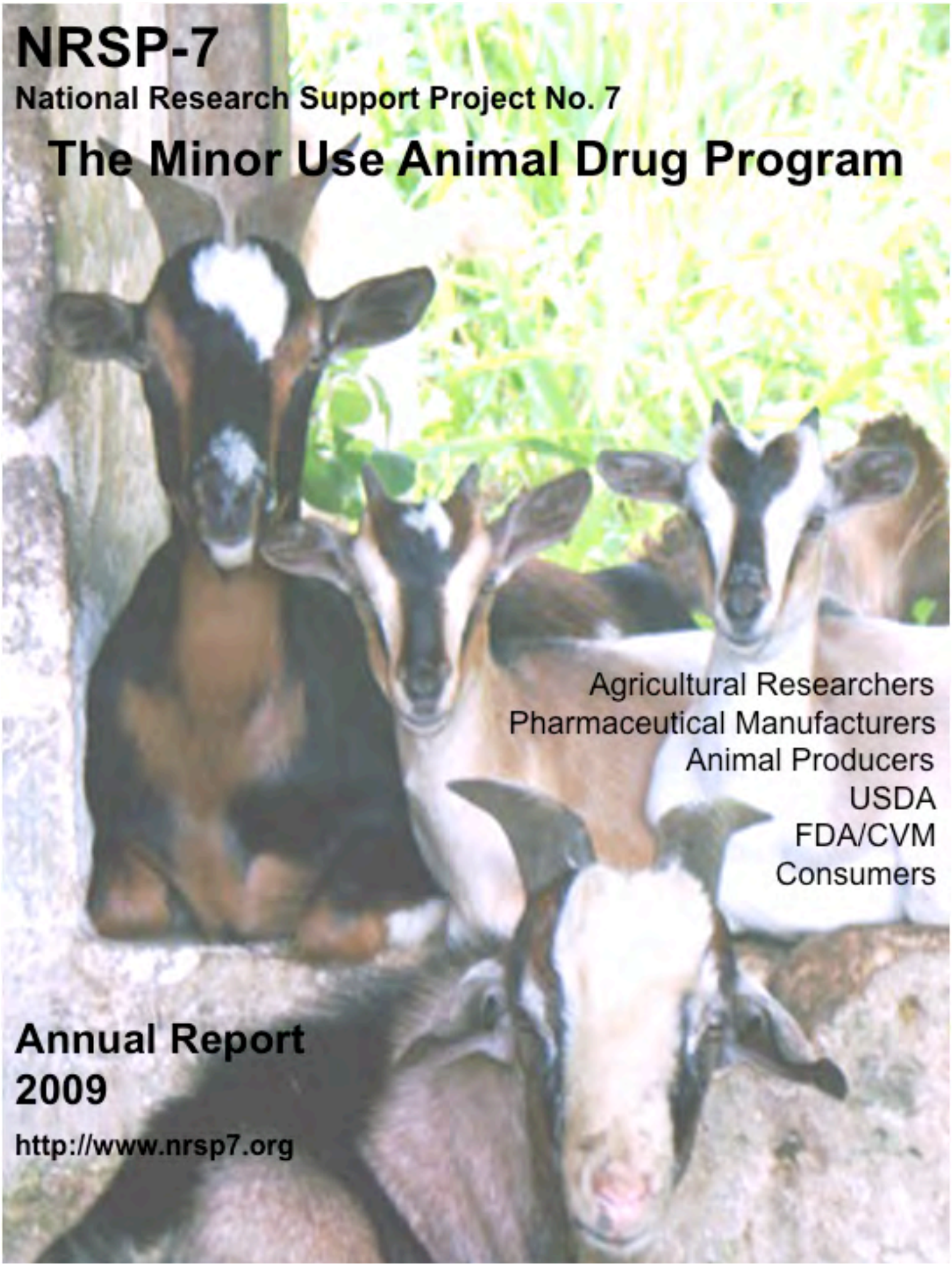
NRSP-7

National Research Support Project No. 7

The Minor Use Animal Drug Program



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Annual Report 2009

http://www.nrsp7.org

NRSP-7 MINOR USE ANIMAL DRUG PROGRAM MISSION STATEMENT

Broadly stated, National Research Support Projects (NRSPs) are created to conduct activities that enable other important research efforts. The activity of an NRSP focuses on support activities, such as collecting, assembling, storing, and distributing materials, resources and information, or the sharing of facilities needed to accomplish high priority research. In accordance with the focus of NRSPs, the mission of the NRSP-7 Minor Use Animal Drug Program is:

- To identify animal drug needs for minor species and minor uses in major species,
- To generate and disseminate data for safe and effective therapeutic applications, and
- To facilitate FDA/CVM approvals for drugs identified as a priority for a minor species or minor use.

To accomplish these goals, the NRSP-7 Minor Use Animal Drug Program functions through the coordination of efforts among animal producers, pharmaceutical manufacturers, Food and Drug Administration/Center for Veterinary Medicine, United States Department of Agriculture/Cooperative State Research, Education, and Extension Service, universities, State Agricultural Experiment Stations and veterinary medical colleges throughout the country.

EXECUTIVE SUMMARY

In 2009 data from the NRSP-7 Minor Use Animal Drug Program was used in support of the FDA approval of progesterone inserts for estrus synchronization in sheep (PMF 5947 March 20, 2009). Additionally, during 2009 the regional coordinators published five articles in peer-reviewed journals disseminating information relevant to the program's mission.

Since the first drug approval in 1984 under the former IR-4 program, NRSP-7 has been responsible for generating 36 Public Master File (PMF) publications in the *Federal Register*, an average of 1.3 per year during its 28 years of funding. The mean total expenditure per completed research for a drug approval or publication of a PMF over this time period was $529,000. Average USDA expenditures per completed research for a drug approval or publication of a PMF was $329,000. Over the last ten years, however, the cost for NRSP-7 to provide the data necessary to support a single label claim has risen six-fold to approximately $3.1 million. This increase is due to (1) more sophisticated analytical procedures for residue analysis, (2) the need to conduct all studies under Good Laboratory Practices and auditing of projects, (3) more expensive environmental assessments, and (4) the expanded scope of requests to additional species including honey bees and deer.

Compared to an average investment of the pharmaceutical industry of $10 to $25 million for adding a label claim to an existing veterinary drug, expenses for data generated for additional label claims by the NRPS-7 program are approximately 10 to 35% of pharmaceutical industry costs. With NRSP-7 current level of funding and cost per drug approval of $3.1 million, the expected time for achieving a drug approval is over three years. Thus, it is anticipated that NRSP-7 will achieve one to two approvals over the next five years.

To date 343 drug requests have been submitted to the Minor Use Animal Drug Program for the development of data in support of the submission of a New Animal Drug Application. Currently there are 17 active research projects involving nine animal species and 11 different drugs. Through a prioritization process that has included (i) constraints imposed by concerns of antimicrobial resistance, (ii) limitations of availability of certain expensive or rare animal species, (iii) appropriate efficacy models, and (iv) high risk/benefit liabilities and lack of economic incentive for certain pharmaceutical manufacturers, the number of highest priority projects has been estimated at 40. Added to our 17 current active projects, the backlog of projects represents a research commitment stretching over several decades.

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Appendix I
Animal Drug Requests Received by NRSP-7 through 2009

Project Number: National Research Support Project-7

Project Title: NRSP-7 A National Agricultural Program to Approve Animal Drugs for Minor Species and Uses

Duration: October 1, 2009 – September 30, 2014

Statement of the Problem

In 1976, the Food and Drug Administration (FDA) initiated an extensive study of the minor use of animal drugs through the efforts of a minor use/minor species drug committee. This committee, comprised of representatives of the FDA's then Bureau of Veterinary Medicine and Bureau of Foods, the U.S. Department of Agriculture (USDA), the pharmaceutical industry, and animal producer groups identified the problem as a lack of approved drugs for diseases of minor species and for the principle minor diseases of major species. The committee also identified the principal diseases for which drugs were not available in the minor species. Further, the committee recognized that the livestock industry in the United States relies heavily on the judicious use of drugs for the prevention and treatment of diseases in food animals. Without these drugs, animal suffering and mortality would continue to increase, as would the cost of producing animal-derived food products. Before a drug can be marketed for use in a food animal species, however, it must be shown to be safe to the human consumer of the animal-derived food, and safe and efficacious in the target animal.

The process of generating the safety and efficacy data necessary for FDA approval of a drug is costly and time-consuming. At present, the estimated cost to a pharmaceutical company for research necessary to obtain FDA approval for a new drug exceeds $100 million, and requires 7 to 10 years of concentrated research effort[1]. The addition of a new label claim is also costly, ranging from $10 to $25 million. Because of this substantial investment in time and resources, pharmaceutical companies must be assured that the drug will have a reasonable potential for profit. Therefore, most drug approvals are sought only for those animal species that are produced in sufficient numbers to support large volume sales, specifically cattle, swine, and chickens. There is little economic incentive for pharmaceutical firms to generate data necessary to seek FDA approval of drugs in minor species; hence, very few drugs are available for management of diseases in these animals. Inequities in drug availability represent serious management and economic problems for producers for minor species.

The FDA was aware that veterinarians and livestock producers were using unapproved drugs without the safeguards that approved drugs carry. Such unapproved drug use could not only cause detrimental effects to the animals being treated, but could also lead to the persistence of drug residues in animal products intended for human consumption. A definite need was identified for approval of minor use veterinary drugs and the scope of the problem was defined. This need was also affirmed by various grower organizations.

[1] See comments of Dr. Richard Carnavale, Vice President for Scientific and Regulatory Affairs, Animal Health Institute, at FDA public meeting on ADUFA reauthorization, March 11, 2008, at [http://www.fda.gov/cvm/ ADUFA032008Transcript.htm]. Many of these companies are members of the Animal Health Institute, the trade association that represents their interests, at [http://www.ahi.org/].

In 1982, the IR-4 Animal Drug Program was established as part of the overall IR-4 Minor Use Pesticide Management Program. Since that time the animal portion has been recognized as a national means of securing approved drugs and as a conduit between the animal industries and the FDA.

In December 1990, the USDA/CSRS requested a peer review of the IR-4 program, including both the pesticide portion and the minor use animal component. A reorganization of the minor use animal drug section was one of the recommendations of the Review Team. This change was carried out with the development of a separate Minor Use Animal Drug Technical Committee that reported to the IR-4 Administrative Advisors.

In 1992, IR-4 Administrative Advisors recommended that with the change from interregional Projects (IR's) to National Research Support Projects (NRSP's), as well as the experience gained under the reorganized IR-4 Project, that the two programs (pesticide and animal) be separated into two projects. In 1993, NRSP-7 was thus created as the Minor Use Animal Drug Program.

Justification and Stakeholders

Stakeholders represent a major resource to the NRSP-7 program. It is through them that industry needs are determined and prioritized. Over the last five years, stakeholders have been invited to meet with the Technical Committee at FDA/CVM during the spring meeting. **Table 1** below identifies the stakeholder groups and their representative that have worked actively with NRSP-7.

Gross annual farm gate income from production of minor animal species has been estimated at over $4.4 billion in the US. Economic impact to the US Gross Domestic Product is estimated at another $33.8 billion (**Table 2**). While the cumulative contribution of minor species to agricultural income is great, the return to pharmaceutical companies for research on therapeutics for this category is small and generally unprofitable. Before NRSP-7, private sponsors had supported approvals for the use of minor use drugs as follows: none for rabbits, one for ducks and pheasants (none for other game birds), two for food fish, four for goats and twenty-one for sheep. Minor and specialty use needs have continued to accumulate, leaving the producers of these species without the drugs necessary for disease prevention and control. Currently 40 drug-species combinations are identified by the Program as urgently in need of approval for minor species (**Table 3**). Research at State and Federal Laboratories to provide data necessary for such approval are provided through the Minor Use Animal Drug Program.

The Animal and Plant Health Inspection Service (APHIS) has reported that 9.4% of the lambs born alive died before weaning and that death losses in adult sheep during 1995 were 5.1% of inventory. With 7.8 million sheep and lambs in inventory in 1997, this loss is significant in dollar value and has not changed over the last 10 years. These are but two examples of agricultural losses due to disease and the impact on farm income. There is no total dollar value loss for all minor species as the result of diseases but it has been estimated to be in the billions of dollars. Additionally it should be born in mind the goat industry is growing with the increase in goat-consuming segments of the US population. Despite these acute needs, approval of drugs for

use in these animals has been hampered by increased regulatory requirements and spiraling costs of drug development and approval research.

