Livestock Skills Performance Levels Reported by Agricultural Production Teachers in Ohio

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The importance of vocational agriculture teachers having the ability to perform technical skills has been widely recognized. Warmbrod (1979) indicated that one measure of the quality of vocational agriculture programs is the technical competence of beginning teachers. Researchers have generally agreed that successful instruction in agricultural production programs requires teachers be able to perform the essential skills in animal science and other technical areas (Thomas, 1979). According to Gadda (1963), the acquisition of such skills is important for two reasons: (a) effective teaching has often been dependent upon mastery of skills, and (b) the confidence of beginning teachers is noticeably greater when skills are adequately mastered. However, Herr (1976) suggested that one of the major inadequacies of young teachers as perceived by experienced teachers has been a lack of practical agricultural knowledge and skill.

Objectives of the Study

The purpose of the study was to determine the livestock skills possessed by agricultural production teachers in Ohio and to examine the extent to which livestock skills were taught in high school vocational agriculture classes. The major research questions included:

1. What was the self-reported performance level of the agricultural production teachers with respect to livestock skills?
2. How confident were teachers in their ability to perform and demonstrate these skills?
3. To what extent did teachers report that they taught these skills during the past year in their high school classes, and what teaching methods were used?
4. What was the relationship between performance levels reported by teachers and (a) confidence level, and (b) demographic characteristics?

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Methodology

The research design implemented in the study was classified as descriptive correlational. Potential measurement, nonresponse, frame, and sampling errors were controlled via the research methodology utilized. The *Ohio Agricultural Education Directory* served as the frame for the target population, which consisted of Ohio agricultural production teachers.

The skills necessary for producing swine, beef, dairy, poultry, and sheep were identified through several processes. First, an extensive literature review was performed, and a number of skills were identified for each species. Next, five Ohio State University faculty members in the College of Agriculture (one for each livestock species) were selected to review the list of skills. Each faculty member also provided the name of a top local producer, who was personally visited and asked to review the list of skills and make additions, deletions, or modifications. The skills were restricted to those performed only with the live animal, (e.g. clip needle teeth, castrate, vaccinate, etc.). A total of 61 skills was identified as having content validity and were included in the survey instrument. These included 13 swine, 17 general cattle, eight dairy, 15 sheep, and eight poultry skills.

Data were collected from teachers through the use of a mailed questionnaire. The instrument was field tested for clarity, and reliability was examined using the pilot test data. Reliability assessment consisted in part of an examination of the internal consistency of the confidence levels reported by teachers. Cronbach's Alpha was calculated to be $r = .98$.

The instrument was distributed through the initial mailing, a postcard follow-up reminder, and two additional follow-up letters containing replacement questionnaires. The instrument was compiled in booklet fashion and mailed to the random sample of 100 current agricultural production teachers. A formula which took into account the desired levels of accuracy and confidence in the results was used to determine sample size (Elliott, 1980). A total of 90 questionnaires was returned. However, four were received after the established deadline, and another four were not usable due to partial completion. Thus, the data sample consisted of 82 questionnaires, or 82% of the sample.

Since nonresponse error is a potential source of bias in survey research, responses must be obtained from at least a random sample of the nonrespondents (Mouly, 1978). A 20% random sample of nonrespondents was drawn for the purpose of examining possible differences between respondent and nonrespondent groups. *T*-test results showed no significant differences between the two groups, thus allowing for generalization of the results to the target population under study.

Descriptive statistics were used to summarize and analyze the data, and possible relationships between variables were examined using Pearson correlation coefficients.

Findings

Characteristics of Current Teachers

About 50% of the responding teachers had taught eight years or less, and the average teacher had taught just over 10 years. About one-fourth of the teachers supervised a school livestock farm. Over 90% had been reared on a livestock farm, and approximately one-half reported they currently owned or worked on a livestock farm.

The number of years of high school vocational agriculture completed by the responding teachers ranged from zero to four, with the average teacher completing about two and one-half years. Only three of the 82 teachers in the data sample were female, and about 90% of the teachers had earned a degree from The Ohio State University in agricultural education. The 20% of the teachers who reported they had earned a dual major, slightly more than one-half were animal science/agricultural education majors.

Livestock Skills Performance Levels

Teachers reported their level of performance for each livestock skill based upon the following steps, which represented values on an interval scale: (1) no knowledge; (2) read about; (3) seen performed; (4) performed myself; and (5) possess mastery. The resulting mean performance levels were interpreted using the following design:

No Knowledge	Read About	Seen Performed	Performed Myself	Possess Mastery
1.000	1.600	2.600	3.600	4.600	5.000

Approximately 40% of the mean performance levels (see Table 1) were in the "performed myself" range, another 50% fell in the "seen performed" range, and the remaining 10% were less than 2.60. These results indicated that on the average, just over one-half of the teachers had at best only seen the skill performed and had not performed it themselves. Overall, the teachers reported an average level of performance for the 61 skills of $\bar{X} = 3.34$, placing them in the "seen performed" range (see Table 2).

