

SUMMARY REPORT

4-H ANIMAL SCIENCE PROGRAM EVALUATION

SPRING 2004

4-H YOUTH DEVELOPMENT EVALUATION TEAM

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SUMMARY REPORT

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Background. Animal science projects are a foundation of the 4-H Youth Development Program in Wisconsin. Projects have been popular among members since the beginning of the 4-H youth program in the early 1900's. An animal care activity was one of the first expansions from the original young people's corn growing clubs. By 1917, Wisconsin had 15 pig clubs, 29 calf clubs, and 45 poultry clubs (Apps, 2002: 51). In 2004, 13,000 youth in Wisconsin participated in 4-H animal science projects. On average, each youth enrolled in three animal projects.

Animal science projects cover production and companion animals and related topics: beef, dairy, horse, horseless horse, swine, sheep, goats, poultry, llama, dogs, cats, rabbits, emus, birds, tropical fish, and veterinary science. Most include project literature that is divided into 3 skill levels -- beginner, intermediate and advanced -- with the purpose to build knowledge and provide opportunities for life skill development (Danhof, 2003). Curricula are designed to be age appropriate, and to build and enhance skills over multiple years of involvement (Russell, 2001).

2004 Evaluation: It was time to evaluate this significant Wisconsin program. The WI Animal Science program is the largest 4-HYD program, has the most participants and the greatest investment. A team of 4-HYD agents and specialists and an evaluation specialist came together to design the study. They drew upon the relevant research literature and completed studies of 4-H animal science programs, notably two Wisconsin studies (Danhof, 2003; Steele, 1978) and studies from other states that looked at particular aspects of the animal science program experience (Oregon-Sawer, 1987; New Hampshire-Townson, 2001; Texas-Boleman et al, nd; Purdue-Rusk and Machtmes, 2002; 2003; NJ-Ward, 1996; West Virginia - Woloshuk et al, 1999; Wyoming-Weigel et al, 2002; Utah-Kitchen, nd.)

Based on the literature, discussions with program staff and their own experience, the team identified those outcome variables that they thought were the most important and common across all animal science projects. The clustered into four categories that parallel youth development outcomes described in the research literature:

1. life skills development (changes in knowledge, skills and behaviors in leadership, decision making, goal setting, organization, relationships, communications);

2. cognitive development (changes in knowledge in technical subject matter, technology use, understanding of agricultural issues, being an informed consumer);
3. moral development (changes in ethical knowledge and behavior); and
4. career exploration (interest in animal industry).

The central question that this evaluation sought to address was: To what extent does participation in 4-H animal science projects lead to changes in knowledge and behaviors in the above listed youth development outcomes? Achievement in these outcomes is linked in the research to long-term success as adults in terms of economic self-sufficiency, healthy families and social relationships, and civic responsibility (Gambone et al, 2002). See Appendix 1 for a discussion of the theory of action.

Methods and procedures

We contracted with an external evaluator who prepared the design (quasi-experimental design with intervention and comparison group using retrospective pre-post survey and site observations), developed the instrument (self-administered questionnaire), collected the survey data and qualitative data from 11 sites and from a document review. The evaluation was conducted during spring, 2004.

Target: In order to achieve the desired developmental outcomes, it was felt that a youth needs to participate in the animal science program for at least three years. Thus, the target group for this evaluation were current participants in animal science program who had participated for at least three years in order to capture the longer-term impacts of the program.

Sample: The sample size set at 384 of current project membership (39,569 participants statewide in 2002) allows for 95 percent probability with a 5 percent margin of error. The evaluation design called for a stratified sampling plan in order to capture findings from projects with fewer numbers of participants (such as llama/alpaca projects) as well as those projects with greater participation (such as beef and horse). Program staff provided a list of scheduled project activities across Wisconsin for spring 2004 where 4-H club members could be surveyed and activities observed. Ultimately, 11 sites were selected for the survey to reflect a balance among rural and urban areas. The 384 4-Hers who completed the survey at these sites represented all 24 of the 4-H animal science projects.

Comparison group: In order to answer: Did change occur and is the change attributable to the program?, the evaluation used a quasi-experimental design with comparison group. Youth of same age range as the 4-H members, match overall demographics of the 4-H members, have an animal(s) under their care for a minimum of three years, not *currently* participating in a 4-H program or similar effort such as FFA (past participation was allowed). Comparison participants each were provided a \$5.00 incentive for completing the survey. One hundred comparison group participants were included.

The study was approved by the UW-Extension Human Subjects review board.

The survey questionnaire (see Appendix 2) included 46 items organized into three sections with questions covering the following topics:

1. Knowledge of animals, animal care and the place of animals in the food chain (cognitive development);
2. Daily living skills and responsibilities: decision making, communications, responsibility, leadership, (life skill development);
3. Ethical and moral issues related to animals (moral development); and
4. Career exploration in the animal industry (career exploration).

The research team used factor analysis to check the reliability of the survey questionnaire and as a way to determine which variables were related to each other.