Table 1. NRSP-7 Minor Use Animal Drug Program Stakeholder Representatives

INDUSTRY	NAME	email
American Veterinary Medical Association	Mark_Lutschaunig Gina Luke	MLutschaunig@avma.org GLuke@avma.org
American Association of Veterinary Medical Colleges	Brian Smith	Bsmith@aavmc.org
Dairy Goats (American Dairy Goat Association)	Linda Campbell Joanne Mac Neill Gene Zimmerman	Linda@Khimaira.com joanne@woolwichnova.com gandgdairy@dotnet.com
Deer (Texas Deer Association)	David Hayward Lisa Barton	caminocasa@prodigy.net lisa@texasdeerassociation.com
Deer (North American Deer Farmers Association)	Shane Donely Shawn Schafer	vetdonley@yahoo.com schafer@nadefa.org
Game Bird (North American Game Bird Association)	Eva Wallner-Pendleton Ladd Johnson John Metzer	eaw10@psu.edu laddjohnson@verizon.net metzer@metzerfarms.com
Honey Bees (American Bee Keeping Association)	Troy Fore	troyfore@abfnet.org
Meat Goats (American Meat Goat Association)	Ray Bowman	ray@kysheepandgoat.org
Rabbit (American Rabbit Breeders Association)	Chris Hayhow	ohiostatebuckeyes@kc.rr.com
Sheep (American Sheep Industry)	Paul Rodgers Peter Orwick	prodgers2@earthlink.net Peter@SHEEPUSA.ORG

Congress has considered bills to promote drug availability for minor species and for minor uses in major species. The Animal Medicinal Drug Uses Clarification Act of 1994 [AMDUCA] and the Animal Drug Approval Act [ADAA] have expanded “extra label” uses for minor species. Additionally, introduced June 28, 2000 by Mississippi Rep Charles Pickering Jr, the Minor Animal Species Health and Welfare Act [MUMS] was, after considerable effort, passed and signed by President Bush August 2, 2005. This bill established within the FDA/CVM an office supervising an expedited approval process for minor use drugs. The office will also administer grants and contracts to companies producing animal drugs for minor uses. In addition to facilitating new drug development, existing animal drugs could receive conditional approval by the office for minor uses when there is reasonable expectation of efficacy and no human food-safety concerns.

"Minor species" are, by definition, animals other than dogs, cats, horses, cattle, swine, chicken, and turkeys. Included are sheep, deer, rabbits, and aquatic animals. "Minor use" is the use of drugs in minor species, or in any animal species for the control of a disease that occurs infrequently or in limited geographic areas. Amendments to the Internal Revenue Code would allow companies sponsoring drugs for approval to receive a tax credit equal to 50 percent of the clinical testing expenses. Owners of animals submitted for clinical testing could also apply for a tax break. The plan is modeled after the successful Human Orphan Drug Program that has, for the past 20 years, encouraged investment in products to treat rare human diseases.

Table 2. US Farm Gate Value and Economic Impact of Minor Species by Industry and Leading States

INDUSTRY	LEADING STATES	US FARM GATE VALUE [$M]	US ECONOMIC IMPACT [$M]
Game Bird	TX, NC, PA, KS, WI, NY, IL, SD, FL, MN, IA, GA, MS, IN & AL.	$830	$5,000
Rabbits	CA, GA, OH, PA, & TX	$20	$831
Honey Bees	ND, CA, SD, FL, MT, MN, TX, & WI.	$153	$16,000
Cervid	TX, PA, OH, FL, LA, IA, & KS	$894 (farming) $757 (hunting)	$3,000
Meat Goats	TX, TN, CA, GA, OK, NC, KY, MO, FL, & AL	$173.2 $189 (breeding)	$1,039
Dairy Goats	TX, OH, NY, PA, WI, WA, IN, CA, MD, MN, MI, FL, & KS.	$58.3 $14.8 (export)	$439
Sheep	TX, CA, WY & CO	$750	$4,500
Catfish/Aquaculture	**Catfish** MS, AK, AL, & LA **Trout** WA, WI, PA, ID, NC, OR, NY, CA, & CO	Catfish $480 Trout $87.5	$2,880 $159

The limitations imposed by AMDUCA on extra-label drug use in feeds proved to be a major problem to aquaculture and game bird industries and a guidance document has outlined conditions where limited extra-label use of approved formulations will be permitted under conditions of a valid veterinarian-client-patient relationship. The NRSP-7 Minor Use Animal Drug Program is the only organized State/Federal effort to address the inadequate number of FDA approved drugs available for minor-use species and has been responsible for nearly all of the progress made in the approval of minor-use/minor-species drugs.

Federal regulations require an extensive examination of experimental data on efficacy, safety, and residue depletion before any drug can be used in a food animal species. Data must also be obtained for each animal species for which drug use is intended. At present, most minor species of food animals do not have the benefit of the number of safe and effective drugs such as are available for cattle, swine and poultry. This situation has the potential to cause adverse effects upon both the producers and consumers of animal products.

NRSP-7 Objectives

1. Identify the animal drugs for minor species and minor uses in major species.
2. Generate and disseminate data for the safe, effective, and legal use of drugs intended for use in minor animal species.
3. Facilitate FDA/CVM approvals of drugs for minor species and minor uses.

Minor uses include minor species (all species except dogs, cats, horses, cattle, swine, chickens, turkeys) and minor uses in major species are those that occur infrequently or in limited geographical locations. The primary emphasis of The Program is on food-and/or fiber-(hair, wool, fur, feathers or hide) producing minor species with a secondary interest in non-food animals such as bees and tropical fish.

Table 3. High Priority NRSP-7 Minor Use Animal Drug Program Potential Projects

ADR	Drug	Formulation	Species	Indication
209	Amoxicillin	Premix	Salmonids	Furunculosis
270	Amoxicillin	Premix	Hybrid striped bass	Strep infections
176	Amoxicillin	Injectable	Dairy goats (lactating)	Bacterial pneumonia
198	Ceftiofur	Injectable	Rabbits	Pasteurellosis
251	Ceftiofur	Injectable	Deer, red	Respiratory infections
228	Ceftiofur	Injectable	Veal calves	Respiratory infections
236	Clopidol	Premix	Pheasant	Coccidiosis
231	Copper sulfate	Topical soluble powder	Catfish, channel	External protozoan parasites
281	Deccox	Premix	Pheasants	Coccidiosis
281	Deccox	Premix	Partridges	Coccidiosis
174	Erythromycin	Premix/ injectable	Salmonids	Bacterial kidney disease
325	Florfenicol	Injectable	Sheep	Respiratory infections
326	Florfenicol	Injectable	Sheep	Foot rot
327	Florfenicol	Injectable	Goats	Respiratory infections
328	Florfenicol	Injectable	Goats	Foot rot
260	Hydrogen peroxide	Topical	Atlantic salmon	Sea lice
312	Imidocarb	Injectable	Dairy cattle	Anaplasmosis babesiosis
222	Ivermectin	Pour-on	American bison	GI parasites
197	Ivermectin	Pour-on	Deer, red	GI parasites and lungworm
341	Melatonin	Implant	Sheep	Reproductive aid
336	Metomidate	Injectable	Ornamental fish	Anesthesia
284	MGA/GnRH	Feed/ injectable	Sheep	Estrus synchronization
342	Moxidectin	Oral	Goats	Internal parasites
273	Nitarsone	Premix	Partridge	Blackhead
66	Novobiocin/ penicillin	Intramammary infusion	Dairy goats	Mastitis
335	Ovaprim	Injectable	Ornamental fish	Spawning aid
120	Oxolinic acid	Premix	Salmonids	Furunculosis, vibriosis
332	Oxytetracycline	Oral	Abalone	Withering syndrome
19	Oxytetracycline	Premix	Alligators	Bacterial infection
43	Oxytetracycline	Injectable	Dairy goats (nonlactating)	Bacterial pneumonia
161	Oxytetracycline	Premix	striped bass	Pasteurellosis
286	Oxytetracycline	Feed	Tilapia	Strep infections
299	Pirlimycin	Intramammary	Goats	Mastitis
277	Potassium permanganate	Topical	Catfish	External *ichthyophthirius multifilis*
31	Praziquantel	Premix/ oral capsule	Ducks, geese, swan	Schistosomiasis
343	Remebee	Oral	Honey bees	Israeli Acute Paralysis Virus
178	Spectinomycin	Injectable/oral	Ducks	Colibacillosis, salmonellosis
74	Sulfamethazine	Oral sustained release	Sheep	Bacterial pneumonia
138	Virginiamycin	Premix	Alligators	Hatchling alligator syndrome
274	Zoamix	Premix	Pheasant	Coccidiosis

Organization

NRSP-7 is composed of a Technical Committee and four Administrative Advisors representing State Experiment Station Directors. These Administrative Advisors provide liaison between the Directors of the State Experiment Stations, USDA/CSREES, FDA/CVM, various animal organizations, and others coordinating the efforts of this program. The Administrative Advisors provide input on policy, budget and administrative matters.

The organizational structure of the Minor Use Drug program follows:

Administrative Advisory Committee

The Administrative Advisory Committee is composed of one Experiment Station Director from each of the four regions (North Central, Northeast, Southern, and Western). The chair of the committee is selected internally. The role of the Administrative Advisory Committee is to provide liaison between the Directors of the Agricultural Experiment Stations in the four regions, Colleges of Veterinary Medicine, the USDA/CSREES, the FDA/CVM, various animal organizations, and with those coordinating the efforts of this program. This committee

establishes and sets policy consistent with the mission of this project. This committee also advises on budget and administrative matters relating to this program.

Technical Committee

The Technical Committee is composed of the following representatives:

- National Animal Drug Coordinator (Chair)
- Regional Animal Drug Coordinators representing each of the four regions (North Central, Northeast, Southern, and Western)
- Administrative Advisory Committee Chair (non-voting)
- USDA/CSREES Representative (non-voting)
- FDA/CVM liaison to NRSP-7 (non-voting)

In addition to the above committee, the FDA/CVM has a Minor Use Animal Drug Committee that meets with the Technical Committee generally once a year at the semi-annual meetings of the Technical Committee. This FDA committee consists of representatives from the Division of Therapeutic Drugs for Food Animals, Antimicrobial Drugs Branch, Methods Validation and Analytical Branch, Companion and Wildlife Drugs Branch, and the Environmental Sciences Staff. The National Animal Drug Coordinator is salaried on a part-time basis and maintains an office. The Regional Animal Drug Coordinators are not compensated by salary except for secretarial or technical services. During 2009, Dr. Garry Adams retired as Chair of the Administrative Advisors and Dr. John C. Baker was selected as his replacement. In addition, Dr. Kirklyn M. Kerr retired as Northeastern Administrative Advisor and Dr. Margaret Smith of Cornell University was appointed in his place. Finally, Dr. Zhanjiang (John) Liu Alabama AES was appointed Administrative Advisor to represent the Southern AES replacing the retiring Chair Dr. L. Garry Adams.

During 2009, a search was conducted for the retiring Southern Regional Coordinator Dr. Alistair Webb. Following replacement procedures instituted in 2005, a letter of interest was requested from AES researchers in the southern region. Two applicants, approved by the Administrative Advisors, were interviewed by the Technical Committee in August. In September Dr. Thomas Vickroy of the University of Florida was selected to fill the position of Regional Coordinator for the Southern Region when Dr. Alistair Webb retires April 30, 2010.

Cooperating Agencies and Principal Leaders:

US Department of Agriculture/CREES

Dr. Gary B. Sherman	USDA/CREES Representative

US Food and Drug Administration/Center for Veterinary Medicine

Dr. Meg R. Oeller	FDA/CVM Liaison

Administrative Advisors

Dr. Garry Adams (Chair)	Texas AES
Dr. Margaret Smith	Cornell AES
Dr. David Thawley	Nevada AES
Dr. John C. Baker	Michigan AES
Dr. Zhanjiang (John) Liu	Alabama AES

National Coordinator

Dr. John G. Babish	New York AES

Regional Coordinators

Dr. Lisa Tell	California AES
Dr. Paul R. Bowser	New York AES
Dr. Alistair I. Webb (Retiring '10)	Florida AES
Dr. Thomas Vickroy	Florida AES
Dr. Ronald W. Griffith	Iowa AES

Funding

This year The Minor Use Animal Drug Program was again funded through USDA Special Research Grant, administered by CSREES at the level of $429,000 over the four regions. Efforts of stakeholders and university government relations specialists were essential in retaining this funding. The program also received significant "in-kind support from several sources including the institutions conducting the research (State Agriculture Experiment Stations, Colleges of Veterinary Medicine, Federal laboratories), animal producer groups through contributions of animals for research, and pharmaceutical companies (**Table 4**). Perhaps the most significant of this "in-kind" support comes through the cooperation of the pharmaceutical companies, which provide access to their proprietary data package prepared for the drug approval in a major species. In addition, the pharmaceutical sponsors complete the approval package by adding the new use of the drug to their current label, and often contribute to the program in the form for drug research, as well as direct financial aid. Without the generous support of the pharmaceutical manufactures, this program would not be possible.

The Regional Animal Coordinators are not compensated by salary for time contributed to the Minor Use Animal Drug Program. In some cases, secretarial and/or technical support services are provided through the Program. Funding is provided for the National Drug Coordinator's part-time salary and the maintenance of an office. Total USDA funding for the Program has been $11.8 million or $424,000 per year over 26 years. Overall, funding from USDA/CSREES has averaged 61% of total funding since 1991 (**Column 6 of Table 4**).

