V(A). Planned Program (Summary)

1. Name of the Planned Program

Sustainability of NJ Equine Industry and Its Impact on Agriculture and Open Space

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

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<thead>
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<th>%1862 Research</th>
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<td>302</td>
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<td>315</td>
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V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

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2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

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V(D). Planned Program (Activity)

1. Brief description of the Activity
Conduct 2006 Economic Impact Study

- Horse Management seminars and Equine Science Update – county and statewide
- Public relations and promotions
- Actively engaged as outside speakers for the industry State 4-H horse program
- Perform consultations to individuals and agricultural organizations

Maintain Research-based website

Conduct research to impact policy decisions for industry

Conduct Roundtables

Produce research based materials

Hold Annual Stakeholder meeting to Identify issues of importance

RUBEA – advisory committee

Facilitate the opportunity to network within the industry

2. Brief description of the target audience

Equine users – including, students/youth, equestrians, owners

Equine professionals: veterinarians, researchers, industry leaders, farmers, service providers, trainers, breeders, stable managers

Legislators/Government Officials/Industry Officials e.g. Racing Commission, Sport and Competition Officials (FEI, USEF)

Educators

General public

V(E). Planned Program (Outputs)

1. Standard output measures

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Contacts Adults</th>
<th>Indirect Contacts Adults</th>
<th>Direct Contacts Youth</th>
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2. Number of Patent Applications Submitted (Standard Research Output)

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Patents listed
3. Publications (Standard General Output Measure)

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</table>

V(F). State Defined Outputs

Output Target
Output #1

Output Measure
- Economic Impact Study, Educational Seminars at state and county levels. 3 news releases, 63 extension publications, 7 students supervised and field visits.

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<thead>
<tr>
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<th>Target</th>
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</thead>
<tbody>
<tr>
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### V(G). State Defined Outcomes

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<td>1</td>
<td>Short Term New Jersey residents and government officials will be made aware of the importance of the equine industry. Equine enthusiasts take leadership roles to unify the industry and will acquire knowledge to support the industry's sustainability.</td>
</tr>
</tbody>
</table>
1. Outcome Measures

Short Term New Jersey residents and government officials will be made aware of the importance of the equine industry. Equine enthusiasts take leadership roles to unify the industry and will acquire knowledge to support the industry’s sustainability. Equine industry segments will learn the importance and benefits of speaking in one voice.

2. Associated Institution Types

• 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>20000</td>
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</tbody>
</table>

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Antioxidants, Oxidative Stress and Performance in the Horse

The ability to exercise is as important to the horse, as lactation is to the dairy cow. The impact of the research performed will give the trainer, owners, and breeders of performance horses a better idea of the effect of various antioxidants and the levels of supplementation needed to produce the desired effect. Over-supplementation is common in the horse industry and better-determined supplementation levels will make feeding horses more economical to the horse and barn owners. Losses of top equine athletes at the 1992 Olympic Games in Barcelona and the 2002 World Equestrian Games in Jerez, Spain have provoked public interest in the performance and welfare of competitive horses. Oxidative stress has become recognized as one of the possible harms. Oxidative stress occurs when the antioxidant defense system in the body is overwhelmed with reactive oxygen species (ROS). An increase in ROS may occur due to increased exposure to oxidants from the environment, increased production within the body from an increase in oxygen metabolism during exercise, or an imbalance in antioxidants. Useful properties of ROS include targeting of bacteria and viruses during respiratory bursts in phagocytes, and serving as special messengers within neurons. However, if ROS accumulation becomes too great it can be damaging to the DNA, protein, and lipids in cells. Oxidative stress has been implicated in the pathogenesis of certain diseases (e.g. cancer, AIDS, and Alzheimer’s disease) and has been linked with the aging process and exercise. There is evidence showing that oxidative stress does exist in the intensely exercising horse; however, there has never been an attempt to quantify the feeding or management practices that would reduce the levels of oxidative stress. It is also not easily determined how much of a particular supplement would provide the horse the most benefit. In many circumstances horse and barn owners are over-supplementing with compounds that are unnecessary or having a negative impact on metabolism of other nutrients in the diet.

