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**COMPETENCIES IN FORAGE CROP PRODUCTION AND
UTILIZATION NEEDED BY FARMERS**

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Department of Education

and

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Iowa State University of Science and Technology
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in cooperation with

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This is an abstract of a thesis submitted to Iowa State University of Science and Technology by Francis Leo Abel in partial fulfillment of the requirements for the degree of Master of Science in 1966.

The study is one of a series conducted by the Department of Education of Iowa State University of Science and Technology with the assistance of graduate students in agricultural education in cooperation with the Iowa Agriculture and Home Economics Experiment Station and the Vocational Agriculture Section, Division of Vocational Education, State Department of Public Instruction.

This abstract was prepared by Francis L. Abel with the assistance of Alan A. Kahler, Assistant Professor of Education, under the direction of Professor C. E. Bundy.

COMPETENCIES IN FORAGE CROP PRODUCTION AND UTILIZATION NEEDED BY FARMERS

by

Francis Leo Abel

Purpose

The purposes of this investigation were: (1) to determine the competencies needed by farmers engaged in forage crop production and utilization, (2) to determine the relation of years of farming, size of farm, acres of forage, educational experience and major type of livestock produced to the evaluation of the degree of forage competence needed and possessed by a selected sample of outstanding Iowa forage producers and a selected random sample of Iowa farmers, and (3) to plan for educational needs of present and prospective farmers.

This study is one of a series of studies conducted by graduate students in agricultural education at Iowa State University of Science and Technology in cooperation with the Vocational Agriculture Section, Division of Vocational Education, State Department of Public Instruction as a part of the Iowa Agriculture and Home Economics Experiment Station Project Number 1253.

Method of Procedure

A basic list of 34 competencies needed to succeed in forages was formulated by consulting with six forage specialists and 12 Iowa farmers deemed outstanding in forage production and utilization. Of the 34 competencies, 13 were understandings and 21 were abilities.

The list of competencies were used in a questionnaire which was submitted to a selected sample of 125 outstanding farmers and 125 farmers who were graduated from high school from 1950-1954. These farmers were asked to rate the degree of competence they needed and the degree of competence they possessed in each competency listed on the questionnaire. Ratings were made on a five point scale (0-4) with a 4 meaning very much competence and 0 meaning no competence.

Other personal information was requested for use in stratifying the respondents. Usable questionnaires were received from 100 outstanding farmers and 100 random sample farmers from well distributed locations throughout Iowa.

Findings

All comparisons between and within the two sample groups of farmers were made in terms of mean scores derived from the 0 - 4 rating scale by which the respondents evaluated each of the 34 competencies. Both respondent groups of farmers had higher overall degree competence needed scores than

possessed scores. The 1950-1954 graduates had a higher competence need score (2.94) than the outstanding farmers (2.90) but the reverse was true for competence possessed scores (2.26, 2.34).

The seven competencies requiring the greatest knowledge and skill, based on the competence needed mean scores of the group of outstanding farmers were: (1) determine levels of feeding forage, grain and supplement to formulate least time and least cost balanced rations (3.27); (2) determine the moisture content at which to begin final machine harvest operation for best storage preservation (3.25); (3) calibrate planting, fertilizing and spraying equipment (3.19); (4) recognize the stage of maturity at which to harvest high quality forage (3.19); (5) evaluate quality for forage being fed (3.18); (6) recognize major plant food deficiency symptoms in growing forages (3.17); and (7) the understanding of effects of various insecticides and herbicides on forage chemical residue limitations or restrictions (3.18). The respective scores for these same competencies by the random sample group of farmers were: 3.25, 3.06, 3.15, 3.01, 3.01, 3.16, and 3.45, indicating both groups agreed that these competencies required much or more competence needed. Mean scores of all competencies for both groups are presented in Table 1.