Prioritization and selection of projects for the Program

The process for selection of drugs for testing in NRSP-7 was reviewed in 2009. Filing of an Animal Drug Request (ADR) form by any group or individual associated with specialty animal production initiates the process. Representatives of such groups include, animal producers or their representative organizations, pharmaceutical manufacturers, university faculty and veterinarians. ADR request form can be submitted online at www.NRSP7.org or through any of the four Regional Drug Coordinators, the National Coordinator, and FDA/CVM liaison. Once

received, the ADR is assigned a unique ADR number and included in the master ADR listing maintained at FDA/CVM, the National Coordinator's headquarters and at www.NRSP7.org.

Table 4. NRSP-7 Minor Use Animal Drug Program Funding by Year and Source

YEAR	USDA/CSREES	FDA/CVM[1]	STATE[2]	INDUSTRIAL[3]	% USDA FUNDING
1982	$240	$78	$33	$40	61%
1983	$240	$82	$35	$42	60%
1984	$240	$86	$37	$44	59%
1985	$240	$90	$39	$47	58%
1986	$229	$95	$41	$49	55%
1987	$229	$99	$43	$51	54%
1988	$229	$104	$45	$54	53%
1989	$229	$110	$47	$57	52%
1990	$226	$115	$49	$60	50%
1991	$450	$121	$52	$63	66%
1992	$464	$127	$54	$66	65%
1993	$464	$133	$57	$69	64%
1994	$611	$140	$60	$72	69%
1995	$550	$147	$63	$76	66%
1996	$550	$147	$63	$76	66%
1997	$550	$147	$63	$76	66%
1998	$550	$147	$63	$76	66%
1999	$550	$147	$63	$76	66%
2000	$550	$154	$66	$80	65%
2001	$549	$154	$66	$80	65%
2002	$588	$154	$66	$80	66%
2003	$588	$154	$66	$80	66%
2004	$491	$154	$66	$80	62%
2005	$588	$162	$69	$84	65%
2006	$588	$162	$69	$84	65%
2007	$279	$162	$69	$84	47%
2008	$429	$162	$69	$84	53%
2009	$429	$162	$69	$84	58%

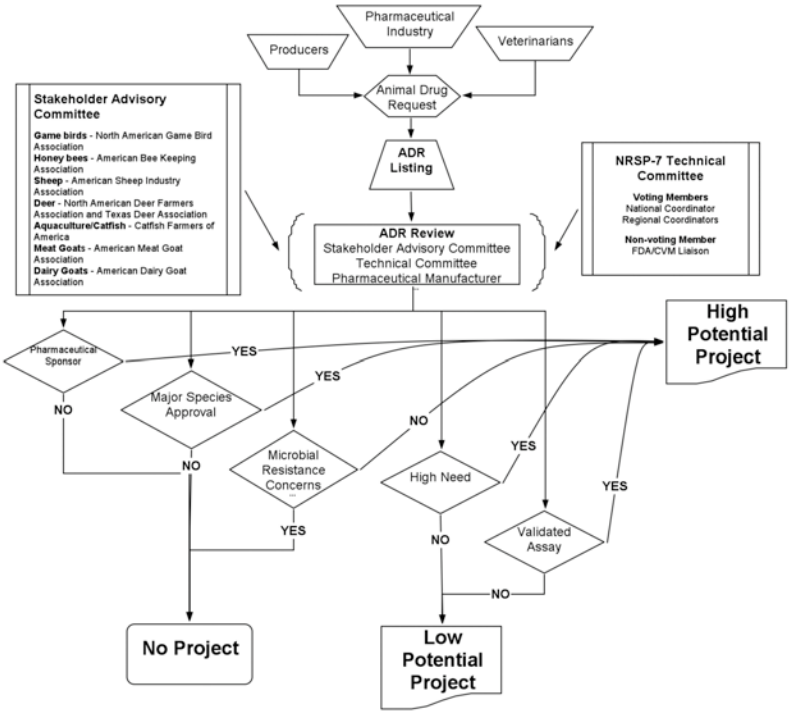
[1)]Salary, benefits, materials and supplies for full-time FDA/CVM liaison to the NRSP-7 program provided by FDA/CVM.

[2)]Salary and benefits for four regional coordinators to the NRSP-7 program provided by individual college and state funding.

[3)]Includes personnel from the veterinary pharmaceutical and animal production industries needed to review protocols, data submissions, change label claims and file amended anima drug applications. Companies specifically involved with NRSP-7 include Pfizer, Biomedia, Intervet, Schering and Alpharma. Cooperation with pharmaceutical companies to sponsor animal drug research projects is vital to the Program. The major contribution to the program is the cost borne by the pharmaceutical industry for the approval of drugs for a major species, estimated at approximately $100 million or more per approved drug.

During the spring annual meeting the NRSP-7 Technical Committee and representatives of the Stakeholder Advisory Committee (SAC) review the current projects and consider new ADR for funding. Each newly received ADR is then evaluated by the Technical Committee and SAC according to established criteria that include (1) availability of a pharmaceutical manufacturing sponsor, (2) major species approval, (3) microbial resistance concerns, (4) significance to the animal industry, (5) cost of developing the necessary data, and (6) food safety implications. ADR requests that meet these criteria are considered as high or low potential projects. This process is detailed in **Table 5** and represented schematically in **Figure 1**.

Figure 1. Flow chart outlining the selection of drugs for testing in the Minor Use Animal Drug Program



Objectives

Objective 1

Identify the critical needs of the various producers of minor livestock species

The Southern Region has taken responsibility for the NRSP-7 Home-Page [www.nrsp-7.org]. This resulted in reworking the public sector and, the IP limited access site [“Ringer Site”] which continues to allow members of the committee access to archival data, relevant media material, and information on on-going projects. The latter includes an ASP interactive database [“MUMS Rx”], which will complete development in the current year and be available for public access.

Table 5. Operation of NRSP-7 Following the Identification of Need Through Research, FDA/CVM Submission and Drug Approval

I Drug Request/Need Identified	II Fund or Conduct Research	III Submit Data Package to FDA/CVM	IV FDA/CVM Review Publication of Public Master File New Label Claim Added
1. An animal drug request (ADR) is filed with one of the four Regional Drug Coordinators or the National Coordinator. 2. Informal review by FDA/CV and the drug company to identify current information available relative to the drug and any major clearance problems. 3. Approval of new project by the Animal Drug Technical Committee.	4. Send ADR to the Regional Animal Drug Coordinator to initiate work with an investigator. 5. Develop and send protocols to FDA/CVM and the drug company for review. 6. Provide funding to the investigator to initiate studies. 7. Conduct studies under Good Laboratory Practices (GLP/CFR 21.58). 1. Efficacy 2. Target Animal Safety 3. Human Food Safety 4. Environmental Safety 8. Prepare Environmental Impact Assessments Statements	9. Investigator and Regional Animal Drug Coordinator prepare study report for GLP review and FDA submission. 10. Regional Animals Drug Coordinator sends a draft copy of the study report to the drug company for review. Also sends a copy to the FDA/CVM liaison for informal review. 11. GLP review is completed. 12. Regional Animal Drug Coordinator finalizes report, GLP Unit reviews report and Animal Drug Coordinator submits report to FDA/CVM.	13. FDA/CVM reviews the report and provides comments to Animal Drug Coordinator. 14. Animal Drug Coordinator responds to FDA/CVM comments. 15. FDA/CVM formally reviews the Public Master File containing the Efficacy, Target Animal Safety, Human Food Safety and Environmental Impact Assessment reports. 16. FDA/CVM publishes the Public Master File (PMF). 17. Pharmaceutical company references the PMF and adds claim to existing label.

During the last four years, drug coordinators, the USDA representative and the FDA liaison have conducted regular teleconferences. These have been coordinated by the PI of the Southern Region and have proved very successful in facilitating communication and coordination between the parties participating. These teleconferences usually take place at noon EST on the first Monday of the month.

Objectives 2 and 3

Generate and disseminate data for the safe, effective, and legal use of drugs used primarily in therapy or reproductive management of minor animal species. Facilitate FDA/CVM approvals of drugs for minor species and minor uses.

In 2009 data from the NRSP-7 Minor Use Animal Drug Program was used in support of the FDA approval of progesterone inserts for estrus synchronization in sheep (PMF 5947 March 20, 2009). Tissue stability studies of progesterone implants for estrus synchronization in sheep are under review at FDA. Finally, during 2009 the regional coordinators published five articles in peer-reviewed journals containing data developed in the Program.

To date 342 drug requests have been submitted to the Minor Use Animal Drug Program for the development of data in support of the submission of a New Animal Drug Approval (**Appendix I**). Through a prioritization process that has included (i) constraints imposed by concerns of antimicrobial resistance, (ii) limitations of availability of certain expensive or rare animal species, (iii) appropriate efficacy models, and (iv) high risk/benefit liabilities and lack of economic incentive for certain pharmaceutical manufacturers, the number of highest priority projects has been estimated at 40 (**Table 3**). Added to our 17 current active projects (**Table 6**), the backlog of projects represents a research commitment stretching over several decades.

Summary of Current Projects and Publications

For detailed reports on current projects, see the sections of Regional Coordinator reports starting on page 14. During 2009 the regional coordinators published five articles in peer-reviewed journals disseminating information relevant to the program's mission (listing of these publications is provided on page 22).

Activities, Accomplishments, Interactions with Stakeholders and Communications

Prior to the Minor Animal Drug Approval Program, the FDA had approved the use of drugs for minor species as follows: none for rabbits, one for ducks and pheasants (none for other game birds), two for food fish, four for goats and twenty-one for sheep. Minor and specialty use needs have continued to accumulate, leaving the producer of these species without the drugs necessary for disease prevention and control. Forty drugs have been identified as urgently in need of approval for minor species (**Table 3**). The Minor Use Animal Drug Program has received 343 Animal Drug Requests submitted by researcher investigators at federal, state, and university laboratories, veterinarians, and animal industry personnel for approval of a specific drug for the control of a certain disease in an animal industry (**Appendix I**). Each request is reviewed on basis of need and research is scheduled for selected projects as outlined in **Table 5** and schematically in **Figure 1**.

Table 6. NRSP-7 Minor Use Animal Drug Program Active Projects

DRUG	FORMULATION	SPECIES	INDICATION	INAD
Erythromycin	Premix	Fish (Salmonids)	Bacterial kidney disease	6013
Fenbendazole	Premix	Deer	GI parasites	10-993
Fenbendazole	Premix	Pheasants & partridges	Gapeworm	10-062
Florfenicol	Oral	Fish (finfish)	Bacterial infection	11-145
Florfenicol	Injection	Sheep	Respiratory infections	10-958
Ivermectin	Injectable	Rabbits	Ear mites	9557
Lasalocid	Premix	Deer	Coccidiosis	10-746
Lasalocid	Premix	Goats	Coccidiosis	10-872
Lasalocid	Premix	Pheasants	Coccidiosis	9096
Lincomycin	Soluble powder	Honey Bees	American Foulbrood	10-776
Oxytetracycline	Feed	Fish (Various)	Vibriosis	10-320
Progesterone	CIDR	Goats	Estrus synchronization	11-389
Progesterone	CIDR	Sheep	Estrus synchronization	10-321
Strontium chloride	Immersion	Fish	Otolith marking	10-536
Sulfadimethoxine & ormetoprim	Premix	Fish	Bacterial infections	10-823
Tulathromycin	Injection	Goats	Respiratory infection	11-512
Tulathromycin	Injection	Sheep	Respiratory infection	11-513

To date 343 drug requests have been submitted to the NRSP-7 Minor Use Animal Drug Program for the development of data in support of the submission of a New Animal Drug Approval (**Appendix I**). Currently there are 17 active research projects involving nine animal species and 12 different drugs. Through a prioritization process that has included (i) constraints imposed by concerns of antimicrobial resistance, (ii) limitations of availability of certain expensive or rare animal species, (iii) appropriate efficacy models, and (iv) high risk/benefit liabilities and lack of economic incentive for certain pharmaceutical manufacturers, the number of highest priority projects has been estimated at approximately 40 (**Table 4**). Added to our 17 current active projects, the backlog of projects represents a research commitment stretching over several decades.

Since the first drug approval in 1984 under the former IR-4 program, NRSP-7 has been responsible for generating 36 Public Master File (PMF) publications in the *Federal Register*, an average of 1.3 per year during its 28 years of funding (**Tables 7 and 8**). The mean total expenditure per completed research for a drug approval or publication of a PMF over this time period was $529,000. Average USDA expenditures per completed research for a drug approval or publication of a PMF was $329,000. Over the last ten years, however, the cost for NRSP-7 to provide the data necessary to support a single label claim has risen four-fold to approximately $3.1 million. This increase is due to (1) more sophisticated analytical procedures for residue analysis, (2) the need to conduct all studies under Good Laboratory Practices and auditing of projects, (3) more expensive environmental assessments, and (4) the expanded scope of requests to additional species including deer.

