Animal Industry Survey: The Importance of Technical and Soft Skills, Coursework, and Extracurricular Activities on the Success of Undergraduates Entering Animal Industries

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Jennifer M. Bundy, Assistant Professor, Undergraduate Advising Coordinator;
Katelyn Zeamer, Lecturer;
Holly Evans, Lecturer;
Jodi Sterle, Harman Endowed Professor in Teaching & Learning and Associate Department Chair for Teaching;
Dan Thomson, Department Chair, Professor;
Department of Animal Science, Iowa State University

Summary and Implications

A survey instrument was developed to inquire about the skills and experiences needed to be successful in an entry-level position within an animal industry. The instrument called upon industry representatives to rank the importance of skills, experiences, and coursework as they relate to success. A five-point scale was used for ranking (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important). Industry representatives ranked personal and team-based soft skills as the most important skills related to success. Animal science coursework and hands-on animal handling and welfare experiences also ranked very high. Non-animal science coursework, agricultural business skills, collegiate experiences, and scientific/laboratory skills were ranked the lowest in terms of importance, but rankings of these categories still fell in the moderately important range. These rankings indicate the need for well-rounded students that have gained technical and personal skills throughout their collegiate education. This also signals a need for projects, writing assignments, and hands-on animal-related activities that promote development of soft skills within the animal science curriculum.

Introduction

The mission of the Department of Animal Science at Iowa State University (ISU) is to educate and develop students with life skills and knowledge to serve the people who produce animals and animal products. In the fall of 2020, the undergraduate population in this department consisted of 1030 students, only 48.8% of which held Iowa residency status. These demographics show ISU has become an important source for education in animal agriculture outside of Iowa's borders as well as within. To date, the department has achieved a 99% placement rate for placing students into an animal career or into further education within six months of graduation. As a major contributor of animal science graduates to the workforce, it is important that our curriculum and training reflect the needs of our industry stakeholders. Therefore, the objective of this study was to gather feedback from industry representatives on the skills, coursework, and experiences that animal science graduates need to be successful in an entry-level position within an animal industry.

Materials and Methods

Researchers identified 267 animal-related companies through cooperation from the College of Agriculture and Life Sciences Careers Office. Companies were included if they have hired Iowa State Animal Science students for internships and full-time post-graduate employment in the past. Interests of these companies varied across species and disciplines.

A survey instrument was developed using Qualtrics XM survey software (Provo, UT). Questions within the instrument were designed to address the importance of technical skills, soft skills, collegiate experiences, and collegiate coursework to potential success within their respective field(s). Within each category, participants were presented with a specific skill or experience and asked to rank its importance to post-graduate success within their field according to a five-point scale (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important).

The survey was distributed to company representatives via email. Survey responses were tallied and descriptive statistics were calculated within and across categories. Differences between categories were tested for significance using ANOVA and Student's t-tests. This study was approved by the Institutional Review Board (IRB 20-327).

Results and Discussion

Demographics of Respondents

A total of 68 industry representatives completed the survey, although not all participants completed it in its entirety. Size of participating companies is shown in Figure 1. Approximately 75% of participants represented small-to-medium sized companies with between 1 and 500 employees. Specie and discipline of participating companies

are shown in Table 1. Respondents were given the option to choose more than one specie and more than one discipline from a list, therefore percentages are expressed as a total of the 68 surveys returned. Almost half of the respondents reported business activities in the swine industry, while almost 40% of respondents provided services in the beef cattle industry. The most-represented disciplines included animal health, animal breeding and genetics, and animal production. Less-represented disciplines were placed in the "other" category and included business, education, extension, pharmaceuticals, retail, government, and recreation.

Technical Skills

Respondents were asked to rank the importance of technical skills in the areas of 1) animal handling and welfare, 2) agribusiness, and 3) science, laboratory, and discipline-specific. The number of respondents per question, average rankings, and standard deviations of the importance of technical skills are shown in Table 2.

