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1917

South Dakota State College

Agronomy Department

Lessons in

Field Management

By

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no. 1.

EXERCISE 1

Farm Prospects

I. Farm Opportunities.

1. Farm Ownership.
2. Farm Tenancy.
3. Salaried Farm Managership.

II. Does the Farm Pay?

1. A System of Farm Records.
 - a. Daily Record.
 - b. Farm Day Book in journalized form.
 - c. Farm Ledger.
 - d. Field Plat Record.
 - e. Special Tabulations.

III. Statistical Methods.

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EXERCISE 2

Farm Day Books

1. Prepare a daily record for the month of April, showing labor performed and other matters of a general nature, after the following form:

April
 1.
 2.
 3. etc.

2. Prepare a journalized day book for the month of April, showing business transactions after the following form, red ink for the ruling:

		Dr.	Cr.
April	1		
		Sold 1 Ton Hay @ \$10	
		6	
		Jones, J.	
		4	
		Cash	
			10
			Hay
		Sold 30 lbs. Butter @ 30c	
		9	
		Smith & Co.	
			9
			Cattle
		Carried Forward	
		19	19

QUESTIONS

1. What five classes of records are necessary in keeping account of a farm?
2. What is the purpose of the daily labor record?
3. What is the purpose of the business record or journalized day book?
4. Illustrate how to rule up an ordinary book for a journalized day book.
5. In what two ways may the dates be recorded?
6. What accounts would you suggest keeping for the various farm departments?
7. If you sold 3 hogs at \$20 each to John Jones and he paid you half cash and charged the balance, what would your journal entry be?

EXERCISE 3

Farm Ledgers

1. Accounts will be needed on a diversified farm for all the departments, such as: Horses, Hogs, Sheep, Cattle, Poultry, Wheat, Barley, Oats, Corn, Alfalfa, Mixed Hay, Rye and Sorghum.
2. Besides the above, accounts are needed for Cash, Sundry Expenses, Labor and one for each person with whom we do a credit business
3. Some special accounts may be needed in addition to the above or some mentioned in No. 1 may be omitted. All in No. 2 are essential.
4. Rule up ledger accounts for each of the separate individuals or departments mentioned in your journal in Exercise 2, using the following form with red ink ruling:

Cash

Dr.			Cr.
		Bal. on hand	93
April	1	Oil, 1 gal.	80
	5	Cream, 100 lbs. @ 6c	6
	8	Hogs, 780 lbs. @ 10c	78
			80
April	1	March wages	75
	10	Nails	50
	15	Axle grease	1 00

QUESTIONS

1. What general accounts are needed on every farm?
2. What does Cash represent.
3. Which side of an account is used for credit ledger entries?
4. Which side for debit entries?
5. Illustrate how to rule up a ledger account.
6. What words are used for carrying forward sum totals?
7. What words are used where an amount is brought forward?
8. Why is it necessary to carry totals forward from page to page?
9. Since hay for horses and cattle is often kept in the same barn, would it be preferable to have horses and cattle in the same department?
10. What is the purpose of the expense account?

EXERCISE 4

Farm Ledger, Continued

1. Post the ledger accounts which you have prepared.
2. Balance each account. Insert the balance in red ink on the side where it is needed. Draw single red line under money columns. Total same to even totals. Draw double red lines across page under the totals and bring down the balance on the reverse side of the account in black ink.
3. Make a trial balance. Add all the debit balances and all the credit balances. The sums should be equal or should agree with cash on hand April 1 if any.

QUESTIONS

1. If you purchase seed wheat for \$125 and pay cash, what account should be debited?
2. Which credited?
3. If you use wheat you have on hand for seed, what account would be debited if any?
4. Which credited?
5. If you put 100 bushels of corn into the bin to be fed to hogs, what account would be debited?
6. Which credited?
7. Why should the sum of the debits equal the sum of the credits?
8. In case of failure in the trial balance, how may the error be found?
9. What are the common causes of error?
10. How may a debit be distinguished from a credit?

