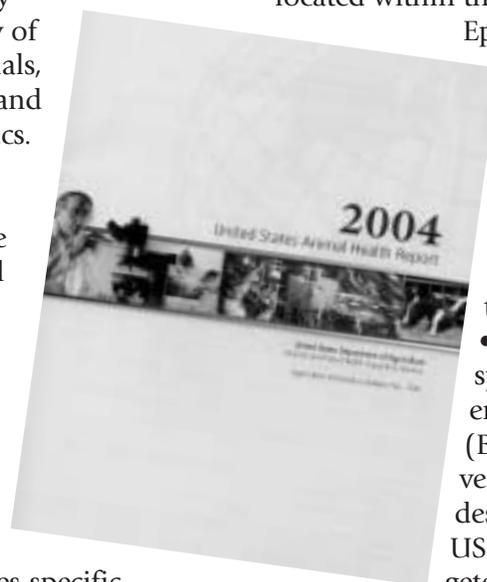
New animal-health initiatives highlighted in the 2004 U.S. Animal Health Report include:

- The National Animal Identification System, tasked with coordinating the establishment of species-specific working groups, supporting the development of state premises systems and developing a national allocation database for premises identification numbers in order to develop a national tracking system for U.S. livestock.
- The national surveillance unit –

located within the Centers for Epidemiology and Animal Health – responsible for coordinating the development of the national animal health surveillance system.

- The bovine spongiform encephalopathy (BSE) enhanced surveillance plan, designed to augment USDA's existing targeted surveillance efforts by strengthening surveillance in the high-risk cattle population.

The 2004 U.S. Animal Health Report can be found on the Internet at www.aphis.usda.gov/lpa/pubs/2004_us_animal_health_report.pdf. ●



National Scrapie Eradication Program Completes Fifth Year of the Accelerated Eradication Plan

National Scrapie Eradication Program FY 2005 Report

During the federal government's fiscal year, Oct. 1, 2004 to Sept. 30, 2005, the percent of scrapie-infected black faced sheep disclosed at slaughter decreased by 26 percent. This percentage is the best measure of program efficacy according to Dr. Diane L. Sutton, Coordinator of the National Scrapie Eradication Program (NSEP) for the U.S. Department of Agriculture's Animal and Health Inspection Service, Veterinary Services (APHIS, VS.)

Despite the decrease in scrapie infection in sheep sampled at slaughter, APHIS successfully identified 165 new scrapie infected and source flocks, an increase of 65 percent over FY 2004.

The NSEP Accelerated Eradication Plan is entering its sixth year with the goal of making U.S. sheep and goats scrapie-free by 2010. This year, the Regulatory Scrapie Slaughter Surveillance (RSSS) program sampled 33,137 animals at 81 slaughter facilities, an increase of 32 percent overall and 90 percent for black and mottled faced sheep. This shift toward black and mottled faced sheep greatly increased the efficiency and effectiveness of the surveillance effort.

The vital function of scrapie surveillance in slaughter houses has been in place since April 2003. The purpose is to detect scrapie in culled slaughter ewes that aren't showing clinical signs of the disease or those displaying non-specific signs so that infected and source flocks can be identified. In the more than two years that it has been in place, the RSSS pro-

gram has taken samples from more than 62,800 sheep of which results on more than 59,100 have been reported. A total of 209 have been confirmed positive for scrapie. Nearly all of these have been black or mottled faced sheep.

APHIS investigates exposed flocks in two ways: Testing exposed animals and testing animals that were in contact with an exposed ewe in cases where the exposed ewe is unavailable for test. This second type of investigation is called a missing ewe investigation. In FY 05, APHIS evaluated the efficacy of these two methods and showed that both methods resulted in a determination that approximately 10 to 12 percent of the investigated flocks were infected. On average, four ewes were tested as part of each missing ewe investigation either by third eyelid or at necropsy. Third-eyelid testing and necropsy testing were each used in about 50 percent of the flocks and showed similar results.

Scrapie Flock Certification Program

As of September 30, 2005, there were 1,961 flocks participating in the Scrapie Flock Certification Program (SFCP). Of these flocks 188 were certified flocks, 1,770 were complete monitored flocks and three were selective monitored flocks. There were 209 flocks newly enrolled and 53 newly certified.



Animal ID

As of Sept. 30, 2005, 103,580 sheep and goat premises had been assigned identification numbers in the Scrapie National Generic Database. Official eartags have been issued to 73,807 of these premises.