Other competencies for which the outstanding farmers felt much competence was needed were for the understandings of the bloat problem and possible preventive practices; of variety differences in a specific forage crop as to yield and longevity of stand; of effects of seedbed, seeding rate and depth on stand and yield; of effect of different amounts and quality of forage feeding on livestock performance and costs; for the ability to distinguish between insect, disease, weather and nutrient deficiency damage to plants; to evaluate your forage harvest and storage costs compared to alternative methods; to recognize a potential damaging insect problem; to obtain a good stand of a new seeding; and to properly lime and fertilize forage crops. Of these foregoing eight competencies, the 1950-1954 graduates rated five of them as much competence needed.

A difference of .56 and .68 respectively existed between the overall mean scores for competence needed and possessed for the group of outstanding farmers and the 1950-1954 graduates. For only one competency was the possessed score higher than the needed score, that for the 1950-1954 graduates for the understanding of the influence of too early or over grazing on yield. For both groups of farmers the widest difference (range of 1.11 to 1.37) between competence needed and possessed scores were for the competence (1) understanding of various insecticides and herbicides on forage chemical residue limitations or restrictions, (2) understanding of practices that reduce disease loss after early recognition, and (3) the ability to distinguish between insect, disease, weather and nutrient deficiency damage to plants.

The average years farmed for the group of outstanding farmers was 23.7 compared to 9.32 for the 1950-1954 graduates. For both groups, as years in farming increased the overall competence needed and possessed scores declined slightly.

Seventy-three percent of the outstanding farmers were either owners or owner-renters compared to 38 percent for the graduates (48 percent of the graduates were renters). Sixty percent of the outstanding farmers operated over 300 acres compared to 40 percent of the graduates. Nearly twice as many

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Table 1. Degree competencies in forage crop production and utilization were needed and possessed by farmers

Competencies	Mean scores			
	Outstanding farmers N = 100		1950-54 Graduates N = 100	
	Na	Pb	Na	Pb
<u>Understanding of:</u>				
1. Effects of various insecticides and herbicides on forage chemical residue limitations or restrictions	3.18	1.31	3.45	2.08
2. The bloat problem and possible preventive practices	3.14	2.37	3.09	2.13
3. Variety differences in a specific forage crop as to yield and longevity of stand	3.06	2.37	2.86	1.93
4. Effects of seedbed, seeding rate and depth on stand and yield	3.04	2.66	2.86	2.61
5. Effect of different amounts and quality of forage feeding on live-stock performance and costs	3.03	2.67	3.15	2.33
6. Practices that reduce disease loss after early recognition	2.88	1.50	3.11	1.79
7. Kinds of forage crops available for a farming situation	2.84	2.55	2.77	2.19
8. Influence of soil drainage and properties on stand and yield	2.68	2.44	2.75	2.27
9. Need for root reserves and/or leaf area for proper regrowth	2.65	2.07	2.75	2.27
10. Efficiency gained by rotational grazing patterns within on field	2.64	2.58	2.62	2.24
11. Influence of too early or over-grazing on yield	2.47	2.23	2.57	2.81
12. Need for removal of surplus growth on certain species	2.34	1.73	2.50	1.79
13. Forage seed crop management and harvest	2.30	1.46	2.27	1.52
Overall mean score for understandings	2.79	2.17	3.82	2.13
<u>Ability to:</u>				
14. Determine levels of feeding forage, grain and supplement to formulate least time and least cost balanced rations	3.37	2.39	3.25	2.32
15. Determine the moisture content at which to begin final machine harvest operation for best storage preservation	3.25	2.62	3.06	2.55
16. Calibrate planting, fertilizing and spraying equipment	3.19	2.60	3.15	2.65
17. Recognize the stage of maturity at which to harvest high quality forage	3.19	2.71	3.01	2.53
18. Evaluate quality of forage being fed	3.18	2.62	3.01	2.14

a4= very much competence needed, 3 = much competence needed, 2 = some competence needed, 1 = little competence needed, 0 = no competence needed.

b4 = possess very much competence, 3 = possess much competence, 2 = possess some competence, 1 = possess little competence, 0 = possess no competence.