What has been done
Overall objective is to determine the levels of vitamin E and other antioxidants needed in the intensely working horse to maximize performance and minimize the negative effects of oxidative stress, muscle membrane leakage and apoptosis.

We have determined the best level of vitamin E needed to minimize the negative effects of oxidative stress, muscle membrane leakage and apoptosis in the intensely exercising horse. The results of this study have been presented and published at the International Conference of Equine Exercise Physiology in France, August 2006, and select parts have been incorporated into a talk at an invited presentation at the European Association of Animal Producers in Antalya, Turkey in September of 2006.

A division of this project looking at oxidative stress and antioxidant status in older exercising horses compared to younger horses was recently accepted for publication in the Journal of Animal Science and is due to come out in print the middle of next year (2008).

We have also investigated the effect of a natural beta-carotene supplement on exercising horses and how that works in combination with vitamin E, which has lead to a manufactured supplement for horses. Along with these projects leading to student honors thesis publications and scientific abstracts presented at society symposia. We also expanded the scope of this project to include competitive 3-Day Event Horses at the International level event at the Horse Park of New Jersey. This event, the Jersey Fresh event, has top level riders and horses from all over US and Canada. Most of these horses are bound for Olympic Level competition in the near future. At this level these horses are under great stress, but this has never been quantified in terms of nutritional status, and oxidative stress. In June 2006 fifty percent of the 84 horse and rider combinations, and in June of 2007 35 pairs (just under 50%) participated in the 4-day long study. Results were tabulated and a summary was sent to each rider and other personnel involved in the competitive event along with presentations made at scientific society meetings. Meeting proceedings have been written and a manuscript including the results from both years is in the process of being submitted to the Journal of Animal Science.

Results

The vitamin E supplementation portion of this study found that horses supplemented with vitamin E at nearly 10-times the 1989 NRC recommended level did not experience lower oxidative stress compared to control horses. Additionally, there was lower plasma beta-carotene levels observed in the high supplemented group, which may indicate that vitamin E has an inhibitory effect on beta-carotene metabolism. This could save horse owners and trainers a lot of money in the long run if they are able to get away with little to no supplementation of vitamin E as compared to what is commonly supplemented.

The beta-carotene supplementation proved to increase the levels of beta-carotene in the blood of exercising horses over a 4-week period and may prove to be a better, more economical form than the typically supplemented synthetic form. However, more studies will continue to investigate this theory. A follow-up study to this first study looked at a supplement mixture of beta-carotene and other antioxidants in 8 horses pre-and post-exercise. The results here are being written up as an undergraduate honors research project. Funding from the supplement company will allow us to further research this topic.

Results from the Jersey Fresh event have proven the horses of this caliber are undergoing stress during the event; however, many variables go into determining differences between individual horses and each level of competition. Studies from this previous year have also shown that horses are receiving daily amounts of various vitamins and mineral in excess of their daily recommended amounts. These horses are still undergoing inflammation produced during exercise. Theory behind this is that there is a moderate amount of inflammation that is a natural response to the body's exertion during exercise, and completely eliminating this inflammation could be detrimental to the body. Education of horse owners is necessary to help eliminate the over supplementation that we see with so many disciplines, not just exclusively 3-Day Eventers.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
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<tbody>
<tr>
<td>302</td>
<td>Nutrient Utilization in Animals</td>
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<tr>
<td>312</td>
<td>External Parasites and Pests of Animals</td>
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<tr>
<td>303</td>
<td>Genetic Improvement of Animals</td>
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<td>315</td>
<td>Animal Welfare/Well-Being and Protection</td>
</tr>
<tr>
<td>301</td>
<td>Reproductive Performance of Animals</td>
</tr>
</tbody>
</table>

Outcome #2

1. Outcome Measures

Medium Term Diverse equine-related units are organized into one voice Misperceptions by the general public re: the segments of equine industry are corrected All uses of the horse are recognized as agricultural by local and state government officials

