

T H E S I S

F A R M S H O P W O R K
I N
V O C A T I O N A L A G R I C U L T U R E

By
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THIS THESIS HAS BEEN READ
AND APPROVED AND RECOMMENDED
FOR CREDIT.

A handwritten signature in cursive script, appearing to read "H. Sargent". The signature is written in dark ink and is positioned above the printed text of the approver's title.

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May 22, 1923.

THIS THESIS HAS BEEN APPROVED AND
RECOMMENDED FOR THE DEGREE OF MASTER OF
SCIENCE IN VOCATIONAL EDUCATION.



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Professor of Veterinary Pathology

CONSTITUTING
COMMITTEE ON ADVANCED DEGREES

Colorado Agricultural College
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FARM SHOP WORK IN VOCATIONAL AGRICULTURE

I N T R O D U C T I O N

It has been recognized as desirable that instruction in some form of mechanic arts be included with instruction in purely agricultural subjects for about as long a time as agricultural work has been taught.

Although the desirability of such work has long been recognized, it has not been until recently that much has been done to determine what the content of the farm shop course should be, the position it should occupy in the curriculum, how the course should be organized, etc.

The objects of this thesis are to compare the work required in various states, when given and content and scope of the work, in order to learn if the requirements of the Colorado State Plans are at variance with accepted good practice in other states. The second part is an attempt to determine what the farmers consider essential to courses in farm shop work both in construction and repairing. The replies from Colorado are tabulated according to the principal farming regions to see how the courses could be modified to better meet local conditions.

There is a looseness in terminology with the result that there is a hazy idea of what should be included under the term "shop work." Everyone is agreed that it should include some kind of wood work. Practically all

agree some form of metal work should be given. For the purpose of this paper, all of this and more is included; for instance, rope work, harness work, soldering, cement work, window glazing, painting, pipe fitting and plumbing, in fact all kinds of repairing and construction work commonly done on the farm. This at once connects us with farm machinery repair, care and operation, including gas engines and tractors. Automobile repairs and adjustments are included in some states, notably Utah where they have a special appropriation which permits them to do more work of that type than is usual in neighboring states.

There has been no great uniformity in various state plans in the matter of farm shop work in agricultural courses.

P A R T O N E

In order to learn what is being done in other states that I might revise our state plans to advantage, the following questionnaire was sent to each State Supervisor of Agricultural Education.

"I would greatly appreciate the information sought concerning the matter of farm shop work in vocational agriculture. For the purpose of this questionnaire the term "Farm Shop Work" will include farm wood work, hot and cold metal work, bench work of all kinds, harness making and repairing, rope work, tractors and automobiles.

1. Types of work offered

1st year
2nd year
3rd year
4th year

2. Texts and references.

1st year
2nd year
3rd year
4th year

3. Average weekly percentage of time devoted to shop work (Colorado 40% for three years)
4. Average time in minutes per week (Colorado 270 minutes).
5. Do you offer a separate course in Gas Engines and Farm Motors in the third or fourth year agricultural courses?
6. Do you allow students to elect agriculture or shop work as a single course?"

Reasons for asking these particular questions are, I believe, fairly clear. (Many others were thought of but I knew the fate awaiting the extended questionnaire. By including an addressed stamped envelope, I received forty-six replies, several of which were letters.)

When I first became supervisor in Wyoming, I found a very large majority of the agricultural teachers with little or no pedagogical training and some very hazy ideas of what to do in shop work. A very similar condition prevailed in Colorado three years ago, but I am glad to say it is showing marked improvement at present. More emphasis should have been placed on possibilities of

correlating the shop work with the type of agriculture studied by the class. That is now taught here by Professor Schmidt and is recommended in field visits. So many of the teachers, school men and board members, however, needed enlightenment regarding the shop work that the following paragraphs were written into the state plans.

On pages 17 and 18 of the Colorado State Plans we see, "The farm shop work, including also farm machinery, motors and tractors, should not occupy more than forty percent of the time devoted to school work in Vocational Agriculture, or two unit periods of ninety minutes, or 135 minutes per week, as the case may be.

"Thus, a study of a crop should include a study of the plant itself, its relation to the soil, methods of production, harvesting and marketing, and also a study of the weeds, insects, and plant diseases affecting the crop, as well as methods of control, and a study of the farm machinery used in producing or harvesting the crop.

"The farm shop work should be such as to train pupils in proper care and use of tools and materials, interpreting plans, construction and repairing. The construction work should be mainly of wood. The work in iron should be mainly that of repairing. There should also be work in soldering, window glazing, rope splicing, belt

lacing, harness repair and concrete.

"The second year's work should be a continuation of the first, doing such work as would come to the ordinary farm shop. The farm shop work should be taught only as it relates to Vocational Agriculture.

"During the last year of the three year or four year course, the mechanics work may be replaced by courses in sociology and economics which are planned with special reference to farm life and farm problems."

TABLE I COURSES TAUGHT IN FARM SHOP WORK

	First Year	Second Year	Third Year	Fourth Year
Wood Work)	17 ^x	10 ^{xx}	3	
Wood work)				
Repair)	3	4		
Harness work	8	5	2	
Rope work	10	3	1	
Soldering	3	1	3	
Hot Metal Work	1	9	1	
Cold Metal Work	1	7	1	
Care, Repair Adjusting Farm Machinery	2	7	4	9 ^{xxx}
Gas Engines, Motors & Tractors	2	7	7 ^{xxxx}	
Sewage Disposal Plants - Plumbing	1	-	2	1
Heat & Lighting Systems	1	-	1	-
Dairy Barn Plans and Equipment	-	-	3	-
Cement Work	3	5	2	2
Fruit Equipment	-	-	1	-
Farm Engineering and Road Building	-	1	2	-

x Illinois elective
 xx Wyoming elective
 xxx Three include automobiles
 xxxx Ten weeks required in Wyoming

Comparing the Colorado State Plans with Table I it is seen that the former provides for a wide range of conditions. Such freedom of choice is to be preferred to an inflexible program for the different regions of the state.

Twenty-seven of thirty courses in wood work are given in the first two years of the course. When not specified otherwise, wood working courses usually include training in the sharpening and care of tools. Fifteen states named harness work; fourteen named rope work; eleven named hot metal work and only seven mentioned soldering. Cement work is represented by but twelve courses. The small number of states requiring these subjects is unjustifiable in view of the importance attached to these subjects by the farmers themselves.

See Table X A

Colorado is one of the states requiring such work.

