Reporting Template
for NC-1119 Project Final Report (October 08, 2007)

Project title: Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises (Rev. NC-119)

Period Covered: October 2006 through September 2007

1. Station Reporting:

New Mexico Cooperative Extension

2. Personnel reporting from experiment station: Names

Victor E. Cabrera

3. Accomplishments and Impacts under each Objective/ sub-objective.

Objective 1: Develop and integrate decision support systems to promote efficient, environmentally sound, and economically viable management systems for dairy young stock.

Sub-objective 1A. To enhance the understanding of nutrient requirements of young calves and growing dairy heifers and identify nutritional strategies that maximize the efficient use of dietary nutrients and reduce excretion into the environment.

Enter **accomplishments and usefulness of findings** here for this sub-objective:
Opportunities to improve nutrient management in grazing systems for young stock can be assessed through a computer application (*N-Grazing*) to balance N in young stock grazing systems. *N-Grazing* is a spreadsheet that uses standard book values and local information to determine carrying capacity and amount of N depleted in grazing systems. The application is available through http://dairy.nmsu.edu: Tools.

Enter **IMPACTS** here for this sub-objective **(specific and quantified)**:
Environmental consultants that serve 75% of dairy producers in New Mexico are using the application for planning and reporting purposes. Some of these consultants are also using the application with clients in other states. The New Mexico Environment Department is still reluctant to endorse and promote the application, but accepts its predictions on farmer's individual basis.

Objective 2: To develop strategies and systems to optimize utilization, economic returns, and environmental goals for management of dry, pregnant and lactating dairy cows.

Sub-objective 2B. _To address environmental challenges of dairy production and determine strategies to achieve environmental goals._

Enter **accomplishments and usefulness of findings** here for this sub-objective:
Substantial seasonal variability on manure excretion for whole farm dairy farms systems has been found. Opportunities exist to better recycle nutrients and utilize manure through on-farm management practices. A dynamic, stochastic application has been created to assess seasonal manure excretion and test best management practices. This application is in addition a baseline model to build extra dairy modules to better assess economic and environmental impacts of dairy farm systems. The application is available through http://dairy.nmsu.edu: Tools.

Enter **IMPACTS** here for this sub-objective:
General assessment studies on manure utilization in the state of New Mexico have been accomplished using the application. Most of these analyses focus on the seasonal and spatial availability of manure for bioenergy purposes and the capacity of enhance New Mexico's rangelands by manure application along with their economic implications.

Sub-objective 2C. _To develop and expand financial, production, and management databases, perform financial analysis, and integrate data information into decision support systems to optimize efficiency of dairy management systems._

Enter **accomplishments and usefulness of findings** here for this sub-objective:
Adapted and developed a framework to create a decision support system to optimize dairy farm risk management strategies under uncertain conditions of price and production performance.
Developed a framework to calibrate DSSAT crop simulation models and integrate them with other dairy farm system components to analyze whole dairy farm systems.
Developed a framework to create a universal nutrient management plan for record keeping and reporting to state and federal agencies.
Analyzed field experiments on irrigated alfalfa for New Mexico conditions. Results are compiled in a user-friendly application that predicts probabilistic alfalfa yields according to user defined parameters. The application is available through http://dairy.nmsu.edu: Tools.

Enter **IMPACTS** here for this sub-objective:
Dairy producers and their consultants are providing information and facilities to develop the frameworks outlined above, which are under consideration for competitive grant funding. The alfalfa yield predictor is being used by farm producers who provide hay to the dairy industry in New Mexico.

4. Publications and Software:

Enter All Publications and Software (2002-2007) associated with this project; everything that's been produced whether peer-reviewed/refereed or not; include Extension outcomes, as well as research):

Refereed

Cabrera, V.E., S. Jagtap, and P.E. Hildebrand. 2007. Strategies to limit (minimize) nitrogen leaching on dairy farms driven by seasonal climate forecasts. Agriculture, Ecosystems, and Environment 122, 479-489.

Cabrera, V.E., Letson, D., Podesta, G. 2007. The value of the climate information when Farm Programs matter. Agricultural Systems 93, 25-42.

Cabrera, V.E., Fraisse, C., Letson, D., Podesta, G., Novak, J. 2006. Impact of climate information in reducing farm risk by selecting crop insurance programs. Transactions of the ASABE 49, 1223-1233.