2. Associated Institution Types

• 1862 Extension
3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
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<tr>
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<td>Reproductive Performance of Animals</td>
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<tr>
<td>315</td>
<td>Animal Welfare/Well-Being and Protection</td>
</tr>
</tbody>
</table>

Outcome #3

1. Outcome Measures
Long Term Equine industry is unified and is economically sustainable Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space

2. Associated Institution Types
*1862 Extension

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Marketing Hay to the New Jersey Equine Industry

The equine industry in New Jersey is one of the fastest growing agricultural sectors with nearly twenty-percent of the states agricultural lands dedicated to equine operations (2007 Equine Industry Survey). The increased popularity of the equine industry in the state has provided hay producers a new market for their hay. Approximately 46,000 of the states 115,000 hay acres are dedicated to supplying the equine industry. While the steady increase of the equine industry offers a tremendous opportunity for hay producers, the demands of the equine industry are different than traditional animal operations. Furthermore, equine producers traditionally do not produce agricultural crops and have little understanding of the costs associated with producing quality hay. Agricultural production in New Jersey is very expensive with the countries third highest land prices, high production costs and high labor wages. Maintaining a successful agricultural enterprise in New Jersey requires that producers have a strong understanding of the marketing opportunities in the region.
What has been done

In 2006, the Rutgers University Animal Science Team (RUAST) was established to provide the New Jersey animal industry with non-biased, research based information to help improve productivity and to promote sound environmental management of animal operations in the state. In 2006 the RUAST began a series of educational programs dedicated to improving the quantity and quality of New Jersey grown hay specifically for the equine industry. Programs were held at several locations across the state and included programs for hay producers and consumers. Programs were continued in 2007 and focused on developing linkages between hay producers and equine consumers. Programs included, Marketing Hay to the Equine Industry, hay Production and Marketing, Hay Day, a program for youth and adults. Programs featured specialists from out of state specializing in production utilization and marketing. Agents involved established a forage assist team, consisting of specialists in animal production, crop production and marketing. This team conducted several site specific field visits to assist producers with issues affecting hay quality. These site evaluations stimulated the forage team to initiate replicated research trials to address many production issues. Program participants were surveyed to determine the effectiveness of program efforts and research projects included an economic analysis.

This program focused on two separate groups, the equine consumer and the hay producer. Programs consisted of formal classroom instruction, practical hands on training and through take-home evaluations. Evaluations were conducted to determine if programs were meeting the needs of the clientele and to assess future program needs.

Results

Extension programs were well attended with an average of seventy participants per program. Approximately forty-percent of the attendees completed the program survey. Respondents reported gaining a better level of understanding of hay production practices. Thirty-two percent of respondents reported a change in hay feeding practices based on the information presented in programs. This change resulted in an average 11.5 % increase in total hay fed based on survey results. Fifty-six percent of consumers reported a willingness to pay an average 11.5 % premium for locally produced, high quality hay. This translates to a $0.42 to $0.49 premium per bale based on consumers reported hay prices and a potential $ 2 million impact to the New Jersey hay industry. Producers reported gaining a better understanding of consumer needs and in hay production practices including: 33% performing soil tests, 17% reporting a plan to conduct soil tests according to university recommendations. Research conducted determined that an $80 per acre return could be realized by treating for one insect pest common in timothy, a hay heavily demanded by the equine industry. This research program demonstrated a protocol which, if followed in 50% of the state's 45,000 acres, could result in $1.8 million additional gross revenue for hay producers while ensuring an adequate supply of high quality hay for the industry.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
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<tr>
<td>302</td>
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<td>Genetic Improvement of Animals</td>
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</table>

Outcome #4

1. Outcome Measures

Short Term New Jersey residents and government officials will be made aware of the importance of the equine industry Equine enthusiasts take leadership roles to unify the industry and will acquire knowledge to support the industry's sustainability Equine industry segments will learn the importance and benefits of speaking in one voice.