Table 1 continued.

Competencies	Mean scores			
	Outstanding farmers N = 100		1950-54 Graduates N = 100	
	Na	Pb	Na	Pb
<u>Ability to:</u>				
19. Recognize major plant food deficiency symptoms in growing forages	3.17	2.05	3.16	1.97
20. Distinguish between insect, disease, weather, and nutrient deficiency damage to plants	3.08	1.97	3.11	1.98
21. Evaluate your forage harvest and storage costs compared to alternative methods	3.07	2.29	2.84	2.00
22. Recognize a potential damaging insect problem	3.05	2.09	3.32	2.14
23. Obtain a good stand of a new seeding	3.04	2.62	3.19	2.63
24. Properly lime and fertilize forage crops	3.00	2.47	2.97	2.47
25. Select high quality seed	2.96	2.68	2.94	2.63
26. Determine quantity of forage required by your livestock	2.91	2.63	3.05	2.33
27. Select proper forage crops to fit soil sites	2.90	2.44	2.98	2.23
28. Use weather information to reduce rain damage risk	2.86	2.24	2.84	2.53
29. Recognize weeds and evaluate extent of their damage	2.84	2.53	3.26	2.50
30. Choose proper insecticides and herbicides	2.75	2.19	3.25	2.38
31. Use machinery efficiently to minimize harvest time	2.75	2.68	2.86	2.67
32. Determine the general success of a new seeding	2.69	2.53	2.77	2.35
33. Distinguish between major grasses and legumes prior to heading	2.61	2.44	2.67	2.17
34. Compute tonnage of forage in various storage structures	2.51	2.40	2.60	2.21
Overall mean score for abilities	2.97	2.43	3.01	2.35
total overall mean score	2.90	2.34	2.94	2.26

^aSee footnotes on previous page.^bSee footnotes on previous page.

of the outstanding farmers (27), as compared to the graduates (15), operated farms of more than 500 acres. Their average acres operated were 465.47 and 337.46 respectively.

The outstanding farmers grew an average of 71.3 acres of forage compared to 39 acres for the graduates. When respondents were stratified in groups according to acreage of forage grown (0 to 49, 50 to 95, over 95 acres) and needed and possessed competence scores for the top 10 competencies were compared, it appeared that forage acreage had little affect on scores. When the three forage acre groupings of outstanding farmers' scores were averaged they had higher mean scores for both knowledge needed and possessed (3.19, 2.44) than the graduates (3.05, 2.40).

The lowest average competence possessed score (1.98) for both groups of farmers, classified by forage acres grown, was for the understanding of effects of various insecticides and herbicides on forage chemical residue limitations and restrictions. The highest competence possessed average score was for the ability to recognize the stage of maturity at which to harvest high quality forage.

Forty-eight percent of the outstanding farmers had some college education, an average of 12.96 years of schooling, and 34 percent had some vocational agriculture training compared to 30 percent, 12.71 years and 99 percent respectively for the 1950-1954 graduates. Farmers that had some college education had slightly higher competence needed (3.19) and possessed (2.43) scores compared to farmers with 9 to 12 years of schooling (3.03, 2.31). The farmers with an eighth grade education or less was the only group with a competence possessed score of less than 2.00, that for the ability to recognize major plant food deficiencies in growing forage crops. Mean scores for the ten competencies receiving the highest scores are presented in Table 2 supporting the above statement of findings.

As years of vocational agriculture increased, the outstanding farmers competence needed scores declined and their competency possessed scores varied. The 87 graduates with 3 to 4 years of vocational agriculture had slightly lower competence needed (3.03) and competence possessed scores (2.30) than did the 12 graduates with 1 to 2 years of vocational agriculture (3.11, 2.37). These findings are presented in Table 3.

Farmers who had either college or noncollege credit courses in forages had higher competence needed and possessed scores than those with no such instruction as is revealed in Table 4. Competency needed and possessed scores varied little among groups who had or had not received adult farmer and young farmer instruction in forages.