The process of generating the safety and efficacy data necessary for FDA approval of a drug is costly and time-consuming. At present, the estimated cost to a pharmaceutical company for research necessary to obtain FDA approval for a new drug exceeds $100 million, and requires 7 to 10 years of concentrated research effort. The addition of a new label claim is also costly, ranging from $10 to $25 million. Because of this substantial investment in time and resources, pharmaceutical companies must be assured that the drug will have a reasonable potential for profit. Therefore, most drug approvals are sought only for those animal species that are produced in sufficient numbers to support large volume sales, specifically cattle, swine, chickens and turkeys. There is little economic incentive for pharmaceutical firms to generate data necessary to seek FDA approval of drugs in minor species; hence, very few drugs are available for management of diseases in these species. Inequities in drug availability represent serious management and economic problems for producers for minor species.

Table 7. Public Master Files Published and New Animal Drug Application Approvals by Drug

DRUG	FORMULATION	SPECIES	INDICATION	GROUP	STATUS
Albendazole†	Oral suspension	Goats	Liver flukes	Ruminant	PMF
Amoxicillin trihydrate†	Injectable	Sheep	Bacterial pneumonia	Ruminant	PMF
Amprolium	Premix	Pheasants	Coccidiosis	Avian	NADA
Bacitracin	Premix	Quail	Ulcerative enteritis	Avian	NADA
Ceftiofur	Injectable	Goats	Bacterial pneumonia	Ruminant	NADA
Ceftiofur	Injectable	Sheep	Bacterial pneumonia	Ruminant	NADA
Chlorimine T	Soluble powder	Salmonids	Bacterial gill disease	Aquatic	PMF
Clorsulon†	Oral suspension	Goats	Liver flukes	Ruminant	PMF
Decoquinate	Premix	Goats	Coccidiosis	Ruminant	NADA
Decoquinate	Premix	Sheep	Coccidiosis	Ruminant	NADA
Fenbendazole	Premix	Bighorn Sheep	Lungworms	Ruminant	NADA
Fenbendazole	Oral suspension	Goats	GI parasites	Ruminant	NADA
Formalin	Immersion	Finfish & eggs	External fungal & protozoan parasites	Aquatic	NADA
Formalin	Immersion	Penaeid shrimp	External protozoan parasites	Aquatic	NADA
Hydrogen peroxide	Immersion	Salmonids	Bacterial gill disease	Aquatic	NADA
Ivermectin	Injectable	American bison	Hypodermosis	Ruminant	NADA
Ivermectin	Injectable	Fox	Ear mites	Other	NADA
Ivermectin†	Injectable	Goats	GI parasites	Ruminant	PMF
Ivermectin	Injectable	Reindeer	Warbles	Ruminant	NADA
Lasslocid	Premix	Chukar partridges	Coccidiosis	Avian	NADA
Lasslocid	Premix	Rabbits	Coccidiosis	Other	NADA
Levamisole†	Soluble powder	Goats	GI parasites	Ruminant	PMF
Monesin	Premix	Goats	Coccidiosis	Ruminant	NADA
Monesin	Premix	Quail	Coccidiosis	Avian	NADA
Morantel tartrate	Premix	Goats	GI parasites	Ruminant	NADA
Oxytetracycline	Premix	Lobster	Gaffkemia	Aquatic	NADA
Oxytetracycline	Immersion	Finfish	Otolith marking	Aquatic	NADA
Salinomycin	Premix	Quail	Coccidiosis	Avian	NADA
Sulfadimethoxine/ ormetoprim	Premix	Catfish	Bacterial infections	Aquatic	NADA
Sulfadimethoxine/ ormetoprim	Premix	Chukar partridges	Coccidiosis	Avian	NADA
Thiabendazole	Premix	Pheasants	Gapeworm	Avian	NADA
Tilmicosin phosphate	Injectable	Sheep	Respiratory infections	Ruminant	NADA
Tylosin	Soluble powder	Honey bees	Foul brood	Other	NADA

†Public Master File; NADA = New Animal Drug Approval

Table 8. Public Master Files Published and New Animal Drug Application Approvals by Species

SPECIES	DRUG	FORMULATION	INDICATION	GROUP	STATUS
American bison	Ivermectin	Injectable	Hypodermosis	Ruminant	NADA
Bighorn Sheep	Fenbendazole	Premix	Lungworms	Ruminant	NADA
Catfish	Sulfadimethoxine/ ormetoprim	Premix	Bacterial infections	Aquatic	NADA
Chukar partridges	Lasslocid	Premix	Coccidiosis	Avian	NADA
Chukar partridges	Sulfadimethoxine/ ormetoprim	Premix	Coccidiosis	Avian	NADA
Finfish	Oxytetracycline	Immersion	Otolith marking	Aquatic	NADA
Finfish & eggs	Formalin	Immersion	External fungal & protozoan parasites	Aquatic	NADA
Fox	Ivermectin	Injectable	Ear mites	Other	NADA
Goats	Albendazole†	Oral suspension	Liver flukes	Ruminant	PMF
Goats	Ceftiofur	Injectable	Bacterial pneumonia	Ruminant	NADA
Goats	Clorsulon†	Oral suspension	Liver flukes	Ruminant	PMF
Goats	Decoquinate	Premix	Coccidiosis	Ruminant	NADA
Goats	Fenbendazole	Oral suspension	GI parasites	Ruminant	NADA
Goats	Ivermectin†	Injectable	GI parasites	Ruminant	PMF
Goats	Levamisole†	Soluble powder	GI parasites	Ruminant	PMF
Goats	Monesin	Premix	Coccidiosis	Ruminant	NADA
Goats	Morantel tartrate	Premix	GI parasites	Ruminant	NADA
Honey bees	Tylosin	Soluble powder	Foul brood	Other	NADA
Lobster	Oxytetracycline	Premix	Gaffkemia	Aquatic	NADA
Penaeid shrimp	Formalin	Immersion	External protozoan parasites	Aquatic	NADA
Pheasants	Amprolium	Premix	Coccidiosis	Avian	NADA
Pheasants	Thiabendazole	Premix	Gapeworm	Avian	NADA
Quail	Bacitracin	Premix	Ulcerative enteritis	Avian	NADA
Quail	Monesin	Premix	Coccidiosis	Avian	NADA
Quail	Salinomycin	Premix	Coccidiosis	Avian	NADA
Rabbits	Lasslocid	Premix	Coccidiosis	Other	NADA
Reindeer	Ivermectin	Injectable	Warbles	Ruminant	NADA
Salmonids	Chloramine T	Immersion	Bacterial gill disease	Aquatic	PMF
Salmonids	Hydrogen peroxide	Immersion	Bacterial gill disease	Aquatic	NADA
Sheep	Amoxicillin trihydrate†	Injectable	Bacterial pneumonia	Ruminant	PMF
Sheep	Ceftiofur	Injectable	Bacterial pneumonia	Ruminant	NADA
Sheep	Decoquinate	Premix	Coccidiosis	Ruminant	NADA
Sheep	Tilmicosin phosphate	Injectable	Respiratory infections	Ruminant	NADA

†Public Master File; NADA = New Animal Drug Approval

PROGRAM ACTIVITY BY REGION

NORTHEAST REGION: DR. PAUL BOWSER

Progress of the work and principal accomplishments

The Northeast Region NRSP7 has been without funding from the period of 09/2008 to 09/2009. Due to this financial situation, work accomplished during this period was limited primarily to providing administrative support to the New York State Department of Environmental Conservation in their conduct of field trials under our INAD 10-320 for the use of Oxytetracycline in fish.

Species Grouping Project:

INAD 10-320 Oxytetracycline in Fish
INAD 10-823 Romet-30 in Fish
INAD 11-145 Florfenicol in Fish

No additional work has been performed on this project during this study period.

Usefulness of the findings:

In all cases, the findings to date over the course of these projects serve as the foundation for continued work on these compounds. The Human Food Safety Studies completed to date in fish are consistent with what was expected; namely that the elimination of therapeutic compounds from the edible portion of the fish tested are within the withdrawal times currently specified for labels, or available in the literature for oxytetracycline, Romet-30 and Aquaflor (Florfenicol) in trout, salmon and catfish.

Work planned for next year:

Species Grouping Project:

INAD 10-320 Oxytetracycline in Fish
INAD 10-823 Romet-30 in Fish
INAD 11-145 Aquaflor (Florfenicol) in Fish

Future work is being hampered by a lack of funds in the Northeast Region. We anticipate our efforts on this project to center around the continued provision of administrative support of Efficacy Studies of oxytetracycline in a collaborative effort with the New York State Department of Environmental Conservation. The particular focus of the efficacy trials will be for the treatment of bacterial diseases not currently on the label for treatment of bacterial diseases of cool water species such as walleyes, muskellunge and tiger muskellunge (hybrid muskellunge X northern pike). These studies will be initiated when diagnosed field cases can be identified that will lend themselves to the implementation of controlled field studies.

Other:

We are also considering the development of a project that centers on the question of Iodophore disinfection of fish eggs to prevent the vertical transmission of Viral Hemorrhagic Septicemia Virus. Contact has been made with a potential sponsor, Western Chemical, which expressed interest in developing a collaboration with the NRSP7.

CRITICAL REVIEW (Northeast Region)

1) Work accomplished under the original project:

The original objectives of the project were to conduct a national program to obtain minor and specialty animal-drug clearances (tolerances, exemptions and registrations) in cooperation with state, federal and industry personnel. The mission of NRSP-7 is:

To identify animal drug needs for minor species and minor uses in major species,
To generate and disseminate data for safe and effective therapeutic applications, and
To facilitate FDA/CVM approvals for drugs identified as a priority for a minor species or minor use.

Under the framework of this mission, progress has been made in the following areas:

(A) Use of hydrogen peroxide for the control of bacterial gill disease in fish.
(B) Species Grouping in Fish, using the compounds Oxytetracycline, Romet-30/Romet-TC and Aquaflor as test articles.

2) The degree to which the objectives have been met:

Work has focused on a number of important therapeutic compounds in aquatic animals. The work is being conducted in a deliberate manner with the goal of developing appropriate data that will be submitted in support of a label for these compounds. An initial step in this process is the publication of the data in the peer reviewed scientific literature. While we consider it extremely important to have such peer-reviewed information available for the veterinary community, should they consider an extra-label use, the ultimate goal is to secure a label for the product. As an additional goal, the work is being done in a manner that could justify a species-grouping concept for finfish cultured in the United States. Additional work is currently being impacted by a lack of funds in the Northeast Region.

Incomplete work or areas needing further investigation:

The development of a crop (species) grouping concept is seen as imperative for supporting efforts to gain labels for therapeutic compounds for fish. Our work on Oxytetracycline, Romet-30/Romet-TC and Aquaflor (Florfenicol) in fish is proposed to be part of an effort to utilize those compounds as models in this effort. We expect that our efforts in developing a species grouping concept for fish will be a major undertaking in the upcoming years.

NORTH CENTRAL – DR. RONALD W. GRIFFITH

Progress of the work and principal accomplishments

Goat CIDR-G Milk Residue

Study report accepted. We have requested a zero-day withholding time for milk. If allowed, this will greatly enhance our ability to complete the efficacy study for milk goats.

Goat CIDR-G Tissue Residue

Validation of the analytical phase has been completed along with an ongoing freezer stability study of both incurred and spiked residues. Dr. Dennis Hallford at NMSU is performing the analytical work. The data indicate that P4 levels are stable to multiple freeze-thaw cycles as expected. Sixteen meat-type does were purchased and CIDR's placed in 8 does on October 24, 2009. The CIDR's were removed on November 11 and muscle and fat tissues harvested according to protocol (just less than 12 hr. following CIDR removal). The reproductive tracts were removed and examined by a board certified theriogenologist. The tissues were shipped to the analytical lab on November 17, 2009. Analysis for progesterone levels will be performed the week of November 23, 2009.

Goat CIDR-G Effectiveness

The NC and Western Regions are cooperating on this study. The Western Region is currently conducting a study in dairy goats with the U.C. Davis herd. Both regions decided to just do a single herd this fall and plan on a big push during next fall's breeding season. The NC (Iowa State) is working with a herd of 54 meat-type does. CIDR's were placed on October 9, 2009 and were removed on October 27, 2009. Estrus synchronization occurred in 90% of the does. Contacts have been made for placing CIDR's in at least 3 dairy goat herds in Wisconsin during the fall 2010 breeding season. We have one other group of meat goats lined up for next fall in Iowa and need to find at

least one more herd. We still need to identify several more herds willing to cooperate with this study. Our targets are 6 herds of approximately 60 does each in at least two different geographic areas of the U.S. We need to do 6 herds for dairy goats and 6 herds for meat goats. Our target for submission of the completed study report is spring or summer 2011.

Draxxin Target Animal Safety in Goats

The QA report was recently received from Sandy Ogletree with some relatively minor corrections requested. The report should be submitted very soon. Dr. Kris Clothier has prepared a manuscript for submission to the Journal of Pharmacology and Therapeutics.

