



Figure 1. Designation of Sample Area

Pork Production Practices, Costs and Returns in North Dakota

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Production of butcher hogs in North Dakota has undergone many changes in the past decade. Specialized buildings and equipment are being substituted for labor, and commercially prepared feeds are being substituted for homegrown feeds. The number of pork producers in the state has declined sharply, decreasing from 21,500 in 1960 to 8,500 in 1970. The average number of hogs per farm increased from 13 to 50 during the same period.

These changes have made previous information about production practices, costs and labor and capital requirements outdated. At the same time, rapid and substantial changes in the economic environment make it imperative that producers have information which is both accurate and current.

A survey of hog producers was conducted to obtain information concerning production practices, costs, returns and resource requirements. The study area included 33 counties in North Dakota (Figure 1). The 20 counties in the north-central and western portions of the state, which were omitted from the survey, are counties where few hogs have been produced in recent years. A sample of producers was selected for personal interview, and 56

producers with complete farrow-to-finish operations were able to provide all the information requested. This report summarizes the information obtained from the 56 farrow-finish producers for their 1971 production.

Production Practices

The farrow-finish producers were divided into four size groups by number of butcher hogs sold. Group I included those producers selling 100 or fewer butcher hogs, Group II included producers selling 101 to 200 hogs, Group III producers were those selling 201 to 500 hogs, while those selling more than 500 hogs made up Group IV. Table 1 indicates the number of producers in each size group.

Spring was the most common farrowing period considering pork producers as a whole. However, producers with large hog enterprises (Groups III and IV) commonly farrowed year-around. Pigs saved per litter averaged 8.3 for all producers, with Group I having the smallest average number of pigs saved (see Table 1). The larger producers (Groups III and IV) had a much higher ratio of sows per boar than producers in Groups I and II.

Feeding practices of pork producers appear to be related to enterprise size. Self-feeding systems were used by most producers in Groups I and II and

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Table 1. Production practices of farrow-finish pork producers, North Dakota, 1971.

Item	Unit	Farm Size Group				Total
		I	II	III	IV	
Number of farms	number	11	16	16	13	56
Average 1971 pork production	cwt.	206.7	402.6	797.6	1,795.9	800.4
Average sow herd size	number	9.8	10.8	30.3	54.8	25.3
Average pork production per sow	cwt.	21.1	37.3	26.3	32.8	31.6
Average number of sows per boar	number	8.2	9.5	16.8	17.4	13.0
Farms farrowing in:						
Spring	per cent	90.9	93.8	81.3	84.5	87.5
Summer	per cent	9.1	25.0	62.5	100.0	50.0
Fall	per cent	18.2	50.0	56.3	92.3	55.4
Winter	per cent	18.2	31.3	81.3	84.5	55.3
Average pigs saved per litter	number	7.7	8.6	8.3	8.3	8.3

by all producers in Groups III and IV. All producers used purchased feeds to supplement their home-grown feeds and a few producers (14 per cent) used purchased feeds exclusively. Producers in Groups III and IV used purchased feeds more extensively than smaller producers, and most of the producers using only purchased feeds were in the two largest size groups. In each size group, supplements were the type of feed most commonly purchased, with pig starter second in importance. Oats and barley were the homegrown feeds used most commonly. Considering all producers, 56 per cent of the total feed requirements by weight were homegrown and 44 per cent were purchased.

Capital Investment

The average investment in the hog operation per producer was \$18,632. The investment figures referring to the present value of buildings, machinery and equipment, and the hog inventory are summarized in Table 2. Some buildings and machinery were used partly for the hog enterprise and partly for other enterprises. The calculated value of the investment for these items represents only the

portion for which they were used in the hog enterprise.

The investment per hundredweight of pork produced and sold is summarized in Table 2. No clear relationship exists between enterprise size and the per-unit capital requirement. It is possible, however, that producers in Group I had a relatively small investment because their buildings were older and their hog operations generally less automated.

Table 2. Average capital investment of farrow-finish pork producers, North Dakota, 1971.

