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REPORT

APRIL 21, 1987

CONSULTANCY REPORT ON
BIODEGRADABLE ANIMAL WASTES FOR LIVESTOCK FEED

April 19 - 19, 1987

Agricultural Research Project (386-0470)

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CONSULTANCY REPORT
ON
USA STUDY TOUR OF MANAGEMENT TEAM
APRIL 10-19, 1987
PROJECT NO. 386-0470
AGRICULTURAL RESEARCH UMBRELLA
SUBPROJECT 5
CONVERSION OF BIODEGRADABLE ANIMAL
WASTES FOR LIVESTOCK FEED

SUBMITTED BY
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APRIL 24, 1987

I. Introduction

The Management Team consisted of Dr. C. L. Arora, Assistant Director General, Indian Council of Agricultural Research, Krishi Bhavan, New Delhi; Dr. K. Pradhan, Professor of Animal Nutrition, Haryana Agricultural University, Hissar; and Dr. M. L. Punj, National Dairy Research Institute, Karnal, India.

The locations and persons visited are given in the attached itineraries for April 10-19, 1987 (Appendix A).

II. Activities and Visits

Initially, general discussions were held with the Management Team members concerning the objectives of the project, especially the purpose of the visits by the Team. While in the Washington, D.C. area the consultant took the team to pertinent historical places.

A. Mississippi State University, Starkville, Mississippi.

Dr. James Minyard, State Chemist, made the arrangements for the visit to the Mississippi State Chemical Laboratory. Other persons visited with were Dr. Paul Brignac, Associate State Chemist, Dr. Larry Lane, Director of Industrial and Agricultural Service Division; Mr. Rubel Cowart, Industrial and Agricultural Service Division; Mr. R. L. Erickson, Chemical Regulatory Division; Ms. Pat Roebuck, Feed Microscopist; Dr. Chris Lusk, Gas-Liquid Chromatography.

The Laboratory provides analytical support for regulation of quality and safety of feeds in Mississippi. A variety of analyses are conducted, including determination of nutrients, mycotoxins, pesticides and toxic chemicals. Animal wastes have

been analyzed for nutrients, and for possible hazardous substance.

The laboratories are well equipped with classical equipment, as well as modern up-to-date equipment such as infrared spectrophotometers, gas-liquid chromatographs, atomic absorption spectrophotometer, high pressure liquid chromatographs, mass spectrometer and personal computers.

A scientist(s) from India could obtain good training with equipment and procedures to measure toxic substances and residues in this laboratory. Dr. Minyard indicated an interest in being involved in this type of activity.

The Team visited also with Dr. H. W. Essig, Professor of Animal Science. Dr. Essig conducted research on feeding poultry waste a few years ago, but is no longer involved in this kind of research.

B. Auburn University, Auburn, Alabama

Dr. Tom McCaskey, Associate Professor of Microbiology and Dr. B. G. Ruffin, Extension Animal Scientist, Department of Animal and Dairy Science made the arrangements for the visit. Auburn researchers were among the pioneers in processing and feeding animal waste, especially cattle waste. The activity in this area has been rather limited since the retirement of Dr. W. B. Anthony, a few years ago. However, Dr. McCaskey has maintained interest and some activity, especially concerning determination of pathogenic microorganisms and methods of destroying these. The laboratories are well equipped for research concerning determination of numbers of different pathogenic microorganisms.

Scientists from India involved in research on animal wastes could receive good training in this laboratory in pathogenic microbe detection and evaluation of conditions for the destruction of these. Dr. McCaskey indicated a keen interest in participating in training scientists.

Dr. B. G. Ruffin made arrangements for the Team to visit two feedlots, where poultry litter is used as a feedstuff. Mr. David Carpenter, Associate County Agent, Troy, AL assisted with the visit to the two feedlots. The Richard Dunn Feedlot, Troy, AL has a capacity of 8000 head per year. The broiler litter is processed by deep stacking, and is used in a complete ration with corn silage, corn grain and liquid supplement. The owners of the feedlot reported that good performance is obtained and no problems have been encountered in cattle fed broiler litter.

At the Hastens Feedlot, Brundidge, AL about 2500 cattle are finished per year. Initially, the cattle are kept on pasture and are fed a 1:1 mixture of corn and broiler litter. Later, the level of litter is reduced to 25%. Also included in the ration is a by product from the food processing industry, contributing about 5% fat to the ration. When in drylot the cattle are also fed long hay or peanut hulls. The broiler litter is processed by deep stacking. Cattle performance has been good and no major problems have been encountered.

