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College of Business Administration

STRUCTURE AND EFFICIENCY OF NEBRASKA FARMS

Farm structure issues have been the subject of considerable debate in recent years. The debate has centered around the growing size of farm operations and the desirability of such growth. Those who oppose this growth express concern over the future of family farms and the continued viability of traditional rural institutions. Others argue that farm size has grown because efficiency requires it, and that any attempts to limit its growth is an infringement on the entrepreneurial spirit of our nation's farmers. It is not possible in this article to address all of the relevant issues surrounding this debate, nor is it a desire to present the various arguments for and against the growth in farm size. Instead, data from the 1978 Census of Agriculture concerning farm structure in Nebraska will be reviewed, along with the most recent U.S. Department of Agriculture (USDA) study on economies of size in field crop farming. Finally, the implications of this study for farm structure in general and, more specifically, for Nebraska farms will be explored.

FARM STRUCTURE IN NEBRASKA

The Census of Agriculture is a valuable source of information concerning the structure of farming. Not only are the size and numbers of farms given, but various organizational features such as the tenure of farm operators and the extent of corporate farming are also given. Table 1 (p. 1) summarizes information concerning farm structure in Nebraska from the most recent Census of Agriculture (1978) and selected census years dating back to 1945.

The fact that the number of farms has steadily declined since 1945 is a surprise to no one. Farm numbers in Nebraska have decreased from just under 112,000 in 1945 to slightly less than 66,000 in 1978. The average annual percentage decrease between 1974 and 1978, however, was less than in any of the previous census periods shown. Both the average annual percentage decrease and the absolute average annual decrease in the number of farms was the greatest during the period from 1954 to 1964.

Not too surprisingly, average farm size in Nebraska parallels closely the decline in farm numbers. Average farm size increased most rapidly during the period between 1954-64, and least rapidly in the most recent census period, 1974-78. During the 1954-64 period, average farm size grew at an average annual rate of 12.5 acres per year, compared to 4.7 acres per year during the 1974-78 period.

A breakdown of farms-by-size categories reveals some interesting trends which have occurred since 1945. The smallest size category of farms (1-99 acres) has actually increased as a percent of the total farms since 1964. This increase (an increase in both the percentage and absolute number of farms) has been attributed by

many to a growing phenomenon called "hobby farming," that is, persons who work full time off the farm, but who commute from a rural acreage where a small amount of agricultural products are grown. Other size categories have reflected the trend toward larger farm size. As a share of total farms, the 100-179 acre category has steadily declined since 1945, the 180-259 acre category since 1954, and the 260-499 acre category since 1964. As one would expect, the largest size categories have all been increasing since 1945.

The value of land and buildings can be used as an indication of the barriers to entry in the farming industry. Although the average value of land and buildings in Table 1 is in nominal rather than real terms, there can be little doubt that the real value has increased dramatically since 1945. The average value of land and buildings was just over \$15,000 in 1945. This compares to over \$372,000 in 1978. Of course, some of this represents the increasing size of farms, but most is due to the rapid escalation of land prices. Regardless of its reasons, the increased value of land has become a major barrier to the entry of beginning farmers in the industry.

Tenure patterns of farm operators in Nebraska have shown significant changes since 1945. Full owners and part owners (those who both own and rent land they operate) as a percent of total farm operators have increased significantly since 1945. Tenants (those who only rent land or work on shares for others) as a percent of total farm operators have decreased from 47.9 percent in 1945 to 21.5 percent in 1978. An optimistic view of this trend is that for various reasons (credit availability, credit programs for beginning farmers, and the like), a higher percent of people who actually work the land also own at least part of the land they operate. Another view, however, is that the decline in the percent of tenants is an indication of increasing barriers to entry. Tenancy (at least in the northern states) has been a traditional way for families who do not own land to enter the farming business and gradually gain ownership. Perhaps as capital requirements have increased, the possibility of going from a tenant to at least a partial owner has decreased over the years, resulting in a relative decline in the number of people attempting tenancy. This is certainly speculative, though, and other explanations might well be given.