Consistent States

In order to move sheep and goats in interstate commerce with minimal restrictions, states must meet the requirements (9 CFR 79.6) as specified in the regulations for NSEP. At the end of FY 2005, 27 of the states were considered "consistent," having enacted the required identification rules. The remaining states have submitted a work plan that describes the steps that will be taken to comply, along with a timeline for completing significant milestones. ●

By Gale Johnson, contributing writer

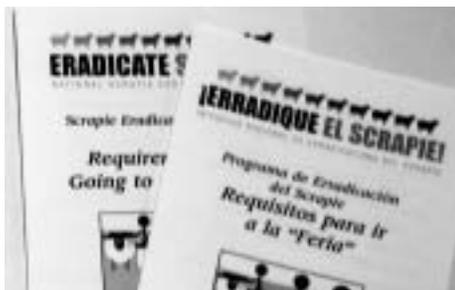
NSEP UM&R

The Scrapie Eradication Uniform Methods and Rules (UM&R) is reviewed annually and open to continuous comment, review and change. The current publication was issued June 1, 2005. Comments and suggestions regarding the UM&R can be made to NSEP Coordinator, Dr. Diane L. Sutton, at diane.l.sutton@aphis.usda.gov. The document can be found on the Internet at www.aphis.usda.gov/vs/naahps/scrapie/yearly_report/yearly_report.html.

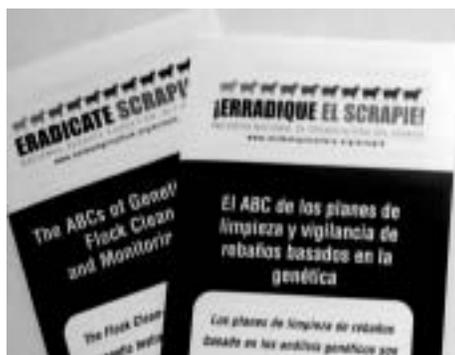
Scrapie Eradication Publications Now Available in Spanish

Several key publications which explain to sheep and goat producers their responsibilities regarding the National Accelerated Scrapie Eradication Program (NSEP) have been updated and are now available in both English and Spanish. They include:

- "Requirements for Going to The 'Show'", in Spanish, "Requisitos para ir a la 'Feria'";



- "The ABCs of Genetic Based Flock Clean-up and Monitoring Plans", in Spanish, "El ABC de los planes de limpieza y vigilancia de rebanos basados en la genética"; and



- "What You as a Producer Need to Know About the National Accelerated Scrapie Eradication Program" in Spanish, "Lo que usted como productor debe saber sobre el Programa Nacional de Erradicación Acelerada del (Scrapie)."

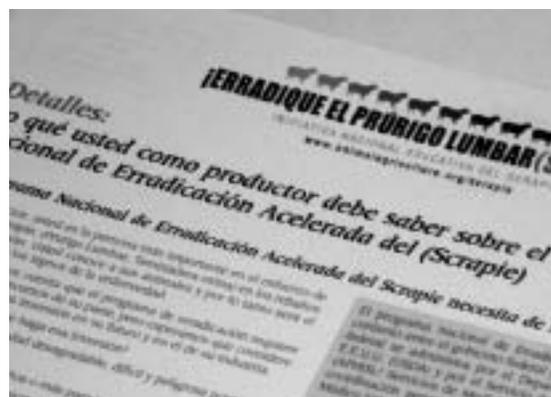
The first two cover the specific

areas relating to shows and exhibitions and genetic clean-up plans. The third one "What Producers Need to Know"/"Lo que usted como productor debe saber sobre" is more general in content and specifically outlines which categories of sheep and goats need NSEP identification as well as the record-keeping requirements of the program.

These and other materials are part of the National Scrapie Education Initiative conducted by the National Institute for Animal Agriculture (NIAA) on behalf of the U. S. Department of Agriculture's Animal and Plant Health Inspection Service, Veterinary Services,

which administers NSEP.

These publications, as well as other materials on scrapie and NSEP, can be downloaded from the Internet at www.animalagriculture.org/scrapie. Bulk orders can be placed by contacting Julie at jjones@animalagriculture.org or by calling NIAA at 270-782-9798. ●



MRI Technique, Rectal Biopsies Show Promise for Scrapie Diagnosis

The U.S. Animal Health Association (USAHA) Committee on Scrapie, at its annual meeting in Hershey, Pa. in early November, heard a report on magnetic resonance imaging (MRI) diagnostics that shows promise as a test for scrapie in both live and dead sheep.

Dr. Alexia McKnight of the University of Pennsylvania reported that the same type of equipment that is used to perform MRIs on people can be used on anesthetized sheep to detect signs of scrapie. The advantage of this exciting new technique is that the information obtained from the tests can be read immediately.

Although the procedure has

potential, it may have limited practical use due to the cost of the equipment. The technique is still under study.

Rectal biopsies also show promise for live animal scrapie diagnosis.