The research team's observations at the eleven sites added qualitative information to describe project activities. These descriptions help the reader understand what goes on during a 4-H animal science project meeting and how the activities may produce the desired effect.

FINDINGS¹

To what extent does participation in animal science projects lead to improvements in the developmental outcomes? i.e, does participation in animal science projects make a difference?

On all items, 4-H members self-reported much greater improvements over the 3 year time frame with improved knowledge and behaviors. In every measurement of behavior, the differences between the 4-H members and the comparison group at the posttest period were statistically significant with the 4-H members reporting significantly higher levels of positive behavior.

CHARACTER DEVELOPMENT

The factor analysis identified 18 items on the questionnaire that clustered together at 95% reliability and was labeled "character development". Within the factor of 18 items, 6 items dealing with animal care were found to correlate very strongly with 12 items specifically dealing with decisions and responsibilities in everyday life.

The findings show a strong positive relationship between involvement in animal care as practiced by 4-H members in animal science projects and their character development (high correlation and highly significant pre-post change)

- Animal care items included: make decisions about my animal based on what is best for the animal, take daily care of animals, train animals regularly, do what is needed to control diseases/pests and; keep records on animal.

¹ Summarized from the full report prepared by Jill Florence Lackey and Associates, July 2004.

- Character items included questions about decision making, ethics and goal setting and daily responsibilities.

Animal care (6 items). This category included topics such as consideration of animals' needs, daily care of animals, animal training, animal disease control, adults trusting youth's decisions and keeping records on animals such as health records.

TABLE 1. Responsibility for animals under youths' care		
Questions	Mean/SD	
	3years ago	Now
I make decisions about my animal(s)		
Intervention Group (n=358)	3.8 (1.4)	4.6 (0.8)***
Comparison Group (n=98)	3.4 (1.2)	3.6 (1.3)*
I take daily care of my animal(s) (provide needed food, water supplies, clean animal areas, groom)		
Intervention Group (n=362)	3.3 (1.5)	4.0 (1.2)***
Comparison Group (n=95)	2.4 (1.3)	2.5 (1.2)
I train my animal(s) on a regular schedule		
Intervention Group (n=347)	3.3 (1.5)	4.0 (1.2)***
Comparison Group (n=93)	2.4 (1.3)	2.5 (1.2)
I do what is needed to control disease and pests in my animal(s)		
Intervention Group (n=358)	3.8 (1.4)	4.5 (1.0)***
Comparison Group (n=98)	3.0 (1.4)	3.1 (1.4)
Adults trust me with making decisions about my animal(s)		
Intervention Group (n=361)	3.4 (1.5)	4.4 (1.0)***
Comparison Group (n=99)	3.5 (1.3)	3.7 (1.3)
I keep my records on my animal(s) (such as health records)		
Intervention Group (n=358)	3.8 (1.4)	4.6 (0.8)
Comparison Group (n=98)	3.4 (1.2)	3.6 (1.3)
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

As seen in Table 1, 4-Hers reported significant improvements on every item over the 3 year period; all results were highly statistically significant. The greatest change was reported for the item, "Adults trust me with making decisions about my animals".

Comparison youth indicated improvements as well but much slighter. The most positive change was reported for 'making decisions about my animal based on what is best for the animal'.

Decision making in daily life : Seven items clustered to create this category including items related to decision making (4 items) and questions related to responsibility (3 items).

TABLE 2. Decision making in daily life		
Questions	Mean/SD	
	3 years ago	Now
When I make decisions, I think about the advantages and disadvantages of each choice		
Intervention Group (n=348)	3.2 (1.4)	4.1 (1.1)***
Comparison Group (n=99)	3.3 (1.3)	3.5 (1.3)
When I make a decision I discuss it with others		
Intervention Group (n=346)	3.1 (1.4)	3.5 (1.3)***
Comparison Group (n=99)	2.8 (1.2)	2.8 (1.1)
When I have to make a decision I get as much information as I can before I make the decision		
Intervention Group (n=348)	3.0 (1.4)	3.7 (1.3)***
Comparison Group (n=100)	2.9 (1.2)	3.1 (1.3)
When I am faced with a decision, I take responsibility for it		
Intervention Group (n=347)	3.3 (1.4)	4.2 (1.1)***
Comparison Group (n=100)	3.2 (1.2)	3.4 (1.3)
I help my family around the house on a daily basis		
Intervention Group (n=367)	3.7 (1.4)	4.2 (1.2)***
Comparison Group (n=97)	3.3 (1.3)	3.3 (1.3)
I get some work accomplished every day		
Intervention Group (n=362)	4.0 (1.4)	4.5 (0.9)***
Comparison Group (n=97)	3.5 (1.2)	3.6 (1.4)
I complete my schoolwork on time (when I have it)		
Intervention Group (n=366)	4.0 (1.4)	4.4 (1.0)***
Comparison Group (n=99)	3.8 (1.3)	3.7 (1.3)
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p<0.05; **=0.01<p<0.01; ***=p<0.001		

4-H members self-reported improvements on every item with high statistical significance over the 3-year period. Participants reported the greatest degree of change for two of the decision-making items: taking responsibility for a decision and getting as much information as possible before making a decision.