The 1978 Census of Agriculture has the most complete breakdown of farms by type of business organization of any of the previous censuses. The major area of clarification deals with the classification of corporations—family held and other than family held. The 1969 Census did not classify corporations in this manner, and although the 1974 Census

(continued on page 2)

(continued from page 1) used a similar classification, the accuracy of the data received is in question due to the manner in which the survey questions were asked.

The 1978 Census shows that individual or family farms are by far the most dominant legal form of business organization in Nebraska. Farms owned directly by individuals or families constitute just over 86 percent of all farms. Partnerships follow with almost 10 percent, and corporations with 3.6 percent. Most corporations are family held, with nonfamily corporations representing only 0.3 percent of all farms in Nebraska.

This information concerning the legal form of business organization, however, is not as conclusive as it might seem. Legal form of business organization as used in the census refers to that of the operator, not to that of the land owner. For example, under the census classification a person who only rents land would be classified into one of the three categories: individual or family, partnership, or corporation. At the same time, the land which is rented to the tenant may be owned by an individual or family, partnership, or corporation. In essence, the business organization of the entities which own land is left unclear.

ECONOMIES OF SIZE IN FIELD CROP FARMING

The USDA has just finished the most complete study of economies of size in field crop farming.¹ Economies of size studies attempt to determine the average costs of production as the size

of the farm is varied. Economies of size are important because they have implications for the structure of farming (the size and number of farms). If relatively large farms can produce a bushel of corn considerably cheaper than smaller farms, then that fact may be responsible for the increasing size of Nebraska farms. If, on the other hand, smaller farms can produce nearly as cheaply as larger farms on a per-unit basis, then reasons for the growth in the size of farms must be found elsewhere. The USDA study just mentioned sheds considerable light on this subject.

The USDA studied seven different types of farms which were characteristic of seven different regions of the United States. The corn belt type was most typical of field crop farms in Nebraska. A typical corn belt farm in the study was one which produced a mix of corn, soybeans, winter wheat, and oats. The primary source of data was a 1978 cost of production survey conducted by the USDA. Standard cropping and management practices were identified, and a least-cost combination of inputs was found for various sizes of farms. This information was then combined to produce a long-run average cost curve (LRAC). The LRAC shows the average cost per unit of output as the size of the farm is varied.

¹Thomas A. Miller, Gordon E. Rodewald, and Robert G. McElroy, *Economies of Size in U.S. Field Crop Farming*, Agricultural Economic Report No. 472 (Washington, D.C.: U.S. Department of Agriculture, Economics and Statistics Service, July 1981).

Table 1
NEBRASKA FARM STRUCTURE

	1978	1974	1964	1954	1945
Number of Farms	65,916	67,597	80,163	100,733	111,756
Average Size of Farms (acres)	702	683	596	471	427
Value of Land and Buildings	\$372,786	\$192,574	\$65,268	\$33,713	\$15,205
Percent of Farms by Size					
1-99 (acres)	19.7	16.2	13.5	14.7	15.8
100-179	12.6	14.0	15.8	22.2	25.3
180-259	9.2	10.3	14.1	18.2	17.6
260-499	24.6	26.8	30.6	26.8	25.1
500-999	18.8	18.6	15.2	10.6	9.7
1000 or more				7.5	6.5
1000 to 1999	9.2	8.5	6.5		
2000 or more	5.9	5.6	4.3		
Number of Farms (%) by Tenure of Operator					
Full owners	26,744 (40.6)	28,674 (42.4)	28,629 (35.7)	35,141 (34.9)	33,622 (30.1)
Part owners	24,971 (37.9)	25,084 (37.1)	26,663 (33.3)	26,342 (26.2)	24,603 (22.0)
Tenants	14,201 (21.5)	13,839 (20.5)	24,871 (31.0)	39,250 (38.9)	53,531 (47.9)
Number of Farms (%) by Business Organization of Farm					
Individual or Family	56,872 (86.3)	NA	NA	NA	NA
Partnerships	6,460 (9.8)	NA	NA	NA	NA
Corporations	2,394 (3.6)	NA	NA	NA	NA
Family held	2,189 (3.3)	NA	NA	NA	NA
Other than family held	205 (0.3)	NA	NA	NA	NA
Other	190 (0.3)	NA	NA	NA	NA
Percent of Sales by Largest 10% of Farms	56.2	52.8	44.8	NA	NA