Livestock Skills Confidence Level

For each of the 61 skills, teachers also reported their level of confidence in their ability to perform or demonstrate the livestock skill to others. A five point scale, ranging from (1) very low to (5) very high, was used. The resulting mean confidence levels were in-

Table 1

Mean Livestock Skill Performance and Confidence Levels Reported by Teachers

Skill	Performance Level[a] $\bar{X}$	Performance Level[a] SD	Confidence Level[b] $\bar{X}$	Confidence Level[b] SD
Swine				
1. castrate	4.15	0.74	3.81	0.89
2. give injections	4.00	0.80	3.78	1.07
3. treat for external parasites	3.98	0.83	3.75	0.92
4. clip needle teeth	3.95	0.89	3.74	1.04
5. ring	3.90	0.94	3.65	0.96
6. treat for internal parasites	3.90	0.90	3.65	0.92
7. fit and show	3.79	0.82	3.59	1.06
8. ear notch pigs	3.78	0.93	3.57	1.08
9. ear tag	3.74	1.00	3.57	1.13
10. clip tails	3.71	1.03	3.55	0.94
11. probe backfat	2.89	0.80	2.40	1.14
12. artifically inseminate	2.87	0.93	2.34	1.14
13. detusk boars	2.60	1.15	2.31	0.94
General Cattle				
1. ear tag	3.98	0.78	3.73	0.90
2. castrate	3.94	0.70	3.72	1.05
3. treat for external parasites	3.90	0.74	3.66	0.90
4. assist in calving	3.90	0.80	3.65	0.91
5. treat navel cord	3.86	0.97	3.53	0.99
6. dehorn	3.82	0.67	3.46	1.01
7. fit and show beef	3.79	0.67	3.44	1.01
8. vaccinate	3.77	0.84	3.40	0.96
9. treat for internal parasites	3.70	0.89	3.35	0.92
10. trim hooves	3.56	0.91	3.30	1.06
11. treat for bloat	3.50	0.92	3.13	1.00
12. check temperature	3.40	1.05	3.09	1.18
13. tattoo	3.35	1.05	3.06	1.12
14. implant growth stimulant	3.30	0.91	2.99	1.11
15. artifically inseminate	3.26	0.69	2.82	1.12
16. brand	3.11	1.04	2.57	1.11
17. palpate	2.96	0.92	2.24	1.06
Dairy Cattle				
1. treat calves for scours	3.74	0.81	3.47	0.88
2. use proper milking techniques	3.62	1.05	3.33	1.22
3. fit and show dairy	3.53	0.95	3.20	1.09
4. draw milk samples	3.30	1.18	3.19	1.18
5. treat for mastitis	3.27	1.13	2.95	1.10
6. dry treat cows	2.90	1.27	2.75	1.32
7. install heat detectors	2.51	1.20	2.47	1.27
8. administer California mastitis test	2.24	1.29	2.08	1.28

Table 1 (continued)

Skill	Performance level[a] $\bar{X}$	Performance level[a] SD	Confidence level[b] $\bar{X}$	Confidence level[b] SD
Sheep				
1. dock lambs	3.80	0.88	3.49	1.04
2. castrate	3.64	0.97	3.49	1.07
3. ear tag	3.64	1.01	3.43	1.12
4. treat for parasites by drenching	3.56	0.95	3.39	1.10
5. assist in lambing	3.55	1.02	3.38	1.14
6. fit and show	3.55	0.99	3.18	1.19
7. trim feet	3.53	1.05	3.14	1.16
8. treat navel cord	3.49	1.02	3.13	1.12
9. vaccinate	3.35	1.03	3.07	1.25
10. treat for parasites with boluses	3.34	1.13	3.06	1.16
11. shear	3.33	0.84	3.05	1.24
12. treat for foot rot	3.23	1.03	3.03	1.15
13. treat for parasites by dipping	3.20	0.95	2.96	1.19
14. check temperature	3.08	1.16	2.65	1.36
15. tag and crutch ewes	2.89	1.31	2.61	1.23
Poultry				
1. candle eggs	3.51	1.14	2.91	1.22
2. treat for internal parasites	2.69	1.22	2.38	1.15
3. treat for external parasites	2.68	1.20	2.37	1.15
4. debeak chicks	2.53	1.13	2.13	1.11
5. vaccinate	2.27	1.03	2.10	1.10
6. clip wings (turkeys)	1.81	1.07	1.70	1.11
7. artifically inseminate turkeys	1.55	0.85	1.44	0.94
8. desnood (turkeys)	1.38	0.74	1.39	0.95

