# Animal Science Student Perceived Benefits of Participation in an Undergraduate Research Club

***E.L. Karcher[1] and N.L. Trottier[2]***
***Michigan State University***
***East Lansing, MI***

## Abstract

The Animal Science Undergraduate Research Student Association (ASURSA) at Michigan State University was developed to engage students interested in science and research in a club atmosphere. A survey was designed to determine student perceived benefits of club involvement. Survey items included demographic variables and the evaluation of benefits of club membership. Twenty-eight of the 36 dues paying members responded to the survey (77.8%). Results indicated that 84.6% of respondents agreed or strongly agreed that club participation allowed for better understanding of concepts discussed in the classroom. The majority of club members (92.3%) felt their level of interaction with livestock animals had increased since joining the club and that they had further developed connections with classmates (92.3%) and Animal Science faculty (84.6%). Students viewed their involvement in the club research projects as increasing their basic understanding of the scientific method (75% agreed or strongly agreed) and basic knowledge of animal husbandry (80.0% agreed or strongly agreed). Results of the survey demonstrate that the implementation of an undergraduate research club provided a number of perceived student benefits for club members.

## Introduction

Traditional classroom strategies for conveying information, such as the 50-minute passive-learning lecture, are not always the most effective method of content delivery (Young et al., 2003). Likewise, these strategies may not be effective at meeting the overall learning outcomes and goals for Animal Science curricula. Increased student engagement in practices that promote active and experiential learning is one strategy to meet these goals.

Chickering and Gamson (1987) reported on the seven principles for good practice in undergraduate education. Active learning was included on this list, along with the following: encouragement of student-faculty contact, encouragement of cooperation among students, emphasizing time on task and communicating high expectations. Several practices, including undergraduate research, study abroad, first-year seminars, student learning communities, internships and service learning projects support the basic principles presented by Chickering and Gamson.

Lopatto (2004) reported that participation in a research project enhanced the overall undergraduate experience. Involvement in a research project sustained or increased interest in postgraduate education (Hathaway et al., 2002; Lopatto, 2007) as well as developed interpersonal skills (Zydney et al., 2002). Students participating in undergraduate research reported increased ability to work independently as well as increased tolerance for new obstacles (Lopatto, 2007). Involvement in undergraduate research allowed for further development of faculty-student relationships and gave students a sense of belonging to the science community (Hunter et al., 2007).

The Animal Science Undergraduate Research Student Association (ASURSA) at Michigan State University was created in 2009 to promote high impact learning activities while providing a social community for undergraduate students interested in animal science research. The development of research clubs at the department level addresses the university's goal of increasing the number of undergraduates participating in research programs. With increasing student interest in undergraduate research in Animal Science and limited published information available on the learning impact of an organized research club, the objective of the survey was to determine the student perceived impact of ASURSA club involvement on the undergraduate learning experience.

## Materials and Methods

### Survey Design

The survey and experimental design were approved by the Michigan State University Institutional Review Board. The survey consisted of 27 items, including demographic variables and evaluation of the benefits of club membership and participation in the club research

[1]Department of Animal Science, 474 S. Shaw Ln., 1290 Anthony, 48824; Email: ekarcher@msu.edu; Phone: 517-353-8518
[2]Department of Animal Science, 474 S. Shaw Ln., 1290 Anthony, 48824; Email: trottier@msu.edu; Phone: 517-432-5140

project. Students' responses were evaluated using a Likert scale (1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree and 5 - strongly agree). The survey was located online and could be voluntarily accessed at the SurveyMonkey website during a regularly scheduled club meeting. The survey was only available to access for 20 min during this time. Individual computer IP addresses were tracked to ensure each participant responded only once to the survey.

### Subject Selection

Undergraduate students who were members of ASURSA during the 2011 to 2012 academic year were invited to participate in the survey. Twenty-eight of the 36 members responded to the survey, for a response rate of 77.8%. Students were asked to provide demographic information but anonymity was maintained throughout the process.

## Results and Discussion

In 2009, a need was recognized to establish a club in the Department of Animal Science for students interested in undergraduate research. The following objectives and goals were identified for the club: increase understanding and proficiency of the scientific method, engagement of students in an annual group undergraduate research project and increase in student-livestock interactions. Additionally, the club provides a forum for professional and social interactions. In its inaugural year, the club had eight members. This number has continued to grow to 36 members during the 2011 to 2012 academic year and 53 members during 2012 to 2013 academic year. Because the purpose of the study was to assess student perceived impact of club involvement on their undergraduate learning experience, the survey was not administered prior to student involvement in the club.