The comparison group did not report the same levels of improvement: one item showed a slight decline – completing school work on time. Two items showed no change and 3 items showed slight improvement.

The final three items in Table 2 speak to *work ethic*.

Ethical decision-making

Another category of variables that correlated to animal care is “ethical decision making.” Two questions on the survey instrument asked about ethical behavior and decision making.

As seen in Table 3, for the item, “I know the difference between ethical and unethical behavior”, 93 % of 4-Hers reported yes while 77% of comparison group did. Both groups reported positive improvement on “I make ethical decisions just because they are the right thing to do”. 4-Hers level of improvement was greater (from 3.5 to 4.2 on 5-point scale; compared to 3.3 to 3.5 for comparison).

TABLE 3 Ethical decision making		
Questions	Percent “yes”	
	3 years ago	Now
I know the difference between ethical and non-ethical behavior		
Intervention Group (n=331)	65%	93%***
Comparison Group (n=90)	69%	77%
I make ethical decisions just because they are the right thing to do	Mean /SD	
Intervention Group (n=331)	3.5 (1.5)	4.2 (1.1)***
Comparison Group (n=90)	3.3 (1.2)	3.5 (1.3)*
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

Achieving goals

We also asked two questions about goal setting since it is expected that participation in animal projects leads to improved ability in goal setting and achievement. Table 4 shows these results.

TABLE 4. Goals		
Questions	Percent “yes”	
	3 years ago	Now
I set goals for myself on a regular basis		
Intervention Group (n=316)	65%	88%***
Comparison Group (n=89)	69%	70%
I achieve the goals I set	Mean /SD	
Intervention Group (n=349)	3.1 (1.4)	3.8 (1.2)***
Comparison Group (n=97)	3.0 (1.3)	3.1 (1.3)*
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

Eighty-eight percent of the 4-Hers reported that they set goals for themselves on a regular basis compared to 70% of the comparison group.

Over the 3 year period, 4-Hers reported significant improvement in achieving goals that they set (from 3.1 to 3.8 on a 5 point scale) compared to the comparison group (from 3.0 to 3.1 on the 5 point scale).

Developing relationships

Improved ability in relationships is another life skill expected from participation in animal science projects. Again, the correlation between caring for animals and abilities in human relationships was found to be strong, based on these self-reports. Three items formed a factor that is labeled “developing relationships”.

Questions	Mean/SD	
	3 years ago	Now
I feel comfortable interacting with people of different ages		
Intervention Group (n=365)	3.6 (1.5)	4.3 (1.1)***
Comparison Group (n=96)	3.7 (1.2)	3.8 (1.3)
I am able to connect and work with adults		
Intervention Group (n=357)	3.7 (1.4)	4.4 (1.0)***
Comparison Group (n=96)	3.5 (1.2)	3.6 (1.3)
I get along with people who have different interests and opinions		
Intervention Group (n=357)	3.5 (1.4)	4.1 (1.1)***
Comparison Group (n=94)	3.5 (1.0)	3.7 (1.1)
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

As seen in Table 5, the 4-Hers reported significant improvements for the 3 year period; with average percent changes of .6 and .7. The comparison group also reported positive changes but the reported change was more modest (.1 to .2 average percentage point change).

The three items in the *developing relationships* cluster showed the least amount of difference between the two groups.

COMMUNICATION SKILLS

The factor analysis identified a second major factor that is labeled “communicating with others.”

Questions	Mean/SD	
	3 years ago	Now
I feel confident answering questions about my animal(s)		
Intervention Group (n=361)	3.3 (1.5)	4.2 (1.1)***
Comparison Group (n=96)	3.3 (1.3)	3.3 (1.3)
I feel confident in helping younger or less experienced people with their animals		
Intervention Group (n=355)	2.9 (1.5)	4.1 (1.2)***
Comparison Group (n=96)	3.0 (1.4)	3.3 (1.3)*
When I have time to make a decision I get as much information as I can before I make the decision		
Intervention Group (n=348)	3.0 (1.4)	3.7 (1.3)***
Comparison Group (n=100)	2.9 (1.2)	3.1 (1.3)
I get along with people who have different interests and opinions		
Intervention Group (n=357)	3.5 (1.4)	4.1 (1.1)***
Comparison Group (n=94)	3.1 (0.9)	3.3 (1.0)
Scale: 1=almost never, 2=sometimes, 3=half the time, 4=usually, 5=almost always		
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

The first two items (dealing with communicating about the animal) were found to correlate moderately strongly ($r=0.50$ at pretest and $r=0.51$ at posttest) with the other two items (dealing with communications in daily life). Thus, these findings suggest a moderately strong relationship between communicating about animals, a skill developed and practiced in the animal science program, and other communications youth employ in their everyday lives.