TABLE II

FARM SHOP TEXTS AND REFERENCES

		<u>Texts</u>	<u>References</u>	<u>Total</u>
Roehl -	"Agricultural Wood Work"	15	8	23
	"Farm Wood Work"	9	9	18
	"Harness Work"	10	5	15
	"Rope Work"	7	4	11
Brace & Mayne Davidson & Chase	"Farm Shop Work"	7	6	13
	"Agricultural Engineering"	7	4	11
Ramsower	"Equipment for Farm & Farmstead"		3	3
Wirt	"Farm Machinery"	2	1	3
Potter	"Farm Motors"	2	1	3
(Portland Cement Co. Bulletin No Texts		3		3
Frazer & Jones	"Motor Vehicles"	1		1
Ekblaw	"Farm Concrete"	1	1	2
Outlines Supplied Bulletins		4 1		4 2
Davis -	"Rural Engineering"	1	1	1
Burton	"Shop Project and Community Problems"		1	1
Bacon -	"Forge Practice"	1		1
Ives -	"Drawing & Farm Structures"	1		1
Freise -	"Farm Blacksmithing"	2	1	3
Goss -	"Bench Work in Wood"		1	1
Blackburn	"Problems in Farm Wood Work"		1	1
Baxter -	"Elementary Concrete Construction"		1	1
I.H.C.	"Cerberus Engines"		1	1
Sexton	"Concrete Construction"		1	1
Wright	"Automotive Repairs"		1	1

The chief value of Table II is to confirm the selection of farm shop texts and references commonly used in Colorado, so far as suitable texts or manuals are available. It also reveals the lack of books suitable for such work and the use of college farm engineering texts or elementary shop manuals to meet the need. Recent publications have added to the list. Chief among these is "Farm Mechanics" by Crawshaw and Lehman. This book gives promise of becoming a standard text inasmuch as it contains material on practically all of the various types of farm shop work offered in high schools.

The majority of the states apparently follow the same plan as outlined in the Colorado State Plans, although approximately 33% of the courses taught are offered in the first year; 70% by the end of the second year; 90% by the end of the third year and 100% in the fourth year.

Several of the Southern States, some of the Eastern States and two Western States have had no well defined plan in operation. Nine supervisors stated that they correlated the shop work with the work in agriculture. One supervisor writes:

"In regard to the farm shop work, I will state that the work in this state is not on a very definite basis at the present time.

"Where farm shop is offered in this state, it is being offered on the basis of a one year course and there has been no definite year in

which it should be offered. Most schools have been offering the other agricultural work and then having one class in farm shop work in which any of the agricultural boys could be enrolled. The difficulty at the present time is in arranging a schedule that will not conflict with the regular high school work, but still at the same time, allow a boy to take ninety minutes of agriculture in addition to ninety minutes of farm shop work.

"The average percent of time devoted to farm shop work will vary from no time up to fifty per cent of the student's time devoted to agriculture. The average time in minutes per week will be 450.

"Some schools are offering a separate course in Gas Engines and Farm Motors, with Farm Machinery and Farm Equipment as another year's work, while some are dovetailing this into the farm shop work. I am inclined to prefer it in a separate course if offered at all.

"We allow students to elect agriculture without the farm shop work. In fact, we have some schools where the farm shop work is not offered at all."

Shop work (wood) is elective in Illinois and Wyoming. In Michigan, wood shop work is offered ninety minutes per day for one semester and half a semester the fourth year. In Ohio, the shop work is given ninety minutes per day for one year.

Because of the elasticity of the school program and indefinite replies, it is difficult to determine the average percentage of time devoted to shop work. It runs from 0%-50%. The average is between 25%-31%.

The time in minutes varies from nothing to 450

minutes per week. The average is from 192-213 minutes per week.

Eleven states give separate courses in gas engines and tractors and farm machinery. Eighteen do not separate the instruction so given.

Twenty-three states stated definitely that they did not allow students to elect farm shop work unless they also took other work in agriculture. Three states have allowed it in some instances.

The situation revealed by the questionnaire is interesting, but a much more interesting collection of information results when replies are secured from 200-300 representative farmers from one or more states, telling the kinds of work they consider the most important for instructional purposes both in construction and repairs. Work of this nature has been done in Pennsylvania, Wisconsin, Minnesota, South Dakota, California and is in progress in other states. Acknowledgement is made to the above for helpful suggestions obtained. The writer wishes further to acknowledge the helpful cooperation of the State Supervisors, agricultural teachers and others that made possible the collection and compilation of the data secured.

P A R T T W O

In order to determine what the farmers consider the most essential repair and construction jobs to be taught in farm shop course classes, questionnaires were sent to the teachers of vocational agriculture in the state of Colorado. They obtained the information through the cooperation of the pupils and through personal interviews. Two hundred well distributed replies were received from two hundred individuals.

The same questionnaires were sent to the State Supervisors of the other states included in the Pacific Region (Montana, Wyoming, New Mexico, Arizona, Utah, Nevada, Idaho, Washington, Oregon and California). The supervisors were requested to have these filled and returned to the writer. Sixty-five replies to the repair job sheet were received and fifty-four replies to the construction job sheet. In the Western States the same people did not answer each questionnaire. An attempt to remedy this situation in the case of one state was so unsatisfactory that it was not tried in other states. Two states made no reply and a third was so late that but one answer was received in time for tabulation.

The "jobs" selected were tabulated in the order of choice and the replies from Colorado were further arranged according to local regions. The Colorado

replies on the repair jobs were also classified on a basis of plus or minus three miles from market or blacksmith.

The following questionnaires were used:

Date

Please give us the following personal data.

Name Age
Town County

1. How long have you operated a farm? Years
2. No of acres in the farm? Acres
3. Do you own or rent the farm?
4. Distance from market? Miles
5. Distance from blacksmith? Miles
6. Check the kind of a farm you operate, (a) General,
 (b) Livestock, (c) Dairy, (d) Grain, (e) Fruit,
 (f) Poultry.
7. Is it irrigated?
8. Check if your house is equipped with (a) Electric lights,
 (b) Gas lights, (c) Running water, (d) Sewage system.
9. Underscore method of heating used, steam, hot water,
 hot air, stove.

List of Farm Shop Problems (repair work)

Please check the 20 most important items of this
repair list.

- | | |
|---|---------------------------------|
| 1. Put new section in sickle | 18. Tie about 10 good knots |
| 2. Repair binder sill | 19. Cut glass |
| 3. Fixing binder canvas | 20. Puttying |
| 4. Repairing harness | 21. Painting |
| a. oil | 22. Plastering |
| b. riveting | 23. Repairing mower |
| c. sewing | pitman |
| 5. Fitting handles to tools
(hammer, ax) | 24. Soldering |
| 6. Repairing link in chain | 25. Lace belts |
| 7. Repairing broken chair | 26. Make rope halters |
| 8. Put new leather in pump | 27. Grind scythes |
| 9. Cutting new threads on bolts | 28. Grind sickle |
| 10. Sharpening plow share | 29. Grind ax |
| 11. Sharpening drag teeth | 30. Whip end of a rope |
| 12. Sharpening cultivating shovels | 31. Splice a rope |
| 13. Sharpening disc | 32. Sharpen a bit |
| 14. Sharpening hand saws | 33. Fit pipe |
| 15. Sharpening two man saws | 34. Hang farm gate |
| 16. Tempering metals | 35. Make joints in
carpentry |
| 17. Welding broken sickle or
machine parts | 36. Laying shingles |
| | 37. Additional repair work |
| | |
| | |

Name

Date

Please check in this manner the 40 most important jobs listed below which you consider worth while for boys in high school to devote their time in learning. In checking these items, please keep in mind that separate work in farm machinery and gas engines will be given.

