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Of Major Pork Exporting Countries**

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**Staff Paper No. 302
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Introduction

Change is apparent in the pork industry during the last few years. The size of pork production operations is growing rapidly in the United States while many small to mid-size producers are leaving the business. In 1997, the largest pork producers, those marketing over 50,000 hogs accounted for 36% of U.S. production, and they report the fastest growth plans for the near future (Lawrence, Grimes, and Hayenga). With this rapid change in the United States pork industry structure, the issue of the competitive position in world pork markets quickly emerges.

This study uses pork production records to estimate the cost of production for two U.S. scenarios: the typical Midwest producer and the U.S. large-size producer, Denmark, The Netherlands, and Canadian producers. Differences in cost patterns among the countries along with a discussion of these differences are presented.

The year chosen to compare production costs is 1995. This is the most recent year of consistent data available for all the countries. Moreover, feed cost relationships in 1995 are more representative of expected future relationships. Feed grain prices rose to record levels in the United States during 1996, and European countries had grain export restrictions in place that artificially held grain prices relatively low in those countries during that time.

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The authors are a Iowa State University graduate student and professors of Economics respectively.

Any opinions, findings, conclusions, or recommendations expressed are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

In the analysis, on-farm production records were used to develop comparable costs whenever possible. For information where records were not available, expert opinion and budgeting was used. Use of these broad-based on-farm production records provide a direct measure of hog production costs.

United States Production

Within the United States pork production occurs in operations of varied sizes. For this analysis, two operations are evaluated. The first size investigated is the small to mid-size system, referred to as typical Midwestern production. The second is the large-scale producer. To estimate cost of production for the typical operation, production records were obtained from various record sources. These sources are discussed in the Technical appendix. To estimate production costs for the large-scale producers expert opinion, in the form of budgets, and industry surveys were used.

Typical Midwest Production

Midwestern swine production is undergoing change with respect to location and size of operations. The change is so rapid and widespread that the definition of the typical Midwestern producer will likely depend on the defining party. The reports used to estimate the typical operation ranged in size from 100 to 250 sows per farm. It seems reasonable that in 1995, operations of this size were considered typical.

Approximately forty-six percent of the U.S. pork production occurred in the five Midwest states included in this study (National Agricultural Statistics Service 1997). These five states are Iowa, Illinois, Nebraska, Kansas, and Missouri. Each state annually publishes reports which provide cost of pork production. These reports for 1995 were used in the computation for typical Midwest producers production costs. Among the respective reports, variations existed regarding

methods of data collection and reporting. Phone conversations, personal interviews and email correspondences with report administrators clarified differences among the reports (see technical appendix). The technical appendix of this report provides information on adjustments made for comparability.

An issue which needed clarification was the discrepancy in reporting facility fixed costs. Many operations had been in production for a number of years and were fully depreciated. For these producers the tendency was to report facility cost at zero. These producers omit allowances for facility replacement cost and interest on investment in their cost of production. Moreover, variable expenses such as interest and labor are also typically under reported. For example, operators may not borrow money for operating expenses; therefore their interest expense is typically reported below the opportunity cost of capital. Labor expense can also be misleading. Operations structured as sole proprietorships or partnerships may not report labor expense when the owners contribute the labor (Baas 1997). Given this the record programs focus on obtaining a full accounting of labor use.

These variations in methods of cost reporting can cause problems when typical operations are compared across states as well as when they are compared to large-scale operations and international competitors. As was expected, the reports for the five states each contain relatively low values for variable interest, fixed interest, and housing expense. Therefore, for comparability, cost of production values for variable interest, fixed interest, and housing were developed to reflect full production costs for the typical Midwest producer (see Table 1 and technical appendix Table 1.1). Other costs—feed, labor, and other variable costs—were taken directly from the various reports.

Estimated “average” production costs for the typical Midwestern pork production system was \$43.28. This was determined by using a weighted average based on the relative swine inventory in each respective state (Table 1.3 technical appendix). This weighted average is representative of typical small to mid-scale Midwestern production costs. Production costs per cwt ranged from a low of \$40.74 in Nebraska to a high of \$46.68 in Missouri.