Figure 1 depicts the LRAC curve arrived at by the study for grain farms in the corn belt region. Gross income depicted on the horizontal axis is a proxy for farm size. The vertical axis shows the cost per dollar of gross income. The vertical distance between the LRAC curve and the one dollar line is equal to net farm income per dollar of gross income. For example, if a farm is grossing \$20,000 per year, the cost per dollar of gross income would be roughly \$0.60 and net farm income per dollar of gross income would be \$0.40. Net farm income in this case is a return to all residual claimants: owned land, equity capital, and operator inputs such as labor, management, and entrepreneurship. In other words, after all cash costs have been met, the remaining net income is a return for the operator's investment, time, and expertise.

Looking at Figure 1, cost per dollar of gross income ranges from around \$0.59 for farms grossing \$20,000 to \$0.48 for farms grossing \$160,000, an \$0.11 differential from the smallest to the largest farms in the study. Farms which are grossing from \$40,000 to \$60,000 have costs per dollar of gross income which are \$0.08 to \$0.05 higher than the largest farm. This general relationship also held for other field crop farming regions. Figure 2 shows the average LRAC curve for the seven field crop farming regions. Here again, costs per dollar of gross income for the smallest farm are about \$0.10 higher than the largest farm, and farms grossing between \$40,000 and \$60,000 have costs per dollar of gross income which range from \$0.05 to \$0.02 higher.

The study concludes that economies of size in field crop farming are not great. According to the report, "The cost curves estimated in this study suggest that technical economies of size exist on field crop farms but that their importance is not great. The estimated LRAC curves decline significantly at first and then are relatively flat over a wide range. Small or medium-size farms in most regions are nearly as efficient as large farms."²

Implications for Farm Managers. The study concludes that for all but the smallest farms, economies of size are not a signifi-

cant factor in the success or failure of a farm. The report says, "Based on this more general view of factors affecting efficiency, farm managers should avoid concluding that size is the primary determinant of efficiency. Past some minimum point when a small machinery complement can be efficiently utilized, factors other than size are much more important in controlling per-unit costs. Concentrating on management and productivity appears to be the most important means of increasing efficiency for commercial farms; size is of much less importance."³

