I. Title: Animal Identification Using Retinal Imaging Technology

II. Principal Investigators: S.B. LeValley; Extension Sheep Specialist
    B.L. Kaysen; Extension Youth Specialist

III. State and Multiple Counties:
    Alamosa, Archuleta, Conejos, Costilla, Delta, Dolores, Eagle, Garfield,
    Jackson, La Plata, Mesa, Moffat, Montezuma, Montrose, Rio Blanco, Rio
    Grande, Routt, Saguache

IV. Nutrition, Health and Food Safety, 4-H and Youth Development, Competitive
    and Sustainable Agricultural Systems

V. Work Teams:
    4H and Youth
    Small Ruminant
    Beef Cattle

VI. Situation Statement:

    Positive identification of exhibition animals has evolved over the years
    using tattoos, brands, ear notches, ear tags, and nose prints. The animal ID
    procedures have all shown limited value for all species of junior market livestock
    except hogs where ear notches still are preferred. Each type of identification has
    species specific issues for permanent tamper proof positive identification. In the
    Colorado 4-H youth program, approximately 8000-9000 beef, sheep, swine and
    goats are identified each year for livestock exhibition. Positive identification
    inconsistencies can and do occur, as all of the aforementioned forms of animal
    identification can be altered or lost. Food safety or disease issues that involve
    animal trace back are only as strong as the individual animal identification protocol
    implemented. Retinal scanning offers one of the most accurate identification
    systems, where source verification and positive identification are needed.

    Retinal imaging technology as a positive animal identification system was
    developed at Colorado State University with Optibrand. In ruminant animals, (beef,
    sheep and goats) the vascular pattern of the retina is unique in each animal. The
    eye is scanned and a retinal image is then recorded with a picture of the ear tag if
    available. Show animals are then rescanned at a subsequent exhibition to verify
    animal identity via computer image matching. Twenty Colorado individuals have
    been trained by Colorado State Extension and Optibrand to use retinal imaging
    technology. Five Optibrand scanning devices have been purchased by Colorado
    counties or area programs at a cost of approximately $2600 per unit, including
    software. Currently all retinal imaging devices are in counties in eastern or
    southeastern Colorado. The importance of this project is to provide equipment and
    training to positively identify all junior livestock exhibits in regions of the state where
    no equipment is available. From a food safety and animal health standpoint, retinal
imaging provides positive, accurate, animal movement documentation via digital storage and GPS, and demonstrates youth project responsibility for food animal production.

VII. Project Description

Purchase of Optibrand retinal imaging devices on a regional basis in the following Western Slope counties and the San Luis Valley: Routt, Moffat, Rio Blanco, Garfield, Jackson, Mesa, Montrose, Delta, San Miguel, LaPlata, Montezuma, Archuleta, Rio Grande, Conejos, Castilla, Alamosa, Saguache.

Train individual extension personnel and volunteer 4-H leaders in the respective regions to operate retinal imaging equipment. Assist in statewide implementation of retinal imaging and integrate with the Colorado State Fair and the National Western Stock Show.

VIII. Anticipated Impacts/Outcomes of this work

Short Term: At least 40 extension personnel, fairboard members, and 4-H leaders will learn to operate accurately retinal imaging equipment from Optibrand.

Mid-Term: Junior livestock market animal projects will have the opportunity for retinal imaging at the time of processing at the county level and at subsequent livestock exhibitions.

Long Term: Retinal imaging is worldwide state-of-the-art technology that has and is currently being implemented internationally. Retinal imaging along with other forms of permanent animal ID will be an important component of international food animal sales. 4-H and FFA project members will be exposed to state-of-the-art animal agriculture technology that provides accurate animal movement and source verification. Retinal imaging will provide positive tamper-proof identification for youth livestock projects in Colorado, and demonstrate to other states the importance of seamless animal ID and traceback.

IX. Partnerships

Animal health and food safety issues are a high priority within USDA and the Colorado Department of Agriculture. Partnerships will be formed with Optibrand, USDA (premises ID), Colorado Department of Agriculture (animal health), the Colorado State Fair and the National Western Stock Show (animal exhibition).