The major kind of livestock produced had little effect on the forage competence needed and possessed scores of either group of farmers. In both farmer groups, the swine producers had the largest differences between competence needed and possessed scores. The dairymen had the highest competence possessed average score (2.45), followed by sheepmen (2.43), beef producers (2.40), and swine producers last with 2.34. The swine producers had the highest competence needed average score (3.15), followed by dairymen (3.10), sheepmen (3.07) and beef producers last with 3.02.

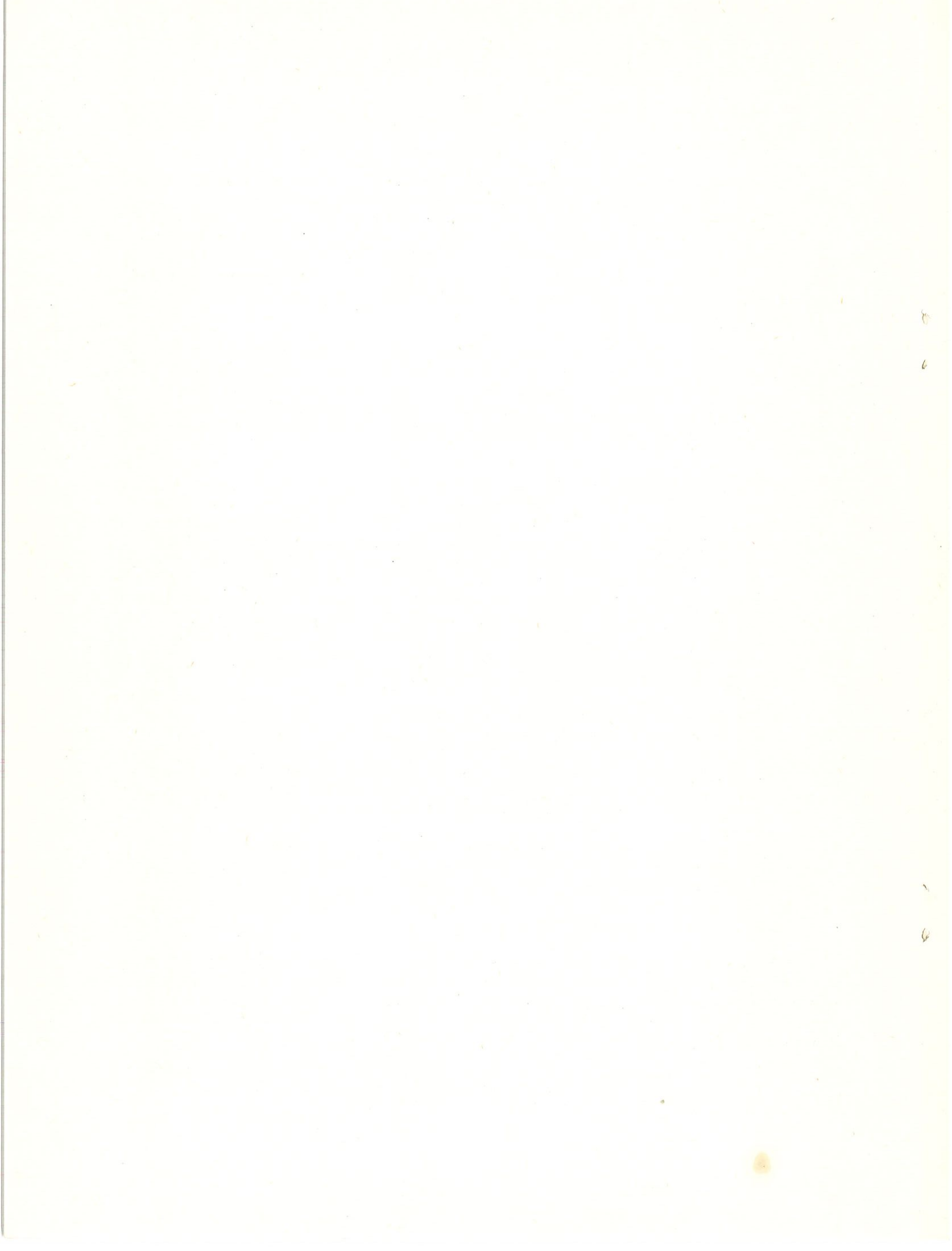


Table 2. Degree selected competencies were needed and possessed by farmers by educational levels