Check Making of

- | | | |
|---------------------------------|-----------------------------|---------------------------------|
| 1 Milk stools | 30 Grain bin | 59 Egg tester |
| 2 Wire fences
(barb & woven) | 31 Wagon rack
(cattle) | 60 Trap nest |
| 3 Hog troughs | 32 Feed rack | 61 Oat sprouter |
| 4 Double trees | 33 Seed tester | 62 Milk record
sheet cabinet |
| 5 Hammer handles | 34 Seed corn drying
rack | 63 Fireless cooker |
| 6 Pick handles | 35 Mortar box | 64 Ironing board |
| 7 Ax handles | 36 Hog shipping
crate | 65 Kitchen sink |
| 8 Sledge handles | 37 Hog house | 66 Wash bench |
| 9 File handles | 38 Chicken house | 67 Mitre box |
| 10 Saw horse | 39 Cattle shipping
crate | 68 Loading chute
for cattle |
| 11 Hens nest | 40 Wagon box | 69 Road drag |
| 12 Farm gate | 41 Wheelbarrow | 70 Storm sash |
| 13 Hay rack | 42 Screen door | 71 Hot bed & Cold
frame |
| 14 Feeding trough | 43 Screen window | 72 Chisels |
| 15 Pig pen | 44 Wagon bolster | 73 Pinchers |
| 16 Stone boat | 45 Wagon seat | 74 Tongs |
| 17 Nail box | 46 Potato marker | 75 Staples |
| 18 Tool box | 47 Kitchen table | 76 Bolts |
| 19 Self feeder
(chicks) | 48 Shoveling board | 77 Cement floor |
| 20 Chicken crate | 49 Wagon tongue | 78 Cement wall |
| 21 Wagon reach | 50 Farm work bench | 79 Cement foundation |
| 22 House ladder | 51 Neck yoke | 80 Cement steps |
| 23 Step ladder | 52 Wagon jack | 81 Cement trough |
| 24 Fruit ladder | 53 Bird house | 82 Cement posts |
| 25 Bread board | 54 Dog house | 83 Cement water
tank |
| 26 Saw buck | 55 Book rack | 84 Cement culverts |
| 27 Calf pen | 56 Corn crib | 85 Cement milk
house |
| 28 Hand sled | 57 Ice house | |
| 29 Curry comb box | 58 Smoke house | |

Additional construction
work

The survey was sufficiently extensive in character to present a cross section of the more representative farmers of Colorado. It is not equally representative of the Western States, owing to lack of numbers and unequal distribution. It does, however, furnish a basis for interesting comparison.

TABLE III TYPE OF FARM STUDIED (COLORADO)

Age of Farmer	Operated by		Owners		Renters	
	No. (Total)	Per cent (Total)	No.	Per cent	No.	Per cent
Under 25	3	1.5	1	.5	2	1.0
(26-30	7	3.5	2	1.0	5	2.5
(31-32	3	1.5	2	1.0	1	.5
(33-34	6	3.0	3	1.5	3	1.5
(35-36	3	1.5	3	1.5	-	-
(37-38	2	1.0	1	.5	-	-
(39-40	15	7.5	10	5.0	5	2.5
(41-42	14	7.0	11	5.5	3	1.5
(43-44	22	11.0	14	7.0	6	3.0
(45-46	21	10.5	15	7.5	5	2.5
(47-48	16	8.0	13	6.5	3	1.5
(49-50	25	12.5	22	11.0	3	1.5
(51-52	15	7.5	13	6.5	2	1.0
(53-54	10	5.0	9	4.5	-	-
(55-56	9	4.5	8	4.0	1	.5
(57-58	9	4.5	8	4.0	1	.5
(59-60	4	2.0	4	2.0	-	-
(61-62	3	1.5	3	1.5	-	-
(63-64	2	1.0	1	.5	1	.5
(65-66	5	2.5	5	2.5	-	-
(67-68	3	1.5	3	1.5	-	-
(69-70	2	1.0	2	1.0	-	-
(87	1	.5	1	.5	-	-
Not given	5	2.5	-	-	-	-

Percentage of farms rented - 20.5%

Percentage of farms owned - 77.0%

Not reported - 2.5%

TABLE III A

TYPE OF FARMS STUDIED
(WESTERN STATES)

Age of Farmer	<u>Operated</u>		<u>by</u>	<u>Owners</u>		<u>Renters</u>	
	No.	Per cent (Total)		No.	Per cent	No.	Per cent
Under 25	2	3.1		1	1.5		
26-30	6	9.2		4	6.2	2	3.1
31-32	5	7.7		3	4.6	1	1.5
33-34	2	3.1		2	3.1	-	-
35-36	2	3.1		2	3.1	-	-
37-38	2	3.1		2	3.1	-	-
39-40	1	1.5		1	1.5		
41-42	7	10.8		4	6.2	3	4.6
43-44	2	3.1		2	3.1	-	-
45-46	7	10.8		5	7.7	-	-
47-48	-	-		-	-	-	-
49-50	7	10.8		4	6.2	-	-
51-52	3	4.6		2	3.1	-	-
53-54	1	1.5		1	1.5	-	-
55-56	2	3.1		2	3.1	-	-
59-60	3	4.6		3	4.6	-	-
61-62	1	1.5		1	1.5	-	-
63-64	3	4.6		3	4.6	-	-
71-72	1	1.5		1	1.5	-	-
Not given	16	24.6					

Percentage of farms rented - 9.2%

Percentage of farms owned - 66.2%

Not reported - 24.6%

From the personal information obtained we learn that the average age of the two hundred Colorado farmers is 47.0 years with an average experience of 20.9 years operating a farm. The sixty-five farmers from the Western States average 43.7 years of age with an average experience of 17.0 years operating a farm. In this latter group are ten farmers with less than ten years experience. 77.0% of the Colorado farmers own their farms while 20.5% are renters. 2.5% did not answer. 66.2% of the Western farmers own their farms. 13.8% rent farms while 20.0% did not reply as to ownership.

TABLE IV

SIZE OF FARMS
NUMBER AND PER CENT

Acres	Colorado		Western States	
	No. of Farms	Per cent	No. of Farms	Per cent
1-19	11	5.5	2	3.1
20-99	57	28.5	21	32.3
100-149	16	8.0	2	3.1
150-219	37	18.5	11	16.8
220-299	10	5.0	5	7.7
300-399	35	17.5	5	7.7
400 or more	32	16.0	12	18.5
Not given	<u>2</u>	<u>1.0</u>	<u>7</u>	<u>10.8</u>
	200	100.0	65	100.0

Within Colorado, approximately one-third of the farmers answering the questionnaire are on farms under 100 acres; one-third on farms between 100 and 300 acres and one-third on farms over 300 acres. There is a tendency toward a similar grouping in the Western States.