The main reason for the visits to the feedlots was to show application of research on animal wastes, and to acquaint the India Scientists with effective technology transfer. If feasible, it may be wise for someone from India who will be involved in the technology transfer portion of this project to

train with Dr. B. G. Ruffin.

C. Virginia Polytechnic Institute and State University (Va. Tech, Blacksburg

Dr. J. P. Fontenot, John W. Hancock, Jr. Professor of Animal Science, made the arrangements for the visit on campus and in the state. Dr. Fontenot discussed in detail the past and current research at Va. Tech on underutilized wastes, including broiler litter, caged layer waste, cattle waste, swine waste, seafood processing waste and slaughterhouse waste. The Team Members had the opportunity to observe research in progress on 1) preservation of seafood processing waste (crab waste), 2) processing of poultry litter (deepstacking, composting, sun drying, ensiling) and 3) a digestion trial with sheep fed ensiled corn forage-poultry waste.

A research program in animal wastes as feedstuffs has been active for 25 years. The research group has the experience and facilities to train scientists in processing and utilization of poultry waste, cattle waste, seafood processing waste and slaughterhouse waste. Dr. Fontenot is interested in training scientists in these areas.

The Team also visited with Mr. R. W. Young, Director of the Pesticide and Residue Laboratory on campus. The laboratory is well equipped and the personnel have vast experience in analyzes for residues, especially for pesticides and mycotoxins. It may not be advisable to place scientists in that laboratory for 6 months, but the laboratory may be quite useful for short-term training in some of the techniques for scientists

training at Va. Tech in processing and utilization of wastes for use as feedstuffs.

The Team Members visited with Dr. Tracy Wilkins, Head, Department of Anaerobic Microbiology and some of his staff members. The Anaerobe Laboratory is among the best in the world and is very well equipped. The primary activity in the Laboratory is research related to taxonomy of anaerobes and biochemical mechanisms. Training would be useful mainly for persons who would be involved in research with pure cultures of anaerobes. A 2-week short-course is offered by the faculty in the Laboratory every fall. Possibly, a scientist(s) training in processing and utilization of animal waste at Virginia Tech or at some other location may find it beneficial to participate in the short-course.

A visit was scheduled to a crab-processing and a fish processing plant at Hampton, VA. Wastes have been obtained in that area for the research on processing and utilization of seafood wastes at Virginia Tech. Mr. John Graham, Owner of Graham and Rollins, Hampton, Va., toured the Team through his processing plants and explained the problems with the waste. The waste comprises 90% of processed crabs. Furthermore, the waste is very perishable. He owns a plant to produce crab meal, but the business operates at a loss, due to low price for crab meal. Alternate use of the crab waste is needed. The Team visited a finfish processing plant also. A sizeable amount of the finfish waste is used as an ingredient in pet foods.

Dr. H. J. Gerken, Jr. Extension Animal Scientist, Animal Science Department, arranged for visits to farms feeding poultry

litter in Virginia. The Tucker Farm (Mr. Lewis Tucker), McKenney, VA has been feeding broiler litter for a number of years to finishing cattle. The cattle are fed a mixture of deep-stacked litter and corn silage. Mr. Nelson Bolt, Farmville, Va. feeds litter added to corn silage at 20% of the dry matter to stocker cattle. The litter is processed by deep stacking in an open shed. Mr. William Maxey, Dillwyn, Va. showed the Team cattle fed a mixture of broiler litter and ground corn in self feeders. Coarse roughage is provided to the cattle, in addition. Mr. Richard Ellis, Mt. Rush, Va. uses broiler litter ensiled with corn forage (20%, dry basis) in a bunker silo. The silage is fed to stocker cattle. Mr. Charles Farriss, Rustburg, Va. has been feeding a mixture of ground corn grain and poultry litter to stocker cattle.

All the farmers reported satisfactory results and no problems in cattle fed broiler litter. Every farmer stated that use of poultry litter resulted in increased profit. In fact, some of them indicated that no profit would have been made if conventional feed sources had been used. In a number of occasions the farmers were asked where they learned of the use of poultry litter as feedstuffs. In every case they indicated that they learned of this technology from Extension, either from the County Agent or directly from the Extension Specialist, Dr. John Gerken. This shows the effectiveness of technology transfer by Dr. Gerken. It is suggested that during the third or fourth year of the project persons involved in the transfer of this technology to farmers in India spend some time with Dr. Gerken to train in technology transfer. Perhaps, it may be feasible for

Dr. Gerken to spend some time in India to work with Extension Personnel on technology transfer. It is planned that the persons who are sent to Va. Tech for training in processing and utilization of animal waste for use as feedstuffs will spend some time in the field with Dr. Gerken.