### Demographic Description

Demographic information is presented in Table 1. Females comprise 89.3% of survey respondents, which is in line with the proportion of students currently in the Department of Animal Science at Michigan State University. In fall 2011, 83.8% of the 433 enrolled undergraduates were female. This demographic is similar to that reported by Lyvers-Peffer (2011), with 78.8% of females representing an introductory animal science course at The Ohio State University. Among the respondents for this survey, 64.3% were of junior (>59 credits) or senior (>89 credits) standing. The Animal Science major represented the greatest enrollment (89.3%). The club is open to all undergraduate students interested in animals and research. Therefore, a smaller percentage of students represented the following majors: Biochemistry/Molecular Biology (3.6%), Fisheries and Wildlife (3.6%) and Zoology (3.6%). A total of 64.3% of club members hoped to attend veterinary school (42.9%) or graduate school (21.4%). A smaller subset of survey respondents was interested in pursuing career goals related to agriculture business and animal production. A large percentage of respondents indicated their career goals related to veterinary medicine. This trend is reflected in a decreasing number of Animal Science undergraduate students intending to return to family farms and an increase in the number planning on applying to veterinary school (Buchanan, 2008).

The Animal Science Undergraduate Research Student Association grew from only eight members in fall 2009 to 36 members in spring 2012. Based on survey results, 60.7% of membership was new members with only 1 year of club involvement, reflecting a growing interest in the club. Only 19.2% of club members reported any previous research experience before joining ASURSA.

**Table 1. Demographic information from the Animal Science Undergraduate Research Student Association survey respondents[a].**

| Demographic category | Percentage of respondents |
|---|---|
| Gender, n=28 | |
| Female | 89.3 |
| Male | 10.7 |
| Class Standing, n=28 | |
| Freshman | 14.3 |
| Sophomore | 21.4 |
| Junior | 28.6 |
| Senior | 35.7 |
| Major, n=28 | |
| Animal Science | 89.3 |
| Biochemistry/Molecular Biology | 3.6 |
| Fisheries and Wildlife | 3.6 |
| Zoology | 3.6 |
| Career Goal, n=28 | |
| Veterinary School | 42.9 |
| Graduate School | 21.4 |
| Agriculture Business (Sales/Service) | 10.7 |
| Animal Production (Farming/Ranching) | 10.7 |
| Laboratory (Technician) | 7.2 |
| Other[b] | 7.2 |
| Length of Club Membership (years) | |
| 1 | 60.7 |
| 2 | 28.6 |
| 3 | 10.7 |
| Prior Research Experience | |
| No | 80.8 |
| Yes | 19.2 |

[a]Total respondents, n=28

[b]Students selecting other were asked to specify their career goal. One student responded 'Training, Breeding, and Raising' and 1 student responded 'Wildlife Conservation and Biology' (7.2% total).

### Impact of Club Membership

In order to determine the perceived impact of club members on enhancement of the overall student experience, members were asked to answer a number of statements indicating their level of agreement (Table 2). One goal for the club was identified as enhancing the overall Animal Science curriculum. Of the members, 84.6% agreed or strongly agreed that club participation allowed for better understanding of concepts discussed in the classroom. All club members agreed or strongly agreed that club participation provided them with additional knowledge beyond what was gained in the classroom. Steffes (2004) reported that non-traditional classroom experiences facilitate a connection between concepts discussed in the classroom and practical, real world examples.

**Table 2. Percentage of Animal Science Undergraduate Research Student Association survey respondents indicating level of agreement with statements relating to club membership.[a]**

| | Strongly Disagree | Disagree | No Opinion | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Participating in ASURSA has provided me with additional knowledge beyond what had been gained in the classroom. | 0.0 | 0.0 | 0.0 | 76.9 | 23.1 |
| I believe club participation has allowed me to better understand concepts discussed in my classes. | 0.0 | 0.0 | 15.4 | 76.9 | 7.7 |
| Club participation has increased my interaction with agricultural animals. | 0.0 | 3.8 | 3.8 | 50.0 | 42.3 |
| Club participation has allowed me to further develop connections/ relationships with my classmate. | 0.0 | 0.0 | 7.7 | 53.8 | 38.5 |
| Club participation has allowed me to further develop connections/ relationships with Animal Science faculty. | 0.0 | 3.8 | 11.5 | 50.0 | 34.6 |
| Club membership has provided me with opportunity for additional experiences on non-club research projects. | 3.8 | 3.8 | 15.4 | 46.2 | 30.8 |
| Club participation has changed my career path. | 0.0 | 42.3 | 34.6 | 23.1 | 0.0 |

[a]Total Respondents, n=26

As an increasing number of Animal Science students enroll in the major with limited interaction with agriculture animals, it is becoming more critical to facilitate opportunities for such interactions into undergraduate programs. The majority of respondents (92.3%) reported their level of interaction with livestock animals had increased since joining the club, a goal that MSU Department of Animal Science set forth as part of their curriculum review. As a growing number of enrolled students come from an urban background, there is an increasing need for exposure to agricultural animals.