EXERCISE 5

Tabulation of Records

1. Tables consist of a systematic combination of verticle and horizontal columns for the purpose of condensing special records. They may be adapted to many purposes.
2. Prepare a field record table as follows: Use 11 verticle columns per page, the one at the left being double the width used for others. Cross these columns with 20 horizontal spaces. The plain blue lines will serve the purpose on ordinary ruled paper.
3. Insert words indicating data desired in wide columns as follows:

Variety
Crop
Field
Size of Field
Fertilizer (Kind)
Fertilizer (Date applied)
Plowing (Depth)
Plowing (Date)
Harrowing (Date)
Discing (Date)
Planting (Date)
Planting (Rate)
Stand (%)
Emerged (Date)
Ripe (Date)
Harvested (Date)
Disease (Kind %)
Yield (Grain)
Yield (Straw)
Remarks.

4. Similarly prepare a corn breeding record table inserting the following data for a 25 row plat:

Row Number
Stand
Date Planted
Date Up
Date Detasseled
Date Seed Selected
Date Bulk Harvest
Wt. Select Seed
Wt. Bulk Corn
Total Corn Yield
Equalized Yield to 100% Stand
Remarks.

EXERCISE 6

Tabulation of Records

1. Prepare a table adapted to the seed grain business which would enable one to keep a record of each purchaser with address, amount purchased, when shipped or delivered and the balances in the respective bins.
2. Prepare a table adapted to reporting the yields obtained and the number of days to mature in a variety test of oats.
3. Prepare a table adapted for a daily record of actual labor performed showing: Horse hours, man hours and field on which labor was done.
4. Prepare a table adapted to some special farm need on a place in which you may be interested.

QUESTIONS

1. In what ways are tables of value?
2. What is a table?
3. What data is needed for a complete field record?
4. What data is needed for a corn breeding record?
5. What data is necessary to the dealer in seed grains?
6. Suggest a method for reporting three facts about a series of twenty varieties.
7. Suggest other possible uses for tabulated records.

EXERCISE 7

Crop Rotation

Mapping the Farm

Continuous Cropping

1. Continuous cropping is detrimental to the soil and becomes unprofitable eventually because:
 - a. It fills land with diseases.
 - b. It puts soil in poor condition.
 - c. It exhausts soil fertility.
 - d. It wastes labor.
 - e. It prevents proper tillage.
2. The pioneer improvement is the two year or two course rotation consisting of summer tillage, with or without crop and a small grain crop.
3. Construct two charts representing a farm of 100 acres continuously cropped to small grain for five years. On the left hand chart enter the crops grown and yields each year. On the right hand chart indicate the soil preparation for each of the five years.
4. Make out a financial statement with journal ruling, totals inserted in right hand money column showing the cost of producing the crops for each of the five years and the probable gross returns and the net gain or loss.
5. Items to be considered in determining production cost include: Plowing, rent of land, other tillage, seed, seeding, harvesting, stacking, threshing, marketing.

QUESTIONS

1. Discuss the advantages of crop rotation.
2. What are the leading labor difficulties which you find in continuous cropping?
3. What is the approximate average yield per acre of wheat in this state? Of barley? Of oats? Of corn?
4. Suggest a method for preparing a record of the use of land.
5. Describe the method of preparing a financial statement.
6. Did you discover any way to condense financial statements covering a period of years? If so how?
7. What items are to be considered in preparing a financial estimate for crop production?

EXERCISE 8

Crop Rotation

Two Course Rotations

1. A two course rotation to be of value must consist of cultivated crop or fallow and a non cultivated crop.
2. The following combinations may be made:
 - a. Corn, wheat.
 - b. Corn, oats.
 - c. Corn, barley.
 - d. Corn, rye.
 - e. Fallow, winter wheat.
 - f. Fallow, winter rye.
 - g. Potatoes, wheat.
 - h. Potatoes, barley.
 - i. Potatoes, early oats.
 - j. Sorghum, winter rye.
 - k. Sorghum, millet.
 - l. Sorghum, barley.
 - m. Row oats, wheat or barley.
3. Using blank cards, practice methods of crop rotation.
4. Construct four charts representing a two year rotation, using left hand chart for crops and right hand for labor on land for each year. Prepare financial estimates as in Exercise 7
5. Assign names to the fields and place in upper left hand corner. Insert acreage of each field in upper right hand corner. Use red ink for names and acreages. Letters as A, B, C, etc. are usually used for field names and in case a field is divided among different crops, numbers are appended to the letters as A₁, A₂, A₃, B₁, B₂, etc.
6. Divisions between fields are indicated by plain lines. Lines between subdivisions are dotted to indicate that the division is temporary.
7. Fields rotate in reverse order of the alphabet, that is B follows A, C follows B, etc., as to crop produced.
8. Cultivated crop fields may be manured, may be plowed deeply and usually may be planted rather late which permits discing.