Skill type had a significant effect on overall ranking of importance. Animal handling and welfare skills were deemed more important than agribusiness and scientific/laboratory skills ($p<0.001$). There were no significant differences between the perceived importance of agribusiness and scientific/laboratory skills ($p>0.05$). All aspects of animal handling and welfare were deemed to be, on average, very important with the exception of livestock transportation. The importance of livestock transportation skills were also the most variable from company to company. The ability to understand and interpret data was the only technical agribusiness skill that was deemed very important by participating respondents. Scientific, laboratory, and discipline-specific skills were ranked, on average, in the moderately important range, but varied the most when compared to animal handling and agribusiness skills.

Soft Skills

Respondents were asked to rank the importance of soft skills in the areas of 1) personal soft skills and 2) team-based soft skills. The number of respondents per question, average rankings, and standard deviations of the importance of personal soft skills are shown in Table 3. No significant differences were observed between the perceived importance of personal and team-based soft skills ($p>0.05$). Participants ranked all soft skills as very important to extremely important.

Collegiate Experiences

Participants were asked to rank the importance of common collegiate experiences to the success of the individual within animal industry. The number of respondents per question, average rankings, and standard deviations of the importance of collegiate experiences are shown in Table 4. Animal-related work experiences and internships were ranked as the most important experiences for post-graduate success. Both experiences were ranked in the very important range. Study abroad was ranked as the least important collegiate experience for industry success.

Collegiate Coursework

Respondents ranked the importance of coursework in 1) animal science and 2) non-animal science to post-graduate success. The number of respondents per question, average rankings, and standard deviations of the importance of collegiate coursework are shown in Table 5. Animal science-related coursework was ranked significantly more important than non-animal science coursework ($p<0.001$) as it relates to industry success. Animal behavior/welfare and animal health/diseases were ranked highest among animal science coursework. Ethics, Mathematics, and Speech were deemed the most important non-animal science coursework to animal industry success.

Categorical Comparisons

Least-square means for all skill, experience, and coursework categories are provided in Table 6. On average, personal soft skills, team-based soft skills, and animal handling/welfare skills were ranked as the three most important factors linked to post-graduate success in animal industries. Animal science coursework was ranked as the fourth most important factor but was still significantly less important than soft skills ($p<0.05$). Collegiate experiences and scientific/laboratory skills were ranked as the least important of all categories, however the average rankings for these categories were still in the moderately important range.

Conclusions

All skill, experience, and coursework categories were ranked between moderately to extremely important indicating that employers are looking for well-rounded graduates that have gained technical and personal skills throughout their collegiate education. Coursework within the animal science curriculum should include assignments and projects that aid in the development of soft skills through required teamwork, communication, and problem solving. Additionally, students should be encouraged to participate in extra-curricular activities including (but not limited to) undergraduate research, teaching, and student organizations. Although these activities were ranked lower than internships and hands-on experiences, these activities help build personal and team-based soft skills that are of the utmost importance to post-graduate success.

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critical curricular improvement areas to further develop and support future graduates and employees.