2. Associated Institution Types

• 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

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3c. Qualitative Outcome or Impact Statement
Sustainability of NJ Equine Industry and Its Impact on Agriculture and Open Space

New Jersey 4-H Horse Program

The New Jersey Equine Industry is a huge economic force in the state with over $3.5 billion in property and animals. It generates $1.1 billion in revenue for the state annually. If the industry is to remain viable in the future, there is a need to educate young people about all aspects of the equine industry from leisure riding to horse racing as well as the opportunities in this state for jobs in related industries like pharmaceuticals, feed production, veterinary, etc.

Issue (Who cares and Why)

The New Jersey 4-H Program utilizes adult volunteers, educational workshops, events and curriculum to educate youth about a variety of topics related to the Equine Industry. Youth grades 1- 13 (one year out of high school) in every county in New Jersey have the opportunity to participate in the 4-H Horse project. In the 4-H year 2006-2007, 1,698 youth participated in the New Jersey 4-H Horse Program. Nearly every county in the state has at least one 4-H Club with horse project members and most of the counties participate in county and state workshops and competitive events related to Equine.

What has been done

On the state level the following events were conducted with the help of statewide volunteer committees:
- Model Horse Show - 25 members from 5 counties participated.
- State Horse Bowl - 126 youth from 11 counties participated in this state competition. One four-member team was selected to represent New Jersey at the Eastern National 4-H Horse Round Up in KY, November 2-4, 2007
- New Jersey 4-H Horse Judging and Hippology contests. In Hippology, 76 youth from 11 counties participated in this competition. One four member team competed at the Eastern National Round Up in Kentucky in November. In Horse Judging 73 youth from 11 counties participated in the State contest. Four of these youth were selected to represent New Jersey in the Eastern National 4-H Horse Round Up competition.
- Equine Presentations - 29 youth from 11 counties participated in this State Competition. Two members were selected to represent New Jersey at the Eastern National 4-H Horse Round Up competition in Louisville, KY.

- State 4-H Horse Show - 990 total entries submitted by 300 youth from 12 different counties in New Jersey. By discipline: Dressage - 114; Driving - 33; Games - 140; English - 346; Western - 274; and Challenged - 2.

- State 4-H Trail Ride - 42 riders representing 8 counties.

Results
Prior to competing in any of these events, 4-H youth participate in months of studying, riding and learning about the horse and related industries at club meetings, team practices, county and state workshops and on an individual basis. Youth learn physiology of the horse including the digestive, skeletal, and reproductive systems. They learn how to speak in public, research a topic and present it to others. They learn decision making skills and how to defend their decision to a judge or official. They learn one or more styles of riding and how to compete (win or lose) with grace and composure.

Individual impacts reported by the participants included the following results:

Hippology
-100% agreed that Hippology taught them about the horse.
-94% agreed that Hippology taught them to be team players.
-94% agreed that Hippology taught them how to be better listeners.
-80% agreed that Hippology taught them public speaking skills.
-78% agreed that Hippology taught them about ethics.

Horse Judging
-94% agreed that Horse Judging taught them about public
-92% agreed that Horse Judging taught them about ethics.
-90% agreed that Horse Judging taught them about being a better listener to directions.
-88% agreed that Horse Judging taught them about being a team player.

State 4-H Horse Show
The percent of youth participants which reported learning the following skills from the State 4-H Horse Show was:
Time management 22%
Patience 22%
Sportsmanship 15%
Team Work 13%
Confidence 10%
Responsibility 6%
Cooperation 6%
Other 6%

State 4-H Trail Ride
Participants in the State 4-H Trail Ride reported the following impact as a result of the event:
Helped me gain confidence. 66%
Made me be more responsible and disciplined. 63%
Improved my teamwork skills. 71%
Improved my goal setting skills. 63%
Improved my organization skills. 56%
Helped me gain knowledge of horse care and management practices. 62%
Encouraged me to continue trail riding. 66%