TABLE V

DISTANCE TO NEAREST MARKET AND
NEAREST BLACKSMITH

Miles	<u>M a r k e t</u>				<u>B l a c k s m i t h</u>			
	Colorado		Western States		Colorado		Western States	
	Per		Per		Per		Per	
	No.	cent	No.	cent	No.	cent	No.	cent
0	20	10.0	10	15.4	31	15.5	12	18.5
1÷ - 2	38	19.0	5	7.7	44	22.0	6	9.2
2÷ - 3	41	20.5	8	12.3	48	24.0	10	15.4
3÷ - 4	19	9.5	7	10.8	20	10.0	8	12.3
4÷ - 5	22	11.0	4	6.2	20	10.0	3	4.6
5÷ - 7½	19	9.5	3	4.6	16	8.0	4	6.2
7½÷ - 10	22	11.0	8	12.3	15	7.5	9	13.8
10÷ - 15	7	3.5	4	6.2	3	1.5	1	1.5
15÷ - 20	1	.5	3	4.6	1	.5	3	4.6
20÷ - 25	1	.5	2	3.1	1	.5	1	1.5
25÷	4	2.0	3	4.6	-	-	-	-
Not given	6	3.0	8	12.3	1	.5	8	12.3

As might be expected, the farms studied in Colorado are located nearer to market and a blacksmith than are those of the Western States. In most cases also, the farmers in each region are closer to a blacksmith than to market.

Markets are located within five miles of 70.0% of the Colorado farms, while the same radius will find 81.5% of the Colorado farms within five miles of a blacksmith. For the Western States, the figures for the same distance show 52.4% for market and 60.0% for blacksmith shop.

The same relative situation obtains for the shorter distance of three miles. 49.5% of the Colorado farms are within three miles of a market and 61.5% are the same distance from a blacksmith.

35.4% of the farms of the Western States are within three miles of a market and 43.1% are within three miles of a blacksmith.

TABLE VI

KIND OF FARMS

	Colorado (200)		Western States (65)	
	No.	Per cent	No.	Per cent
General	154	77.0	41	63.1
Live Stock	30	15.0	9	13.8
Dairy	22	11.0	4	6.2
Grain	22	11.0	4	6.2
Fruit	16	8.0	5	7.7
Poultry	20	10.0	5	7.7
Not given	-	-	5	7.7
	264		83	
Twice counted	<u>64</u>		<u>18</u>	
	200		65	

	Colorado (200)		Western States (65)	
	No.	Per cent	No.	Per cent
Irrigated	157	78.5	46	70.8
Not irrigated	34	17.0	9	13.9
Not given	9	4.5	10	15.3

Table VI shows the majority of the farms classified as general farms. Ambiguous or double listing by the owners, i.e. "fruit and poultry", resulted in counting some farms twice.

Colorado reports 78.5% of the farms irrigated; 17.0% not irrigated and 4.5% not answering. The replies

from the Western States are unsatisfactory owing to the large percentage (15.3%) failing to report this item.

TABLE VII
NUMBER AND PERCENT OF FARMS
HAVING CONVENIENCES

	Colorado (200)		Western States (65)	
	No.	Per cent	No.	Per cent
Electric lights	44	22.0	25	38.5
Gas lights	25	12.5	7	10.8
Running water	61	30.5	35	53.8
Sewage disposal	44	22.0	22	33.8

	Colorado (200)		Western States (65)	
	No.	Per cent	No.	Per cent
Steam Heat	3	1.5	0	0.
Hot water	11	5.5	1	1.5
Hot air	14	7.0	5	7.7
Stove	164	82.0	53	81.5
Not given	8	4.0	6	9.3

From the figures given in Table VII, there is reason to believe that the farms considered in this study are above the average in equipment and conveniences for the farm home. There is no marked difference in heating devices but aside from the matter of gas lights, there is a marked difference in the percentage of household conveniences in favor of the Western States. Here again comparisons may not be made rigidly owing to the small number representing the Western States.

From the information presented in Tables III

to VII, we are justified in believing that the Colorado farmers, at least, who answered the questionnaires constitute a very representative group of the so called "better class" of farmers. Because of this, we may assume that with their age and experience, their judgment is sufficiently clear and mature to enable them to give worth while opinions.

TABLE VIII Number And Percentage Of Farmers
Suggesting The Following Repair Jobs
To Be Taught In The Farm Shop Courses.

	Colorado (200)		Western States (65)	
	No.	Per cent	No.	Per cent
1 - Repairing harness	196	98.0	61	93.8
2 - Fitting handles to tools (hammer, ax)	171	85.5	59	90.7
3 (Hang farm gate	166	83.0	53	81.5
3 - (Grind sickle	166	83.0	47	72.3
4 - Soldering	151	75.5	54	83.1
5 - Splice a rope	150	75.0	46	70.8
6 - Sharpening plow share	149	74.5	46	70.8
7 - Put new section in sickle	148	74.0	46	70.8
8 - Painting	142	71.0	48	73.8
9 - Cutting new threads on bolts	141	70.5	44	67.7
10 - Put new leather in pump	140	70.0	46	70.8
11 - Repairing mower pitman	138	69.0	32	49.2
12 - (Make rope halters	132	66.0	32	49.2
12 - (Fixing binder canvas	132	66.0	25	38.5
13 - Tie about 10 good knots	127	63.5	45	69.2
14 - Welding broken sickle or machine parts	126	63.0	29	44.6
15 - Laying shingles	120	60.0	42	64.6
16 - Sharpen a bit	117	58.5	45	69.2
17 - Make joints in carpentry	115	57.5	35	53.8
18 - Grind ax	114	57.0	55	84.6
19 - Lace belts	105	52.5	43	66.2
20 - Tempering metals	99	49.5	25	38.5
21 - Sharpening cultivator shovels	91	45.5	28	43.1
22 - Sharpening two-man saws	86	43.0	23	35.8
23 - Grind scythes	82	41.0	35	53.8
24 - Fit pipe	80	40.0	38	58.4
25 - Puttying	70	35.0	17	26.2
26 - Repairing link in chain	66	33.0	23	35.8
27 - Repairing broken chair	65	32.5	25	38.5
28 - Plastering	62	31.0	13	20.0
29 - Sharpening drag teeth	59	29.5	19	29.2
30 - Sharpening disc	57	28.5	20	30.8
31 - Repair binder sill	51	25.5	10	15.4
32 - Cut glass	48	24.0	12	18.3
33 - Whip end of a rope	43	21.5	19	29.2
34 - Sharpening hand saws x	40	20.0	55	84.6

xBand saws" a typographical error in Colorado
questionnaire. It should have read "Hand saws."