EXERCISE 9

Crop Rotation

The Three Course Rotation

1. A three course rotation permits the use of the three essentials of a good rotation namely; a cultivated crop, a small grain crop and a leguminous crop.
2. Cultivated crops adapted to South Dakota include; corn, potatoes, sorghum, proso, foxtail millet for seed production, field beans, soy beans, etc.
3. Small grain crops include spring and winter wheat, winter rye, emmer, early and late oats, barley, foxtail millet and proso.
4. Leguminous crops include alfalfa, white sweet clover, red clover, alsike clover, field peas, field beans, soy beans, etc. For the diversified farm system white sweet clover is apparently most profitable.
5. Biennial legumes are seeded the second year of the rotation with the small grain and produce two crops the third year. Alfalfa, though a perennial may be used as a biennial. The standard rates of seeding for biennial and perennial legumes are 10 lbs. of legume to one bushel of nurse crop per acre.
6. Annual legumes prefer shallow rather mellow seed beds and may usually be cultivated or not to suit, with the exception of field beans which are best grown in hills of four or five plants cross cultivated.
7. Prepare six charts, two for each year as before. Indicate preparation and labor on the right hand and crops and yields on the left hand chart as before. Select your own crops from the three groups given above.
8. Prepare financial estimates as before for each of the three crops in the rotation for the three years grown.

EXERCISE 10

Crop Rotations

Multi-Course Rotation Including Perennials

1. The leading perennials available to the South Dakota farmer are timothy, mammoth clover, alfalfa, red top for the eastern section. In the central and western section, slender wheat grass and brome grass replace timothy and red top.
2. Rates of seeding perennials are suggested as follows:
 - a. Timothy 8 lbs. + Clover 6 lbs.
 - b. Timothy 4 lbs. + Red Top 3 lbs. + Alsike 4 lbs. + Red clover 2 lbs. + Italian rye grass 2 lbs.
 - c. Alfalfa 8 lbs. + Brome grass 6 lbs.
 - d. Alfalfa 8 lbs., Slender wheat 6 lbs.
 - e. In all cases add 1 bushel cereal as nurse crops.
3. Prepare a map of some farm in which you are interested, as it is now.

QUESTIONS

1. Suggest combinations suitable for two year rotations.
2. What practical objection is there to rotating wheat or oats with sorghum?
3. What is the first improvement in farming in nearly every agricultural community?
4. What are the advantages of a three year rotation?
5. What annual legumes may be used?
6. What biennials?
7. What perennials are available to the dry land farmer?
8. Explain how a perennial may be worked into a farm system.
9. Give some standard rates of seeding for perennial mixtures.
10. Which is adapted to low, wet land?

EXERCISE 11

Crop Rotation

Multi-Course Rotations Including Perennials, Cont'd.

1. Replan the farm mapped in Exercise 13, putting it in to one or more good rotations, including a perennial or perennial mixture.

QUESTIONS

1. In replanning the farm what objects did you keep in mind?
2. Was the farm you planned in a rotation at the outset?
3. Was it in an orderly rotation at the time the ideal was reached?
4. Of what value is a perennial in a farm system?
5. What object is attained by using mixed perennials instead of a single crop?
6. If you had rough, untillable land, how could you utilize it?
7. In such a case would you give it the same average valuation as the rest of the farm?

EXERCISE 12

The Farm Invoice

1. At the beginning and ending of any year's business it is necessary to take an invoice to determine the real result of a year's transactions.
2. The following prices represent the retail cost of implements. These prices vary about 10% in different parts of the state owing to freight rates and varying competition.