The variable interest cost was calculated at 10.39% of the variable costs for a five month period. The 10.39% represents the average agricultural interest rate for 1995 (see Technical appendix). Depreciation was computed using replacement costs of like type buildings for average Midwestern production (Table 1.2 technical appendix). Depreciation and fixed interest are combined to reflect housing costs. For comparability, identical housing costs were assigned for each Midwestern state. It is acknowledged, however, that nominal differences in housing costs may exist between states. Given this, the cost differences reflect differences in variable production costs. Table 1 provides state comparisons for a typical Midwest producer.

Table 1: Cost of Pork Production by Area of the United States. (\$ per cwt)

Item	Iowa	Illinois	Nebraska	Kansas	Missouri	Average
Variable Cost						
Feed Cost	25.29	24.67	24.39	26.06	28.28	25.47
Labor Cost	4.59	4.26	4.07	4.84	4.24	4.42
Interest	1.52	1.55	1.43	1.64	1.68	1.54
Other Variable Cost	5.24	6.78	4.63	6.93	6.26	5.63
Sub-total	36.64	37.26	34.52	39.47	40.46	37.06
Fixed Cost						
Housing Costs	6.22	6.22	6.22	6.22	6.22	6.22
Total Costs	42.86	43.48	40.74	45.69	46.68	43.28

Sources indicated in technical appendix

Large-Scale U.S. Production

Large-scale operations are defined as those with over 500 sows, usually 1,000 or more.

Cost of production information for Large-scale producers is not available in published form like

that for typical operations. To estimate cost of production for these large-scale operations it was necessary to use industry inquiries, budgets and Delphi methods (see technical appendix for methods).

Table 2: Comparison of Pork Production Costs. (U.S. \$/cwt)

Item	Average U.S. MW	Large U.S. MW	Alberta ^(a)	Ontario ^(a)	Netherlands ^(b)	Denmark ^(b)
Variable Cost						
Feed Cost	25.47	22.75	20.12	27.03	34.00	34.77
Labor Cost	4.42	3.45	4.40	3.98	10.63	10.40
Interest	1.54	1.39	0.92	1.14	2.88	3.58
Other Variable Cost	5.63	5.94	5.41	6.21	14.47	11.81
Sub-total	37.06	33.53	30.85	38.36	61.98	60.56
Fixed Cost						
Housing costs	6.22	5.50	8.12	8.61	12.60	17.03
Total Costs	43.28	39.03	38.97	46.97	74.58	77.59

a) Exchange rate: (CA\$)/(.73\$U.S.)

b) Exchange rate: (1.56guilders)/(\$U.S.)

Sources indicated in technical appendix.

Table 2 shows the comparisons of large firms to typical Midwest operations and international competitors. These industry surveys and budgeting provide a relatively good measure of total production cost. The resulting total cost of \$39.03 indicates that large-scale U.S. producers rank second, with Alberta Canada as having the lowest production expense among the operations compared. The lower cost of production for large operations was obtained through extensive use of specialized technology, bulk purchasing, large capital outlay, and other strategies to capture economies of scale.

Canadian Production

The cost of Canadian pork production varies between eastern producers (Ontario) and western producers (Alberta). Western Canada estimates are pulled from Alberta records while those for eastern Canada represent Ontario producers. The Alberta records include only producers of over 2,500 hogs finished per year with the average production for firms in the

record analysis at 7,600 head finished annually. The Alberta estimates are for operations larger than that represented by the typical Midwest producer. Ontario producers are relatively smaller producers.

Western Canada--Alberta

The relatively cheap feedgrains in western Canada provide this region with the lowest cost of production among the operations investigated. In August of 1995, the Western Grain Transportation subsidy ended. The effect has been to increase the transport cost of feedgrains from the western prairies to eastern Canada. According to a recent study published in Canada, the end of subsidized transportation will result in lower feed grain prices and lower hog production costs in the prairie region. (Martin, Kruja, and Alexiou) This result is reflected by Alberta's feed cost of only \$20.12 per cwt liveweight.