Draxxin Tissue Residue

Thirty-three male/castrated male goats were obtained from local producers in July 2009. We experienced some death loss and had to initiate treatment for coccidiosis in a few of the dairy breed goats and for *Haemonchus contortus* in a few of the meat breed goats. As a result, we needed to conduct and justify an extended "washout" period and replace 4 of 5 goats that died. Tissues have been collected at 1, 5, 11, 18, 25 and 48 days post treatment. The methods for tissue extraction and tulathromycin analysis have been validated and the tissues were shipped to the analytical lab at U.C. Davis.

Draxxin Efficacy in Goats

A protocol based upon determination of AUC/MIC was prepared and submitted. It was decided that we needed some preliminary pharmacokinetic and MIC data in order to set a realistic target. We have procured sufficient isolates of *Mannheimia haemolytica* (over 30) but could use a few more isolates of *Pasteurella multocida.* We have placed a request for isolates on the American Association of Small Ruminant Practitioners list-serve and have contacted almost all the state diagnostic labs in the U.S. with a request for additional isolates of *Pasteurella*. Dr. Kris Clothier also presented a talk at the last US Animal Health Association meeting and requested isolates from that group. Preliminary data from 6 goats in the TAS study indicated that tulathromycin given subcutaneously is very rapidly absorbed. We have performed a larger pharmacokinetic study (using the 25- and 48-day goats of the HFS study above). Plasma samples were collected from these 10 goats with much earlier and more frequent sampling times. The plasma samples have been submitted to the analytical lab at U.C. Davis.

Lasalocid in Pheasants Efficacy

The study was completed in 2007 and the study report QA'd by Sandy Ogletree several months ago. There has been no reply to the quality assurance report or to requests for a reply.

Lasalocid in Pheasants TAS

The study was completed the first week of August, 2009. The study report has been written except for the section dealing with the statistical analysis. The student has promised to work on this over the Christmas break. There were no adverse effects noted when lasalocid was fed at 1X, 2X and 3X the highest recommended dose for chickens and turkeys. These levels of lasalocid were fed for 6 weeks.

Bioclip in Sheep

No report. Too many projects at the moment to devote any time to this for at least another month.

WESTERN – DR. LISA TELL

Progress of Work and Principal Accomplishments

Active Regional Projects:

ADR#325 – Florfenicol (Nuflor® Injectable Solution) for sheep for respiratory disease

The human food safety and efficacy studies required by FDA/CVM for the old formulation of florfenicol (Nuflor Injectable Solution) have been completed. All of the data from this project have been published.

This project has been terminated and this termination has been entered into RUSTI.

ADR#350 – Florfenicol (Nuflor Gold®) for sheep for respiratory disease

A pilot study evaluating administration route (IM vs. SC) and doses of 20 (IM) or 40 (SC) mg/kg was performed in September and October of 2009. All of the samples (n=672; 28 samples for 24 animals) have been analyzed. A product development meeting was held on November 18th , 2009 with CVM, the sponsor and the Minor Use Animal Drug Program. Another dose range finding study using the SC route of administration is to be performed. Once the proposed label dose is determined, the Target Animal Safety Study will be performed.

ADR#299 - Pirlimycin for Dairy Goats

Project on hold until funding is identified and CIDR goat studies are completed.

ADR#295 - Strontium Chloride for Salmonids. Steve Schroeder

There is nothing to report. Status of the project needs to be changed.

ADR#338 – Spectramast™ LC Sterile Suspension for Mastitis in Dairy Goats

Project on hold until funding is identified and CIDR goat studies are completed.

ADR#135 – Erythromycin in Salmonids

The environmental assessment was sent to FDA/CVM for review and they requested a revision of certain sections and that a chronic toxicity study with *Daphnia magna* be performed. This chronic toxicity study has been performed and will address CVM concerns regarding chronic toxicity to aquatic insects. In addition, a study describing the physiochemical properties of erythromycin has been performed. Because of the physical characteristics of ERTT, an empirical pKa could not be established. A draft of the revised environmental assessment report for erythromycin in salmonids is presently in preparation and has a targeted date for completion on December 7th, 2009. The report for the range-finding chronic toxicity study for the *Daphnia magna* has been reviewed and will be submitted to CVM.

ADR# 311 –Lincomycin soluble powder for foulbrood disease in Honeybees

The human food safety technical section is complete. The pending section that needs to be written and submitted to CVM is the effectiveness technical section.

Collaborative Projects:

ADR# 258 - CIDRg (Controlled Internal Drug Release Devices) in Sheep

FDA/CVM has accepted all of the data for this study and the information has been summarized by FDA/CVM in a Public Master File. Completed sections are effectiveness, target animal safety, human food safety, and environmental safety.

ADR#272 - Romet for Game birds

No Western region activity on this project.

ADR#280 - Fenbendazole in Game Birds (Pheasants, bobwhite quail, partridge)

See Southern Region Report.

ADR#324 - Progesterone CIDRs for Goats (TAS, Milk Residue Study, and Efficacy)

The target animal safety study technical report has been accepted by FDA/CVM (February 2008). The milk residue study has been completed and the quality assurance inspection has been completed. The final technical report was sent to FDA/CVM in December 2008 and accepted October 2009. FDA/CVM has provided comments regarding the efficacy protocol. The protocol has been accepted for concurrence. The efficacy study was started at UC Davis and Iowa State University during the fall of 2009.

ADR#340 - Tulathromycin in Goats (Collaborative project with the North Central region)

The quality assurance was performed for the target animal safety study in February and March 2008. A tissue liquid chromatography/mass spectrometry method for analysis of the samples has been validated using 664 spiked samples to validate 4 tissues. Validation of analytical methods for liver, muscle, kidney and fat samples is complete. Plasma (444) and tissue (180) samples from the target animal safety have been analyzed. The quality assurance for the target animal safety report was completed November 2009.

Other Projects/Activities:

Excede in Goats: Study has been completed in non-lactating and lactating goats. The serum and milk samples have been analyzed and the pharmacokinetic data modeled. The manuscript has been written and submitted to the Journal of Veterinary Pharmacology and Therapeutics for publication.

New Projects:

Ceftiofur for Treating *Arcanobacterium pyogenes* Respiratory Infections in Deer: 17 isolates from deer (4 females, 7 males, and 6 unknown sex) ranging from 6 weeks to 14 years of age have been collected. Of these isolates, the MIC's for ceftiofur ranged from 0.25-1. All of the isolates were sensitive to ceftiofur. Dr. Albert Ramudo from Pfizer was contacted on November 12th, 2009 regarding Pfizer's interest in a label claim.

Fenbendazole for Treating Gastrointestinal Parasites in Deer: Conference call with Brent Herrig was held on September 17th , 2009. Intervet/Schering Plough has indicated interest in this label claim. Shawn Schafer from the cervid industry was contacted via e-mail on September 21^{s} and 30th, 2009 asking if NRSP-7 could get feedback regarding the following label claim: Use of 8% fenbendazole Type A medicated article in white-tailed deer for the removal of *Strongyloides* spp., *Trichostrongylus* spp., and *Haemonchus contortus*. Still awaiting response.

Laboratory Report:

Most of the activity continues as sample analysis in the laboratory. Results and plans are reported under separate projects above.

Usefulness of the Findings:

The findings from all of the studies above will be utilized to fulfill the data requirements for the FDA/CVM approval of these drugs for use in minor species.

Work Planned for Remainder of the Year:

Over the next year our primary goals are to continue the CIDR-G Efficacy study, finish the analyses for the goat tulathromycin project, and finish the salmonid erythromycin environmental assessment. Submission of protocols for the florfenicol in sheep and ceftiofur for deer studies will be the focus for project development.

Critical Review:

1. *Work accomplished under the original project*

The original objectives of the project were to conduct a national program to obtain minor and specialty animal drug clearances (tolerances, exemptions and registrations) in cooperation with state, federal and industry personnel to include:

a. Determination and prioritization of minor-use needs and data requirements.
b. Review, analysis and evaluation of minor-use research proposals.
c. Development and assembly of data for minor-use registrations.
d. Preparation and submission of petitions for drug registrations.

Considering these objectives, considerable progress has been made towards achieving them for each of the active projects listed above, particularly in the development of the data (the actual research), its analysis, assembly and interpretation, and submission to the FDA/CVM for review.

2. *The degree to which objectives have been met*

The degree to which these objectives have been met varies from project to project, however, in most all cases there has been progress. Those projects on which there has been no movement are reevaluated during each meeting of the NRSP-7 Technical Committee and decisions made on whether to continue to pursue them or move them into the inactive project list.

3. *Incomplete work or areas needing further investigation*

All of the projects listed above have some work that needs to be completed before they are approved by the FDA/CVM. In some cases this is just the FDA/CVM review, while in others there is work needed by the NRSP-7 project. The NRSP-7 work that is undertaken each year within the Western Region is based on the availability of qualified and interested investigators, the capacity of the regional laboratory to validate methods and analyze samples, and cooperation of the pharmaceutical manufacturers whose products are investigated.

SOUTHERN – DR. ALISTAIR I. WEBB

Projects in Progress

RABBITS

ADR – 0107 Ivermectin & Rabbits

The human safety and target animal safety reports are being prepared subject to completion of freezer stability. This task was treated as secondary to the fenbendazole in game birds but is now being pushed to completion.

BIRDS

ADR - 0280 Fenbendazole & Game birds

The human safety report was submitted to FDA-CVM. The concerns of UC-Davis QA resulted in (a) withdrawal of quail part of the report [QA problem with Webb's dual role as study director and QA inspector plus very problematic withdrawal conclusions]; (b) letters from site personnel were submitted to try and mitigate lack of in vivo QA inspection; (c) in vitro section QA was certified by UCD. We have just heard that the pheasant study has been rejected but we have no information of why or whether there is any possibility of re-submission. The TAS report is now complete but lacks investigator's final input and QA we are planning a 60-day completion. We are very concerned with the GLP QA aspect as it has some of the same problems as the rejected HFS submission. If critics are happy, this will be submitted to FDA within 30 days.

SMALL RUMINANTS

ADR – 0210 Fenbendazole & Red Deer & ADR – 0216 Fenbendazole & Fallow Deer.

Intervet / Schering Plough/Pfizer are still working on their combined project pipeline priorities so this project is on hold. Dose seems a critical point to be solved.

ADR - 0294 Lasalocid and Deer /ADR - 0298 Lasalocid and Goats

Problem is that Alpharma will only proceed if there is a zero withdrawal time. We have had problems with the assay and hope to gain guidance from CVM at this meeting. The problem is the established method is non-reproducible so validating/bridging of the assay is problematic. Alpharma seem reluctant to file for designation that would eliminate applying for the FDA competitive funds to work on an acceptable assay. Also we have not submitted a protocol for the HFS study in either goats or deer. See below for TAMU collaboration.

We have exchanged drafts of the HFS protocol for lasalocid in goats with Dr Fajt [TAMU]. It has not been readied for submission to FDA. TAMU is developing a drug development program and will probably have it's own QA unit.

BEES

ADR – 0343 Remebee and Honey bees

The Remebee project is with Beeologics for an Israel Acute Paralysis Virus [IAPV] specific double strand RNA product for prevention of collapsing colony disorder. The company has obtained an INAD and following a teleconference with FDA/CVM last month, has gained both EA exclusion and approval for consumption of honey from treated hives (treatment has to end before honey flow). NRSP-7's role is of a possible advisor until FDA considers all the data submitted to determine what gaps there are and how large.

Work Planned for the remainder of the Year:

- Familiarize the new coordinator with the functions of the NRSP-7 program and the souther region's role.
- Assist the new Coordinator in establishing his/her own priorities.
- Maintain lab and staff at GLP level.
- Submit by early new year all the ivermectin for rabbit reports and the TAS in gamebirds fenbendazole reports.
- Continue efforts for collaborative studies for gaining approval of fenbendazole & lasalocid in deer, and lasalocid in goats.
- Prepare, in coordination with the National Coordinator, INAD submissions for studies conducted under the aegis of the Southern Region. Initial preparation of written responses to CVM review of all of the data submitted for each project. This is often a time consuming and unrecognized activity associated with the completion of each project and may require considerable correspondence and conversation.
- Continued collaborative work with the other regions is anticipated and may include unplanned studies to address critical needs and opportunities to collect data.
- Continue the development of the NRSP-7 web site with possible re-implementation of the RUSTi database.

New / Proposed Projects:

Currently, the primary effort is to complete existing studies and we are trying to collaborate with TAMU to start work on lasalocid deer and goat projects.

Web Site

The NRSP-7.org web has continued to function well but is need of some development such as PowerPoint Presentations. The University is cranking-up security and is centralizing control of IT. We are concerned but we have been model citizens plus we actually got our original permission to host the web site without obvious use of the ufl.edu domain from the current head of IT. The MUMSRx web database continues to be updated – it alone receives 1-2 hits each day. RUSTi is alive but with loss of biological scientist we have kept a low profile. Further development will have to wait upon program's choice of a successor for the current coordinator. However we would like some discussion and guidance on off-site housing of the web site and records of minutes, reports, and current as well as past project documents.

NRSP-7 PUBLICATIONS IN 2009

Rowe, J, Tell, L, and Wagner, D. Animal safety report on intravaginal progesterone controlled internal drug releasing devices (CIDRs) in sheep and goats. J Vet Pharmacol Therap, 32(3): 303-305, 2009.