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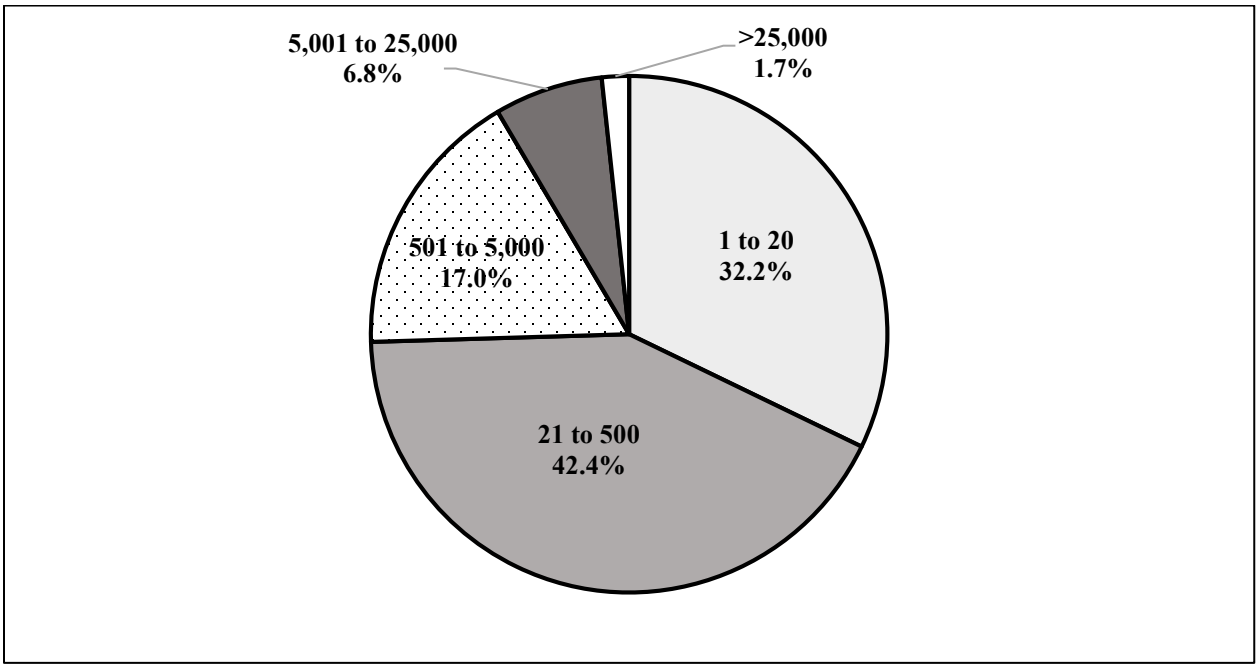

Figure 1. Size of participating companies

Table 1. Species and discipline specialization of participating companies

	Count[1]	%[2]
Specie		
Swine	32	47.1%
Beef	27	39.7%
Poultry	22	32.4%
Dairy Cattle	21	30.9%
Companion Animal	16	23.5%
Equine	15	22.1%
Goat	15	22.1%
Sheep	14	20.6%
Aquaculture, Wildlife, Exotics	12	17.6%
Other	3	4.4%
Discipline		
Animal Health	17	25.0%
Animal Breeding and Genetics	15	22.1%
Animal Production	13	19.1%
Animal Reproduction	9	13.2%
Animal Welfare and Behavior	9	13.2%
Animal Nutrition	9	13.2%
Agronomy	8	11.8%
Food Processing	4	5.9%
Other	20	29.4%

[1]Participants were allowed to choose more than one species or specialization

[2]Percentages are presented as a proportion of the total number of surveys returned (N=68)

Table 2. Ranked importance of technical skills

	n[1]	Average Ranking[2]	Standard Deviation
Animal handling and welfare skills			
Understand proper handling	52	4.58	0.88
Treat animals humanely	55	4.53	0.85
Understand animal needs	53	4.49	0.77
Proper use of antibiotics, vaccinations, etc.	50	4.26	0.96
Identify unhealthy animals	54	4.24	1.10
Understand biosecurity	50	4.16	1.07
Transportation of livestock	50	4.12	1.11
Agricultural business skills			
Understand and interpret data	55	4.16	0.93
Understand laws and regulations in animal agriculture	51	3.69	1.16
Understand supply and demand	48	3.60	1.11
Understand how to calculate break-even costs	50	3.52	1.15
Understand commodity markets	46	3.15	1.16
Scientific, laboratory, and discipline-specific skills			
Understand the reproductive cycle of animals	48	3.77	1.26
Understand nutritional needs of animals	49	3.76	1.17
Understand the scientific method	47	3.43	1.20
Evaluate livestock composition	42	3.40	1.29
Understand applied software	42	3.29	1.40
Understand breeding and genetics	49	3.17	1.32
Understand how to formulate rations	47	3.11	1.26
Interpret and understand progeny differences	43	3.07	1.32
Have knowledge of basic laboratory skills	45	3.00	1.37

[1]n = number of respondents who participated in the question

[2]Average ranking across all question respondents (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important)