The published cost of housing for Alberta was believed to be lower than the opportunity cost as was the case in typical Midwestern U.S. reports. Therefore, housing costs are assigned based on Martin et al. Western Canada feeds are barley and wheat based, as compared to corn based feeds fed in eastern Canada.

Alberta had production cost at the same level as the large U.S. producer, about \$39.00 per cwt. These costs were \$4.00 per cwt under the typical Midwest producer.

Eastern Canada--Ontario

The estimates for Ontario are based on records from farms which, on average, sold 2,067 market hogs per year. Eastern Canada, specifically Ontario, has higher costs in all areas except labor. Total production costs are \$8.00 over those of the Alberta Canada area and the large U.S. producer. Ontario production is located closer to older existing processing.

However, new processing facilities are being built in the prairie regions where pork production is

growing relative to that of eastern Canada. The new plants also provide western Canada with lower processing costs to go along with lower production costs.

European Exporters Production

The Netherlands and Denmark have high costs of production compared to the U.S. and Canada. However, they are important international competitors in the world pork market. High quality specialized products, governmental price supports, and effective coordination or linkages allow them to compete very effectively in the global market. Given their higher production costs, their competitive position would be expected to be less significant in the world market as free trade evolves over time.

Denmark

Denmark estimates were obtained from Europorc record analysis results. The values from these records included opportunity cost of capital and allowances for replacement of facilities (see technical appendix for sources). Denmark producers had the highest overall cost of production at \$77.59 per cwt. This is explained by higher feed costs, higher labor costs, higher housing costs, and lighter slaughter weights.

The Netherlands

The Netherlands estimates were also obtained from Europorc record analysis results. The values from these records included opportunity cost of capital and allowances for replacement of facilities (see technical appendix for sources). The Netherlands producers realize the second highest overall cost of production of all operations investigated at \$74.58 per cwt. They compared with Denmark in most cost areas.

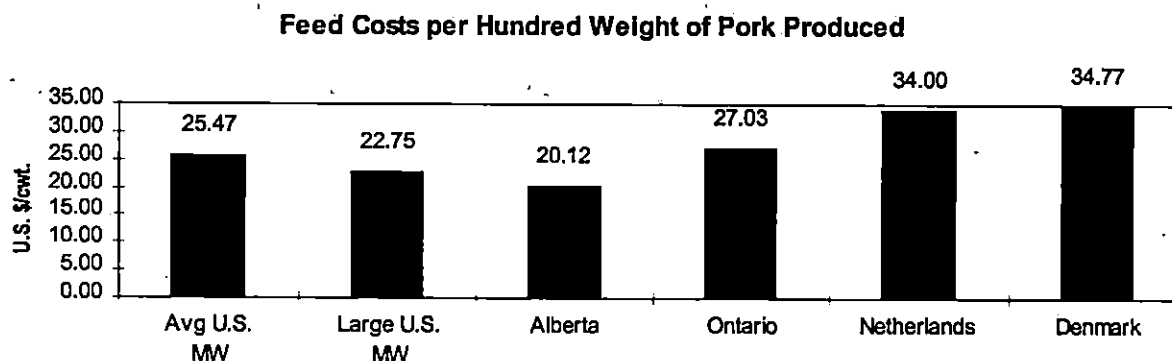
Costs Differences

Why do production cost differences exist between different sizes and national regions?

Cost comparisons between small and large producers within the United States and typical size operations of Canada, Denmark and The Netherlands provide some answers. Moreover, additional cooperative in-depth on-farm studies are needed to provide definitive comparisons but several comparisons are worth noting.

Feed costs

Feed costs represent the largest portion of pork production costs. In the United States feed costs represent approximately 59% of total costs. Western Canada, Eastern Canada, The Netherlands, and Denmark show feed costs of 52%, 58%, 46%, and 45% of total costs, respectively.



Western Canada's feed costs per cwt of pork produced are the lowest (\$20.12) with Denmark's costs ranking highest (\$34.77). Feed ration composition varies between location, but Western Canada has a clear feed cost advantage. Unit cost for feed within the United States shows some variation. Large producers specializing in pork production and/or located away from concentrated grain production purchase most of their feedgrains. In comparison, the typical Midwest producer is a more diversified producer, raising most of their own feedgrains.