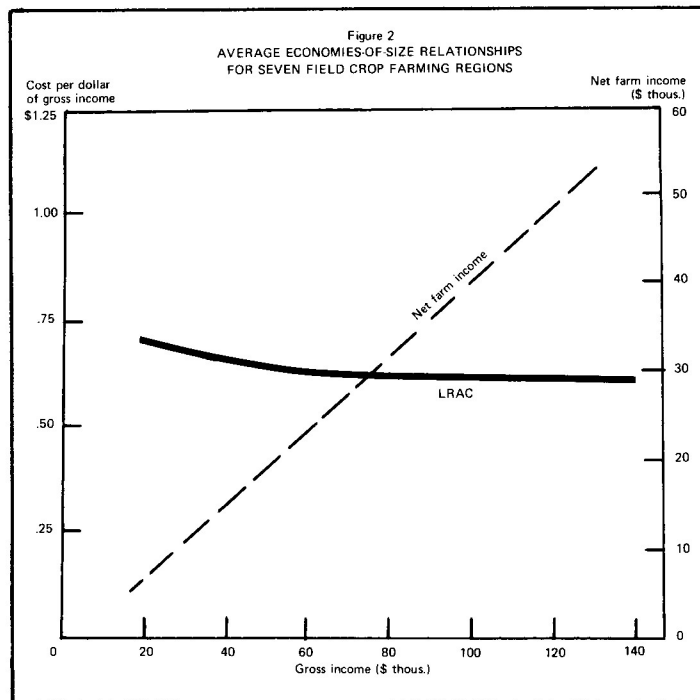
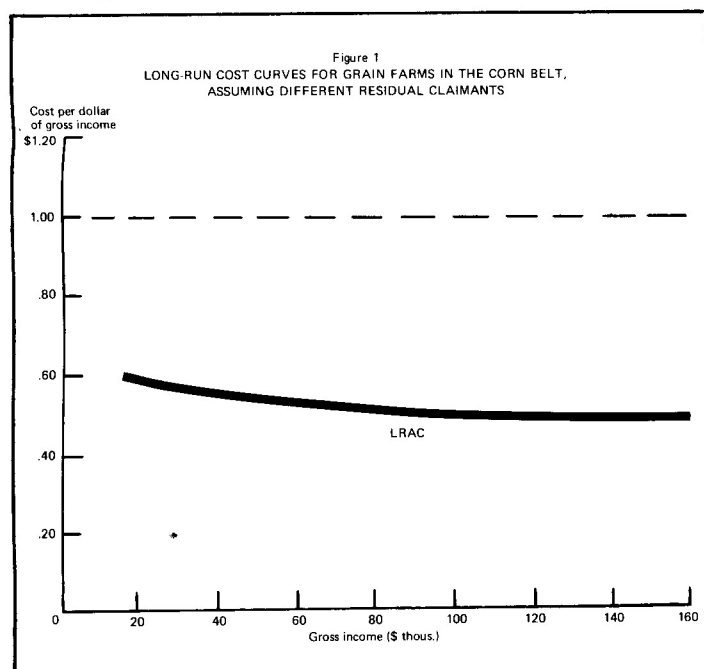
Of course, the biggest problem facing smaller farms is low income. Although per-unit cost and per-unit net income of smaller farms may be similar to those of larger farms, smaller farms simply produce fewer units and, therefore, realize smaller income. Again looking at Figure 2, net farm income is estimated for farms with various gross incomes. The income levels associated with the smallest farms are generally inadequate to support a family. The study notes, however, that many of the smallest farms are part-time units, and that if the farming unit can be combined with other income-producing activities such as custom services, live-stock production, or off-farm employment, the production unit may be both efficient and viable.

It should also be pointed out that the USDA study considered only standard cropping methods. One might legitimately ask whether alternative technologies considered to be more appropriate for smaller farms might further enhance the viability of small farms.

Implications for the Growth in Farm Size. Technological change is not always accompanied by increasing economies of size. In this case, it appears that technological change has *allowed*, rather than *forced* farms to grow larger. In other words, the technological changes which have occurred have allowed larger farms to produce at a per-unit cost which is roughly equivalent to smaller farms, whereas at an earlier time they could not. In summarizing previous studies along with (continued on page 5)

² Ibid., p. 20.

³ Ibid., p. 22.



Review and Outlook

A slight decrease in economic activity was recorded in Nebraska in September, with the index slipping 0.6 percent to 139.8 (1967 = 100). All sectors were down, with the exception of manufacturing which recorded a gain of nearly 3 percent.

The agriculture index slipped 0.8 percent following substantial gains in July and August as grain prices tumbled and marketings decreased in volume. The construction index declined again, slipping 6.7 percent from August to September, a sizable one-month decline. The construction index is at its lowest point in 1981, and remains about 10 percent below the June 1980 bottom.

Manufacturing recorded an increase of 2.9 percent in September.

This sector has shown a slow but steady increase during much of 1981, with the index peaking in July, declining sharply in August, and now rebounding in September. The July-August-September movements appear to reflect seasonal adjustments in the work force and may not be indicative of fundamental economic trends.