Table VIII shows repair jobs listed in order according to Colorado returns. The most striking result apparent is the importance assigned to harness repairing. 196 out of 200 replies from Colorado included it. 61 out of 65 from the Western States did likewise. In each group it ranked first with percentages of 98.0% and 93.8% respectively.

Comparing the replies further, the results of a typographical error are apparent. In the original questionnaire sent out in Colorado, the item "Sharpening hand saws" was copied as "Sharpening band saws" and sent out as such. As might be expected, this job received the smallest percentage of votes from Colorado. The error was corrected on the questionnaires sent to the Western States with the result that "Sharpening hand saws" ranked third in that group with 55 or 84.6% suggesting that particular job. It is reasonable to assume that that work would have had approximately the same ranking on the Colorado list had it been properly included.

With this exception and one other there is little material difference in the placings of the first ten jobs listed. Grinding an ax ranks eighteenth on the Colorado list and fourth on the Western States list, with a difference of 27.6%. The difference may be due to a more frequent use of the ax in the Western States. Below the first ten jobs larger differences are noticed

between the choice of Colorado and the Western States.

The very practical list of repairs suggested and the order in which they are placed by the farmers of Colorado and other Western States would indicate that many states are not giving sufficient attention to harness work, soldering, hot and cold metal work. Additional repair work suggested but not tabulated, included soling shoes, true a grindstone, setting horse shoes, repairing flumes and head gates and repair stacker.

TABLE VIII A Number And Percentage Of Farmers
Suggesting The Following Repair Jobs
To Be Taught In The Farm Shop Courses.
Arranged According To Regions.

Rank	Items	Platte Valley (77)		Arkansas Valley (45)		Western Slope (56)		San Luis Valley (22)	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
1	Repairing harness	75	97.4	44	97.8	56	100.0	21	95.5
2	Fitting handles to tools (hammer-ax)	67	87.0	38	84.4	49	87.6	17	77.3
3	(Hang farm gate	59	76.5	40	88.9	48	85.7	19	86.4
3	(Grind sickle	63	81.8	38	84.4	47	83.9	18	81.8
4	Soldering	60	77.9	34	77.8	39	69.6	18	81.8
5	Splice a rope	60	77.9	31	68.9	42	75.0	17	77.3
6	Sharpening plow share	53	68.8	31	68.9	49	87.6	16	72.7
7	Put new section in sickle	57	75.3	29	64.4	47	83.9	15	68.2
8	Painting	51	66.2	36	80.0	41	73.2	14	63.6
9	Cutting new threads on bolts	55	71.4	30	66.6	39	69.6	17	77.3
10	Put new leather in pump	63	81.8	37	82.2	28	50.0	12	36.4
11	Repairing mower pitman	45	58.4	32	71.1	45	80.3	16	72.7
12	(Make rope halters	55	71.4	29	64.4	34	60.7	14	63.6
12	(Fixing binder canvas	47	61.0	30	66.6	37	66.1	18	81.8
13	Tie about 10 good knots	49	63.6	30	66.6	33	58.9	15	68.2
14	Welding broken sickle or machine parts	44	57.1	29	64.4	37	66.1	16	72.7
15	Laying shingles	51	66.2	27	60.0	31	55.3	11	50.0
16	Sharpen a bit	41	53.3	27	60.0	36	64.2	13	59.1
17	Make joints in carpentry	48	62.3	21	46.7	33	58.9	13	59.1
18	Grind ax	43	55.9	20	44.4	37	66.1	14	63.6
19	Lace belts	43	55.9	25	55.6	19	33.9	18	81.8
20	Tempering metals	33	42.9	21	46.7	33	58.9	12	54.5
21	Sharpening cultiva- tor shovels	35	45.5	21	46.7	27	48.2	8	36.4
22	Sharpening two- man saws	28	36.4	20	44.4	25	44.6	13	59.1
23	Grind soythes	37	48.1	19	42.2	21	37.5	5	22.7
24	Fit pipe	36	46.8	17	37.8	18	32.1	9	40.9

TABLE VIII A

(Continued)

Rank	Items	Platte Valley (77)		Arkansas Valley (45)		Western Slope (56)		San Luis Valley (22)	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
25	Puttying	29	37.5	19	42.2	15	26.7	7	31.8
26	Repairing link in chain	23	29.9	11	24.4	23	41.1	9	40.9
27	Repairing broken chair	27	35.1	16	35.5	17	30.3	5	22.7
28	Plastering	22	28.6	18	40.0	12	21.4	10	45.5
29	Sharpening drag teeth	20	26.0	15	33.3	15	26.7	9	40.9
30	Sharpening disc	25	32.5	12	26.7	15	26.7	5	22.7
31	Repair binder sill	15	19.5	8	17.8	21	37.5	7	31.8
32	Cut glass	17	22.1	16	35.5	12	21.4	3	13.6
33	Whip end of a rope	20	26.0	10	22.2	10	17.8	3	13.6
34	Sharpening band saws x	21	27.3	10	22.2	8	14.2	1	4.5

x Written "band" saws rather than "hand saws" through error.

Variation in the importance of repair jobs by different sections of the state may be explained in part, at least, by the necessity for such jobs in the experience of the individual, the small number (22) reporting from the San Luis Valley, and types of agriculture predominating. In general most of the variations are due to the above causes; for instance, the job of lacing belts has eighteen votes or 81.8% in the San Luis Valley, nineteen votes or 33.9% on the Western Slope, forty-three votes or 55.9% in the Platte Valley and twenty-five votes or 55.6% in the Arkansas Valley. Putting new leather in pump was indicated in 81.8% of the Platte Valley returns, 82.2% for the Arkansas Valley, 50.0% for the Western Slope and but 36.4% for the San Luis Valley showing the influence of an easily obtained water supply.

At a conference of teachers of vocational agriculture, held at Fort Collins in the summer of 1921, Professor L. M. Roehl, of Cornell, made a statement to the effect that distance from a blacksmith would have an influence upon the type of work to be offered in a farm shop course and that metal work, particularly hot metal work, was not important as the farmer could reach a blacksmith within a couple of miles. Exception was taken

to the statement and Table IX was arranged to see how necessary the farmers at various distances regarded such instruction.

TABLE IX

Percentage Of Farmers Under And Over
Three Miles From Blacksmith, Who Deem
It Worth While To Teach The Following
Repair Jobs In Farm Shop.