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>303</td>
<td>Genetic Improvement of Animals</td>
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<td>Animal Welfare/Well-Being and Protection</td>
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<tr>
<td>302</td>
<td>Nutrient Utilization in Animals</td>
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Outcome #5

1. Outcome Measures
   Long Term Equine industry is unified and is economically sustainable Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space

2. Associated Institution Types
   • 1862 Extension
3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

<table>
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<tr>
<th>Year</th>
<th>Quantitative Target</th>
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<tbody>
<tr>
<td>2007</td>
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3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

Mid-Atlantic Equine Pasture Initiative

There is an inadequate number of knowledgeable advisors for the large and widespread equine community. The goal of the "Mid-Atlantic Equine Pasture Initiative" (MAEPI) is to train extension agents, governmental agency employees, and other industry professionals to serve as informed field consultants and advisors to horse farm owners and managers in New Jersey and the Mid-Atlantic region. Also, there are both new and established horse farm owners who need updated pasture management information to more successfully begin and sustain their operations.

**What has been done**

The essential elements of this 2007 pasture project included conducting two training meetings in Central NJ, holding Open Houses on campus and the developing of training materials, as well as summarizing a list of resources accessible via web sites and video. Program participants were provided with free soil test kits along with instructions how to conduct a soil sample properly and understand the subsequent analysis.

The objectives over a 3-year period were to increase outreach and assistance to this clientele, improve their knowledge, and adoption of practices that improve pasture quality, reduce environmental impact and sustain equine operations.

Our projects to make this program successful included the two Training Sessions in Monmouth County completed in October 2007. One session was held in our county extension office and the other was held outdoors at Stargate Horse Farms. Attendees at our training sessions were provided with a training module, which included fact sheets from the participating universities on all aspects of pasture management. The module also came with a CD curriculum containing electronic copies of the fact sheets, evaluations for our project individual pasture programs, and nine PowerPoint presentations with detailed notes to serve as a script. The nine presentations included topics on importance of pasture to horses, soil fertility, manure management, forage species ID and selection, forage growth and rotational grazing, plants toxic to horses, weed control, pasture renovation, and environmental concerns with equine operations. The curriculum was also provided for sale in a cost-recovery portion of this program.

The audience consisted of equine field consultants, agronomic advisors, horse farm owners, horse farm managers and horse owners. This cohesive community was very involved in interacting and contributing to these timely sessions in equine pasture management. Complete satisfaction was verbally conveyed by all attendees and our preliminary client surveys have documented this very high level of satisfaction.

**Results**
Our outcomes of the 2006 program were evaluated by each participant at the end of the training and 1 year later (2007). The evaluations asked the participants to rank each category on a scale of 1 to 5 with 5 being the most valuable. After the training the attendees felt the training module with PowerPoints was the most valuable portion (4.7). Attending the training session ranked second (4.6), followed by the availability of fact sheets (4.4) and the opportunity to create a network of pasture professionals (4.3). The individual PowerPoints scored from 4.1 to 4.7. When the attendees were asked to list their plans of developing equine pasture programs, 43% commented that they planned on hosting a workshop, seminar or short course based on the materials within the next year. Fifty percent are going to host more informal twilight meetings or pasture walks and more than half will write fact sheets, popular press articles, or dedicate a section of an existing newsletter, or develop a new newsletter on what they have learned at the training. Almost all of the attendees listed that they planned on taking more calls and answering more questions one on one to equine producers regarding pasture management.

After a year of working with the module the attendees felt the fact sheets were the most valuable portion on the CD (4.4). The evaluation score for attending the actual training session (4.0) their opportunity to create a network of pasture professionals (3.3) decreased due to not all survey participants attending the training session. Participants evaluated each PowerPoint presentation again after the year of being able to use them in their own programs and the scores ranged from 3.8 to 4.3 with 'Horse Health and Pasture Importance' being the highest ranked presentation. Client evaluations from this 2007 program were again conducted at the two October sessions in a similar manner as 2006 and are in the process of being compiled and analyzed.