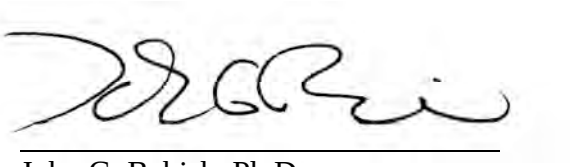
Bowser PR, Kosoff RE, Chen C-Y, Wooster GA, Getchell RG, Craig JL, Lim P, Wetzlich SE, Craigmill AL, Tell LA. Florfenicol residues in Nile tilapia after 10-d oral dosing in feed: Effect of fish size. J Aquat Anim Health, 21: 14-17, 2009.

Kosoff RE, Chen C-Y, Wooster GA, Getchell RG, Bowser PR, Clifford A, Craig JL, Lim P, Wetzlich SE, Craigmill AL, Tell LA. Florfenicol residues in three species of fish after 10-day oral dosing in feed. J Aquat Anim Health, 21: 8-13, 2009.

Rowe, J, Tell, L, Griffith, R, Lee, K, Hallford, D. Progesterone Milk Residues in Goats Treated with CIDR-G® Inserts. Submitted to Journal of Veterinary Pharmacology and Therapeutics.

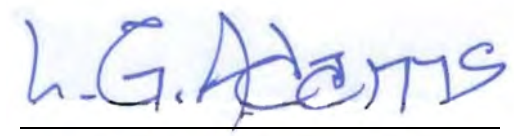
Dore, E, Angelos, J, Rowe, J, Wetzlich, S, and Tell, L. Pharmacokinetics of ceftiofur crystalline free acid and metabolites after single subcutaneous administration in lactating and non-lactating domestic goats (*Capra aegagrus hircus*). Submitted to Journal of Veterinary Pharmacology and Therapeutics.

SUBMITTED:



John G. Babish, Ph.D.
National Coordinator
Chair, Technical Committee

9/30/09
Date



L. Garry Adams, DVM, Ph.D.
Chair, Administrative Advisors

9/30/09
Date

Appendix I
Animal Drug Requests Received by NRSP-7 Program through 2009

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
1	Feb-82	Monensin	Premix	Goats	Ruminant	Coccidiosis
2	Apr-82	Amprolium	Premix	Pheasant	Avian	Coccidiosis
3	Nov-81	Monensin	Premix	Sheep	Ruminant	Coccidiosis
4	Jun-82	Sulfadimethoxine/ ormetoprim	Premix	Catfish	Aquatic	Bacterial infection
5	Apr-84	Thiabendazole	Premix	Pheasant	Avian	Gapeworm
6	Nov-82	BHT	Premix/ unspecified topical	Fish	Aquatic	Viral diseases
7	Oct-82	Various coccidiostats & antibiotics	——	Rabbits	Lagomorph	Coccidiosis, pasteurellosis
8	Dec-82	Albendazole	Oral suspension	Goats	Ruminant	Liver flukes
9	Dec-82	Lincomycin	Premix	Ducks	Avian	Pasteurellosis
10	Dec-82	Penicillin	Premix	Ducks	Avian	Erysipelas
11	Sep-81	Ivermectin	Injectable	Deer, reindeer	Ruminant	Warbles
12	Jul-83	Fenbendazole	Oral suspension/ premix	Goats	Ruminant	GI parasites
13	Jan-83	Monensin	Premix	Cattle	Ruminant	Emphysema
14	Jan-83	Decoquinate	Premix	Sheep	Ruminant	Coccidiosis
15	Oct-83	Oxytetracycline	Premix	Lobster	Aquatic	Gaffkemia
16	Feb-83	Xylazine	Injectable	Goats	Ruminant	Anesthesia
17	Jan-83	Ivermectin	Injectable	Goats	Ruminant	GI parasites
18	Jun-84	Chloramine-T	Topical soluble powder	Salmonids	Aquatic	Bacterial gill disease
19	Dec-83	Oxytetracycline	Premix	Alligators	Aquatic	Bacterial infection
20	Jul-84	Chloramine-T	Topical soluble powder	Catfish	Aquatic	Bacterial infection
21	Dec-82	Albendazole	Oral suspension	Sheep	Ruminant	Liver flukes
22	Aug-84	Penicillin	Injectable	Ducks	Avian	Erysipelas
23	Apr-83	Lutalyse	Injectable	Goats	Ruminant	Anestrus
24	Apr-83	Monensin	Premix	Goats	Ruminant	Coccidiosis
25	May-83	Xylazine	Injectable	Cattle	Ruminant	Anesthesia
26	Jun-83	Mebendazole	Oral paste	Goats	Ruminant	GI parasites
27	May-83	Spectinomycin	Intramammary infusion	Cattle	Ruminant	Mastitis
28	Oct-83	Chloramine-T	Topical soluble powder	Salmonids	Aquatic	External bacterial infections
29	Oct-83	Lasalocid	Premix	Goats	Ruminant	Coccidiosis
30	Oct-83	Bacitracin	Premix	Quail	Avian	Ulcerative enteritis
31	Nov-83	Praziquantel	Premix/ oral capsule	Ducks, geese, mute swan	Avian	Schistosomiasis
32	Dec-83	Ampicillin	Oral bolus	Goats	Ruminant	Enteritis
33	Dec-83	Amoxicillin trihydrate	Injectable	Dairy goats (nonlactating)	Ruminant	Bacterial pneumonia
34	Dec-83	Amoxicillin trihydrate	Oral bolus	Dairy goats (nonlactating)	Ruminant	Bacterial enteritis
35	Dec-83	Amoxicillin trihydrate	Oral bolus	Dairy goats (nonlactating)	Ruminant	Bacterial enteritis
36	Dec-83	Ampicillin	Injectable	Dairy goats (lactating)	Ruminant	Bacterial pneumonia
37	Dec-83	Ampicillin	Injectable	Dairy goats (nonlactating)	Ruminant	Bacterial pneumonia & enteritis
38	Dec-83	Ampicillin	Oral bolus	Dairy goats (nonlactating)	Ruminant	Enteritis
39	Dec-83	Chlortetracycline	Premix	Dairy goats (nonlactating)	Ruminant	Bacterial infection
40	Dec-83	Chlortetracycline	Premix	Dairy goats	Ruminant	Bacterial pneumonia
41	Dec-83	Neomycin sulfate	Oral soluble powder	Dairy goats (nonlactating)	Ruminant	Enteritis
42	Dec-83	Oxytetracycline	Injectable (100 mg/ml)	Dairy goats (nonlactating)	Ruminant	Bacterial infection
43	Dec-83	Oxytetracycline	Injectable	Dairy goats (nonlactating)	Ruminant	Bacterial pneumonia
44	Dec-83	Oxytetracycline	Injectable (long acting)	Dairy goats (nonlactating)	Ruminant	Bacterial infection
45	Dec-83	Oxytetracycline	Injectable (50 mg/ml)	Dairy goats (nonlactating)	Ruminant	Bacterial infection
46	Dec-83	Benzathine penicillin	Injectable	Dairy goats	Ruminant	Bacterial pneumonia
47	Dec-83	Procaine Penicillin	Injectable	Dairy goats	Ruminant	Bacterial infection
48	Dec-83	Sulfachloropyridazine	Oral powder	Dairy goats	Ruminant	Enteritis
49	Dec-83	Sulfachloropyridazine	Injectable	Dairy goats	Ruminant	Enteritis
50	Dec-83	Sulfabromomethazine	Oral bolus	Dairy goats	Ruminant	Bacterial infection
51	Dec-83	Sulfachloropyridazine	Oral bolus	Dairy goats	Ruminant	Enteritis
52	Dec-83	Sulfadimethoxine	Oral drinking water solution	Dairy goats	Ruminant	Bacterial pneumonia
53	Dec-83	Sulfadimethoxine	Oral bolus	Dairy goats	Ruminant	Bacterial pneumonia
54	Dec-83	Sulfadimethoxine	Oral powder	Dairy goats	Ruminant	Bacterial pneumonia
55	Dec-83	Sulfadimethoxine	Oral powder	Dairy goats	Ruminant	Bacterial pneumonia

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
56	Dec-83	Sulfaethoxypyridazine	Injectable	Dairy goats	Ruminant	Bacterial infection
57	Dec-83	Sulfaethoxy- pyridazine	Oral drinking water solution	Dairy goats	Ruminant	Bacterial infection
58	Dec-83	Sulfaethoxy- pyridazine	Oral bolus	Dairy goats	Ruminant	Bacterial infection
59	Dec-83	Sulfamethazine	Oral sustained release tablets	Goats	Ruminant	Bacterial pneumonia
60	Dec-83	Oxytetracycline	Injectable	Goats	Ruminant	Enteritis
61	Dec-83	Tylosin	Injectable	Goats	Ruminant	Bacterial pneumonia
62	Jan-84	Benzathine cloxacillin	Intramammary infusion	Dairy goats	Ruminant	Mastitis
63	Jan-84	Benzathine cloxacillin (Dry-Clox)	Intramammary infusion	Dairy goats	Ruminant	Mastitis
64	Jan-84	Cephapirin benzathine	Intramammary infusion	Dairy goats	Ruminant	Mastitis
65	Jan-84	Novobiocin	Intramammary infusion	Dairy goats	Ruminant	Mastitis
66	Jan-84	Novobiocin/ penicillin	Intramammary infusion	Dairy goats	Ruminant	Mastitis
67	Jan-84	Hetacillin	Intramammary infusion	Goats	Ruminant	Mastitis
68	Jan-84	Sodium cepharin	Intramammary infusion	Goats	Ruminant	Mastitis
69	Jan-84	Sodium cloxacillin	Intramammary infusion	Goats	Ruminant	Mastitis
70	Jan-84	Dimethyl benzyl ammonium chloride	Immersion	Brown trout	Aquatic	Bacterial gill disease
71	Jan-84	Dimethyl benzyl ammonium chloride	Immersion	Brown trout	Aquatic	Bacterial gill disease
72	Feb-84	Diquat	Immersion	Brown trout	Aquatic	Bacterial gill disease
73	Feb-84	Furazolidone	Premix	Trout	Aquatic	Furunculosis
74	Feb-84	Sulfamethazine	Oral sustained release tablets	Sheep	Ruminant	Bacterial pneumonia
75	Feb-84	Dimethyl benzyl ammonium chloride	Immersion	Brown trout	Aquatic	Bacterial gill disease
76	Feb-84	Ethoxyquin	Premix	Sheep	Ruminant	Bittersweet poisoning
77	Mar-84	Clinoprost tromethamine??	Injectable	Sheep	Ruminant	Breeding synchronization
78	Mar-84	Ivermectin		Sheep	Ruminant	G.I. parasites
79	Mar-84	Lasalocid	Premix	Sheep	Ruminant	Coccidiosis
80	Mar-84	Levamisole	Oral soluble powder	Sheep	Ruminant	G.I. parasites
81	Mar-84	Monensin	Premix	Sheep	Ruminant	Coccidiosis
82	Mar-84	Norgesterone	Injectable	Sheep	Ruminant	Estrus synchronization
83	Mar-84	Oxytetracycline	Injectable	Sheep	Ruminant	Bacterial pneumonia
84	Mar-84	Spectinomycin	Injectable/oral soluble powder	Sheep	Ruminant	Colibacillosis
85	Mar-84	Tylosin	Premix	Sheep	Ruminant	Mycoplasma pneumonia
86	Mar-84	Progesterone	Injectable	Sheep	Ruminant	Anestrus
87	Apr-84	Amoxicillin trihydrate	Injectable	Sheep	Ruminant	Bacterial pneumonia
88	Apr-84	Ampicillin	Injectable	Sheep	Ruminant	Bacterial pneumonia
89	Apr-84	Virginiamycin	Premix	Rabbits	Lagomorph	Bacterial infection
90	May-84	Monensin	Premix	Quail	Avian	Coccidiosis
91	May-84	Erythromycin	Premix	Quail	Avian	Chronic respiratory disease
92	May-84	Ipronidazole	Oral	Quail	Avian	Blackhead
93	May-84	Isoxsuprine HCl	Oral tablets	Horse	Other, Equine	Navicular disease
94	May-84	Di-N-Butyl Tin Oxide	Immersion	Catfish, channel	Aquatic	Tapeworms
95	May-84	Levamisole	Oral soluble powder	Goats	Ruminant	G.I. parasites
96	May-84	Sulfadimethoxine /ormetoprim	Premix	Catfish	Aquatic	Bacterial infection
97	May-84	Tricaine methanesulfonate	Topical solution	Salmonids	Aquatic	Anesthesia
98	Aug-84	Levamisole	Oral soluble powder	Sheep	Ruminant	G.I. parasites
99	Aug-84	Sulfaquinoxaline	Premix	Pheasant	Avian	Coccidiosis
100	May-84	Mebendazole	Oral soluble powder	Goats	Ruminant	G.I. parasites
101	May-84	Methylene blue	Injectable	Cattle	Ruminant	Nitrate poisoning
102	May-84	Erythromycin thiocyanate	Premix	Mink	Other, Mustelidae	Enteritis
103	Aug-84	Griseofulvin	Oral soluble powder	Rabbits	Lagomorph	Ringworm
104	Aug-84	Monensin	Premix	Rabbits	Lagomorph	Coccidiosis
105	Aug-84	Procaine penicillin	Injectable	Rabbits	Lagomorph	Pasteurellosis
106	Aug-84	Azaperone	Injectable	Ungulates, wild	Other	Immobilization
107	Sep-84	Ivermectin	Injectable	Rabbits	Lagomorph	Ear mites
108	Sep-84	Chlortetracycline	Injectable	Rabbits	Lagomorph	Pasteurellosis
109	Sep-84	Sulfadimethoxine /ormetoprim	Premix	Rabbits	Lagomorph	hepatic coccidiosis
110	Sep-84	Ivermectin	Injectable	Foxes	Other, Canidae	Ear mites