X. Action Plan

Place Optibrand retinal imaging equipment in regional areas of the state to be shared by counties:
1. Routt, Moffat, Rio Blanco, Garfield, Jackson  
2. Tri River Area and Gunnison  
3. Dolores, Montezuma, La Plata, Archuleta  
4. San Luis Valley

Place Optibrand equipment ($2600 each) in four strategic areas of the state where no equipment is present for retinal imaging. Provide support for training of key personnel in these respective areas for operation of retinal imaging equipment. July 2007- January 2008

February 2008 – June 2008 – Implement retinal imaging at county 4-H/FFA processing in the aforementioned counties. Approximately 17 counties are involved.

XI. Evaluation Plan

Evaluate training sessions conducted by Optibrand, current data from past trainings indicates a high degree of satisfaction from trainings. Document the number of retinal images taken per county – time and accuracy as evaluated by Optibrand personnel. Document matched retinal images the second time the animal is scanned (typically county fair). Evaluate retinal images taken at either the Colorado State Fair or National Western Stock Show. Document cost of retinal scan versus RFID tag and labor to maintain written records vs. digital technology. Document premises registered. Document the number of extension personnel and volunteer leaders trained. Document accuracy of retinal scanning vs other methods of animal ID.

XII. Sustainability Statement

*Future financial sustainability*

Initially, retinal imaging will divide out the cost of the equipment ($2600) over the number of animals scanned. This equipment has an indefinite life span so the more scans that are taken, the less cost per scan. User fees per head are currently assessed in most counties now.

Long term, the Optibrand equipment has huge potential for use outside the junior livestock program. Currently Optibrand equipment is being used with digital images and GPS to provide source and geographic verification of livestock, primarily cattle. User fees range from $1-$5 per head and offer huge potential in many counties for significant sources of income, as the Optibrand equipment is unique in its ability for digital imaging, data storage and GPS capabilities. Essentially a service fee could be set up in most counties for retinal scanning of livestock other than junior exhibitors for additional income generation.
Risk/Reward:

Risk: Technology might not be immediately accepted by certain counties. To date in 15 eastern Colorado counties, acceptance of this technology has not been a problem.

Reward: Introduce state-of-the-art animal identification technology to the 4-H and FFA youth of Colorado in every county. Provide accurate animal identification technology. Become one of the first states in the United States to have statewide retinal imaging capabilities. Provide opportunities for significant additional income on a fee-for-service basis. Provide additional income from retinal scanning outside the scope of youth livestock projects.

Anticipated Potential for Revenue:

As previously stated, Optibrand equipment can be utilized extensively outside the junior livestock program. Predominantly, cattle producers are using the Optibrand technology for source verification of their livestock for purposes of added value. In counties or areas with large numbers of cattle, future income from this equipment has significant potential ranging from $1-5 per head for the retinal scan digital source verification and GPS.

How and Where Will Anticipated Revenue be Used:

Currently most counties have a “user fee” for each animal identified in the junior livestock project. Revenue could be used to purchase additional equipment so that ultimately each county has Optibrand equipment. Monies from efforts outside the junior livestock program could be returned to CSU in the form of revenues generated, to propagate future venture capital projects.

Project growth will occur as there are increases in the number of junior livestock projects in the respective counties. As more uses are determined for the Optibrand equipment, such as source verification, animal identification, etc., outside the junior program livestock producers will look to CSU Extension for leadership and training in retinal scanning and digital identification. We anticipate that retinal imaging for junior livestock projects will be vertically integrated from the county to state fair to National livestock shows by 2009. Additionally, integrity will be returned to the junior livestock show.
XIII. Funding Request and Budget Narrative

<table>
<thead>
<tr>
<th>Year</th>
<th>Item Description</th>
<th>Cost</th>
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<tr>
<td>2007</td>
<td>3 Optibrand Retinal Imaging Devices</td>
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<tr>
<td>2008</td>
<td>2 Optibrand Retinal Imaging Devices</td>
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<tr>
<td>2008</td>
<td>Travel and training support to Counties involved</td>
<td>$2500.00</td>
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