Protein and feed supplement sources present a different cost structure. Small to mid-size operations typically purchase protein and feed supplements from cooperatives and feed manufactures. Large producers, on the other hand, efficiently produce and mix rations at the farm. For many, they have their own mix-mills delivering feed to the different production sites. Economies of scale are present in the milling and mixing of feed ingredients. Feed mills represent large fixed expenditures but decrease unit feed cost for large operations (Baumel 1997). Large producers also purchase micro ingredients for feed rations in large quantities relative to the typical producer. These bulk purchases provide the large producer the advantage for feed supplement cost.

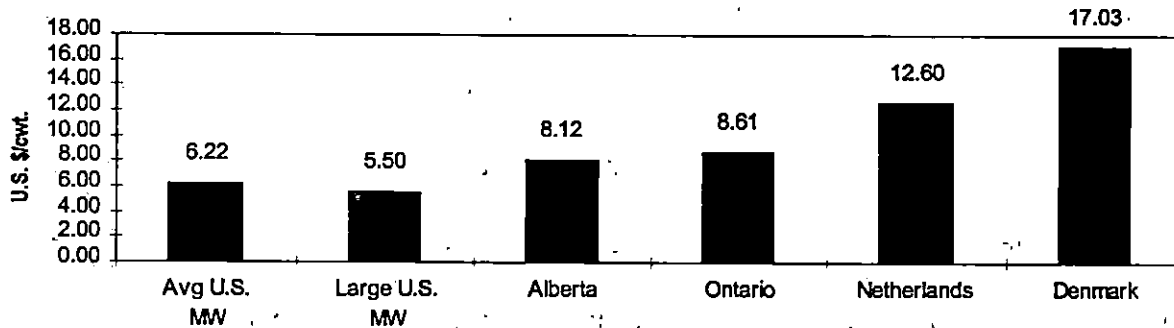
Genetics, housing environment, split-sex feeding, multi-stage feeding, and segregated early weaning are a few of the additional factors that affect overall feed cost per pound of pork produced. While these individual factors may not be large, their individual effects become significant when aggregated together. Large producers typically produce more pigs per unit of breeding stock. Large producers generally use newer buildings than the typical Midwest producer. Their housing environment, if well managed, can enhance feed efficiency and reduce feed cost. Large-scale producers typically utilize more current technologies and create a more stable production environment, thereby reducing feed cost per pound of pork produced.

Split-sex feeding and multi-stage feeding have also been shown to reduce feed costs. Many small to mid-size operations use these techniques; however, it is a common practice for large operations. Split-sex feeding and multi-stage feeding reduce feed costs by more closely matching the exact feed requirements of the pigs by sex and growth stage.

Facility costs

Facility costs for most typical Midwest operations are reported very low. Many facilities were built in the 1970's and the buildings are fully depreciated. When plans are made to continue operations buildings will be replaced. The typical Midwest producer typically will build one or two buildings at any one time. Large operations build many identical buildings at any one time. These cookie cutter buildings utilize economies of scale and result in large operations having the lowest housing costs per unit of pork produced. Company crews are employed by the large-scale producers to constantly construct housing. Design faults can be discovered and improved continuously. In addition to initial building expense being less on a per unit basis, other factors make facility cost less relative to small and mid-size operations. Large operations have better throughput and produce more pounds of pork per pig space.