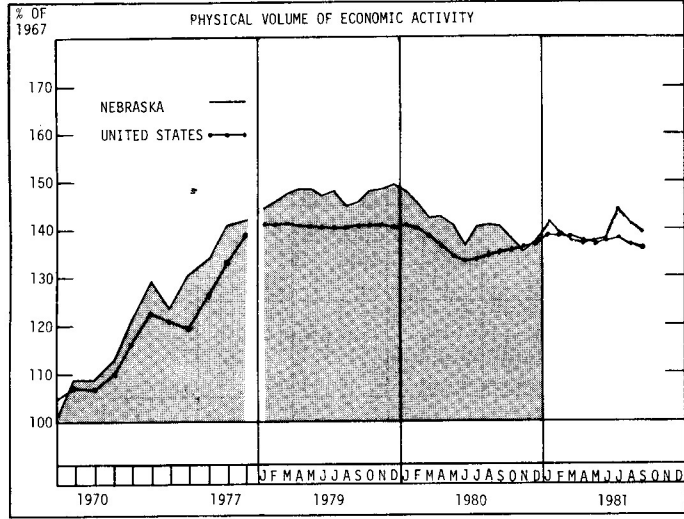
The distributive trade sector and the government sector both recorded decreases in September. The distributive trade sector recorded a decline of 1.3 percent, while the government sector recorded a decrease of 1.2 percent. The government index has drifted erratically lower over the past two years.

Notes for Tables 1 and 2: (1) The "distributive" indicator represents a composite of wholesale and retail trade; transportation, communication and utilities; finance, insurance, and real estate; and selected services. (2) The "physical volume" indicator and its components represent the dollar volume indicator and its components adjusted for price changes using appropriate price indexes—see Table 5, page 5.

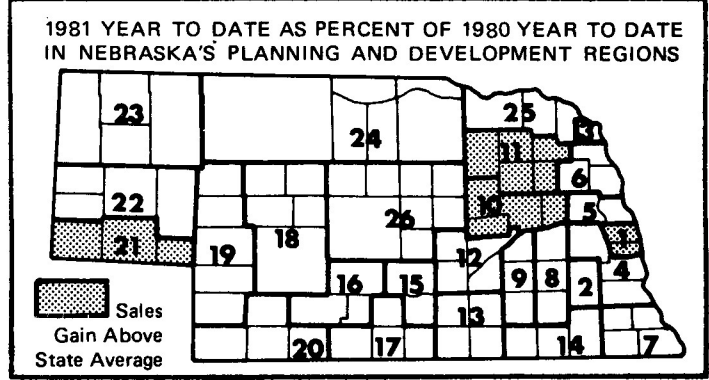
ECONOMIC INDICATORS: NEBRASKA AND UNITED STATES				
1. CHANGE FROM PREVIOUS YEAR				
September 1981	Current Month as Percent of Same Month Previous Year		1981 Year to Date as Percent of 1980 Year to Date	
	Nebraska	U.S.	Nebraska	U.S.
Indicator				
Dollar Volume	107.2	110.8	108.7	110.8
Agricultural	108.7	110.5	106.7	108.6
Nonagricultural	106.9	110.8	108.9	110.9
Construction	104.3	104.5	128.0	105.1
Manufacturing	110.0	111.8	108.9	110.9
Distributive	106.5	111.3	108.4	111.9
Government	105.0	108.8	106.3	108.7
Physical Volume	100.2	101.2	99.3	100.6
Agricultural	115.2	118.2	100.5	100.7
Nonagricultural	98.0	100.7	99.2	100.6
Construction	99.5	99.6	120.4	98.9
Manufacturing	103.4	103.1	99.5	100.7
Distributive	96.0	100.3	98.0	101.1
Government	97.6	97.4	99.3	99.2

2. CHANGE FROM 1967		
Indicator	Percent of 1967 Average	
	Nebraska	U.S.
Dollar Volume	369.8	360.0
Agricultural	385.7	359.5
Nonagricultural	367.1	360.0
Construction	236.7	312.5
Manufacturing	392.5	322.7
Distributive	376.0	390.1
Government	362.7	339.7
Physical Volume	139.8	137.0
Agricultural	153.7	146.8
Nonagricultural	137.6	136.7
Construction	73.3	96.8
Manufacturing	166.5	133.6
Distributive	134.6	139.7
Government	142.2	146.7