On each of these 4 items, the 4-H participants self-reported statistically significant improvements over the 3 year period. The comparison group reported no change or modest improvements. Of the 4 items, 4-Hers reported, on average, the most change about feeling confidence in helping younger or less experienced people with their animals.

LEADERSHIP

The factor analysis identified a third major factor that was labeled “leadership”. The three items on the questionnaire that clustered together with relative strength at both the pre and post times (alpha values of .59 and .65 respectively) include:

1. I give talks and demonstrations on animals;
2. I participate in judging contests where I have to give oral reasons for my decisions; and
3. I serve in a leadership position on a club, group or program.

Questions	Percentage “yes”	
	3 years ago	Now
I give talks or demonstrations on animal(s)		
Intervention Group (n=356)	39%	64%***
Comparison Group (n=96)	18%	9%
I participate in animal judging contests where I have to give oral reasons for my decisions		
Intervention Group (n=349)	33%	60%***
Comparison Group (n=91)	21%	11%
I serve in a leadership position on a club, group, or program		
Intervention Group (n=346)	55%	79%***
Comparison Group (n=93)	55%	41%

Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001

The first two items (dealing with animal-specific aspects) were found to correlate ($r=0.38$ at pretest and $r=0.41$ at posttest) with the third item (dealing with the practice of leadership). These findings suggest a moderate relationship between specific skills developed and practiced in the animal science program, and the practice of leadership in everyday life.

On each of the 3 items, the 4-H participants self-reported statistically significant improvements over the 3 year period. The comparison group self-reported a *decline*. This decline might be explained by the possibility that some of the comparison youth were involved in 4-H or a similar program in the past but had not been participating during the past three years (comparison youth were not prescreened for past participation). It also may relate to the fact that participation in 4-H declines as youth age which raises the question as to whether the intervention group and the comparison group are different in important ways (not a good comparison).

For the 3 items, 64% of the 4-Hers reported that they give talks or demonstrations on animals compared to 9% of the comparison group. Sixty percent of 4-Hers reported that they participate in animal judging contests where they have to give oral reasons for decisions, compared to 11% of the comparison group. Seventy-nine percent of the 4-Hers indicated that they serve in a leadership position compared to 41% of the comparison group.

If the suggested correlation between specific skills developed in the animal science program and the practice of leadership in everyday life is sound, it is clear that participating in the 4-H animal science program results in valuable leadership skills.

ANIMAL SCIENCE TECHNICAL OUTCOMES

The questionnaire included a number of items that were animal science content specific. These items did not cluster with the aforementioned life skills. Nine items did cluster

together as a factor that was labeled “animal technical knowledge.” The nine items plus others that did not cluster into any factor were divided into three broad categories: animal know-how (general), animal know-how (specific to animal industry) and consideration of careers in animal industry.

TABLE 8. General animal husbandry		
Questions	Percentage “yes”	
	3 years ago	Now
I have enough information to be an informed purchaser of animals and animal products		
Intervention Group (n=322)	51%	87%***
Comparison Group (n=85)	42%	55%
I have enough information that I can evaluate my animal(s) (compared to the ideal animal)		
Intervention Group (n=321)	59%	93%***
Comparison Group (n=83)	49%	61%
I can identify body parts of my animal(s) and their purpose		
Intervention Group (n=317)	59%	94%***
Comparison Group (n=88)	60%	67%
I know about the breeds of my animal(s)		
Intervention Group (n=349)	74%	98%***
Comparison Group (n=90)	64%	71%
I know how to recognize symptoms of illness in my animal(s)		
Intervention Group (n=291)	62%	98%***
Comparison Group (n=74)	62%	70%
I know how to act safely around animals		
Intervention Group (n=354)	87%	99%***
Comparison Group (n=89)	83%	88%
I know the dollar/market value of my animal(s)		
Intervention Group (n=310)	47%	79%***
Comparison Group (n=84)	37%	40%
I have enough information to purchase the appropriate products for my animal (feed, supplies, equipment)		
Intervention Group (n=320)	64%	95%***
Comparison Group (n=88)	53%	64%
I know the actual costs and work involved in keeping an animal(s)		
Intervention Group (n=321)	64%	92%***
Comparison Group (n=88)	40%	55%
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

Industry Awareness

This category includes outcomes related to knowledge of animal illness, animal safety, animal value, animal products, animal costs and purchasing, animal evaluation, animal physiology and animal breeds. These are considered essential technical content items for

quality animal care that are covered in the 4-H animal science project materials. On all items, the 4-H participants self-reported significant improvements in their perceived levels of knowledge over the 3 year period. The comparison group self-reported improvements on all items but at much lower levels of change.