Gang plow	\$ 65.00	
Sulky plow	45.00	
Binder (6 ft.)	135.00	
Binder (7 ft.)	140.00	
Binder (8 ft.)	145.00	
Mower (5 ft.)	45.00	
Rake	28.00	
Wagon, complete	85.00	
Corn cultivator (1 row).....	28.00	
Corn cultivator (2 row).....	55.00	
Cream separator (No. 2).....	70.00	
Cream separator (No. 3).....	80.00	
Cream separator (No. 4).....	90.00	
Disc harrow, complete	33.00	
Harnesses (Per set).....	40.00	\$60.00
Bar Harrow	17.50	
Lever harrow	28.00	
Shredder (6 roll)	500.00	
Shredder (8 roll)	700.00	
Roller (15 ft.)	90.00	
Silage Cutter (No. 19).....	270.00	
Weeder (12 ft.).....	30.00	
Fanning Mill (Clipper No. 2).....	28.00	
Manure Spreader (75 bu.).....	120.00	
Grain Drill (10 ft.).....	110.00	
Grass Seed Attachment	8.00	
Gas Engine (1½ H. P.).....	60.00	
Gas Engine (2 H. P.).....	70.00	
Gas Engine (4 H. P.).....	140.00	
Gas Engine (6 H. P.).....	275.00	
Corn Planter	45.00	
Corn Binder	125.00	
Hay Loader	65.00	
Small Sundries	100.00	
Hay Stacker	50.00	
Sweeps (2)	36.00	
Buggy	40.00	
Garden Drill	10.00	
1 Horse drill	28.00	

4. Prepare an invoice using journal ruling for the farm and necessary equipment and stock, mapped in Exercise 11.

QUESTIONS

1. What form of ruling is used for invoices?
2. What purpose does the right hand money column serve?
3. When are invoices taken?
4. How do they serve to verify the accounting system?
5. Give the value at ordinary retail price of a 1½ H. P. engine, a 6 ft. binder, a 5 ft. mower, a corn planter, etc.

EXERCISE 13

Managing the Farm

A Complete Farm System

1. We have now learned the essential features of farm management records, including:
 - a. The Daily Record
 - b. The Journalized Day Book
 - c. The Farm Ledger
 - d. The Field Plat Record
 - e. Special Forms of Tabulated Record
 - f. The Invoice.
 2. We are now ready to undertake a complete scheme of farm management.
 3. Prepare an invoice of some farm in which you may be interested dated January 1, 1915.
 4. Keep a journalized day book for the entire calendar year.
 5. Prepare ledger accounts as follows: Cash, Proprietor, Bills Payable, Bill receiveable, Profit and Loss, Expense, Implements, Real Estate, Corn, Wheat, Barley, Oats, Potatoes, Hay, Pasture, Horses, Cows, Hogs, Sheep, Sorghum, Labor, John Smith and Thomas Jones.
 6. Prepare a set of eight field charts, two for each year for four years, one showing the field labor and the other the crops as the farm is gradually worked into a good rotation system.
 7. Prepare a second invoice dated January 1, 1916.
 8. Post the ledger accounts. Get the postings from the invoices, the field plats for 1915 and the journal.
 9. Balance and close the ledger accounts. Make a trial balance. Debit balances on department accounts are losses. Credit balances are gains. Post the loss and gain or profit and loss account and balance. Compare this balance with the difference between the first and final invoices.
 10. Use the following estimate for manure:
 - Horses—1.25 T per month @ \$2.
 - Cattle—1.50 T per month @ \$2.
 - Sheep— .10 T per month @ \$3.
 - Hogs— .50 T per month @ \$3.
 11. When manure is applied to a rotation, charge it prorata to all the fields in the rotation.
 12. When making entries always keep in mind the following questions:
 - a. From what account does this item come?
 - b. In what account or department is the item used?
- All of the former are credits. All of the latter are debits.
- The system to be of value must tell:
1. Whether the farm as a whole pays.
 2. Which departments pay or fail to pay.
 3. How the land is handled.
 4. The amounts due to us or to others from us.
- If the system meets those requirements it is complete. In practice the journalized day book may be omitted if it seems desirable and postings of daily business may be made direct to the ledger.

QUESTIONS

1. What are the essential features of farm management records?
2. How is an invoice prepared?
3. What two labels are necessary to every field? Which is placed at right and which at left upper corner of field on plat?
4. How are the debits from the invoice balanced with a credit?
5. From whence come the posted items for the ledger?
6. How is the overflow or sundry expense apportioned?
7. Should the pasture account balance?

EXERCISE 14

Statistical Methods

Correlation of Length and Weight in Ear Corn. Length

1. In this exercise two varieties are compared as to length and weight of ear.

2. The following symbols or abbreviations may be used:

V—Value, in this case length or weight.

F—Frequency, the number of ears in each measurement.