3. NET TAXABLE RETAIL SALES OF NEBRASKA REGIONS AND CITIES (Adjusted for Price Changes)			
Region Number and City	City Sales*	Sales in Region*	
	Sept. 1981 as percent of Sept. 1980	Sept. 1981 as percent of Sept. 1980	Year to date '81 as percent of Year to date '80
<i>The State</i>	93.5	93.5	99.5
1 Omaha	90.2	92.1	102.5
Bellevue	104.4		
2 Lincoln	NA	NA	NA
3 So. Sioux City	109.6	108.5	98.8
4 Nebraska City	88.3	92.1	95.9
5 Fremont	101.2	96.6	97.1
Blair	93.5		
6 West Point	88.2	92.7	92.9
7 Falls City	91.2	94.2	95.7
8 Seward	81.6	89.0	94.5
9 York	94.1	86.8	91.7
10 Columbus	100.2	100.5	100.4
11 Norfolk	98.8	99.7	99.9
Wayne	107.4		
12 Grand Island	88.3	83.7	95.3
13 Hastings	91.9	90.4	97.3
14 Beatrice	103.2	99.0	97.3
Fairbury	93.5		
15 Kearney	97.0	91.0	99.0
16 Lexington	93.6	90.0	94.9
17 Holdrege	96.9	91.7	96.7
18 North Platte	95.7	95.7	94.8
19 Ogallala	94.0	92.3	98.1
20 McCook	85.5	87.2	99.2
21 Sidney	104.7	102.9	100.1
Kimball	114.6		
22 Scottsbluff/Gering	107.6	101.7	98.3
23 Alliance	106.2	102.1	98.9
Chadron	99.3		
24 O'Neill	91.2	91.2	97.2
25 Hartington	90.0	94.3	96.4
26 Broken Bow	104.6	91.0	94.3



*State totals include sales not allocated to cities or regions. The year-to-year ratios for city and region sales may be misleading because of changes in the portion of unallocated sales. Region totals include, and city totals exclude, motor vehicle sales. Sales are those on which sales taxes are collected by retailers located in the state. Compiled from data provided by Nebraska Department of Revenue.



(continued from page 3) their own, the authors conclude, "These studies all challenge the conclusion that small farms do not support families adequately because they are inefficient and that farms grow to become more efficient. An alternative explanation is that small farms generate low net farm incomes, and these low incomes cause such farms to exit, become part-time units, or expand to increase income, whether or not economies of size exist. The relatively limited economies of size found on field crop farms would tend to support this second explanation. The process is accelerated by farm operators seeking to expand landholdings because of the expectation of capital gain, which often exceeds farm income."⁴

Of course, the increasing difficulty of earning sufficient income from a small farm is the result of several factors. In a very general sense, the rapid increases in the production of agricultural commodities over the years, along with the increasing costs of purchased inputs, have tended to lower commodity prices relative to costs, which in turn have meant lower profit margins and increased growth incentives. Others have pointed out that many government programs designed to aid agriculture in general have inadvertently fostered greater farm consolidation. U.S. tax policy and commodity programs, it is argued, have tended to benefit larger farms the most and, thereby, have increased the incentives for growth. Low farm incomes of smaller farms, the inadvertent impact of public policy, and the simple desire on the part of farmers to increase their farm size are all reasons for farm size growth. Although there are some economies of size using conventional technology, efficiency appears to be a minor factor in farm consolidation.