Competencies ^a	Mean scores by grade completed					
	Eighth grade or less N = 10			9 - 12 grade N = 112		
	N ^b	pc	N ^b	pc	N ^b	pc
1	3.20	2.50	3.18	1.92	3.37	2.11
2	3.00	2.00	3.11	2.18	3.12	2.38
3	3.10	2.70	2.86	2.24	2.92	2.20
4	3.00	2.50	2.91	2.98	3.00	2.61
Mean scores of above understandings	3.07	2.42	3.01	2.33	3.10	2.32
14	3.00	2.20	3.23	2.37	3.46	2.35
15	2.50	2.70	3.03	2.17	3.28	2.52
16	3.10	2.30	3.12	2.62	3.24	2.66
17	3.40	2.70	2.67	2.37	3.18	2.96
18	3.50	3.10	3.00	2.28	3.18	2.42
19	2.80	1.90	3.18	2.08	3.18	2.05
Mean scores of above abilities	3.21	2.48	3.04	2.31	3.25	2.49
Total overall mean scores of above competencies	3.16	2.46	3.03	2.31	3.19	2.43

^aNumbers used are for the same competencies as in Table 1.

^bDegree competency was needed as derived from the scale presented in the footnote in Table 1.

^cDegree competency was possessed derived from the scale presented in the footnote in Table 1.

Table 3. Degree selected competencies were needed and possessed by farmers by years of vocational agriculture instruction

Competencies ^a	Mean scores by years of vocational agriculture					
	None		1 or 2 years		3 or 4 years	
	N = 66		N = 19		N = 15	
	N ^b	P ^c	N ^b	P ^c	N ^b	P ^c
<u>Outstanding Farmers</u>						
1	3.18	1.85	3.21	2.05	3.13	1.33
2	3.27	2.42	3.00	2.21	2.60	2.33
3	3.01	2.41	2.73	2.73	2.80	1.73
4	3.18	2.65	2.89	2.88	2.60	2.40
Mean scores of above understandings	3.16	2.33	2.96	2.47	2.78	1.95
14	3.42	2.36	3.26	2.42	3.23	2.46
15	3.42	2.47	2.95	2.79	2.86	2.46
16	3.38	3.10	2.79	2.52	2.86	2.33
17	3.28	2.00	3.05	3.05	2.93	3.00
18	3.25	2.62	3.10	2.68	2.93	2.50
19	3.17	2.10	3.18	2.15	3.20	1.66
Mean scores of above abilities	3.32	2.61	3.05	2.60	3.00	2.40
Total overall mean scores of above competencies	3.25	2.50	3.01	2.55	2.91	2.22
<u>1950-1954 Graduates</u>						
1	2.00	3.00	3.16	2.08	3.37	2.07
2	2.00	3.00	3.16	1.83	3.09	2.11
3	3.00	1.00	2.83	2.58	2.86	2.11
4	1.00	3.00	2.58	2.66	2.92	2.59
Mean scores of above understandings	2.00	2.50	2.93	2.29	3.06	2.22
14	1.00	3.00	3.50	2.25	3.24	2.32
15	3.00	2.00	3.00	2.42	3.06	2.56
16	1.00	3.00	3.50	2.25	3.24	2.54
17	1.00	3.00	2.91	2.42	3.05	2.54
18	3.00	1.00	3.00	2.00	3.01	2.16
19	2.00	2.00	3.50	2.25	3.12	2.01
Mean scores of above abilities	1.83	2.33	3.23	2.41	3.10	2.35
Total overall mean scores of above competencies (1950-1954 graduates)	1.90	2.40	3.11	2.37	3.08	2.30

^aNumbers used are for the same competencies as in Table 1.