Over 70 soil tests were conducted by this year’s program participants were analyzed by the Rutgers Soil Lab. Nutrient recommendations by this county agent maintained proper nitrogen, potassium and micronutrient levels and significantly reduced the phosphorus levels that were found to be in excessive amounts in most of the soils tested.

### 4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>312</td>
<td>External Parasites and Pests of Animals</td>
</tr>
<tr>
<td>301</td>
<td>Reproductive Performance of Animals</td>
</tr>
<tr>
<td>302</td>
<td>Nutrient Utilization in Animals</td>
</tr>
<tr>
<td>303</td>
<td>Genetic Improvement of Animals</td>
</tr>
<tr>
<td>315</td>
<td>Animal Welfare/Well-Being and Protection</td>
</tr>
</tbody>
</table>

#### Outcome #6

1. **Outcome Measures**
   
   Long Term - Equine industry is unified and is economically sustainable Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space

2. **Associated Institution Types**
   
   • 1862 Extension

3a. **Outcome Type:**
   
   Change in Condition Outcome Measure

3b. **Quantitative Outcome**

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>(No Data Entered)</td>
<td>0</td>
</tr>
</tbody>
</table>

3c. **Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
In New Jersey, where the horse is the state animal, the equine industry is invaluable as a major factor in retaining agricultural acreage as open space. Although horse owners do not market their product by the bushel, pound, or cubic foot, horses are bred, raised, bought and sold in the Garden State like any other agricultural commodity. The horse industry in New Jersey is represented on the State Board of Agricultural, where policymaking decisions affecting agriculture are made. However, the future of New Jersey's equine industry is in jeopardy as the racing industry faces serious challenges from competition from other gaming options; both in and out of state. The ESC believes that the state of New Jersey, where there are more horses per square mile than in any other state, has minimized the importance of the equine industry and that now is the time to correct the oversight. Economic development processes exist for casinos, tourism, agriculture and food industries, and health care, but not for equine. The reality is that the equine 'industry' is not perceived to be an industry at all. Because of its diversity, the horse industry has many factions which do little to communicate and unify their voices. Hence, key agency leaders and the New Jersey legislature find it hard to respond to an industry which sends so many mixed messages. The biggest challenge faced by the entire horse industry is to support all aspects of this diverse industry in one common, unified voice. There is a dire need for science-based information to document the socio-economic importance of the New Jersey equine industry and to develop the tool-kit needed to educate residents of the state, including policy decision makers about its importance.

What has been done

- In 2006-2007, the Rutgers Equine Science Center conducted economic and land use impact analysis of the horse industry in New Jersey, in partnership with other state agencies and industry breed groups. More than producing just a census, the ESC team conducted analyses which determined the impact of the racing segment on the overall horse industry and collectively the impact of the entire horse industry on traditional agriculture and open space. The purposes of this study were to conduct an economic and land use impact assessment; to begin regular benchmarking of the industry; to profile all components of the state's equine industry, including pleasure & sport/recreation; and to go beyond a simple enumeration.

--- The materials and methods were as follows: In cooperation with NASS, the equine industry was surveyed in 2006. Target population included: operations in NJ with any equine, horse owners in NJ who do not keep animals on-site, major NJ racetracks (supplementary survey by Rutgers team). Survey sample was as follows: 9,949 pieces mailed, 3,400 responded, random geographic contacts, 4 racing venues, 2,050 were summarized. Respondents included: breeding, competition, boarding, and training facilities; facilities offering riding or lessons; horse owners keeping animal(s) at residential property; horse owners boarding animals(s) elsewhere; non-equine farms that have horses.

- Categories of questions asked: Type of operation, acreage devoted to structures, pasture, hay, etc., total asset value of operation and livestock. Equine inventory by major breed categories and by primary use. Equine-related income and expenditures and demographic data

--- Economic impact analysis was conducted using IMPLAN: A quantitative model of the New Jersey economy, used to measure both direct and indirect impact. Land use analysis was determined by operation acres, estimated using survey data and aerial photography cross-check; as well as support acres measured by animal nutritional requirements estimate, other sources of forage acres and a Cooperative Extension hay survey.