Rank	Items	Eight Western States			
		Colorado	Colorado	Western States	Western States
		-3 miles (121)	+ 3 miles (76)	-3 miles (28)	+ 3 miles (29)
1	- Repairing harness	98.3%	98.7%	92.9%	93.1%
2	- Fitting handles to tools (hammer, ax)	89.3	81.6	85.7	93.1
3	- (Hang farm gate	80.1	81.6	75.6	82.8
3	- (Grind sickle	79.3	88.1	67.9	72.4
4	- Soldering	71.9	80.3	71.4	89.7
5	- Splice a rope	78.5	75.0	74.1	69.0
6	- Sharpening plow share	71.9	78.9	67.9	65.5
7	- Put new section in sickle	71.0	78.9	64.3	79.6
8	- Painting	76.0	64.5	67.9	75.8
9	- Cutting new threads on bolts	66.9	82.9	71.4	72.4
10	- Put new leather in pump	71.9	71.1	67.9	58.6
11	- Repairing mower pitman	66.9	73.7	60.7	51.7
12	- (Make rope halters	63.6	66.4	53.6	51.7
12	- (Fixing binder canvas	54.5	84.3	35.7	44.8
13	- Tie about 10 good knots	64.5	63.2	67.9	65.5
14	- Welding broken sickle or machine parts	62.0	63.2	39.3	51.7
15	- Laying shingles	59.5	59.2	75.0	58.6
16	- Sharpen a bit	52.1	70.0	71.4	65.5
17	- Make joints in carpentry	58.7	57.9	64.3	41.3
18	- Grind ax	58.7	52.6	89.3	79.3
19	- Lace belts	47.9	61.8	71.4	62.1
20	- Tempering metals	46.3	53.9	35.7	34.5
21	- Sharpening cultivator shovels	45.4	47.1	50.0	37.9
22	- Sharpening two-man saws	43.8	40.8	39.3	27.5
23	- Grind scythes	45.4	34.1	50.0	41.3
24	- Fit pipe	41.3	36.8	46.4	62.1
25	- Puttying	31.4	27.6	25.0	20.6
26	- Repairing link in chain	29.8	43.4	32.1	41.3
27	- Repairing broken chair	38.0	25.0	39.3	34.4
28	- Plastering	26.4	40.8	14.3	13.7
29	- Sharpening drag teeth	34.7	28.9	35.7	20.6
30	- Sharpening disc	28.9	25.0	17.9	37.9
31	- Repair binder sill	20.7	30.3	17.9	17.2
32	- Cut glass	28.1	19.7	10.7	17.2

TABLE IX

(Continued)

	Colorado		Eight Western States	
	-3 miles (121)	+3 miles (76)	-3 miles (28)	+3 miles (29)
33 - Whip end of a rope	28.1%	13.1%	25.0%	27.5%
34 - Sharpening hand saws x	20.7	19.7	x 85.7	79.3

x "Band saws" a typographical error in Colorado
questionnaire. It should have read
"Hand saws."

^x
x "Hand saws"

In Colorado practically all repair jobs dealing with metals, including grinding sickle but no other sharpening jobs, received a higher percentage of choice from farmers residing more than three miles from a blacksmith. This applies also to machinery repair jobs such as fixing binder canvas , repairing binder sill and belt lacing. The extensive type of farming and greater use of farm machinery on the larger farms would explain this condition.

The repair of smaller implements and hand tools, as fitting handles to tools, grinding scythes, sharpening discs and saws are more frequently selected by farmers living less than three miles from a blacksmith. These results are supported sufficiently by the farmers in the Western States to justify the conclusion that farm shop work should include instruction in hot and cold metal work and particularly where members of the class live more than three miles from a blacksmith.

TABLE X Number And Percentage Of Farmers
Suggesting The Following Construction
Work To Be Taught In Farm Shop Courses.

R a n k	Items	Colorado (200)		R a n k	Eight Western States (54)	
		No.	Per cent		No.	Per cent
1 -	Farm Gate	179	89.5	1	48	87.0
2 -	Hay rack	175	87.5	3	44	81.5
3 -	Farm work bench	163	81.5	1	48	87.0
4 -	Hog house	160	80.0	6	40	74.1
5 -	Cement floor	158	79.0	1	48	87.0
6 -	Wire fences	155	77.5	10	35	64.8
7 -	(Chicken house	154	77.0	2	46	85.2
7 -	(Feed rack	154	77.0	9	37	68.5
8 -	Cement foundation	153	76.5	5	41	75.9
9 -	Feed trough	149	74.5	6	40	74.1
10-	Hog trough	148	74.0	6	40	74.1
11-	Pig pen	145	72.5	7	39	72.2
12-	Double trees	142	71.0	6	40	74.1
13-	Grain bin	141	70.5	19	24	44.4
14-	Self feeder chicks	136	68.0	5	41	75.9
15-	Cement water tank	133	66.5	13	30	55.6
16-	(Smoke house	127	63.5	14	29	53.7
16-	(Hot bed and cold frame	127	63.5	3	44	81.5
17-	(Wagon box	126	63.0	15	28	51.9
17-	(Screen door	126	63.0	13	30	55.6
18-	Cement wall	119	59.5	17	28	48.1
19-	Hog shipping crate	118	59.0	15	28	51.9
20-	Calf pen	116	58.0	19	24	44.4
21-	(Wagon tongue	114	57.0	14	29	53.7
21-	(Tool box	114	57.0	4	42	77.8
22-	Seed tester	112	56.0	5	41	75.9
23-	Cement trough	109	54.5	10	35	64.8
24-	Wagon jack	108	54.0	13	30	55.6
25-	Corn crib	107	53.5	18	25	46.3
26-	Hen's nest	106	53.0	8	38	70.4
27-	Ice house	105	52.5	25	18	33.3
28-	(Wagon reach	104	52.0	12	32	59.3
28-	(Road drag	104	52.0	12	32	59.3
29-	Cement steps	103	51.5	18	25	46.3
30-	Kitchen sink	102	51.0	21	22	40.7
31-	Loading chute for cattle	101	50.5	12	32	59.3
32-	Hammer handles	99	49.5	12	32	59.3

TABLE X

(Continued)

Rank	Items	Colorado (200)		Rank	Eight Western States (54)	
		No.	Per cent		No.	Per cent
33	- Cement milk house	98	49.0	24	19	35.2
34	- Screen window	97	48.5	18	25	46.3
35	- Saw horse	96	48.0	5	41	75.9
36	- Mitre box	87	43.5	14	29	53.7
37	- (Wash bench	86	43.0	11	33	61.1
37	- (Chicken crate	86	43.0	14	29	53.7
37	- (Trap nest	86	43.0	16	27	50.0
38	- (House ladder	85	42.5	19	24	44.4
38	- (Step ladder	85	42.5	11	33	61.1
39	- (Wagon bolster	84	42.0	29	12	22.2
39	- (Wagon rack for cattle	84	42.0	26	17	31.5
40	- (Cement culvert	82	41.0	23	20	37.0
40	- (Milk record sheet cabinet	82	41.0	9	37	68.5
41	- (Chisels	80	40.0	17	26	48.1
41	- (Cement posts	80	40.0	24	19	35.2
42	- Wheelbarrow	76	38.0	22	21	38.9
43	- (Kitchen table	73	36.5	20	23	42.6
43	- (Milk stools	73	36.5	15	28	51.9
44	- Oat sprouter	72	36.0	21	22	40.7
45	- Neck yoke	71	35.5	27	15	27.8
46	- Egg tester	70	35.0	13	30	55.6
47	- Ironing board	69	34.5	16	27	50.0
48	- Ax handle	67	33.5	25	18	33.3
49	- Bolts	66	33.0	22	21	38.9
50	- Shoveling board	64	32.0	32	7	13.0
51	- (Book rack	63	31.5	25	18	33.3
51	- (Seed corn drying rack	63	31.5	22	21	38.9
51	- (Saw buck	63	31.5	23	20	37.0
52	- Potato marker	62	31.0	28	14	25.9
53	- (Wagon seat	58	29.0	28	14	25.9
53	- (Fruit ladder	58	29.0	22	21	38.9
54	- Tongs	57	28.5	27	15	27.8
55	- Pinchers	55	27.5	27	15	27.8
56	- Fireless cooker	54	27.0	28	14	25.9
57	- Storm sash	53	26.5	34	5	9.3
58	- Mortar box	49	24.5	31	8	14.8
59	- Nail box	44	22.0	15	28	51.9
60	- Curry comb box	42	21.0	31	8	14.8
61	- Cattle shipping crate	40	20.0	30	11	20.4