^bDegree competency was needed derived from the scale presented in the footnote in Table 1.

^cDegree competency was possessed derived from the scale presented in the footnote in Table 1.

Table 4. Degree selected competencies were needed and possessed by farmers by college credit and noncollege credit short courses in forage production

Competencies ^a	Mean scores							
	College credit				Noncollege credit			
	Yes		No		Yes		No	
	Need	Possess	Need	Possess	Need	Possess	Need	Possess
	N = 37		N = 163		N = 38		N = 162	
1	3.51	2.62	3.19	1.91	3.08	2.00	3.10	2.24
2	3.03	2.60	3.06	2.18	3.08	2.42	2.88	2.20
3	3.03	2.27	2.86	2.22	2.87	2.41	2.88	2.19
4	3.03	2.50	2.91	2.63	3.01	2.52	3.11	2.65
Mean scores of above understandings	3.15	2.49	3.00	2.23	3.01	2.34	3.10	2.24
14	3.43	2.40	2.19	2.34	3.26	2.34	3.32	2.37
15	3.19	2.57	2.06	3.01	3.29	2.52	3.12	2.59
16	3.51	2.76	3.09	2.61	3.09	2.63	3.19	2.45
17	3.18	2.48	2.02	2.09	3.21	2.97	3.07	2.79
18	3.05	2.57	2.02	2.37	3.16	2.49	3.08	2.38
19	3.65	2.16	3.11	2.03	3.08	2.21	2.71	2.02
Mean scores of above abilities	3.33	2.48	2.41	2.41	3.18	2.52	3.08	2.43
Total overall mean scores of above competencies	2.98	2.49	2.65	2.34	3.11	2.45	3.09	2.36

^aNumbers used are for the same competencies as in Table 1.

A separate correlation matrix was run for both sample groups of farmers. The competence needed and possessed scores for the top seven competencies and five control items made a total of 19 variables in the matrix.

For the outstanding farmers four significant correlations were found between control factors. When control factors were correlated with degree competence was possessed, one was significant at the one percent level and three at the five percent level. A positive correlation of .27 was found between educational level attained and ability to recognize stage of maturity at which to harvest high quality forage. Correlations between competence needed and control factors resulted in none significant at the one percent level.