Questions	Percentage “yes”	
	3 years ago	Now
I have a good understanding of the place of meat animals in the food production cycle		
Intervention Group (n=312)	56%	87%***
Comparison Group (n=82)	18%	10%
I have a good understanding of new technology to use with animals (such as ultrasound, computerized record-keeping)		
Intervention Group (n=305)	44%	79%***
Comparison Group (n=85)	24%	32%
I give talks or demonstrations on animal(s)		
Intervention Group (n=356)	39%	64%***
Comparison Group (n=96)	18%	9%
I participate in animal judging contests where I have to give oral reasons for my decisions		
Intervention Group (n=349)	33%	60%***
Comparison Group (n=91)	21%	11%
I know how to fit/groom and animal for a show or exhibition		
Intervention Group (n=355)	65%	95%***
Comparison Group (n=93)	27%	18%
Significance: *=0.01<p≤0.05; **=0.01<p≤0.01; ***=p≤0.001		

On 7 of the 9 items, 92% or more of the 4-H participants self-reported that they *now* have technical knowledge in the questioned areas. The two areas where fewer 4-Hers reported “having knowledge” dealt with financial aspects of animal care: “I know the dollar/market value of my animal” (79% reported they had this knowledge now) and “I have enough information to be an informed purchaser of animals and animal products” (87% reported having this knowledge). Again, the level of self-reported improvement over the 3 year reporting period was statistically significant for both; the relatively lower numbers for these particular financial aspects might be related to the type of pet/animal kept (e.g., market value was less an issue for pets and companion animals).

The data for the 4-H group compares to the comparison group where 70% or less of the youth reported having the technical knowledge, except for two items (88% reported knowing how to act safely around animals and 71% reported knowing about the breeds of his/her animal).

These data indicate that 4-Hers perceive their level of knowledge related to “animal know-how” as much greater than the comparison youth.

Consideration of careers in animal industry

Two questions were included since an expected outcome of the 4-H animal science program was that youth become prepared for and consider careers in the animal industry.

As seen in Table 10, of the 4-Hers who answered the question, 66% responded that they are thinking about a future career with companion animals; an increase from their previous thinking. Forty-seven percent are considering a future career in the livestock industry, up from 39% who thought that three years ago.

Questions	Percent “yes”	
	3 years ago	Now
I am thinking about a future career with companion animals or pets		
Intervention Group (n=308)	54%	66%***
Comparison Group (n=90)	38%	26%
I am thinking about a future career in the livestock industry		
Intervention Group (n=306)	39%	47%***
Comparison Group (n=90)	22%	9%

Significance: * $0.01 < p < 0.05$; ** $0.01 < p < 0.01$; *** $p < 0.001$

For the comparison group, the percent of those considering these career choices declined in both instances: from 38% thinking about a career with companion animals three years ago to 26% thinking that now; and from 22% considering a career in the livestock industry to 9% considering such a career now.

The decline in numbers for the comparison group and the significant difference between the numbers of 4-H respondents and comparison group respondents considering these careers in the livestock raise concern, again, about the comparability of the two groups. It is possible that the comparison group is not interested in livestock – a predisposition – so while they keep animals (prerequisite for participation) they are not similar to the 4-H group.

MEASURES – Factor analysis

One of the values of this evaluation is its use of factor analysis and coming closer to a reliable way to measure youth outcomes from animal science projects. The evaluation team selected items based on literature and experience to best measure the outcome variables of interest: cognitive development, life skill development, moral development and career exploration. These items then were subjected to factor analysis to determine their validity as useful measures of the variables. Factor analysis identified four major factors: (1) character development, (2) communication skills, (3) leadership (lower alpha .59 and .65), and animal husbandry knowledge. The factors and their strength are exciting

developments as we seek to create reliable measures of youth development. However, further research is warranted to ensure the reliability of these measures. Two of the factors were overlapping. Communication skills and Leadership only had four and three items respectively. Some of the individual subscales only had two items.

Further research is also warranted on the effect of participation in 4-H animal science project by demographic characteristic (notably age, gender and ethnicity) as well as by locale and type of project.

LIMITATIONS

No evaluation is perfect. Several possible limitations affecting interpretation of the findings from this evaluation need consideration:

- 1) Retrospective pre-post design: The retrospective pre-post design relies on self-reported perceptions. The observations at the eleven program sites provide additional information to help substantiate the quantitative data.
- 2) Three years retrospection: It was important to include three years in order to capture the development that was expected to occur as a result of participating in 4-H animal science projects. Is this too long for youth to adequately remember past knowledge and behaviors? How accurate are these reflections? This age group experiences major developmental changes over three years. It is unknown how reliable these retrospections are. However, we might expect the same pattern across all respondents, including the comparison group, that would reduce the bias in any one way.
- 3) Comparison group: Are 4-H participants different than the comparison group in some way that would affect the outcomes measured? This is not resolved. The comparison group was found to be, on average, one grade older than the 4-H participants and included more males. The age difference might account for the differences in outcomes. Older youth may have self-selected out of 4-H and/or not have an interest in the variables being considered. Also, the 4-Hers self-reported higher on some of the variables at the pre period than the control group. Are the youth who participate in the 4-H animal science program different in some ways and would those differences affect the outcomes? The question lingers in this evaluation.
- 4) Sample size: The comparison group numbered 100 whereas the intervention group (4-H members) numbered 384. In an ideal world, these numbers would be approximately the same.
- 5) Normal development: Moral reasoning changes with age. It is possible that changes in “I make ethical decisions because it is the right thing to do” are a result of normal development. It is unclear how much of the effect may be a result of 4-H participation. However, the 4-H animal science curricula place a major emphasis on ethical decision making so a logical connection exists between project activity/learning and this development outcome. The qualitative data that describe project activities help substantiate this finding.