Cabrera, V.E., Breuer, N.E. and Hildebrand, P.E. 2006. North Florida stakeholder perception toward the use of climate forecast technology, nutrient pollution, and environmental regulations. Climatic Change 78, 479-491.

Cabrera, V.E., deVries, A., Hildebrand, P.E. 2006. Prediction of nitrogen excretion in dairy farms located in North Florida; A comparison of three models. J. Dairy Sci. 89, 1830-1841.

Cabrera, V.E., Hildebrand, P.E., Jones, J.W., Letson, D., deVries, A. 2006. An integrated North Florida dairy farm model to reduce environmental impacts under seasonal climate variability. Agriculture, Ecosystems, and Environment, 113, 82-97.

Cabrera, V.E., C.P. Mathis, R.E. Kirksey, T.T. Baker. (In review). Development of a seasonal prediction model for manure excretion by dairy cattle. The Professional Animal Scientist 00, 00-00.

Extension

Cabrera, V.E., Kirksey, R., Mathis, C. 2007. Grazing-N: A Nitrogen Balance Model for Grazing Dairy Heifers and Dry Cows in New Mexico. NMSU Cooperative Extension Service Publication. Las Cruces, NM. Circular 611.

Cabrera, V.E. 2007. User manual of Grazing-N: A Nitrogen Balance Model for Grazing Dairy Heifers and Dry Cows in New Mexico. NMSU Cooperative Extension Service Publication. Las Cruces, NM. Guide D-209.

Cabrera, V.E., Hagevoort, R. 2007. Importance of the New Mexico dairy industry. NMSU Cooperative Extension Service Publication. Las Cruces, NM. Circular 613.

Cabrera, V.E., Marsalis, M., Lauriault, L. (submitted). Using a computer application to predict irrigated alfalfa yield. Cooperative Extension Service Publication. Las Cruces, NM. Circular 000.

Cabrera, V.E., Marsalis, M., Lauriault, L. (submitted). User manual of the Alfalfa yield predictor. Cooperative Extension Service Publication. Las Cruces, NM. Guide D-000.

Cabrera, V.E., Mathis, C., Kirksey, R., Baker, T.T. (submitted). NM-Manure: A Seasonal Prediction Model for Manure Excretion by Dairy Cattle in New Mexico. Cooperative Extension Service Publication. Las Cruces, NM. Bulleitn-000.

Proceedings

Cabrera, V.E., Solis, D., and Letson, D. Optimal crop-insurance strategies under climate variability: Contrasting insurer and farmer interests. 2007 American Agricultural Economics Association Annual Meeting, Portland, July 29-August 1, 2007.

Cabrera, V.E. NM-Manure: a seasonal prediction model of manure excretion for lactating dairy cows in New Mexico. ASABE Annual Meeting, Minneapolis, June 18-20, 2007.

Software

Cabrera, V.E.. 2006. Grazing-N: A Nitrogen Balance Model for Grazing Dairy Heifers and Dry Cows in New Mexico.. Excel spreadsheet. Available through http://dairy.nmsu.edu: Tools.

Cabrera, V.E. 2007. A seasonal prediction model for manure excretion by dairy cattle in New Mexico. Available through http://dairy.nmsu.edu: Tools.

Cabrera, V.E., Marsalis, M., Lauriault, L. 2007. Alfalfa yield predictor. Excel spreadsheet. Available through http://dairy.nmsu.edu: Tools.

5. Leverage associated with NC-1119:

Cabrera, V.E., Angadi, S., Flynn, R, Marsalis, M., Nennich, T., and Hagevoort, R. Improving Nutrient Recycling and Irrigation Efficiency of Southern High Plains Dairy Systems by Developing and Adjusting a New Spatial Decision Support System. US$ 600,000. National Integrated Water Quality Program, CSREES-USDA. Pending.

Cabrera, V.E., Kirksey, R., and Hawkes, J. Development and dissemination of a dairy risk management tool (DairyRisk) for New Mexico dairy farms. US$ 240,000. Risk Management Agency, USDA. Pending.

Cabrera, V.E., Angadi, S., and Hagevoort, R. Development and Adoption of a Dairy Nutrient Decision Support System. US$ 200,000. Western Sustainable Agricultural Research and Education, USDA. Pending.