One club objective was identified as providing a forum for professional and social interactions. The majority of club members agreed or strongly agreed that club membership allowed for further development of connections and relationships with classmates (92.3%) and Animal Science faculty (84.6%). Out-of-class communication with faculty promotes greater social interaction, which has been reported to be influential in predicting student persistency in a program and academic integration (Milem and Berger, 1997). Students engaging in these types of interactions with faculty demonstrate greater academic and cognitive development (Terenzini et al., 1996). Finally, increased interaction with faculty opens opportunities to work on non-club research projects. Of the respondents, 77% indicated that they agreed or strongly agreed that their club involvement resulted in opportunities to participate on non-club research projects.

Only 23.1% of survey respondents agreed that club participation changed their anticipated career path. In fact, 42.3% disagreed with the statement. This was not unexpected given that a high percentage of club members were currently completing their junior or senior year. There was also a strong interest in respondents to attend veterinary or graduate school. As a student advances in their academic career, the ability to influence career choices may become more difficult. Therefore, it is important to increase visibility of the club and the scientific process to students earlier in their career. Underclassman involvement is important because students have reported an increased interest in the science, technology, engineering and mathematics disciplines as an outcome of undergraduate research projects (Zydney et al., 2002; Russell et al., 2007). Students who seek out research opportunities however may already be interested in continuing their science education and few students may be attracted to research programs if they have little interest in science (Lopatto, 2007).

**Table 3. Responses (as times cited) to the open-ended question, 'what do you feel are the top 3 benefits of being a member of the Animal Science Undergraduate Research Student Association'.[a]**

| | |
|---|---|
| Development of relationships with peers and faculty in Animal Science | 19 |
| Exposure to the scientific process | 12 |
| Networking opportunities outside of club | 11 |
| Participation in the club research project | 11 |
| Increased animal interaction | 6 |
| Resume builder | 3 |
| Leadership opportunities | 2 |
| Learning how to work in a team | 1 |
| Learning how to manage time | 1 |

[a]Total Respondents, n=25

Survey respondents were asked to compile the top three benefits of the ASURSA club membership. The results are listed in Table 3. Development of relationships with peers and faculty in Animal Science was the number one benefit reported corroborating the finding of Hunter et al. (2007) who reported an increased sense of belonging. The ability to participate in the club research project and increase exposure to the scientific method was also ranked highly by respondents. Members also appreciated the increased interaction with agricultural animals. Indeed, the non-traditional Animal Science student or the student from an urban community with no livestock experience is increasingly becoming the majority (Buchanan, 2008). Participation in undergraduate research in Animal Science is an excellent vehicle for exposing students to livestock. Finally, networking opportunities, between students and peers and students and faculty outside of the club, was a frequent response.

## Impact of Club Research Project

A primary goal of the club is to conduct one research project each academic year using a different animal model across projects. In spring 2011, members

**Table 4. Description of survey respondents participating in club research project.[a]**

| Demographic category | Percentage of respondents |
|---|---|
| Club Projects, n=25[b] | |
| 1 (poultry) | 4.0 |
| 2 (dairy) | 60.0 |
| Both | 36.0 |
| Role in Project | |
| Daily care of animals | 100.0 |
| Sample collection | 48.0 |
| Grant writer | 24.0 |
| Project manager[c] | 24.0 |
| Laboratory analysis | 8.0 |
| Hrs/wk spent on project | |
| 0 to 1 | 12.0 |
| 1 to 2 | 52.0 |
| 2 to 4 | 8.0 |
| 4 to 6 | 8.0 |
| 6 to 8 | 8.0 |
| >8 | 12.0 |

[a]Total respondents, n=25
[b]In Spring 2011 respondents could participate in a poultry project. In Spring 2012 respondents could participate in a dairy calf project.
[c]Project managers were responsible for organizing grant writing efforts, coordinating the daily care of the animals and sample collection, and assisting with manuscript writing.