Preliminary evaluations of biopsies of the lymphoid tissue found in the rectum near the anus in scrapie positive sheep suggest that this technique may prove easier to use and not have the 'no-test' problem associated with the third eyelid test.

Further study is needed to determine the sensitivity and specificity of the test before it can be adopted for regulatory use. ●

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Michigan State Offers International Food Law Courses

Michigan State University's Institute for Food Laws and Regulations has expanded its distance education program to include a course focusing on OIE, the World Organization for Animal Health, including a broad range of modules on OIE's role in global animal health.

A total of eight courses are available in the certificate program, including the OIE course. They are available completely over the Internet. The spring semester 2006 begins Jan. 9, 2006, and the fall semester begins Aug. 28, 2006.

The award winning program offers courses taught by an international network of food science, academic, regulatory and legal professionals who understand the legal complexities of the food laws and how they impact the flow of food, plants, animals and agricultural products across national boundaries.

To learn more about these opportunities, log onto the Internet at vu.msu.edu/preview/anr-ifl/.

USAHA Elects New Leadership

Dr. Bret Marsh, Indiana State Veterinarian, was elected president of the United States Animal Health Association (USAHA) at its 109th annual meeting in Hershey, Pa. on Nov. 9.

"Over the next year, we will work together with input from the membership and, more specifically, from the Board of Directors to discover our core values," Dr. Marsh said. "We will use this foundation to plan for the future strategically."

President-elect of USAHA is Dr.

Lee M. Myers, Georgia State Veterinarian. Other officers are James Leafstedt, South Dakota pork producer, first vice-president; Dr. Don Hoenig, Maine State Veterinarian, second vice-president; Dr. Richard Breitmeyer, California State Veterinarian, third vice-president; Dr. William L. Hartmann, Minnesota State Veterinarian, treasurer; and Dr. J Lee Alley, retired Alabama State Veterinarian, secretary.

NAHRS Nears Full State Participation

All but eight states are now actively participating in the National Animal Health Reporting System (NAHRS), according to a report presented at a meeting of the Committee on Animal Health Information Systems on Nov 7. The committee is a joint effort of the U.S. Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD).

According to the report, several other states are finalizing their reporting procedures. The 42 participating states represent 86 percent of the cattle, 66 percent of the swine, 90 percent of the sheep, 67 percent of the poultry and 84 percent of the catfish value of U.S. production for these commodities.

Under NAHRS, state animal health officials report on a monthly basis on the occurrence or non-occurrence of specific diseases listed by the World Organization for Animal Health (OIE). The U.S. Department of Agriculture's Animal and Plant Health Inspection Service uses this information in a number of different ways. The data provides the basis for the annual report that the United States is obligated to make

to OIE.

Brazil Battling FMD

Brazil continues a battle with foot-and-mouth disease (FMD), with cases first diagnosed in early October. The latest reports indicate the total is more than 20 cases as officials work to control the disease. The outbreak originated in Mato Grosso do Sul, one of the country's highest cattle-producing states, at an estimated 25 million.

The Brazilian government has stated that 41 municipalities are at risk for the disease. Officials have put into place plans to vaccinate some 160 million cattle to prevent the spread of FMD, which represents about 80 percent of Brazil's cattle herd.

Brazilian Minister of Agriculture Roberto Rodrigues testified before its Congress that export losses could reach as high as \$1.7 billion. Brazil led the world in beef exports, totaling \$2.5 billion.

Health officials from Mato Grosso do Sul say that cattle smuggled from Paraguay may be the source of the disease, though Paraguay reportedly denies that their herds were infected.

Education Prioritized for Johne's Disease Program

Education continues to be a high priority of the National Johne's Disease Control Program.

Citing this need for education, the U.S. Animal Health Association (USAHA) Committee on Johne's Disease, at its meeting in early November in Hershey, Pa., called on USDA's Animal and Plant Health Inspection Service (APHIS) to continue funding the National Johne's Education Initiative through a cooperative agreement

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with the National Institute for Animal Agriculture (NIAA).

In this same area, the committee said that a better understanding of the economic impacts of Johne's disease on beef and dairy production is needed to encourage producer participation in the national control program. Johne's disease is a chronic bacterial infection of ruminants that causes prolonged diarrhea, weight loss and lowered milk production.

The committee called for the production of a "white paper" to spell out the direct and indirect economic impacts of Johne's disease on dairy and beef production. The committee also called for APHIS to conduct a new national Johne's disease dairy herd prevalence study. ●



Dr. Cindy Wolf (left) was presented with the Donald E. Bailey Practitioner of the Year Award for 2005 by the American Association of Small Ruminant Practitioners. Dr. Paul Jones, AASRP outgoing president, presented Wolf with the award at the Association's annual meeting in September. Wolf, of the University of Minnesota College of Veterinary Medicine, was recognized for her efforts in small ruminant medicine.