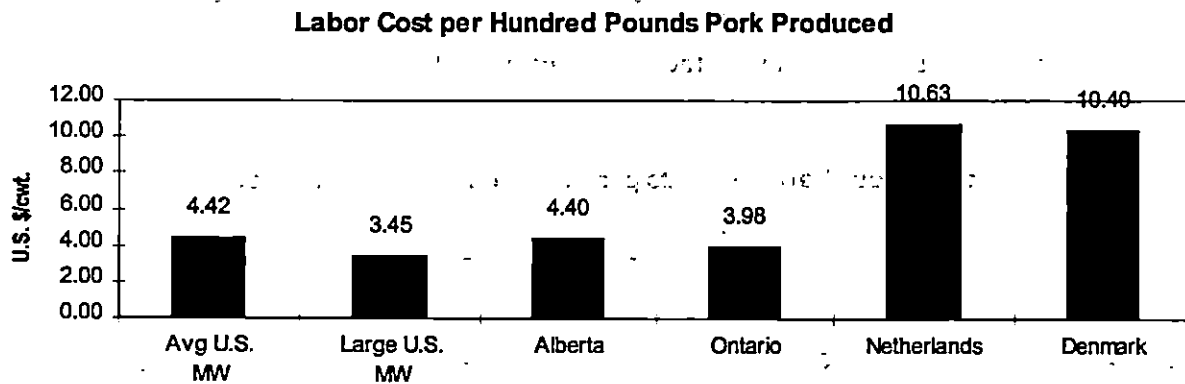
Housing Costs per Hundred Pounds Pork Produced



All international producers have higher building expense compared to the United States. The Canadian producers realize the higher costs as a matter of their lower temperatures. Producers in the Netherlands and Denmark have higher facility costs due to relatively more stringent environmental and animal welfare restrictions.

Labor costs

Labor costs are a relatively small portion of total pork production expense. They range from 9% to 14% of total production costs. Canadian competitors have labor costs similar to those of U.S. producers. The Netherlands and Denmark have labor costs which are about 2.5 times as great as those in the U.S. and Canada.

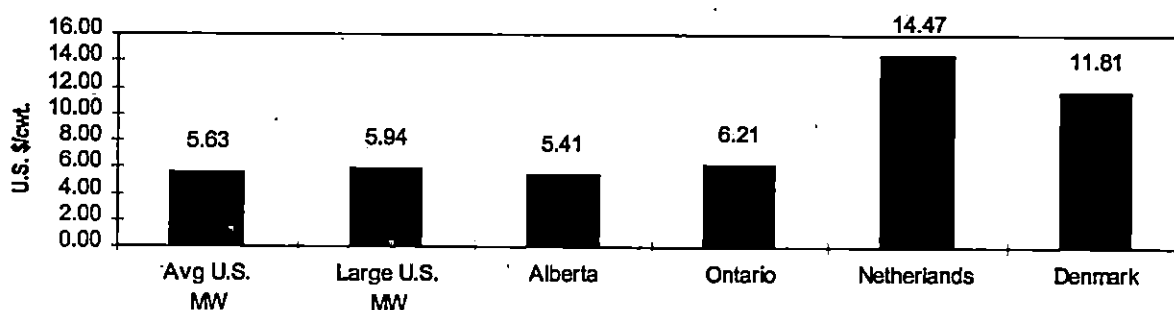


The typical Midwest producer had labor costs about \$1.00 per cwt higher than that of the large operations. Large firms are positioned to fully employ all of their labor and the labor is more specialized. Their intensive use of capital and associated technology also contributes to lower per unit labor cost. Modern facilities with state of the art technology require less labor to operate. Equipment and machinery are dedicated solely to pork production. Additionally, computer use is positively correlated with operation size. Computerized record systems require less time for data management, and computerized feed mixing and delivery systems require less time and improved preciseness for mixing feed.

Miscellaneous Variable Costs

Miscellaneous variable costs include various operational costs. Machinery, utilities, fuel, oil, livestock supplies, insurance, taxes, phone, veterinary and medicine, marketing, etc. costs are included in this category. This cost category acts as a catch all for the micro-costs of pork production. These costs are, in general correlated with total cost of production. they are the lowest for Alberta, Canada, followed by the typical Midwest producer, the large U.S. producer, to Ontario; with the Netherlands having the highest cost level.