completed the first ASURSA research project. This was a nutrition project aimed at evaluating the dietary inclusion of a snack food by-product on the performance of laying hens. Students were involved with all aspects of the project from grant writing to the daily care of the animals. During the bi-weekly club meetings, topics such as the institutional animal care and use forms and animal and research ethics were discussed. Club members presented the hypothesis and objectives of the study and gave updates on the project. The culminating experience was the submission and acceptance of the project to Poultry Science (Van Whye et al., 2012). In fall 2011, members wrote and submitted grants to fund a dairy calves nutrition project conducted over the spring 2012 semester. This later project led to the submission of an abstract and presentation (Nagengast et al., 2013) at a national scientific meeting and two presentations at the university and department research forums. A manuscript from this study will also be submitted.

Demographic information for research project participants is presented in Table 4. In total, 25 of the 28 respondents participated in the club research projects. Of the respondents, 36.0% were involved with both the poultry and calf project and 60.0% were involved with the calf project only. The increase in student involvement on the calf project most likely represents an increase in club membership during the second academic year. Additionally, respondents were asked to indicate what their role was in the project. All respondents were involved with the daily care of the animals, thus directly increasing student-animal interactions. The number of days a student was involved with the basic care was not recorded in this survey. Students assisted with feeding and orts collection, egg collection and general well-being assessments of the animals. A total of 48.0% of respondents were also involved with sample collection. This included weighing the calves and taking appropriate body measurements, blood collection and restraint for collection, weighing hens and recording number of eggs/day/treatment.

A smaller percentage (24.0%) of respondents were identified as project managers. Project managers were typically upperclassman and ideally had participated in at least one club project before accepting the leadership position. These members were responsible for identifying, preparing and submitting grants related to the projects under the club advisors' guidance, as well as coordinating schedules, animal daily care and sample collection. Finally, only 8.0% of respondents were involved with laboratory analysis of samples. One club goal is to increase the number of students involved with laboratory analysis, however, logistics associated with student laboratory training need to be assessed. Time dedicated to the club project was evaluated to further determine the level of involvement. Over half of all respondents (52.0%) reported spending 1 to 2 hr/wk on club project activities and 20% of respondents spent at least 6 hr/wk.

The ability to reinforce concepts discussed in the Animal Science curriculum was an important goal for the club research project. The majority of respondents (80.0%) agreed or strongly agreed that their basic knowledge of animal husbandry had increased through club research projects (Table 5). An additional goal of the project was to increase members' understanding of the scientific method. Although not directly assessed, 75.0% of respondents agreed or strongly agreed that their basic knowledge of the scientific method increased through participation in the club research project (Table 5). Another goal of the club research project was to stimulate interest in science. When asked if participation in a club research project stimulated professional interest in research the student did not previously have, 80.0% responded with agree or strongly agree.

**Table 5. Percentage of Animal Science Undergraduate Research Student Association survey respondents indicating level of agreement with statements relating to club research project partipation.[1]**

| | Strongly Disagree | Disagree | No Opinion | Agree | Strongly Agree |
|---|---|---|---|---|---|
| My basic knowledge of animal husbandry has increased through club research projects. | 0.0 | 4.0 | 16.0 | 60.0 | 20.0 |
| My basic knowledge of the scientific method has increased through club research projects. | 0.0 | 0.0 | 25.0 | 45.8 | 29.2 |
| Participation in research project stimulated professional interest in research I did not previously have. | 0.0 | 12.0 | 8.0 | 40.0 | 40.0 |

[1]Total Respondents, n=25

## Summary and Implications

The involvement of undergraduate students in an organized research club is one approach to implement active and experiential learning into the Animal Science curriculum. Survey respondents in this study felt their basic understanding of the scientific method as well as their ability to relate to classroom material increased as a result of club membership. Furthermore, increased interactions with livestock animals were seen as a benefit, which aligns with the changing Animal Science undergraduate student demographic. Undergraduate research clubs may increase relationships and connections with both peers and faculty. Based on our survey, overall career goals were not impacted in response to club membership. Information presented in this paper will be useful for other Animal Science departments to implement an organized undergraduate research program. The data reported is somewhat limited hence additional metrics are critically needed. Nonetheless, the reported data is unique in that it is the first to demonstrate the significance of an organized undergraduate research student association in the Animal Science curriculum on the student experience. Additional studies are needed to assess if student perceptions align with classroom performance and material retention.

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