FDA Plans to Expand BSE Safeguards

The U.S. Food and Drug Administration (FDA) on Oct. 4 announced new measures to further minimize risks with bovine spongiform encephalopathy (BSE or mad cow disease). The Agency is proposing to amend its animal feed regulations to prohibit from use in the food or feed of all animals certain high risk cattle materials that can potentially carry the BSE-infectious agent. All of the proposed prohibitions, except for those related to tallow, have already applied to cattle feed since 1997.

"These additional measures that we proposed today will make an already small risk even smaller by further strengthening the effective measures already in place to protect American consumers from BSE," said acting FDA commissioner Dr. Andrew von Eschenbach.

These high risk cattle materials prohibited in the new proposed rule include:

- The brains and spinal cords from cattle 30 months of age and older,
- The brains and spinal cords from cattle of any age not inspected and passed for human consumption,
- The entire carcass of cattle not inspected and passed for human consumption if the brains and spinal cords have not been removed,
- Tallow that is derived from the materials prohibited by this proposed rule if the tallow contains more than 0.15 percent insoluble impurities,
- Mechanically separated beef that is derived from the materials prohibited by this proposed rule.

The proposed regulation builds on a series of firewalls that include FDA's 1997 feed regulation which

prohibits the use of certain mammalian-origin proteins in ruminant feed (e.g. for cattle and sheep), but allows these materials to be used in feed for non-ruminant species.

However, the National Renderers Association has concerns with the change. NRA president Tom Cook told *Feedstuffs* that they feel the change isn't necessary. He indicated that the minimal reduction in risk may not be worth the cost to the industry to expand the restrictions on the aforementioned materials.

NRA is in the process of conducting a member survey to better estimate the industry cost burden with such a change.

Comprehensive information about FDA's work on BSE is available at www.fda.gov/oc/opacom/hottopics/bse.html. ●

AASRP Celebrates 20 Years of Guss Memorial Fund

"The American Association of Small Ruminant Practitioners (AASRP) recognizes the importance of providing support to veterinary students interested in pursuing a career in small ruminant medicine," said AASRP president Paul Jones in a letter to AASRP members. AASRP established the Samuel B. Guss Memorial Fund in 1984 to assist senior veterinary students interested in small ruminant medicine externships.

"Just as Sam 'spent time going into deprived countries to help the people find ways of improving their lives by starting small herds of goats' this memorial fund assists struggling veterinary students in fulfilling their interests in small ruminant medicine," said Jones.

Currently, through members'

generous donations to the Guss Fund, AASRP is able to assist students in both research and clinical opportunities they might not otherwise afford.

A 1943 graduate from the University of Pennsylvania School of Veterinary Medicine, Dr. Sam Guss began his career as a practitioner in Virginia. In 1955, he embarked upon what would become a 20-year career as a professor and extension veterinarian at Pennsylvania State University. He was named profes-



"He always went out of his way to help veterinary students..."

sor emeritus upon his retirement in 1976.

During his distinguished career, Dr. Guss served as president of the American Association of Sheep and Goat Practitioners (now

AASRP) from 1979-1981, editor of the *Dairy Goat Journal* from 1973-1984, and authored a book

entitled *The Care and Management of Dairy Goats* from his personal experiences.

For more information, or to make a contribution, log on to www.aasrp.org. ●

ADGA Considers Certificate of Identification for Wethers

The American Dairy Goat Association is in the process of developing a certificate of identification program for wethers. In years past, the ADGA did not register wethers, as the association's primary focus was to track pedigrees of breeding animals, according to their web site.

In 2004, however, the Registration Committee passed a resolution that would clear the way for wethers to be registered. The motion was approved by the board, and this year was amended to include all goat wethers.

So why the new found need? Animal identification, says Registration Committee Chair Lelia Berry in a recent committee report.

"This is part of our process to establish methods of locating and identifying animals for the National Food Animal Identification System," she reported. "Should there be a disease outbreak in the

United States among goats that affects human health, we want to be able to identify where the diseased animal came from."

Berry's report adds the importance of the ADGA's database, and the ability to track the animals within that.

The Registration Committee is currently working with information systems and services manager Bryan Lenihan to develop details on the program.

The program will be designed exclusively for ADGA members, according to the report. Pedigrees will not be kept on the wethers; the program will merely focus on identifying the non-breeding animals for the purposes of transportation.

ADGA is still considering comments and questions regarding certificate of identification for wethers, through the committee process. For more information, log on to www.adga.org. ●

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