Item	Farm Size Group				Total
	I	II	III	IV	
Present value of:					
Buildings	\$1,199	\$4,414	\$ 8,862	\$15,979	\$ 7,792
Machinery & equipment	681	1,529	1,774	4,362	2,090
Hog inventory	2,065	4,028	9,872	18,839	8,750
Total investment per farm	3,945	9,971	20,503	39,180	18,632
Total investment per hundred-weight of pork sold	19.08	24.77	25.71	21.82	23.28

Table 3. Labor used by farrow-finish pork producers, North Dakota, 1971.

Item	Unit	Farm Size Group				Total
		I	II	III	IV	
Labor used per hundredweight of pork sold:						
Daily care of hogs	hours	1.53	0.94	0.46	0.35	0.52
Farrowing	hours	0.48	0.35	0.12	0.09	0.15
Feed grinding	hours	0.16	0.13	0.08	0.05	0.07
Repairs	hours	0.14	0.08	0.10	0.04	0.06
Cleaning and sanitation	hours	0.17	0.26	0.29	0.19	0.23
Marketing	hours	0.14	0.11	0.07	0.06	0.08
Total labor used per hundred-weight of pork sold	hours	2.61	1.87	1.08	0.77	1.11
Total labor used per sow	hours	55.1	69.8	28.5	25.3	35.2
Total labor used per farm	hours	540.0	752.3	864.1	1,388.8	890.9

Table 4. Production costs of farrow-finish pork producers, North Dakota, 1971.

Item	Unit	Farm Size Group				Total
		I	II	III	IV	
Total production costs per farm	dollars	4,625	7,989	15,206	29,478	14,356
Fixed Costs	dollars	655	1,522	2,680	5,257	2,527
Variable Costs	dollars	3,970	6,467	12,526	24,221	11,829
Production costs per hundred-weight of pork sold:						
Fixed costs:						
Interest on investment	dollars	1.36	1.73	1.76	1.53	11.60
Depreciation	dollars	1.60	1.91	1.48	1.27	1.43
Insurance	dollars	0.11	0.11	0.12	0.11	0.11
Land charge ¹	dollars	0.10	0.02	²	0.01	0.02
Total fixed costs	dollars	3.17	3.78	3.36	2.93	3.16
Variable costs:						
Feed	dollars	10.79	9.23	10.68	9.13	9.64
Building and equipment repairs	dollars	0.41	0.39	0.49	0.82	0.66
Labor ³	dollars	5.22	3.75	2.16	1.57	2.23
Interest on operating capital	dollars	1.75	1.69	1.37	1.08	1.28
Miscellaneous costs ⁴	dollars	1.04	1.01	1.01	0.87	0.98
Total variable costs	dollars	19.21	16.06	15.71	13.49	14.79
Total cost per hundredweight	dollars	22.38	19.84	19.07	16.41	17.95

¹Land charge was calculated for pasture used at a rate of \$3.80 per acre (1971 average cash rental charge).

²Less than \$0.01.

³Labor cost based on a charge of \$2 per hour for all labor.

⁴Includes veterinary expense, spray, marketing costs, etc.

Labor Requirements

Labor input is important in hog production. The average number of hours used per producer for the hog enterprise was 890.9 hours. The labor requirement per hundredweight of pork sold declined rapidly as the size of hog enterprise increased. Producers in Group I used 2.61 hours of labor per hundredweight of pork sold, while Group IV producers used only 0.77 hours. A summary of labor requirements is presented in Table 3.

Production Costs

The average total cost per hundredweight of pork sold was \$17.95 (Table 4). Fixed costs are those which are not influenced by the intensity of production, including interest in buildings and machinery, depreciation, insurance and land charge. Fixed costs accounted for \$3.16 of the \$17.95 total cost per hundredweight.

Variable costs are those which depend on the level of production and include feed, repairs, labor, marketing costs and other miscellaneous costs. Variable costs accounted for \$14.79 of the \$17.94 total cost, or 82.4 per cent. The largest variable cost item was feed, which made up 65.2 per cent of the variable costs (\$9.64 out of \$14.79).

Total pork production costs were found to decline substantially as the size of the hog enterprise increased. Total cost per hundredweight declined

from \$22.38 from Group I to \$16.41 for Group IV (Table 4). Lower labor requirements were the greatest source of cost advantage for larger producers. Variable costs accounted for 82.4 per cent and fixed costs accounted for 17.6 per cent of the total cost (Table 5). Feed was the largest single cost item, accounting for 53.7 per cent of the total cost. Labor was also a substantial variable cost item and accounted for 12.4 per cent of total costs. Among the fixed costs, interest was the largest cost item followed closely by depreciation.