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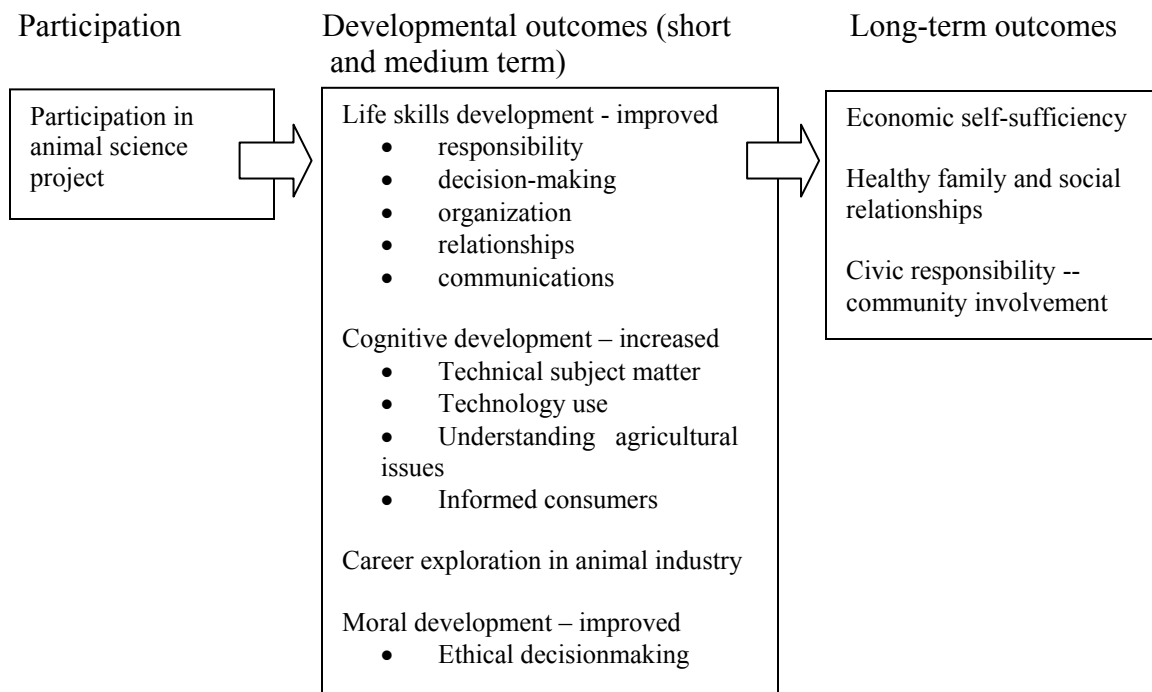
Appendix 1. Research and theory of action (from evaluation proposal)

There is an evolution in youth development thinking, policy and funding: from focus on “at-risk” youth and interventions to change negative behaviors in the late teen years to **prevention** programs for younger “at risk” youth focused on negative behaviors to today’s emphasis on promoting healthy developmental outcomes for all youth (Gambone et al, 2002). Current policy and communities approaches emphasize strategies that provide all young people access to experiences that promote healthy developmental outcomes. Myriad of studies - resulting in over 70 different developmental outcomes as being important and all have at least some correlation to important long term outcomes (Gambone et al, 2002)

Strong evidence is growing that youth development experiences and outcomes link to important long-term outcomes in late adolescence and early adulthood in terms of economic self-sufficiency, healthy family and social relationships and civic and community involvement (Gambone et al, 2002). One of the nation’s most prestigious scientific institutions, the National Academies of Sciences, has found substantial proof that youth development programs work (Eccles and Gootman, 2003; Boyle, 2002). There is growing evidence that out-of-school time (OST) leads to important social, moral and physical development of youth (Simpkins, 2003).

We want to describe and validate the connections between youth’s experience in animal science projects and important developmental outcomes. These developmental outcomes are linked in the research to long-term success as adults (see Fig.1) that draws upon the current research-driven “Community Action Framework for Youth Development” (Connell, Gambone, and Smith, 2000). We will focus on selected key developmental outcomes: those that are most important and common across all animal science projects. The critical linkage is between participation and developmental outcomes: to what extent and how does participation in animal science projects achieve these desired developmental outcomes?

Fig. 1 Theory of action



Appendix 2. Survey instrument **4-H ANIMAL SCIENCE EVALUATION SURVEY**

Please fill out the questions below. For more information, please read the sheet entitled “survey information.”