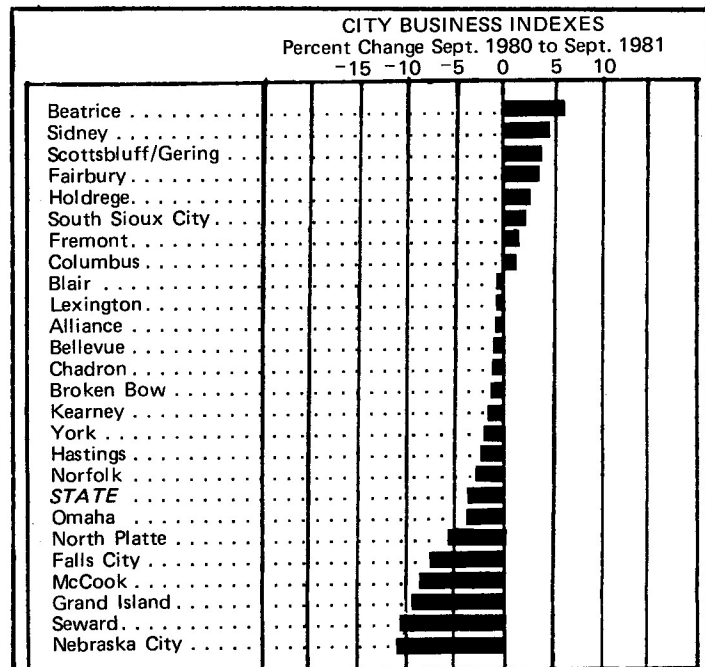
**ECONOMIES OF SIZE
AND NEBRASKA FARMS**

Using data from the Nebraska Crop and Livestock Reporting Service on the value of crops produced, and data from the Census of Agriculture on the number of farms which harvested cropland, rough estimates were made of the average value of crops produced by farms in Nebraska during 1978. In 1978, the value of crop production per farm with harvested cropland averaged \$46,705. Other estimates were made for the central, south, southeast, east, and northeast parts of the state, since these areas more closely approximate the corn belt type of farm (see Figure 3, p. 6). The value of crop production per farm with harvested cropland averaged \$61,849 in the south, \$52,871 in the east, \$51,620 in the central, \$44,772 in the southeast, and \$44,251 in the northeast. These estimates are probably on the low side if one is estimating for a typical cash grain farm, since many (continued on page 6)

⁴ Ibid., p. 22.

5. PRICE INDEXES			
September 1981	Index (1967 = 100)	Percent of Same Month Last Year	Year to Date as Percent of Same Period Last Year*
Consumer Prices	279.3	110.0	110.6
Commodity component	257.7	107.8	109.1
Wholesale Prices	295.5	107.6	109.4
Agricultural Prices			
United States	245.0	93.5	107.7
Nebraska	251.0	94.4	106.5

*Using arithmetic average of monthly indexes.
Sources: Consumer and Wholesale Prices: U.S. Bureau of Labor Statistics; Agricultural Prices: U.S. Department of Agriculture.



Source: Table 3 (page 4) and Table 4 below.

4. SEPTEMBER CITY BUSINESS INDICATORS			
The State and Its Trading Centers	Percent of Same Month a Year Ago		
	Employment ¹	Building Activity ²	Power Consumption ³
<i>The State</i>	101.8	70.1	93.7
Alliance	96.7	67.1	101.6
Beatrice	101.3	229.6	89.3
Bellevue	102.3	46.2	89.0
Blair	104.7	113.3	75.9
Broken Bow	102.4	39.7	100.1
Chadron	100.0	83.1	94.1
Columbus	104.0	76.3	84.3
Fairbury	102.1	290.5	105.5
Falls City	102.5	40.5	92.6
Fremont	102.1	85.5	102.4*
Grand Island	101.9	33.2	103.1
Hastings	102.1	121.1	109.5
Holdrege	103.1	165.3	97.8
Kearney	101.8	84.3	99.3
Lexington	103.4	122.7	106.7
Lincoln	99.8	71.0	87.2
McCook	102.0	57.3	91.0
Nebraska City	101.1	24.5	86.1
Norfolk	101.9	60.3	100.6
North Platte	100.3	44.8	84.5
Omaha	102.3	90.3	93.8
Scottsbluff/Gering	104.2	67.5	92.8
Seward	101.5	48.0	88.4
Sidney	103.2	116.5	101.8
So. Sioux City	98.6	72.2	98.6
York	104.2	86.2	93.9

¹ As a proxy for city employment, total employment for the county in which a city is located is used.

² Building Activity is the value of building permits issued as spread over an appropriate time period of construction. The U.S. Department of Commerce Composite Construction Cost Index is used to adjust construction activity for price changes.