Table 5. Percentage distribution of average pork production costs, North Dakota, 1971.

Item	Per cent of Total Cost
Fixed costs:	
Interest on investment	8.9
Depreciation	7.9
Insurance	0.1
Land charge ¹	¹
All fixed costs ²	17.6
Variable costs:	
Feed	53.7
Repairs	3.7
Labor	12.4
Interest on operating capital	5.4
Miscellaneous costs	7.1
All variable costs ²	82.4

¹Less than 0.05 per cent.

²May not add to totals because of rounding error.

Table 6. Average return: Return to capital, labor and management: and rate of return on investment: farrow-finish producers, North Dakota, 1971.

Item	Unit	Farm Size Group				Total
		I	II	III	IV	
Total return ¹	dollars	4,051	8,046	15,985	33,478	15,433
Return to capital, labor, and management ²	dollars	956	2,290	4,380	10,870	4,624
Return to capital and management ³	dollars	-124	781	2,658	8,046	2,840
Rate of return on investment ⁴	per cent	5	7.8	13.0	20.5	15.2

¹Total return includes receipts from sale of butcher hogs, feeder pigs, sows, and boars, plus any increase in hog inventory.

²Total receipts less feed costs, repairs, miscellaneous variable costs, depreciation, insurance, and land charge.

³Return to capital, labor, and management less labor charge.

⁴Return to capital and management divided by total investment.

⁵Return on investment is negative.

Revenue and Resource Returns

Total receipts from hog production ranged from \$4,051 for Group I producers to \$33,478 for Group IV, and averaged \$15,433 for all producers (Table 6). Returns to capital, labor and management averaged \$4,624, and returns to capital and management averaged \$2,840 for all producers. The rate of return on investment averaged 15.2 per cent, ranging from a negative return for Group I to 20.5 per cent for Group IV.

Factors Influencing Profits of Pork Producers

To investigate why some pork producers were doing well financially and others doing poorly while operating under similar conditions, the data for the 56 producers were arrayed from high to low based on the rate of return on investment. The 14 producers (25 per cent) with the highest rate of return are compared to the 14 with the lowest return in Table 7. High return producers generally had a much larger volume of production than low return producers. To produce this greater volume of output, high return producers required a greater investment, \$18,599 compared to \$11,949 for low return producers. However, high return producers actually required fewer hours of labor than their low return counterparts.

Measures of production efficiency presented in Table 7 indicate some reasons for the high return producers' success. Their feed cost was \$3.65 less per hundredweight of pork sold. Their labor input per unit of output was only 35 per cent of that used by the low return producers and their capital requirement was only 61 per cent of that for the low return producers.

Total production cost provides an overall indication of production efficiency. Table 7 reveals that high return producers produced pork at per unit costs which were 51 per cent of those incurred

by low return producers (\$14.54 compared to \$28.51). High return producers coupled lower production costs with higher prices received. While low return producers received an average of \$19.57 per hundredweight sold, high return producers received \$20.73.

Table 7. Factors influencing profits of farrow-finish producers, North Dakota, 1971.

Item	Unit	Averages for Highest Rate of Return ¹	Producers With Lowest Rate of Return ²
Business size:			
Pork sold	cwt.	889.0	346.1
Investment	dollars	18,599	11,949
Labor used	hours	794.6	881.2
Production efficiency:			
Feed cost per cwt. of pork sold	dollars	8.19	11.84
Labor used per cwt. of pork sold	hours	0.89	2.55
Investment per cwt. of pork sold	dollars	20.92	34.52
Prices received:			
Receipts per cwt. of pork sold	dollars	20.73	19.57
Production costs:			
Variable cost per cwt. of pork sold	dollars	12.39	23.69
Fixed costs per cwt. of pork sold	dollars	2.15	4.82
Total cost per cwt. of pork sold	dollars	14.54	28.51

¹Figures for the 25 per cent of producers with highest rate of return on investment.

²Figures for the 25 per cent of producers with lowest rate of return on investment.