-How much hay is imported?

Outreach Efforts:

- Video and presentation materials
- Educational campaign statewide
  - Press Conference and State-wide Presentations
- Educational material mailings to legislators
- Conducted a two-day short course, working with stakeholders and undergraduate and graduate students to discuss the issue and to discuss solutions.

Audience is all residents of New Jersey. Specifically, horse industry leaders and horse breeders and owners, users, facility owners, and owners of traditional agricultural facilities in support of horses, i.e., hay, grain and straw farmers were targeted when developing the educational program tools and methods. A train the trainer approach was used. Also targeted with research information were legislators in need of current, science-based information on the significance of the horse industry in New Jersey. Meetings with funders, other stakeholders, legislators and the media have acknowledged the value of the study and of the outreach materials and educational meetings conducted.

Results
The New Jersey equine industry, valued at $4 billion, produces an annual economic impact of $1.1 billion comprised of the $647 million spent by New Jersey equine owners and operators of equine facilities and $502.3 million from racetracks. The industry employs 13,000 persons and generates $160 million in federal, state, and local taxes. Horses are found on 7,200 facilities in every county statewide. Besides the economic importance of the industry, these 7,200 horse facilities maintain open space of 176,000 acres, and an additional 46,000 acres in non-equine use, to produce hay, grain, and bedding in support of horses. These in turn provide an enhanced quality of life for New Jersey residents. Horse operations tend to be more sustainable than other types of agricultural businesses, making the horse industry critical to the growth and land-use strategy of the state. Meetings with funders, other stakeholders, legislators and the media have acknowledged the value of the study and of the outreach materials and educational meetings conducted.

4. Associated Knowledge Areas

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Outcome #7

1. Outcome Measures

   Long Term: Equine industry is unified and is economically sustainable Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space

2. Associated Institution Types

   • 1862 Extension
   • 1862 Research

3a. Outcome Type: Change in Condition Outcome Measure

3b. Quantitative Outcome

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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Strongyle Parasites Impact on Animal Health

Rainfall and low-lying regions in the field are factors in strongyle infection in horses. Actively managing pastures can reduce these infections and reduce parasite loads.

Out of approximately 100 species of internal parasites that infect horses, half are due to strongyle species. Of those, the small strongyle species are widely prevalent in almost all parasite burdens in U.S. horses. There are only a few types of drugs to combat strongyle infection, and drug resistance in small strongyles is increasing for certain anti-parasitic drug classes. These parasites are a big economic problem on domestic animal farms, since strongyle infection is a factor in colic, which costs $115 million annually in health costs to horse owners. This project investigates environmental and topological features that lead to aggregation of strongyles on pastures.

What has been done

Research at NJAES determined the effects of rainfall and field topography on the distribution of the infective larvae of strongyle parasites on pastures in New Jersey. By using GIS to create elevation maps of horse pastures on Cook College, and hydrological models were applied to identify run-off patterns on those field. This study looked at parasite distribution on fields using GIS to create elevation maps of pastures on Cook College, and hydrological models to identify run-off patterns on those field.

Results

Infector larvae begin to appear in the field after rainfall begins, and that the highest accumulations occur in the low regions of the field. By being aware of the appearance of infective larvae in low areas and in rainfall, horse owners and managers can actively manage pastures to lessen the interaction with infective strongyle larvae, and subsequent incidence, of strongyle worm infections in their horses. These results also provide information for better pasture hygiene for non-drug prevention and management of strongyle infection, lessening the use of small strongyle anti-parasitic drug classes for which drug resistance is increasing.
4. Associated Knowledge Areas

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V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned
   - Before-After (before and after program)
   - During (during program)
   - Time series (multiple points before and after program)
   - Comparisons between program participants (individuals, group, organizations) and non-participants
   - Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
   - Comparison between locales where the program operates and sites without program intervention

Evaluation Results
Evaluation results are unique to each program. See Qualitative Outcome Statements.

Key Items of Evaluation