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
111	Sep-84	Decoquinate	Premix	Goats	Ruminant	Coccidiosis
112	Nov-84	Clorsulon	Oral suspension	Goats	Ruminant	Liver flukes
113	Nov-84	Amprolium	Oral powder/premix	Quail	Avian	Coccidiosis
114	Nov-84	Monensin	Premix	Quail	Avian	Coccidiosis
115	Nov-84	Salinomycin	Premix	Quail	Avian	Coccidiosis
116	Dec-84	Phenylbutazone	Oral bolus	Sheep	Ruminant	Anti-inflammatory
117	Dec-84	Lasalocid	Premix	Goats	Ruminant	Coccidiosis
118	Jan-85	Tiamulin	Premix	Trout	Aquatic	Red mouth disease
119	Jan-85	Sodium fluoride	Premix	Salmonids	Aquatic	Bacterial kidney disease
120	Feb-85	Oxolinic acid	Premix	Salmonids	Aquatic	Furunculosis, vibriosis
121	May-85	Amoxicillin	Intramammary infusion	Dairy goats	Ruminant	Mastitis
122	May-85	Lasalocid	Premix	Rabbits	Lagomorph	Coccidiosis
123	Oct-85	Botram 75 W	Soluble powder	Honey bees	Other, Insect	Foulbrood
124	Jan-86	Fenbendazole	Oral suspension	Goats	Ruminant	GI parasites
125	Jul-85	Ivermectin	Injectable	American bison	Ruminant	Hypodermosis
126	Oct-85	Clorsulon	Oral suspension	Sheep	Ruminant	Liver flukes
127	Nov-85	Fenbendazole	Premix	Bighorn sheep	Ruminant	Lungworms
128	Dec-85	Amprolium	Oral drinking water solution	Swine (neonates)	Other, porcine	Coccidiosis
129	Jan-86	Levamisole	Oral soluble powder	Quail	Avian	Endoparasites
130	Jan-86	Chlorine dioxide	Topical solution	Salmonids	Aquatic	Furunculosis, bacterial gill disease
131	Feb-86	Benzocaine	Topical soluble powder	Salmonids	Aquatic	Anesthesia
132	Mar-86	Melatonin	Premix	Sheep	Ruminant	Anestrus
133	Mar-86	Lactic acid	Injectable	Sheep (lambs)	Ruminant	Chemical castration
134	Mar-86	Levamisole	Oral soluble powder	Goats	Ruminant	GI parasites
135	Jul-86	Erythromycin	Premix	Salmonids	Aquatic	Bacterial kidney disease
136	Aug-86	Sulfadimethoxine /ormetoprim	Premix	Quail	Avian	Coccidiosis
137	Aug-86	Sulfadimethoxine /ormetoprim	Premix	Chukar partridges	Avian	Coccidiosis
138	Oct-86	Virginiamycin	Premix	Alligators	Aquatic	Hatchling alligator syndrome
139	Nov-86	Ivermectin	Injectable	Cattle	Ruminant	Ticks
140	Feb-87	Amprolium	Oral powder/premix	Rabbits	Lagomorph	Coccidiosis
141	Feb-87	Ivermectin	Injectable	Rabbits	Lagomorph	Ear mites
142	Feb-87	Oxytetracycline	Premix	Rabbits	Lagomorph	Bacterial infection
143	Jan-87	Lasalocid	Premix	Rabbits	Lagomorph	Coccidiosis
144	Sep-87	Morantel tartrate	Premix	Goats	Ruminant	GI parasites
145	Sep-87	Enrofloxacin	Premix	Salmonids	Aquatic	Furunculosis
146	Sep-87	Enrofloxacin	Premix	Salmonids	Aquatic	Bacterial kidney disease
147	Oct-87	Ivermectin	Injectable/oral suspension	Mink	Other, Mustelidae	GI parasites
148	Oct-87	Amprolium	Oral powder/premix	Mink	Other, Mustelidae	Coccidiosis
149	Oct-87	Sulfathiazole	Oral soluble powder	Mink	Other, Mustelidae	Bacterial enteritis
150	Oct-87	Sulfadimethoxine	WSP/tablets/ oral suspension	Mink	Other, Mustelidae	Coccidiosis, resp. and UT infections
151	Oct-87	Ivermectin	Injectable/oral suspension	Foxes	Other, Canidae	GI parasites
152	Oct-87	Amprolium	Soluble powder/ premix	Foxes	Other, Canidae	Coccidiosis
153	Oct-87	Sulfathiazole	Soluble powder	Foxes	Other, Canidae	Bacterial enteritis
154	Oct-87	Sulfadimethoxine	Oral soluble powder/tablets/oral suspension	Foxes	Other, Canidae	Coccidiosis, resp. and UT infections
155	Oct-87	Ivermectin	Injectable	Fish	Aquatic	External crustacean and internal nematode parasites
156	Oct-87	Praziquantel	Premix/ injectable	Fish	Aquatic	Cestodes and trematodes
157	Nov-87	Ivermectin	Injectable	Foxes, ranch	Other, Canidae	Ear mites
158	Nov-87	Tricaine methanesulfonate	Topical soluble powder	striped bass	Aquatic	Anesthesia
159	Nov-87	Sulfadimethoxine /ormetoprim	Premix	striped bass	Aquatic	Bacterial infection
160	Nov-87	Formalin	Topical solution	striped bass	Aquatic	External protozoan parasites
161	Nov-87	Oxytetracycline	Premix	striped bass	Aquatic	Pasteurellosis
162	Mar-88	Fumagillin dicyclohexylamine	Premix/ injectable	Salmonids	Aquatic	Proliferative kidney disease
163	Mar-88	Fenbendazole	Premix	Pheasant	Avian	Gapeworm
164	Mar-88	Morantel tartrate	Premix/oral bolus	Sheep	Ruminant	GI parasites
165	Mar-88	Ceftiofur	Injectable	Sheep	Ruminant	Bacterial pneumonia

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
166	Mar-88	Ceftiofur	Injectable	Goats	Ruminant	Bacterial pneumonia
167	Apr-88	Lincomycin/spectinomycin	Oral soluble powder	Quail	Avian	Air sacculitis
168	Apr-88	Fenbendazole	Oral soluble powder	Quail	Avian	GI parasites
169	Jun-88	Formalin	Oral soluble powder	Penaeid shrimp	Aquatic	External protozoan parasites
170	Feb-89	Ceftiofur	Injectable	Sheep	Ruminant	Bacterial pneumonia
171	Feb-89	Ceftiofur	Injectable	Goats	Ruminant	Bacterial pneumonia
172	Feb-89	Zinc bacitracin	Premix	Rabbits	Lagomorph	Post-weaning enteritis
173	Mar-89	Ethylenedinitrilo tetraacetic acid copper	Injectable	Sheep	Ruminant	Copper deficiency
174	Mar-89	Erythromycin	Premix/ injectable	Salmonids	Aquatic	Bacterial kidney disease
175	Apr-89	Enrofloxacin	Premix	American eels	Aquatic	Aeromonas salmonicida infections
176	May-89	Amoxicillin (keep w/ 33)	Injectable	Dairy goats (lactating)	Ruminant	Bacterial pneumonia
177	May-89	Enrofloxacin	Oral drinking water solution	Rabbits	Lagomorph	Pasteurellosis
178	Sep-89	Spectinomycin	Injectable/oral soluble powder	Ducks	Avian	Colibacillosis, salmonellosis
179	Dec-89	PD 127391 (fluoroquinolone)	Oral drinking water solution	Cockatiels	Avian	Psittacosis
180	Oct-89	Ceftiofur	Intrauterine	Dairy cattle	Ruminant	Metritis
181	Nov-89	Morantel tartrate	Premix/oral bolus	Sheep	Ruminant	GI parasites
182	Nov-89	Albendazole	Premix/block	Deer, white tail	Ruminant	Meningeal worms
183	Nov-89	Metaclopramide	Implant	Cattle	Ruminant	Fescue toxicosis
184	Apr-90	PD 117,596 (fluoroquinolone)	Premix	Salmonids	Aquatic	Furunculosis
185	May-90	Fenbendazole	Premix/feed block	Deer, white tail	Ruminant	Meningeal worms
186	May-90	Sodium carbonate peroxyhydrate	Topical soluble powder	Catfish, channel	Aquatic	External protozoan parasites
187	May-90	Avermectin (Moxidectin)	Biobullet implant	Bighorn sheep	Ruminant	Scabies, GI parasites, lungworm
188	May-90	Avermectin (Moxidectin)	Biobullet implant	Deer	Ruminant	GI parasites, external parasites
189	Jun-90	Sulfathiazole	Premix	Mink	Other, Mustelidae	Bacterial pneumonia (Pseudomonas)
190	Jul-90	Ceftiofur	Biobullet implant	Bighorn sheep	Ruminant	Bacterial pneumonia
191	Aug-90	Lasalocid	Premix	Chukar partridges	Avian	Coccidiosis
192	Aug-90	Ethylene vinyl acetate copolymer	Pellet bait binder	Lobster, crabs	Aquatic	Bait binder
193	Oct-90	Sarafloxacin	Premix	Alligators	Aquatic	Hatchling alligator syndrome
194	Nov-90	Cephapirin	Intramammary infusion	Dairy goats	Ruminant	Mastitis
195	Nov-90	Ivermectin	Premix	Bighorn sheep	Ruminant	Scabies
196	Feb-91	Ivermectin	Pour-on	Llamas	Other, Camelids	GI parasites
197	Feb-91	Ivermectin	Pour-on	Deer, red	Ruminant	GI parasites and lungworm
198	Apr-91	Ceftiofur	Injectable	Rabbits	Lagomorph	Pasteurellosis
199	Mar-91	Enrofloxacin	Soluble powder	Penaeid shrimp	Aquatic	Bacterial infection
200	Mar-91	Erythromycin	Soluble powder/premix	Penaeid shrimp	Aquatic	Bacterial infection
201	Mar-91	Trichlorfon	Soluble powder	Catfish, channel	Aquatic	insect predation
202	Feb-91	Ivermectin/ Clorsulon	Injectable	Llamas	Other, Camelids	GI parasites, liver flukes
203	Feb-91	Enrofloxacin	Premix	striped bass	Aquatic	Bacterial infection
204	Oct-91	Nitrofurazone	Topical soluble powder	shrimp	Aquatic	Bacterial infection
205	Oct-91	Copper	Topical solution (concentrate)	shrimp	Aquatic	Bacterial infection
206	Nov-91	Albendazole	Premix/feed block	Deer, white tail	Ruminant	Meningeal worms
207	Dec-91	Captan	Topical soluble powder	Sheep	Ruminant	Club lamb fungus
208	Dec-91	Trifluralin	Topical solution (concentrate)	shrimp	Aquatic	Mycosis
209	Jan-92	Amoxicillin	Premix	Salmonids	Aquatic	Furunculosis
210	Mar-92	Fenbendazole (216 active)	Premix	Deer, red	Ruminant	G.I. parasites
211	Mar-92	Ivermectin	Blocks	Bighorn sheep	Ruminant	Psoroptic mange
212	Apr-92	Metaclopramide	Oral bolus	Cattle	Ruminant	Fescue toxicosis
213	Apr-92	Sarafloxacin	Premix	striped bass	Aquatic	Septicemia
214	Apr-92	Enrofloxacin	Premix	Hybrid striped bass	Aquatic	Columnaris disease
215	Apr-92	Sarafloxacin	Premix	Catfish, channel	Aquatic	Enteric septicemia and motile *Aeromonas septicemia*
216	May-92	Fenbendazole	Premix	Deer, fallow	Avian	GI parasites
217	May-92	Tylosin	Soluble powder	Honey bees	Other, Insect	Foulbrood
218	Sep-92	Phenothiazine	Block/pellet/ liquid	Sheep, goats	Ruminant	GI parasites
219	Sep-92	N,N'-bis-(dichloroacetyl)-1-8 octane diamine	Premix	Timber wolves	Other, Canidae	Antispermatogenic contraceptive
220	Nov-92	Oxytetracycline	Premix	Chinook salmon	Aquatic	Columnaris disease, vibriosis