Note. [a]1 = no knowledge, 2 = read about, 3 = seen performed, 4 = perfor myself, 5 = possess mastery

[b]1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high

Table 2

Mean Livestock Skills Performance Levels of Agricultural Production Teachers

Livestock species	$\bar{X}$	SD
Swine	3.64	0.63
General cattle	3.59	0.58
Beef and dairy combined	3.44	0.59
Sheep	3.43	0.83
Dairy	3.14	0.86
Poultry	2.31	0.78
Overall	3.34	0.52

terpreted in a similar fashion as the mean performance levels, utilizing the scale below:

Very Low	Low	Medium	High	Very High
1.000 – 1.600	1.600 – 2.600	2.600 – 3.600	3.600 – 4.600	4.600 – 5.000

None of the average levels of confidence were found to be very high (see Table 1), but about one-fourth were found to high. Overall, the average level of confidence reported by teachers for the set of 61 skills was $\bar{X}$ = 3.053, or medium (see Table 3).

Teaching Methods Used

For each of the 61 livestock skills teachers were asked to indicate whether they had taught the skill during the past year, and if so, the primary teaching method used. Each respondent circled one of the following methods, ordered on a scale assumed to be interval: (1) did not teach, (2) discussion only, (3) discussion with models, (4) demonstration with live animal, and (5) student practice.

With the exception of poultry, where an average of three-fourths of the teachers reported they did not teach the specific poultry skill, the teaching of livestock skills and the methods used were fairly consistent across the different species. For each of the 61 skills an average of nearly 50% of the teachers reported they did not teach the specified skill during the past year. Furthermore, an average of about one-third of the teachers used discussion only as their teaching method for each individual skill. Finally, for each specific skill an average of about 15% of the teachers provided either demonstrations or student practice, both of which required direct experience with the live animal.

Table 3

Mean Livestock Skills Confidence Levels of Agricultural Production Teachers

Livestock species	$\bar{X}$	SD
Swine	3.35	0.73
General cattle	3.24	0.73
Beef and dairy combined	3.14	0.69
Sheep	3.14	0.97
Dairy	2.94	0.95
Poultry	2.08	0.84
Overall	3.05	0.60

Table 4

Pearson Correlation of Livestock Skills Performance Levels by Factors Possessed by Current Teachers

Factor	r
Confidence level	.87***
Teaching method used	.59***
Frequency of teaching the skill	.39***
Current farm ownership or work	.33**
Supervision of school livestock farm	.31**
Farm background	.29**
Years of teaching experience	.25*
Sex	-.12
Years of high school vo-ag	.10
Number of college majors	.09

Note. $*p < .05$, $**p < .01$, $***p < .001$

Relationship of Performance Level to Confidence Level and Demographic Factors

For all species, teachers who reported higher performance level had a very strong tendency to report higher levels of confidence in their ability to demonstrate the livestock skills (see Table 4). In addition, teachers who had performed the skills or possessed mastery had a strong tendency to report they used teaching methods which involved teacher demonstrations or student practice with the live animal. Teachers who indicated higher performance levels also tended

to (a) teach livestock skills more often, (b) currently own or work on a livestock farm, (c) be responsible for supervising a school livestock farm, (d) have been reared on a livestock farm, and (e) have more years of agriculture teaching experience. No relationship was found between livestock skill performance level and sex, years of high school vo-ag, or number of college majors. However, the data sample tended to be very homogeneous on these demographic variables.

Conclusions and Recommendations

Based upon the results of this study, the following conclusions and recommendations were drawn:

1. A large percentage of agricultural production teachers in Ohio do not have firsthand experience at performing livestock skills with a live animal and possess only medium levels of confidence in their ability to demonstrate these skills. However, those teachers who have actually performed livestock skills are more confident in their ability to demonstrate these skills. In turn, these teachers teach livestock skills more often and use methods involving live animal demonstrations and student practice more frequently. Therefore, inservice efforts should be aimed at strengthening livestock skill performance levels of teachers, so that they will be more inclined to take their teaching in livestock production to the "doing", demonstration, or performance stage.

2. For those teachers providing instruction in livestock skills, a large majority "teach about" the skill rather than demonstrate the skill to their students. Inservice programs should emphasize to teachers the importance of teaching approved practices and procedures through demonstrations. These programs should be designed such that teachers develop mastery of skills themselves.

3. Although the magnitude of relationships was low, teachers who are in direct contact with livestock production as owners, workers, or supervisors of school farms tended to possess higher levels of skill performance. Additional research is needed to this area to determine if a basis exists for recommending that Ohio agricultural production teachers be actively involved in livestock production while teaching.

4. The list of livestock skills validated in this study should be used as a checklist by Ohio agricultural production teachers as they strive to upgraded their technical skills in formal and informal settings.

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