I. ABOUT YOU	
<p>A. How many years have you been in the 4-H Animal Science program?</p> <p style="text-align: center;">_____</p>	<p>B. How many years have you owned (or been able to care for) an animal?</p> <p style="text-align: center;">_____</p>
<p>C. In what Wisconsin county do you live?</p> <p style="text-align: center;">_____</p>	<p>D. What is your sex? [CIRCLE ONLY ONE]</p> <p style="text-align: center;">1. Female 2. Male</p>
<p>E. What is your grade in school? [CIRCLE ONLY ONE]</p> <p style="text-align: center;"> 6th grade 7th grade 8th grade 9th grade 10th grade 11th grade 12th grade Out of high school </p>	<p>E. What is your ethnic background? [CIRCLE ONLY ONE]</p> <p style="text-align: center;"> 1. White (European American) 2. African American 3. Hispanic/Latino 4. Asian American 5. North American Indian 6. Other/mixed </p>
<p>G. How would you describe the area where you live? [CIRCLE ONLY ONE]</p> <p style="text-align: center;"> 1. Country 2. Small town 3. Suburb 4. City </p>	
<p>H. What 4-H animal project are you in now? [CIRCLE ALL THAT APPLY]</p> <p style="text-align: center;"> 1. Beef 2. Dairy goats 3. Goats 4. Horses 5. Horseless horses 6. Model horses 7. Clothes horses 8. Swine 9. Poultry 10. Turkeys 11. Bantams 12. Sheep 13. Cats 14. Dogs 15. Pigeons 16. Rabbits 17. Pets 18. Cavies 19. Veterinary science 20. Exotic animals 21. Tropical fish 22. Cage birds 23. Llamas 24. Other </p>	

We are now going to ask you a series of questions about you, your animal[s], and your everyday life. We will ask you about the way things are now and the way things were three years ago. Try your best to remember three years ago (in 2001), but if you **absolutely** cannot remember, circle “don’t know.”

II. ABOUT YOU AND YOUR ANIMAL[S]	
Now [CIRCLE ONLY ONE ANSWER]	Then [CIRCLE ONLY ONE ANSWER]
<p>A. I make decisions about my animal[s] based on what is best for the animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>	<p>AA. <i>Three years ago</i> I made decisions about my animal[s] based on what was best for the animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>
<p>B. I take daily care of my animal[s] (I provide needed food, shelter, water, supplies, clean animal areas, groom)</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>	<p>BB. <i>Three years ago</i> I took daily care of my animal[s] (I provided needed food, shelter, water, supplies, clean animal areas, groom).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>
<p>C. I train my animal[s] on a regular schedule.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>	<p>CC. <i>Three years ago</i> I trained my animal on a regular schedule.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>
<p>D. I know how to recognize symptoms of illness in my animal[s].</p> <p>1. No 2. Yes 3. Don’t know</p>	<p>DD. <i>Three years ago</i> I knew how to recognize symptoms of illness in my animal[s].</p> <p>1. No 2. Yes 3. Don’t know</p>
<p>E. I do what is needed to control diseases and pests in my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>	<p>EE. <i>Three years ago</i> I did what was needed to control diseases and pests in my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don’t know</p>

<p>F. I know how to act safely around animals.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>FF. <i>Three years ago</i> I knew how to act safely around animals.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>G. Adults trust me with making decisions about my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>GG. <i>Three years ago</i> adults trusted me with making decisions about my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>H. I know the dollar/market value of my animal[s].</p> <p>1. No 2. Yes 3. Don't know</p>	<p>HH. <i>Three years ago</i> I knew the dollar/market value of my animal[s].</p> <p>1. No 2. Yes 3. Don't know</p>
<p>I. I have enough information to purchase the appropriate products for my animal[s] (such as feed, supplies, and equipment).</p> <p>1. No 2. Yes 3. Don't know</p>	<p>II. <i>Three years ago</i> I had enough information to purchase the appropriate products for my animal[s] (such as feed, supplies, and equipment).</p> <p>1. No 2. Yes 3. Don't know</p>
<p>J. I keep records on my animal[s] (such as health records).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>JJ. <i>Three years ago</i> I kept records on my animal[s] (such as health records).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>K. I know the actual costs and work involved in keeping an animal.</p> <p>L. No 2. Yes 3. Don't know</p>	<p>KK. <i>Three years ago</i> I knew the actual costs and work involved in keeping an animal.</p> <p>1. No 2. Yes 3. Don't know</p>