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
221	Nov-92	Oxytetracycline	Premix	white sea bass	Aquatic	Columnaris disease, vibriosis
222	Nov-92	Ivermectin	Pour-on	American bison	Ruminant	GI parasites
223	Dec-92	Ceftiofur	Injectable	Goats	Ruminant	Bacterial pneumonia
224	Dec-92	Procaine penicillin G	Injectable	Goats	Ruminant	Bacterial pneumonia
225	Dec-92	Erythromycin	Injectable	Goats	Ruminant	Bacterial pneumonia
226	Dec-92	Tylosin	Injectable	Goats	Ruminant	Bacterial pneumonia
227	Dec-92	Sulfadimethoxine	Injectable	Goats	Ruminant	Bacterial pneumonia
228	Jan-93	Ceftiofur	Injectable	Veal calves	Ruminant	Respiratory infections
229	Jan-93	Zinc bacitracin	Premix	Veal calves	Ruminant	Enteric disorders, feed efficiency
230	Jan-93	Ivermectin	Sustained release oral bolus	Deer, reindeer	Ruminant	Warbles
231	Feb-93	Copper sulfate	Topical soluble powder	Catfish, channel	Aquatic	External protozoan parasites
232	Mar-93	Human chorionic gonadotropin	Injectable	striped bass, white bass, hybrid striped bass	Aquatic	Spawning aid
233	Mar-93	Enrofloxacin	Injectable	Ducks	Avian	Colibacillosis, salmonellosis, pasteurellosis (anatipestifer)
234	Jun-93	Luteinizing hormone releasing hormone analog	Injectable	Fish, various	Aquatic	Spawning aid
235	Jul-93	Lasalocid	Premix	Pheasant	Avian	Coccidiosis
236	Jul-93	Clopidol	Premix	Pheasant	Avian	Coccidiosis
237	Aug-93	Ivermectin	Water	Gamebirds	Avian	GI parasites
238	Sep-93	Formalin	Topical soluble powder	Finfish and eggs	Aquatic	External fungal & protozoan parasites
239	Sep-93	Carp Pituitary	Injectable	White Sturgeon	Aquatic	Spawning aid
240	Sep-93	Potassium permanganate	Topical soluble powder	White Sturgeon	Aquatic	External fungal & protozoan parasites
241	Sep-93	Oxytetracycline	Premix	White Sturgeon	Aquatic	Internal bacterial infections
242	Sep-93	Oxytetracycline	Immersion	White Sturgeon	Aquatic	External bacterial infections
243	Sep-93	Sarafloxacin	Premix	White Sturgeon	Aquatic	Internal bacterial infections
244	Sep-93	Oxytetracycline	Premix	Fish, various	Aquatic	Otolith marking columnaris
245	Sep-93	Oxytetracycline	Immersion	Fish, various	Aquatic	Otolith marking
246	Sep-93	Tilmicosin phosphate	Injectable	Sheep	Ruminant	Chronic respiratory disease
247	Oct-93	Diminazene aceturate	Injectable	Cattle	Ruminant	Anaplasmosis piroplasmosis
248	Dec-93	Spectinomycin	Injectable	Veal calves	Ruminant	Enteric colibacillosis
249	Aug-94	Oxytetracycline	Injectable	Veal calves	Ruminant	Respiratory infections
250	Feb-94	Levamisole phosphate	Injectable	American bison	Ruminant	GI parasites Ostertagia
251	Aug-94	Ceftiofur	Injectable	Deer, red	Ruminant	Respiratory infections
252	Aug-94	Tilmicosin phosphate	Injectable	Veal calves	Ruminant	Respiratory infections
253	Aug-94	Fenbendazole	Premix	American bison	Ruminant	GI parasites
254	Aug-94	Clopidol	Premix	Rabbits	Lagomorph	Coccidiosis
255	Jan-95	Salinomycin		Rabbits	Lagomorph	Coccidiosis
256	Jan-95	Sulfadimethoxine & ormetoprim	Premix	Rabbits	Lagomorph	Coccidiosis
257	Mar-95	Oxytetracycline	Soluble powder	Lobster	Aquatic	Gaffkemia
258	Mar-95	Progesterone	CIDR implant	Sheep	Ruminant	Estrus synchronization
259	Apr-95	Hydrogen peroxide	Topical	Fish, various	Aquatic	Bacterial gill disease
260	Apr-95	Hydrogen peroxide	Topical	Atlantic salmon	Aquatic	Sea lice
261	May-95	Ceftiofur	Injectable	Psittacine birds	Avian	Gram-negative bacterial infections
262	Jun-95	Monensin	Premix	Rabbits	Lagomorph	Coccidiosis
263	Oct-95	Erythromycin	Premix	Hybrid striped bass	Aquatic	Strep infections
264	Jan-96	Albendazole	Premix	Emu	Other, Ratite	Nematode/trematode/cestode
265	Jan-96	Ceftiofur	Injectable	Emu	Other, Ratite	Bacterial infection
266	Jan-96	Ivermectin	Injectable	Emu	Other, Ratite	Nematodes, lice, mites
267	Jan-96	Sarafloxacin	WSP	Emu	Other, Ratite	Bacterial infection
268	Jan-96	Sulfadimethoxine	Soluble powder	Emu	Other, Ratite	Bacterial infection & coccidiosis
269	Jan-96	Sarafloxacin	Premix	Catfish	Aquatic	Enteric septicemia
270	Mar-96	Amoxicillin	Premix	Hybrid striped bass	Aquatic	Strep infections
271	Apr-96	Carp Pituitary	Injectable	Fish, various	Aquatic	Spawning aid
272	Jul-96	Sulfadimethoxine & ormetoprim	Premix	Pheasant	Avian	Bacterial infection & coccidiosis
273	Jul-96	Nitarsone	Premix	Partridge	Avian	Blackhead
274	Jul-96	Zoamix	Premix	Pheasant	Avian	Coccidiosis, growth, & feed efficiency
275	Jul-96	Ceftiofur sodium	Injectable	Llamas, alpaca, fallow deer	Other, Camelids	Respiratory infections

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
276	Jul-96	Fenbendazole	Premix	Ostrich & Emu	Ratite	Nematodes
277	Jul-96	Potassium permanganate	Topical	Catfish	Aquatic	External *ichthyophthirius multifilis*
278	Aug-96	Monensin sodium	Premix	Pheasants & partridges	Avian	Coccidiosis
279	Aug-96	Lasalocid	Premix	Pheasant	Avian	Coccidiosis
280	Aug-96	Fenbendazole	Premix	Pheasants & partridges	Avian	Gapeworm & capillaria
281	Aug-96	Deccox	Premix	Pheasants & partridges	Avian	Coccidiosis
282	Aug-96	Chlortetracycline	Premix	Pheasants & partridges	Avian	Bacterial infection
283	May-97	Oxytetracycline HCl	Soluble powder	walleye (larval fish)	Aquatic	Columnaris disease
284	Jun-97	MGA/GnRH	Feed/ injectable	Sheep	Ruminant	Estrus synchronization
285	Nov-97	Oxytetracycline	Feed	Fish, various	Aquatic	Vibriosis
286	Nov-97	Oxytetracycline	Feed	Tilapia	Aquatic	Strep infections
287	Feb-98	Ketamine	Injectable	Ostrich & Emu	Ratite	Anesthesia
288	Feb-98	Xylazine	Injectable	Ostrich & Emu	Ratite	Sedative
289	Feb-98	Enrofloxacin	WSP	Ostrich & Emu	Ratite	Bacterial infection
290	Feb-98	Trimethoprim/ Sulfadiazine	Oral	Ostrich & Emu	Ratite	Bacterial infection
291	Jul-97	Ivermectin	Oral bait	Deer	Ruminant	GI parasites
292	Aug-97	Doxycycline	Extruded feed	Psittacine birds	Avian	Chlamydia
293	Mar-98	Imexon	Injectable	Mink	Other, Mustelidae	Alleutian disease
294	Sep-98	Lasalocid	Premix	Deer	Ruminant	Coccidiosis
295	Sep-98	Strontium Chloride	Immersion	Fish	Aquatic	Otolith marking
296	Nov-98	Molybdate	Injectable	Sheep	Ruminant	Copper toxicity
297	May-99	Triclabendazole	Drench	Deer/elk	Ruminant	Liver flukes
298	May-99	Lasalocid	Oral	Goats	Ruminant	Coccidiosis
299	Aug-99	Pirlimycin	Intramammary	Goats	Ruminant	Mastitis
300	Aug-99	Moxidectin	Topical	Cage birds	Avian	Mites face/airsac
301	Feb-00	Decoquinate	Milk replacer	Calves	Ruminant	Cryptosporidiosis
302	Mar-00	Antimicrobials	Immersion	shellfish	Aquatic	Bacterial infection
303	Apr-00	Banamine	Injectable	Veal calves	Ruminant	Anti-inflammatory
304	Apr-00	Neomycin 325	Soluble powder	Veal calves	Ruminant	Bacterial enteritis
305	Apr-00	Chlortetracycline	Soluble powder	Veal calves	Ruminant	Bacterial enteritis
306	Apr-00	Mu Se (selenium)	Injectable	Veal calves	Ruminant	Se deficiency
307	Apr-00	Florfenicol	Injectable	Veal calves	Ruminant	Bacterial pneumonia
308	Apr-00	Micotil	Injectable	Veal calves	Ruminant	Bacterial pneumonia
309	Apr-00	Sulfamethoxazole/trimethoprim 960	Oral - tablets	Veal calves	Ruminant	Bacterial infection
310	Apr-00	Cephalexin	Oral	Veal calves	Ruminant	Bacterial infection
311	May-00	Lincomycin	Soluble powder	Honey bees	Other, Insect	American Foulbrood
312	Jun-00	Imidocarb	Injectable	Dairy cattle	Ruminant	Anaplasmosis babesiosis
313	Oct-00	Sulfadimethoxine & ormetoprim	Premix	Fish	Aquatic	Bacterial infection
314	Oct-00	Tripelennamine HCl	Injectable	Veal calves	Ruminant	Antihistamine
315	Oct-00	Amikacin	Injectable	Veal calves	Ruminant	Diarrhea
316	Oct-00	Sulfachlor- pyridazine	Injectable or oral	Veal calves	Ruminant	Diarrhea
317	Oct-00	Levamisole phosphate	Injectable	Veal calves	Ruminant	GI parasites
318	Oct-00	Penicillin	Injectable	Veal calves	Ruminant	Bacterial infection
319	Oct-00	Chlortetracycline	Oral	Veal calves	Ruminant	Respiratory infections
320	Oct-00	Tylosin	Injectable	Veal calves	Ruminant	Respiratory infections
321	Oct-00	Apramycin	Oral	Veal calves	Ruminant	Diarrhea
322	Oct-00	Sulfadimethoxine	Injectablen or oral	Veal calves	Ruminant	Respiratory infections
323	Oct-00	Various products	Various	Veal calves	Ruminant	Various
324	Jan-01	Progesterone	CIDR implant	Goats	Ruminant	Estrus synchronization
325	Jul-01	Florfenicol	Injectable	Sheep	Ruminant	Respiratory infections
326	Jul-01	Florfenicol	Injectable	Sheep	Ruminant	Foot rot
327	Jul-01	Florfenicol	Injectable	Goats	Ruminant	Respiratory infections
328	Jul-01	Florfenicol	Injectable	Goats	Ruminant	Foot rot
329	Oct-01	Florfenicol	Injectable	Veal calves	Ruminant	Respiratory infections
330	Oct-01	Apitol	Patties	Honey bees	Other, Insect	Varroa mites

ADR	Date rec'd	Drug	Formulation	Species	Category	Indication
331	Mar-02	Arecoline (Cestolin)	Oral tablets	Gamebirds, pet birds, cocks	Avian	Tapeworms, ascarids, trichinosis
332	Oct-02	Oxytetracycline	Oral	Abalone	Aquatic	Withering syndrome
333	Dec-02	Florfenicol	Oral	shrimp	Aquatic	Necrotizing pancreatitis
334	Jun-03	Florfenicol	Oral	Finfish	Aquatic	Bacterial infection
335	Mar-05	Ovaprim (GnRHa & Domperidone)	Injectable	Ornamental fish	Aquatic	Spawning aid
336	Mar-05	Metomidate	Injectable	Ornamental fish	Aquatic	Anesthesia
337	Jan-06	Progesterone	CIDR implant	Goats	Ruminant	Estrus synchronization
338	Apr-06	Ceftiofur hydrochloride	Intramammary	Goats	Ruminant	Mastitis
339	May-06	tulathromycin	Injectable	Sheep	Ruminant	Respiratory infections
340	May-06	tulathromycin	Injectable	Goats	Ruminant	Respiratory infections
341	Sep-06	Melatonin	Implant	Sheep	Ruminant	Reproductive aid
342	Oct-06	Moxidectin	Oral	Goats	Ruminant	Internal parasites
343	Mar-10	Remebee	Oral	Honey bees	Other, Insect	Israeli Acute Paralysis Virus