TABLE X

(Continued)

Rank	Items	Colorado		Eight Western States		
		(200)		Rank	(54)	
		No.	Per cent		No.	Per cent
62	-(Pick handle	32	16.0	32	7	13.0
62	-(File handle	32	16.0	28	14	25.9
62	-(Sledge handle	32	16.0	33	6	11.1
63	- Staples	28	14.0	28	14	25.9
64	- Stone boat	27	13.5	33	6	11.1
65	- Bread board	26	13.0	30	11	20.4
66	- Dog house	24	12.0	32	7	13.0
67	-(Hand sled	17	8.5	34	5	9.3
67	-(Bird house	17	8.5	35	2	3.7

To an even greater degree than with the repair jobs, the choice of construction jobs emphasizes the desire for practical instruction in farm shop work by the farmers replying to the questionnaire. Jobs that frequently occur as shop exercises in manual training, such as a bird house, hand sled, dog house and bread board are at the bottom of the list irrespective of any value they may possess as exercises to give skill in the use of tools. This same reaction toward manual training explains in part the growing criticism of that type of shop work and an increasing appreciation of farm shop work.

As in the repair work, all are agreed on the first item, making a farm gate. The second item on the Colorado list, making a hay rack, is third for the Western States. The third item for Colorado, making a farm work bench, is tied for first with making of a farm gate, and making a cement floor on the Western States list.

The first ten places on the Colorado list include most of the construction jobs in the first ten places on the Western States list. It is interesting to note that No. 14 (Self feeder for chicks), No. 22 (Tool box), No. 23 (Seed tester) and No. 35 (Saw horse) on the Colorado list are tied for fifth place on the Western States list.

One of the most striking things brought out by the questionnaire on construction work is the emphasis placed upon construction work in cement by the farmers of all the regions studied. The following table gives the information in more condensed form.

TABLE X A CONSTRUCTION WORK IN CEMENT
NUMBER AND PERCENTAGE OF
CONSTRUCTION WORK SUGGESTED

	R a n k	Colorado		R a n k	Eight Western States		
		No	Per cent		No	Per cent	
Cement floor	6	162	81.0	1	48	87.0	(A tie)
Cement founda- tion	8	157	78.5 (tie)	5	41	75.9	" "
Cement water tank	15	137	68.5	13	30	55.6	" "
Cement wall	20	122	61.0	17	26	48.1	
Cement trough	25	113	56.5	"	10.	35	64.8 " "
Cement steps	31	106	53.0	18	25	46.3	" "
Cement milk house	32	105	52.5	24	19	35.2	" "
Cement culverts	42	84	42.0	"	23	20	37.0 " "
Cement posts	44	82	41.0	24	19	35.2	" "

Few things illustrate more clearly the necessity of a changed idea regarding the scope of farm shop work than the figures in the above table. In Table I we see but twelve states indicating courses in cement work. Here we see a high proportion of the farmers themselves suggesting that instruction be given in various kinds of cement work. Not only that, but additional cement work was

suggested under "Additional construction work." It is apparent that the importance of cement construction jobs has been overlooked by the individuals responsible for planning farm shop programs. Any construction material so generally endorsed, deserves wider recognition of a farm shop course by supervisors and teachers.

Additional construction work suggested includes silo building, weirs and measuring boxes for irrigation and cutting chute for sheep.

TABLE X B

Number And Percentage Of Farmers
Suggesting The Following Construction
Work To Be Taught In Farm Shop Courses.
Arranged According To Regions.

Rank	Items	Platte Valley (77)		Arkansas Valley (45)		Western Slope (56)		San Luis Valley (22)	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
1	Farm gate	67	87.0	41	91.1	51	91.1	20	90.9
2	Hay rack	66	85.7	36	80.0	52	92.9	21	95.5
3	Farm work bench	62	80.5	37	82.2	44	78.6	20	90.9
4	Hog house	59	76.6	36	80.0	47	83.9	18	81.8
5	Cement floor	62	80.5	33	77.3	45	80.4	18	81.8
6	Wire fences	56	72.7	36	80.0	47	83.9	16	72.7
7	(Chicken house	55	71.4	35	77.8	45	80.4	19	86.2
7	(Feed rack	54	70.1	35	77.8	50	89.3	15	68.2
8	Cement foundation	55	71.4	35	77.8	48	85.5	15	68.2
9	Feed trough	58	75.3	32	71.1	43	76.8	16	72.7
10	Hog trough	56	72.7	35	77.8	40	71.4	17	77.3
11	Pig pen	55	71.4	29	64.4	41	73.2	20	90.9
12	Double trees	53	68.8	34	75.6	42	75.0	13	59.1
13	Grain bin	53	68.8	32	71.1	42	75.0	14	63.3
14	Self feeder chicks	56	72.7	37	82.2	38	67.9	13	59.1
15	Cement water tank	47	61.0	33	73.3	37	66.1	16	72.7
16	(Smoke house	45	58.4	27	60.0	40	71.4	15	68.2
16	(Hot bed and cold frame	52	67.5	27	60.0	34	60.7	14	63.3
17	(Wagon box	41	53.2	30	66.7	41	73.2	14	63.3
17	(Screen door	45	58.4	30	66.7	38	67.9	13	59.1
18	Cement wall	43	55.8	29	64.4	34	60.7	13	59.1
19	Hog shipping crate	49	63.6	24	53.3	30	53.6	15	68.2
20	Calf pen	46	59.7	26	57.8	34	60.7	10	45.5
21	(Wagon tongue	38	49.3	24	53.3	38	67.9	14	63.3
21	(Tool box	47	61.0	28	62.2	28	50.0	11	50.0
22	Seed tester	44	57.1	23	51.1	28	50.0	17	77.3
23	Cement trough	44	57.1	23	51.1	31	55.4	11	50.0
24	Wagon jack	31	40.3	24	53.3	36	64.3	17	77.3
25	Corn crib	46	59.7	30	66.7	28	50.0	3	13.6
26	Hen's nest	48	62.3	25	55.6	21	37.5	12	54.5
27	Ice house	36	46.8	15	33.3	41	73.2	13	59.1
28	(Wagon reach	40	52.0	20	44.4	32	57.1	12	54.5
28	(Road drag	43	55.8	18	40.0	30	53.6	13	59.1
29	Cement steps	39	50.6	23	51.1	29	51.8	12	54.5