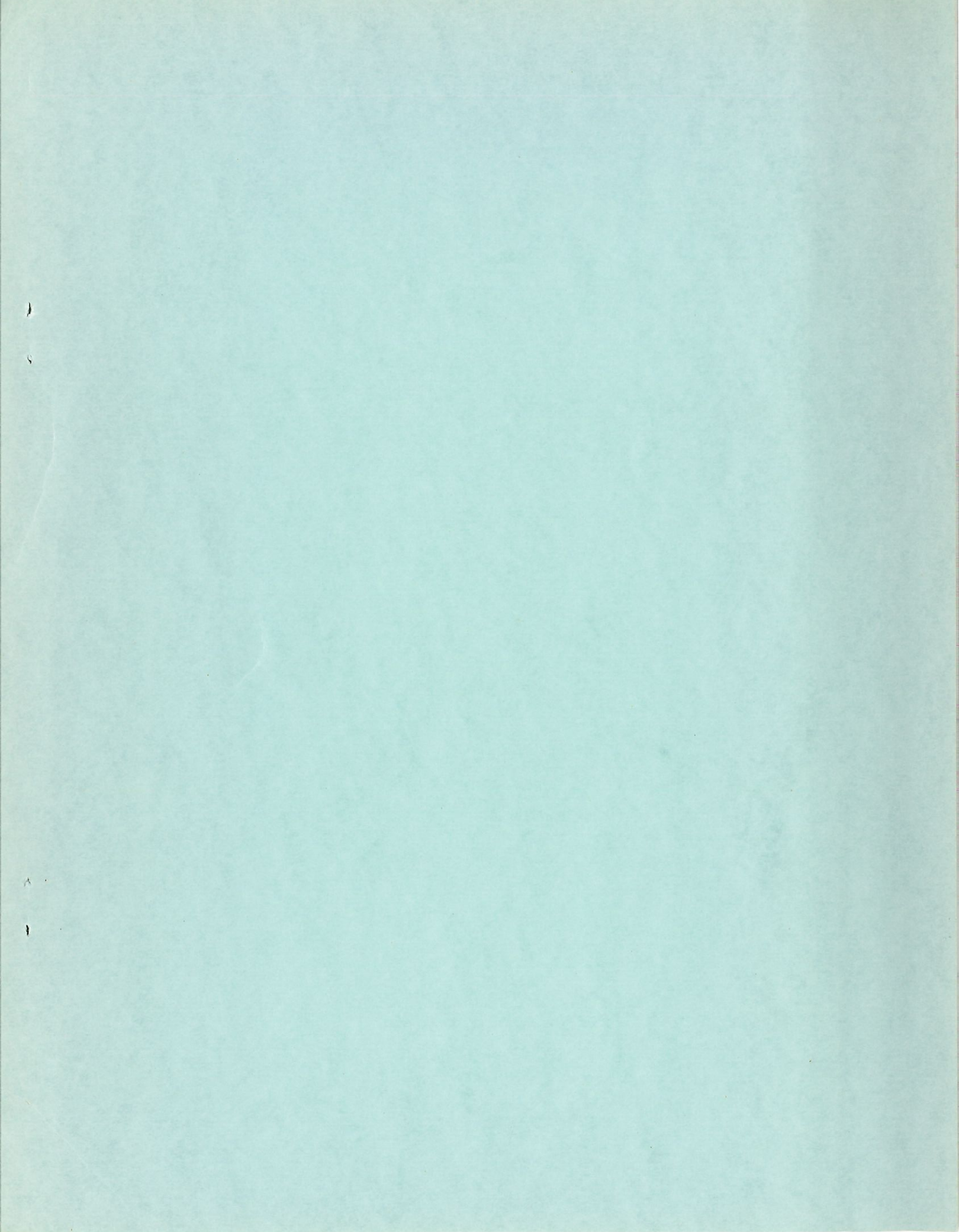
When correlations were made between the scores for the seven selected competencies on the basis of competence needed, possessed and in combination for the outstanding farmers, 39 correlations were significant at the one percent level and 16 at the five percent level. Highest correlation (+.60) was between the ability needed to recognize the stage of maturity at which to harvest high quality forage and the ability needed to determine the moisture content at which to begin final machine harvest operation for best storage preservation.

When correlations were made between control items for the 1950-1954 graduates only two combinations were significant. Correlations between control items and competence possessed scores resulted in two significant correlations. A negative correlation (-.30) at the one percent level existed between years of vocational agriculture and ability possessed to calibrate planting, fertilizing and spraying equipment. Correlations between control items and competence needed scores resulted in one significant at the one percent level and five at the five percent level.

When correlations for the graduates were made between their scores for the seven top competencies, 14 were found significant at the one percent level and 14 at the five percent level. Highest correlation (+.65) was between the understanding of effects of various insecticides and herbicides on forage chemical residue limitations or restrictions and the ability needed to recognize major plant food deficiency symptoms in growing forages.

Implications

The findings of this investigation reveal a need for training in all 34 competencies necessary for success with the production and use of forages. Some competencies need more emphasis than others. The respondents in both groups of farmers felt they possessed considerably less competence in forages than they needed. These 34 competencies should form the basis for forage production and utilization instruction in vocational agriculture programs for high school boys, young farmers and adult farmers, in the cooperative agriculture extension program, in area vocational schools, and in the College of Agriculture resident instruction program.



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