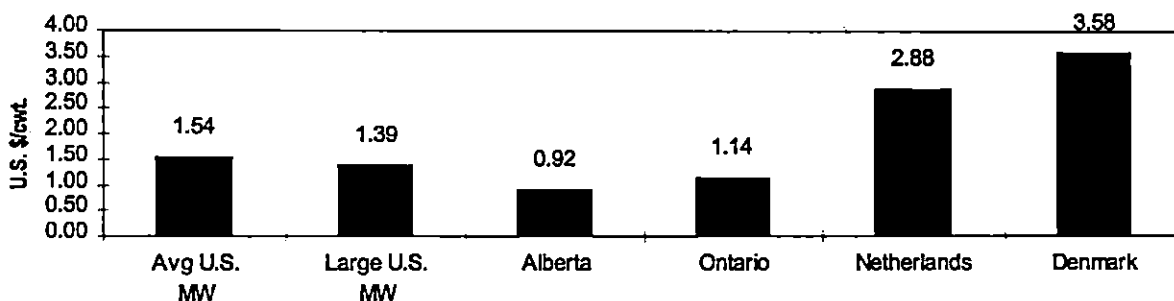
Miscellaneous Variable Costs per Hundred Pounds Pork Produced



Interest

Interest costs are variable expenses were the lowest is Canada at about \$1.00 per cwt followed by the U.S. at about \$1.45 per cwt, the Netherlands at \$2.88 and Denmark at \$3.58 per cwt. Variable costs are calculated for a five month time period. As previously indicated, the interest rate for the U.S. was taken as 10.39%. Canadian economists indicate that the rate for

Variable Interest Costs per Hundred Pounds Pork Produced



Canada is about 3% below that of the United States (Mártn, Kruja, and Alexiou). The Variable interest costs for the Netherlands and Denmark were taken directly from their respective record analysis's.

Genetics

Cost of genetics is generally correlated with the quality of the breeding stock. Large operations and European competitors tend to have improved genetics. Large operations commonly have their own multiplier herds and boar studs or contract for the delivery of large numbers of replacement boars and gilts. This ensures that large producers have a supply of desirable genetics. Small to mid-size producers, when acting independently, do not purchase in large quantities or maintain their own multiplier herds. They can have greater difficulty obtaining similar quality genetics at similar prices.

Revenues

There is much discussion about revenue differences for large and small producers. Data shows that revenue differences do exist between large and small producers overall. Just exactly why these differences exist can partially be explained by non-size related issues. Larger producers, in general, tend to have a better or leaner product. Lean uniform hogs are most desirable to packers. Large producers market hogs which are relatively uniform in weight leading to less sort loss, etc. In a recent study, hog quality, not volume sold, had the biggest impact on revenue differences (Lawrence 1996). However, some argue that large groups of hogs from one source will receive a higher base price, reflecting volume purchasing, however, this has not been fully documented.

Production Efficiencies

Productivity efficiencies explain some of the cost differences between the different size operations and between countries. Within the United States the large-scale operations have better feed efficiency, more pigs/sow/year marketed, and leaner carcasses. A feed efficiency comparison between countries and regions is limited due to different feed composition of the ration. For example, corn represents the main feed ingredient for many U.S. production areas, while the small grains are a primary feed source for Western Canada. An alternative comparison would be energy equivalent. However, energy equivalent conversions could not be performed for this comparison because composition records were not always available.

Table 7: Production Efficiency Comparison

Item	Average U.S. MW	Large U.S. MW	Alberta	Ontario	Netherlands	Denmark
Pigs marketed/sow/year	15.5 ^a	19.77 ^c	17.65 ^d	18.8 ^f	20.57 ^h	20.58 ^h
Lean	46.3 FFLI ^b	50.64 Danish ^c	59.5 CA ^e	52.0 FFLI ^f	55.5 Danish ⁱ	59.8 Danish ^k
Live weight lbs.	242 ^a	239 ^c	238 ^d	231 ^g	248.6 ^j	213 ^j

FFLI = fat free lean index

Danish % lean = $58.86 - (.61 * \text{fat mm}) + (.12 * \text{lean mm})$

Danish % lean minus 3% is used as an approximation to FFLI

CA % lean = $68.1863 - (.7833 * \text{fat mm}) + (.0689 * \text{lean mm}) + (.008 * \text{fat mm}^2) - (.0002 * \text{lean mm}^2) + (.0006 * \text{fat} * \text{lean})$

a) (Typical Midwestern sources)

b) (Brumm and Reese 1997)

c) (Industry survey)

d) (Schuld, Alberta's Pork Production Industry)

e) (Landry, Alberta Pork Producers Development Corp)

f) (Duffy, Ontario Data Analysis Project)

g) (Epp, Ontario Data Analysis Project)

h) (Backus, Europorc)

i) (Backus, TEA-2000)

j) (Backus, Costprice Comparison)

k) (Danske Slagterier, Annual Report 1996)