III. Laboratory Equipment

Needs for equipment were discussed with team members. Descriptions of the major equipment items to be acquired for the Project are being developed. These will be discussed with Dr. K. Pradhan, after which the final specifications will be developed.

7-APR-87

ITINERARY

BICDEGRADATION OF ANIMAL WASTES TEAM

Dr. K. Pradhan
Dr. C.L. Aurora
Dr. M.L. Punj

April 7 (Tuesday)

Depart Delhi for Washington, D.C.

April 8 (Wednesday)

Arrive Washington/Dulles
Flight: PA 061 from Frankfurt at 1640
Hotel: Highlander Motor Inn
3336 Wilson Blvd. at Virginia Square Metro
Arlington, VA
(703) 524-4300

April 9 (Thursday)

9:00 a.m. At Winrock International
1611 N. Kent Street, Suite 600, Arlington, VA
Contact: Dr. Floyd Williams (703)525-9430

1:00 p.m. At USDA/ARS/Beltsville, MD
Contacts: Dr. Lewis Smith (301)344-2690
Dr. L. Slyter (301)344-2436
Bldg. 200, Room 217, BARC

April 10 (Friday)

10:00 a.m. Meet Food and Drug Administration officials
200 C Street, S.W., Washington, Room #4019
Contact: Dr. Paul Corneliussen, 245-1231

p.m. Return to Winrock. Dr. Fontenot will join the team

April 11 (Saturday)

Free Day

April 12 (Sunday)

To Columbus, MS via Atlanta, GA
Washington/Atlanta
Flight: DL 429 1420/1559
Atlanta/Columbus, MS
Flight: DL 2096 1646/1710

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Drive to Starkesville, MS
Hotel: Holiday Inn, Highway 12 & S. Montgomery St.
(601)323-6161 (Two single rooms @ \$40, one double @
\$47 reserved in Dr. Fontenot's name)

April 13 (Monday)

9:00 a.m. At Mississippi State University
Contact: Dr. James Minyard, (601)325-3324

(Call Dr. Minyard's secretary Alice McLeland from hotel for transportation
to the University.)

p.m. Drive from Starkesville to/Auburn, AL
Hotel: Auburn Conference Center and Motor Lodge, 1577 South
College (205)821-7001, reserved one double @ \$43, two
singles @ \$37

April 14 (Tuesday)

8:00 a.m. At Auburn University
Contact: Dr. Tom McCaskey/Dr. B. G. Ruffin (205)826-4160

April 15 (Wednesday)

Columbus, GA to Norfolk, VA via Atlanta

Columbus/Atlanta
Flight: EA 3258 0820/0850

Atlanta/Norfolk
Flight: EA 636 0936/1055

April 16-18 (Thursday-Saturday)

In Virginia. Contact Floyd Williams each evening (703)938-9738

April 19 (Sunday)

Roanoke, VA/Lafayette, IN via Chicago, IL
(Dr. Tillman will join the team in Chicago,
arriving from Tulsa via UN 430, 1406/1544)

Roanoke/Chicago
Flight: PI 742 1210/1245

Chicago/Lafayette
Flight: CO 4507 1640/1725
Hotel: Purdue Memorial Union; Corner of Grant and State St.;
West Lafayette. (317)494-8900, reserved two double
rooms @ \$38 in Dr. Tillman's name.

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April 20 (Monday)

8:00 a.m. At Purdue University
Contacts: Dr. Alan Sutton and Dr. Perry
Animal Science Dept.
Purdue University, Purdue, IN 47907
(317)494-8012

p.m. Drive to Urbana, IL
Hotel: Illini Union; Corner of Green and Wright;
(217)333-1241; reserved two double rooms @
\$46.60.

April 21 (Tuesday)

8:30 a.m. At University of Illinois
Contacts: Dr. Bryan White; Animal Science Dept., Rm. 460;
University of Illinois, 1207 West Gregory Dr.
Urbana, IL 61801 (O) (217)333-2090
(H) (217)398-8118

p.m. Champaign, IL/Des Moines, IA via St. Louis, MO

Champaign/St. Louis
Flight: TWA 663 1700/1741

St. Louis/Des Moines
Flight: TWA 505 1855/1955
Hotel: Holiday Inn; near Merle Hay Mall (515)278-0271,
two double rooms @ \$56 reserved and confirmed for late
arrival. Confirmation #6605 34 55.