³ Power Consumption is a combined index of consumption of electricity and natural gas except in cases marked * for which only one is used.

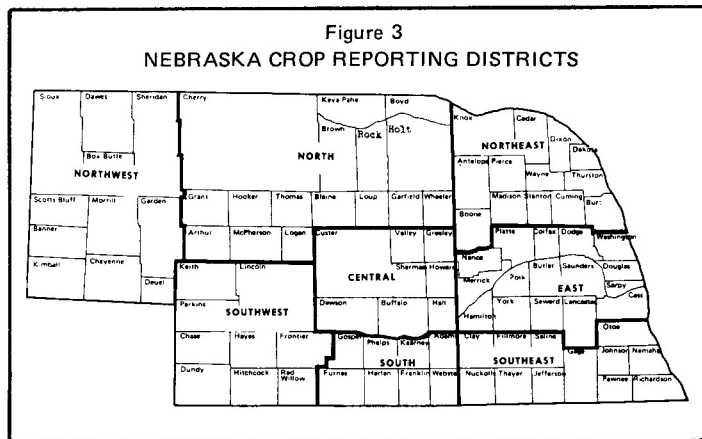
Source: Compilation by Bureau of Business Research from reports of private and public agencies.

(continued from page 5)

noncommercial farms with sales below \$2,500 per year are included, as are some ranches which raise small amounts of grain.

From these estimates and the USDA study it would appear that, on the average, Nebraska field crop farms are more than adequate in size to realize most economies of size. In addition, it would appear that the income-producing potential of these farms under normal conditions would make them viable units. In fact, as the USDA study points out, field crop farms much smaller than these may be both efficient and viable if they are managed well, and if they can be combined with other income-producing ventures which fully utilize the operators' labor and other inputs.

LYNN NEJEZCHLEB



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TELECOURSES

Courses in computer science and flexible reading are available starting February 6, 1982 on the Nebraska Educational Television Network (NETV). "Making It Count (Computer Science 103s)" and "Flexible Reading" are Telecourses, a program of the University of Nebraska-Lincoln Division of Continuing Studies. Any adult can enroll. Books arrive in the mail.

"Making It Count (Computer Science 103s)" is an introduction to computing for which students can earn two hours of University credit. The course acquaints students with hardware and software fundamentals, computer languages, and programming logic. Students follow the development of a computer system to solve a typical problem, and study the computer's role in management decision making and in society at large. Operating systems, multi-programming, system analysis in current computer applications, and the selection and use of computer resources also are discussed.

"Flexible Reading" is a noncredit course to help people learn

* * * * *

VIDEO-TAPE OF VOLCKER SPEECH

On November 11, 1981, Mr. Paul A. Volcker, Chairman of the Federal Reserve Board of Governors, Washington, D.C., delivered the E. J. Faulkner Lecture at the University of Nebraska-Lincoln.

The lecture, "The Framework for Prosperity and Growth," was video-taped and is available on a loan basis without charge to

to read faster and "smarter." For persons who do a great deal of reading as part of their jobs or their lives, this course hones skills in using different reading speeds, various methods and diversified strategies for different kinds of materials read, and different purposes for reading. A self-directed workbook, which contains information and exercises to make flexible reading part of life, allows participants to study on their own or with friends.

Other Telecourses available this semester are: "Focus on Society (Sociology 153s)"; "World Food Problems (Agriculture 492s)"; "Shakespeare (English 230s)"; "Real Estate Principles and Practices (Finance 382s)"; "Loosening the Grip (Psychology 222s)"; "Home Landscape Gardening"; and "Energy and the Way We Live (Engineering 212s)."

For more information on these Telecourses, call 472-3587 in Lincoln. Elsewhere in the state call toll free 800-742-7511, and be sure to ask for Telecourses.

interested groups. Inquiries should be addressed to Donald E. Pursell, Center for the Study of the American Business System, 200 CBA, University of Nebraska-Lincoln, Lincoln, NE 68588. Telephone: (402) 472-2334.

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University of Nebraska-Lincoln
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