Pigs marketed per sow per year was 19.77 for the large U.S. operations as compared to 15.50 for the typical Midwestern operation; increase of four pigs. This compares to about 18 in

Canada (17.65 in Western Canada and 18.80 in Eastern Canada). For both the Netherlands and Denmark about 20.6 pigs were marketed per year.

The typical marketing weight was 240 pounds for the U.S. and Western Canada. It was slightly heavier (249 pounds) for the Netherlands. This compared to a lighter weight for eastern Canada (231 pounds) and a 213 average marketing weight for market hogs in Denmark.

Lean comparisons cannot be made because of differences in methods of measuring lean.

Conclusion

The pork production industry is undergoing rapid change both within the United States and in foreign countries. With the movement toward increasing levels of free trade, cost of production will be a key ingredient to competing in the world market. This study analyzes cost of pork production in the United States, Canada, the Netherlands, and Denmark using farm production cost record information.

Low cost pork production is occurring in Western Canada and by the large United States producers. This production costs is about \$39.00 per cwt liveweight pork produced. The typical United States Midwestern producer had production costs of \$43.00 per cwt while the Ontario Canada producer had costs of \$47.00 per cwt. Production costs for producers in the Netherlands and Denmark was about \$75.00 per cwt.

The United States and Western Canada have competitive production costs. Among the regions studied, their costs position them to be effective participants in the global pork market.

Technical appendix

Budgeting is widely used to model pork production costs. However, production records were chosen for comparisons of production costs for existing operations. Production records were used to develop comparable cost and revenue categories and performance relationships whenever possible. In cases where records were not available, expert opinion was used in the way of budgets and Delphi responses. The sources for information on pork production costs for farrow-to-finish operations identified are as follows:

- I. Typical Midwest production identified by state record systems as follows:
 - A. Iowa—1995 I.S.U. Swine Enterprise Record, Farrow-to-Finish, Iowa State University Extension Service.
 - B. Illinois—1995 Livestock Standards from Illinois Farm Business Records, Illinois FBFM Association in Cooperation with Department of Agricultural and Consumer Economics, University of Illinois.
 - C. Kansas—State Enterprise Analysis-1995, Department of Agricultural Economics, Kansas State University.
 - D. Missouri—Missouri Farm Business Summary 1995, Extension Division, University of Missouri-Columbia.
 - E. Nebraska—Swine Enterprise Records and Analysis Program-1995, Cooperative Extension, University of Nebraska in cooperation with the U.S. Department of Agriculture.
- II. King-size production identified by industry inquiry, budgeting approaches and Delphi responses.
- III. Denmark production identified by EuroporC
- IV. Netherlands production identified by EuroporC
- V. Ontario production identified Ontario Data Analysis Project 1992-1995, Jointly Sponsored by, Policy Branch Agriculture and Agri-Food Canada and Ridgeway College.
- VI. Alberta production identified by Alberta's Pork Production Industry, Alberta Agriculture, Food and Rural Development.

For clarifications of cost information provided in the respective production systems the following individuals were contacted:

- A. Iowa—Tom Baas
- B. Illinois—Dale Lattz
- C. Kansas—Michael Langemeier
- D. Missouri—Gerry Ehlmann
- E. Nebraska—Larry Bitney
- F. Large-Scale—John Lawrence
- G. Ontario—Peter Epp
- H. Alberta—Fred Schuld

United States

Table 1.1 shows cost values taken directly from the various Midwestern reports. Costs were taken as reported with the exception of variable interest costs and housing costs. Variable interest costs were assigned as the result of 10.39% annual nominal rate multiplied by variable costs for 5 months. This interest rate is the average of operating interest reported in the four quarterly publications titled Survey of Agricultural Credit Conditions, published by The Federal Reserve Bank of Kansas City. Housing costs were assigned based on a budgeting approach for replacement of facilities and equipment (table 1.2). Depreciation was figured at 15 years for facilities.