<p>L. I have enough information to be an informed purchaser of animals and animal products.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>LL. <i>Three years ago</i> I had enough information to be an informed purchaser of animals and animal products.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>M. I have enough information that I can evaluate my animal[s] (compared to an ideal animal).</p> <p>1. No 2. Yes 3. Don't know</p>	<p>MM. <i>Three years ago</i> I had enough information that I could evaluate my animal[s] (compared to an ideal animal).</p> <p>1. No 2. Yes 3. Don't know</p>
<p>N. I can identify the body parts of my animal[s] and their purposes.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>NN. <i>Three years ago</i> I could identify the body parts of my animal[s] and their purposes.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>O. I know about the breeds of my animal[s].</p> <p>1. No 2. Yes 3. Don't know</p>	<p>OO. <i>Three years ago</i> I knew about the breeds of my animal[s].</p> <p>1. No 2. Yes 3. Don't know</p>
<p>P. I have a good understanding of the place of meat animals in the food production cycle.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>PP. <i>Three years ago</i> I had a good understanding of the place of meat animals in the food production cycle.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>Q. I have a good understanding of new technology to use with animals (such as ultrasound, computerized record keeping).</p> <p>1. No 2. Yes 3. Don't know</p>	<p>QQ. <i>Three years ago</i> I had a good understanding of new technology to use with animals (such as ultrasound, computerized record keeping).</p> <p>1. No 2. Yes 3. Don't know</p>

<p>R. I give talks or demonstrations on animals.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>RR. <i>Three years ago</i> I gave talks or demonstrations on animals.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>S. I know how to fit/groom an animal for a show or exhibition.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>SS. <i>Three years ago</i> I knew how to fit/groom an animal for a show or exhibition.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>T. I participate in animal judging contests where I have to give oral reasons for my decisions.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>TT. <i>Three years ago</i> I was participating in animal judging contests where I had to give oral reasons for my decisions.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>U. I feel confident in answering questions about my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>UU. <i>Three years ago</i> I felt confident in answering questions about my animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>V. I feel confident in helping younger or less experienced people with their animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>VV. <i>Three years ago</i> I felt confident in helping younger or less experienced people with their animal[s].</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>W. I am thinking about a future career with companion animals or pets.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>WW. <i>Three years ago</i> I was thinking about a future career with companion animals or pets.</p> <p>1. No 2. Yes 3. Don't know</p>

<p>X. I am thinking about a future career in the livestock industry.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>XX. <i>Three years ago</i> I was thinking about a future career in the livestock industry.</p> <p>1. No 2. Yes 3. Don't know</p>
III. ABOUT YOU AND YOUR EVERYDAY LIFE	
Now [CIRCLE ONLY ONE ANSWER]	Then [CIRCLE ONLY ONE ANSWER]
<p>A. I know the difference between ethical and non-ethical behavior.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>AA. <i>Three years ago</i> I knew the difference between ethical and non-ethical behavior.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>B. I make ethical decisions just because they are the “right thing to do.”</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>BB. <i>Three years ago</i> I made ethical decisions just because they were the “right thing to do.”</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>C. When I have to make a decision, I think about the advantages and disadvantages of each possible choice.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>CC. <i>Three years ago</i> when I had to make a decision, I thought about the advantages and disadvantages of each possible choice.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>D. When I make a decision, I first discuss it with others.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>DD. <i>Three years ago</i> when I made a decision, I first discussed it with others.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>E. When I have to make a decision I get as much information as I can before I make the decision.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>EE. <i>Three years ago</i> when I had to make a decision I got as much information as I could before I made the decision.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>

<p>F. When I am faced with a decision I take responsibility for it (instead of ignoring it or letting someone else make the decision).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>FF. <i>Three years ago</i> when I was faced with a decision I took responsibility for it (instead of ignoring it or letting someone else make the decision).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>G. I set goals for myself on a regular basis.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>GG. <i>Three years ago</i> I set goals for myself on a regular basis.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>H. I achieve the goals I set.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>HH. <i>Three years ago</i> I achieved the goals I set.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>I I serve in a leadership position in a club, group, or program.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>II. <i>Three years ago</i> I served in a leadership position in a club, group, or program.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>J. I help my family around the house on a daily basis.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>JJ. <i>Three years ago</i> I helped my family around the house on a daily basis.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>K. I get some work accomplished every day.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>KK. <i>Three years ago</i> I got some work accomplished every day.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>

<p>L. I complete my schoolwork on time (when I have it).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>LL. <i>Three years ago</i> I completed my schoolwork on time (when I had it).</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>M. I feel comfortable interacting with people of different ages.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>MM. <i>Three years ago</i> I felt comfortable interacting with people of different ages.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>N. I am able to connect and work with adults.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>NN. <i>Three years ago</i> I was able to connect and work with adults.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>O. I get along with people who have different interests and opinions.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>	<p>OO. <i>Three years ago</i> I got along with people who had different interests and opinions.</p> <p>1. Almost never 2. Sometimes 3. Half the time 4. Usually 5. Almost always 6. Don't know</p>
<p>P. I know what I need to do to prepare for a public presentation.</p> <p>1. No 2. Yes 3. Don't know</p>	<p>PP. <i>Three years ago</i> I knew what I needed to do to prepare for a public presentation.</p> <p>1. No 2. Yes 3. Don't know</p>
<p>Q. I have a good understanding of life and death cycles (that there is a time to live and a time to die).</p> <p>1. No 2. Yes 3. Don't know</p>	<p>QQ. <i>Three years ago</i>, I had a good understanding of life and death cycles (that there is a time to live and a time to die).</p> <p>1. No 2. Yes 3. Don't know</p>

We wish to thank you for your participation.