TABLE X B
(Continued)

Rank	Items	Platte Valley (77)		Arkansas Valley (45)		Western Slope (56)		San Luis Valley (22)	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
30	Kitchen sink	40	52.0	24	53.3	26	46.4	12	54.5
31	Loading chute for cattle	41	53.2	23	51.1	23	41.1	14	63.3
32	Hammer handles	43	55.8	21	46.7	29	51.8	6	27.3
33	Cement milk house	41	53.2	19	42.2	29	51.8	9	40.9
34	Screen window	34	44.2	21	46.7	31	55.4	11	50.0
35	Saw horse	41	53.2	20	44.4	26	46.4	9	40.9
36	Mitre box	33	42.9	16	36.9	24	42.9	14	63.3
37	(Wash bench	31	40.3	20	44.4	23	41.1	12	54.5
37	(Trap nest	34	44.2	23	51.1	20	35.7	9	40.9
37	(Chicken crate	37	48.1	21	46.7	23	41.1	5	22.8
38	(House ladder	40	52.0	14	31.1	22	39.3	9	40.9
38	(Step ladder	36	46.8	23	51.1	19	33.9	7	31.8
39	(Wagon bolster	34	44.2	17	37.8	23	41.1	10	45.5
39	(Wagon rack for cattle	36	46.8	18	40.0	19	33.9	11	50.0
40	(Cement culvert	35	45.5	13	28.9	27	48.2	7	38.1
40	(Milk record sheet cabinet	38	49.4	15	33.3	18	32.1	11	50.0
41	(Chisels	28	36.4	12	26.7	29	51.8	11	50.0
41	(Cement posts	33	42.9	15	33.3	23	41.1	9	40.9
42	Wheelbarrow	29	37.7	15	33.3	21	37.5	11	50.0
43	(Kitchen table	29	37.7	17	37.8	21	37.5	6	27.3
43	(Milk stools	31	40.3	18	40.0	16	28.6	8	36.4
44	Oat sprouter	26	33.7	18	40.0	18	32.1	10	45.5
45	Neck yoke	24	31.2	13	28.9	27	48.2	7	31.8
46	Egg tester	33	42.9	15	33.3	11	19.6	11	50.0
47	Ironing board	26	33.7	16	36.9	15	26.8	12	54.5
48	Ax handle	24	31.2	11	24.4	24	42.9	8	36.4
49	Bolts	20	26.0	11	24.4	24	42.9	11	50.0
50	Shoveling board	33	42.9	15	33.3	12	21.4	4	18.2
51	(Book rack	32	41.6	14	31.1	9	16.1	8	36.4
51	(Seed corn drying rack	27	35.1	17	37.8	17	30.4	2	9.1
51	(Saw buck	29	37.7	12	26.7	16	28.6	6	27.3
52	Potato marker	24	31.2	4	8.9	24	42.9	10	45.5
53	(Wagon seat	22	28.6	10	22.2	22	39.3	4	18.2
53	(Fruit ladder	23	29.8	16	35.6	17	30.4	2	9.1

TABLE X B
(Continued)

Rank	Items	Platte Valley (77)		Arkansas Valley (45)		Western Slope (56)		San Luis Valley (22)	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
54	Tongs	18	23.4	6	13.3	24	42.9	9	40.9
55	Pinchers	18	23.4	8	17.8	21	37.5	8	36.4
56	Fireless Cooker	14	18.2	16	36.9	16	28.6	8	36.4
57	Storm sash	26	33.7	13	28.9	8	14.3	6	27.3
58	Mortar box	21	27.3	10	22.2	15	26.8	3	13.6
59	Nail box	20	26.0	10	22.2	8	14.3	6	27.3
60	Curry comb box	21	27.3	8	17.8	9	16.1	4	18.2
61	Cattle shipping crate	18	23.4	11	24.4	7	12.5	4	18.2
62	Pick handle	14	18.2	4	8.9	10	17.9	4	18.2
62	File handle	14	18.2	3	6.7	12	21.4	3	13.6
62	Sledge handle	16	20.8	4	8.9	8	14.3	4	18.2
63	Staples	7	9.9	2	4.4	14	25.0	5	22.8
64	Stone boat	6	7.8	1	2.2	18	32.1	2	9.1
65	Bread board	14	18.2	4	8.9	4	7.1	4	18.2
66	Dog house	12	15.6	9	20.0	1	1.8	2	9.1
67	Hand sled	8	10.4	4	8.9	5	8.9	-	-
67	Bird house	8	10.4	2	4.4	3	5.4	4	18.2

There is a greater lack of uniformity in construction work than in repair work among the several regions of the state. Only the Platte Valley and Arkansas Valley agree on the first item of construction, a farm gate. Making a hay rack is first in the San Luis Valley and on the Western Slope, ranks second in the Platte Valley and third in the Arkansas Valley.

The prevailing agricultural industry of a region influences the choice of construction jobs. Making a fruit ladder ranks higher on the Western Slope and in the Arkansas Valley than in the Platte Valley or San Luis Valley, falling to 9.1% in the latter.

The San Luis Valley is 22.2% higher than the Western Slope in the matter of a loading chute for cattle. Here again the majority of variations is not so wide but that they may be usually accounted for by the different lines of agriculture of the various regions, individual experience, or unequal numbers reporting from each region. Variations in the cement construction jobs for the different regions are not striking.

C O N C L U S I O N S

1. In comparing what is outlined for farm shop work in the Colorado State Plans with other states it is seen that the Colorado Plans include the types of farm shop work most acceptable in other states.

2. Farm shop work has not been well organized in too many states. It has not been able to get away from the domination of the idea that manual training in wood work is sufficient.

3. From what the farmers indicate as most important, farm shop work should at least include harness work, wood work, soldering, hot and cold metal work, care, repair and adjusting of farm machinery, gas engines and tractors, and cement work.

4. The large proportion of cement construction jobs suggested indicates a real need of including more of this work in the farm shop course than is usually done.

5. It is not intended that the repair and construction jobs listed should limit the farm shop work, but rather serve as a guide in organization of a farm shop course that will lead up to and include the operations most desired. The use and care of tools, enough drawing to read and interpret plans are desirable prerequisites.

6. Because of the different conditions existing in various parts of the state, it is not advisable to have a rigid farm shop course outlined for the entire

state, but rather that the individual teacher should make a survey of his own community to determine the kinds of farm shop work most needed.