Table 1.1: Production Cost As Reported in Published Costs of Production (\$ per cwt)

Item	Iowa	Illinois	Nebraska	Kansas	Missouri	Average ¹⁾
Variable Cost						
Feed Cost	25.29	24.67	24.39	26.06	28.28	25.47
Labor Cost	4.59	4.26	4.07	4.84	4.24	4.42
Interest	1.42	1.60	1.98	0.96	1.65	1.54
Other Variable Cost	5.24	6.78	4.63	6.93	6.26	5.63
Sub-total	36.54	37.31	35.07	38.79	40.43	37.07
Fixed Cost						
Depreciation	2.61	3.04	2.75	1.82	1.87	2.57
Interest	1.38	1.60	2.20	1.00	1.29	1.51
Sub-total	3.99	4.64	4.95	2.82	3.16	4.09
Total Costs	40.53	41.95	40.02	41.61	43.59	41.15

1) Weighted average according to NASS, "Hogs and pigs: Number and value, by states, Dec 1, 1995". Sources previously indicated.

Table 1.2: Building Cost for Typical Midwestern Pork Production

Stage:	System:	Construction cost:
Farrowing	Partially slotted floor—crates	\$1500/crate
Gestation	Open shelter and paved lot	\$350/sow
Nursery	Raised deck with pit	\$75/pig
Finishing	Enclosed with ventilation	133/hog

These costs are believed to represent cost of construction for the typical Midwest producer. New, bare ground locations would realize higher building cost.

Source: I.S.U. Extension livestock enterprise budgets for Iowa 1995

Weighted Average

Each of the five states was weighted according to their respective swine inventories.

Table 1.3: State Weighting, Percentage of Five Representative States.

State:	% of 5 representative states:	% of U.S.:
Iowa	49.57	23
Illinois	17.76	8.24
Nebraska	14.98	6.95
Kansas	4.55	2.11
Missouri	13.13	6.09

Source: NASS Hogs and pigs: Number and value by States, Dec 1, 1994-1996

Large-scale (king-size)

Keith Allan Good budgeted 1992 large scale production for a Masters' thesis at Purdue University. This budget was used for estimating large-scale production costs. The 1992 values were adjusted using changes in input price from 1992 to 1995. The adjusted values were compared to a budget prepared by Dr. John Lawrence (I.S.U. Livestock Extension Economist). Dr. Lawrence's budget was \$.96 higher. Industry sources were also slightly higher. However, actual records of large-scale production were not available. The completeness of the Allen thesis makes it a good estimator of large-scale production. Input price changes used in indexing from 1992 to 1995 were obtained from National Agricultural Statistics Service.

Alberta

Alberta Agriculture, Food and Rural Development, Pork Industry Group compiled records for typical producers in the region. The records were collected in 1994 and indexed to 1995 for changes input prices. For comparison to U.S. production, the values were exchanged at 1CA\$ to 0.73U.S. \$. Labor costs from the report only included paid labor. According to a study conducted by Dr. Larry Martin, the Canadian prairie region labor costs are only slightly lower

than the U.S. Midwest is. Alberta's labor costs were input at \$4.40/cwt. Housing costs were also adjusted as a ratio of U.S. costs according to the Martin study.

Alberta's average size of production was 7,600 pigs sold per farm per year. This is significantly larger than the United States typical operation and larger than the eastern Canada estimates. This difference was not adjusted for, but should be kept in mind when comparisons are made.

Ontario

Ontario costs were taken from the Ontario Data Analysis Project. The values were exchanged at 1CAD\$ to 0.73U.S. \$. The Martin study was once again used to change particular costs for comparisons. Labor costs in Ontario are believed to be 88% of the Midwestern United States. Housing costs were input at 138.5% of Midwestern U.S. values.

The Netherlands and Denmark

Europorc records were used to estimate production costs of The Netherlands and Denmark. The values were exchanged at 1.56guilders to 1U.S. \$. The Europorc reports were for kg of carcass weight. These values were converted to pounds of live weight for both countries.

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