April 22 (Wednesday)

At Pioneer Hybrid; Microbial Genetic Division;
6800 Pioneer Plaza, P.O. Box 258; Des Moines, IA
Contact: Dr. Jerry Berger (515)270-4134

p.m. Des Moines/Spokane, WA via Minneapolis, MN

Des Moines/Minneapolis
Flight: NW 3225 1640/1745

— Minneapolis/Spokane
Flight: NW 717 1845/1939
Hotel: Ramada Inn, Spokane International Airport,
(509)838-5211, reserved two double rooms @ \$53
guaranteed for late arrival.

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April 23 (Thursday)

a.m. Drive to Pullman

10:00 a.m. At Washington State University
Contact: Dr. J.R. Males, Animal Science Dept.; Washington
State U., Pullman, WA 99164 (509)335-4131

p.m. Spokane, WA/Sacramento, CA via Seattle

Spokane/Seattle
Flight: NW 738 1700/1748

Seattle/Sacramento
Flight: NW 1840 1925/2055
Hotel: Discovery Motor Inn; 350 Bercut Drive; Interstate 5 and
Richards Blvd., (916)442-6971, reserved two doubles @
\$51. (On arrival at airport, call hotel for a courtesy
limo to the hotel)

April 24 (Friday)

At California Dept. of Agriculture
Contact: Dr. Olaf Leifson; Seed and Fertilizer, Livestock, and
Drug Branch; 1215 O St.; Sacramento, CA 95814
(916)322-5820

April 25-26 (Saturday-Sunday)

Free days

April 27 (Monday)

9:00 a.m. At University of California, Davis
Contact: Dr. Dennis Hsieh, Environmental Toxicology Dept.
(916)752-1142

Drive to San Francisco

April 28 (Tuesday)

San Francisco/Hong Kong
Flights: UA 805 1345/1850 (arr. 4/29)

(Dr. Tillman to Tulsa via Denver, United 720,
1500/1818, United 984, 1850/2127)

April 30 (Thursday)

Hong Kong/Delhi
Flight: AI 325 2130/0245 (arr. 5/1)

ITINERARY FOR
DR. K. PRADHAM, DR. M. L. PUNJ, DR. C. L. AURORA
IN VIRGINIA

April 15, 1987

- 11:00 AM - Arrive Norfolk, VA, by air
(Accompanied April 15 and 16 by Dr. J. P. Fontenot, Professor,
and Dr. John Gerken, Extension Specialist, Animal Science
Department, Virginia Tech)
- 12:00 noon - Observe research on processing crab waste by researchers from
Va Tech
- 1:00 PM - Mr. John Graham, Hampton, VA - Crab processing plant
- 2:00 PM - Visit Va Tech Seafood Processing Research Laboratory
- 5:00 PM - Mr. Lewis Tucker, McKinney, VA, Farmer - observe feeding
broiler litter
- 9:30 PM - Lodging - Comfort Inn, Farmville, VA

April 16, 1987

- 8:00 AM - Alvin Thomas, County Agent, Farmville, VA
- 8:15 AM - Mr. Nelson Bolt, Farmville, VA, Farmer - feeding broiler
litter to cattle
- 10:00 AM - Mr. William Maxey, Dilwyn, VA, Farmer - feeding broiler
litter to cattle
- 11:00 AM - Mr. Richard Ellis, Mt. Rush, VA - feeding broiler litter
- 1:30 PM - Mr. Charles Farriss, Rustburg, VA, Farmer - feeding broiler
litter
- 5:00 PM - Blacksburg, VA - Lodging at Donaldson Brown Continuing
Education Center, Campus, Va Tech

April 17, 1987

- 8:00 AM - Tour laboratories and research facilities - Dr. J. P.
Fontenot and staff
- 10:00 AM - Visit Pesticide Residue Laboratory - Mr. R. W. Young, Bio-
chemistry and Nutrition Department

1:30 PM - Visit Anaerobe Laboratory - Dr. Tracy Wilkins, Department Head

4:00 PM - Visit with graduate students in Ruminant Nutrition

April 18, 1987

- Visit Dairy Farm
- Discuss project - equipment and scientists to go to USA for training

April 19, 1987

- Visit with Dr. J. P. Fontenot concerning project
- 10:00 AM - Depart to Roanoke, VA, airport