FV—Values x Frequencies.

D—Deviation from the mean.

D²—The deviation squared.

∑ —Sigma or the sum of.

σ—Small sigma or standard deviation.

G—Guess as to the mean.

N—Number of samples studied.

$$\bar{v} = \frac{V \sum D^2 F}{N}$$

M—Mean or average.

FL—Frequency as to length.

VL—Value of length.

ML—Mean length.

DL—Deviation of length from mean.

σ_L—Standard deviation of length.

Fw—Frequency of weight.

Vw—Value of weight.

Mw—Mean weight.

Dw—Deviation of weight from mean

σ_w—Standard deviation of weight.

r—Coefficient of correlation.

$$r = \frac{\sigma_w}{\sigma_L} = \frac{V \sum D_L D_w}{N \sigma_L \sigma_w}$$

3. Prepare arrays showing lengths of all the ears in each variety furnished in half inch graduations.

4. For reference study Davenport, pages 419-422.

EXERCISE 15

Statistical Methods, Cont'd.

Correlation of Length and Weight in Ear Corn

Weight

1. Prepare arrays showing weight of each ear in each variety furnished.
2. For reference study Davenport, pages 423-425 and 458-461.

QUESTIONS

1. Define type.
2. Define distribution.
3. Define array.
4. Define mode.
5. Define frequency.
6. Define empirical mode.
7. Define modal coefficient.
8. How is it found? $\frac{MF}{N}$
9. How is the mode found? $\frac{V_1 F_1 + V_2 F_2 + V_r F_r}{N}$
10. How is the mean found? $\frac{\sum V_x F}{N}$

EXERCISE 16

Statistical Methods Cont'd.

Correlation of Length and Weight in Ear Corn

Correlation

1. Prepare a correlation table as follows:
 - a. Label the vertical columns with the weight values from one to ten by ounce graduations.
 - b. Label the horizontal spaces with the probable lengths from the shortest to the longest ear found by half inch graduations.
 - c. Place tally mark in proper square to indicate any coincident weight. Later place table in permanent note book using figures instead of tally marks.
 - d. Determine correlation coefficient in accordance with example on Pp. 461 Davenport, using but one decimal place.
2. For reference study Davenport Pp. 462—middle of 465.

QUESTIONS

1. Define correlation.
2. What is the use of determining correlation?
3. Define coefficient.
4. How is the correlation coefficient found?
$$V = \frac{\sum D_1 D_2}{N \sigma_1 \sigma_2}$$
5. How is the E P found?
$$\frac{\sum E D_2 F}{N}$$

EXERCISE 17

Choosing a Farm

1. In choosing a farm we should consider the following points?

- a. Soil { Type
 { Topography
 { Fertility
 { Physical Condition

- b. Farmstead { Convenience
 { Arrangement
 { Usefulness
 { Comfort
 { Beauty
 { Size

- c. Market { Distance
 { Roads
 { Size
 { Diversity

- d. Type of Farming { Dairying
 { Diversified
 { Specialty
 { Truck
 { Grain

- e. Social { Neighbors
 { Schools
 { Churches
 { Telephones
 { Rural Free Delivery
 { County Agricultural Organization.

- f. Title { Abstract of Title
 { Deed
 { Contract for Deed
 { Mortgage

2. For convenience in learning to consider these matters in an orderly manner, weights have been assigned to each point and the following score card has been constructed.

EXERCISE 18

The Farm Score Card

Points	Perfect	Name of Farm	Name of Farm
	Score	Student Score	Student Score
Soil } Condition	10		
} Fertility	10		
Topography } Convenience	10		
} Adaptability	10		
Market } Distance	15		
} Diversity	5		
Farmstead } Buildings	10		
} Grounds	5		
Social Conditions	15		
Title to Possession	10		
Total Score	100		

Remarks.

1. Score farms as assigned by the instructor.

QUESTIONS

1. In choosing a farm what points should be considered?
2. What considerations as to soil?
3. How would one judge of the condition of the soil?
4. The fertility?
5. How does topography affect value?
6. How does distance from market affect farm value?
7. If it costs one cent per mile per bushel to market barley and the average yield is thirty bushels per acre, land one mile from town being worth \$100 per acre, what is land ten miles from town worth for barley production if money is worth 6%?
8. How might land thus distant from town market its products to better advantage?



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