Table 3. Ranked importance of soft skills

	n[1]	Average Ranking[2]	Standard Deviation
Personal soft skills			
Dependability	54	4.93	0.26
Trustworthy	54	4.85	0.40
Integrity	53	4.81	0.48
Effective listening	54	4.80	0.40
Verbal communication	54	4.70	0.53
Positive attitude	54	4.70	0.50
Self-starting or individual initiative	54	4.63	0.59
Adapt to change	54	4.61	0.56
Time management	54	4.57	0.66
Ability to accept constructive feedback or criticism	54	4.57	0.63
Professional communication	54	4.54	0.66
Engage in lifelong learning	54	4.48	0.69
Ability to dress and act professionally	54	4.28	0.91
Abstract thinking	53	4.28	0.83
Inclusive and sensitive to diversity	54	4.24	0.96
Ability to be a leader	54	4.19	0.86
Team-based soft skills			
Ability to work on a team	53	4.74	0.48
Acceptance of advice or mentorship	53	4.62	0.56
Identify and analyze problems	53	4.57	0.60
Ability to build relationships	53	4.57	0.63
Realizing the effects of decisions	53	4.53	0.60
Dealing with conflict	53	4.42	0.74
Confidently ask questions	53	4.40	0.74
Ability to lead others	53	4.09	0.92
Motivate and lead others	52	4.08	0.90

[1]n = number of respondents who participated in the question

[2]Average ranking across all question respondents (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important)

Table 4. Ranked importance of collegiate experiences

	n[1]	Average Ranking[2]	Standard Deviation
Work experience in an animal related field	49	4.37	0.63
Internship in animal-related experience	49	4.29	0.70
Hands-on in-class learning at livestock farms	50	3.84	1.14
Science with Practice	49	3.63	0.98
Work experience in non-animal related field	51	3.35	0.93
Internship in non-animal related experience	50	3.34	0.95
Collegiate Judging, livestock, horse, dairy, or meats	50	3.30	1.06
Undergraduate research	49	3.18	1.02
An-Cy Guide Program	43	3.12	1.06
Undergraduate teaching	50	3.08	1.07
Club involvement	49	3.06	0.87
Study abroad	49	2.55	1.09

[1]n = number of respondents who participated in the question

[2]Average ranking across all question respondents (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important)

Table 5. Ranked importance collegiate coursework

	n[1]	Average Ranking[2]	Standard Deviation
Animal science coursework			
Animal Behavior and Welfare	48	4.40	0.57
Animal Health/Diseases	48	4.40	0.67
Animal Nutrition	48	4.21	0.73
Animal Physiology	48	4.29	0.71
Animal Production	45	4.27	0.85
Animal Reproduction and Management	47	4.28	0.79
Business Management	50	4.22	0.73
Genetics	47	3.96	0.80
Growth and Development	48	3.98	0.80
Lactation	43	3.86	0.85
Meat Science	39	3.64	1.07
Non-animal science coursework			
Ethics	51	4.18	0.78
Math	51	4.16	0.64
Speech	51	4.16	0.72
Biology	51	4.06	0.70
Statistics	51	3.88	0.81
Economics	50	3.86	0.69
Composition	49	3.78	0.74
Chemistry	49	3.71	0.76
International Perspectives	48	3.63	0.75
Humanities	51	3.55	0.72
Social Sciences	51	3.41	0.69
U.S. Diversity	51	3.31	0.96

[1]n = number of respondents who participated in the question

[2]Average ranking across all question respondents (1=not important, 2= somewhat important, 3=moderately important, 4=very important, 5=extremely important)

Table 6. Comparison of all skill, experience, and coursework categories

Category	Least Square Means[1]	Standard Error
Personal soft skills	4.57[a]	0.08
Team-based soft skills	4.45[a]	0.10
Animal handling and welfare skills	4.34[a,b]	0.12
Animal science coursework	4.14[b]	0.09
Non-animal science coursework	3.81[c]	0.09
Agricultural business skills	3.62[c,d]	0.14
Collegiate experiences	3.43[d]	0.09
Scientific, laboratory, and discipline-specific skills	3.33[d]	0.10

[1]LS Means not connected by the same letter are significantly different ($p<0.05$)