Layers, Pullets, and the Egg Production Sector

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Layers, Pullets, and the Egg Production Sector

Abstract
The egg production sector has undergone radical change during the past 25 years. Iowa egg production prior to the 1960s was conducted through relatively small extensively managed flocks dispersed on diversified farming operations. Since that time new technologies have resulted in the industry moving rapidly to specialized intensively managed facilities in fewer locations. This trend can be seen in figure 1 showing the number of Iowa layer and pullet producers in 1964, 1978 and 1987. The total number of producers in 1964 was about 72,000. By 1978 that total, had declined by more than 80% to about 11,000. Between 1978 and 1987 it fell by another 50% to less than 5,000.

Disciplines
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LAYERS, PULLETS, AND THE EGG PRODUCTION SECTOR*

Roger G. Ginder
and William J. Owings**

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* The authors gratefully acknowledge the assistance of John Chism and Gene Futrell in gathering data for this project.

** The authors are Professor of Economics and Poultry Science, respectively.
LAYERS, PULLETS, AND THE EGG PRODUCTION SECTOR

Change in the Iowa Industry at the Farm Level

The egg production sector has undergone radical change during the past 25 years. Iowa egg production prior to the 1960s was conducted through relatively small extensively managed flocks dispersed on diversified farming operations. Since that time new technologies have resulted in the industry moving rapidly to specialized intensively managed facilities in fewer locations.

This trend can be seen in figure 1 showing the number of Iowa layer and pullet producers in 1964, 1978 and 1987. The total number of producers in 1964 was about 72,000. By 1978 that total had declined by more than 80% to about 11,000. Between 1978 and 1987 it fell by another 50% to less than 5,000.

The reductions are even more dramatic when the very small scale of the majority of operations is considered. Operations with less than 100 birds made up more than 3/4 of the 4,800 Iowa producers in 1987. Only about 1200 producers held more than 100 birds in inventory.

Figure 2 shows the trend toward large scale production by relatively few producers. In 1964, only about 12 Iowa producers had more than 20,000 birds in their flock and only 3 producers had more than 50,000. By 1987, 75 producers had more than 20,000 bird flocks.
Figure 1

Iowa Layer & Pullet Producers
- number by flock size -

Number of Producers (Thousands)

<table>
<thead>
<tr>
<th>Farm Size (based on ending inventory)</th>
<th>1964</th>
<th>1978</th>
<th>1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Farms</td>
<td>71.796</td>
<td>10.876</td>
<td>4.834</td>
</tr>
<tr>
<td>1-99 Birds in Inv.</td>
<td>20.913</td>
<td>7.159</td>
<td>3.623</td>
</tr>
<tr>
<td>100+ Birds in Inv.</td>
<td>50.883</td>
<td>3.717</td>
<td>1.211</td>
</tr>
</tbody>
</table>

Source: Census of Agriculture
Iowa Layer & Pullet Producers
- number by flock size -
20,000 Birds or Greater

Source: Census of Agriculture
Data in figure 3 shows how the total Iowa inventory of layers is distributed among operations of various size. The trend toward concentration of production into the hands of fewer and larger producers becomes even more apparent. In 1964, approximately 96% of Iowa layers and pullets was concentrated in the hands of producers with less than 10,000 birds. By 1987, these smaller producers accounted for only about 12% of total. More than 60% of the Iowa inventory of layers and pullets was in the hands of producers with flocks larger than 50,000 birds.

During the same period the number of Iowa layers and pullets declined by almost 65% from about 17 million birds in 1965 to about 6 million in 1987. This trend has since been reversed and Iowa numbers are once again increasing (see figure 4).

Iowa's position, relative to the current production leaders in the U.S., has declined markedly since 1960. Data in figure 5 show the Iowa layer and pullet inventory compared to the states which were the 1988 production leaders. Iowa was a close second to California in egg production in 1960, but it clearly outdistanced Pennsylvania, Indiana, Ohio, and Georgia. By 1988, production in all these states was at least twice the level in Iowa and in California production was nearly four times as high as Iowa levels. It should be noted, however, that California levels have declined about 20% since 1980 while Iowa levels have increased. It is likely that this trend signals a shift in response to economic and business climate facing California producers.

Figure 6 shows Iowa layer and pullet inventories compared to several selected central and eastern states. In 1960, the period began with Iowa and Minnesota each holding about 20 million birds in inventory. By 1970, Arkansas and North Carolina had taken the lead while Iowa and Minnesota numbers had declined nearly 50%. Minnesota,
Figure 3  
Iowa Percentage Distribution 
Year-Ending Layer & Pullet Inventories (By Flock Size and Year) 

% of Tot. End. Inv. a Class Represented 

Farm Size (based on ending flock inv.) 

Source: Census of Agriculture
Figure 4

**Iowa Average Inventory**

- Layers and Pullets -

(By Selected Years, 1955 - 1989)

<table>
<thead>
<tr>
<th>Year</th>
<th>Million Birds In Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>25</td>
</tr>
<tr>
<td>1960</td>
<td>20</td>
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<tr>
<td>1965</td>
<td>15</td>
</tr>
<tr>
<td>1970</td>
<td>10</td>
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<tr>
<td>1975</td>
<td>8</td>
</tr>
<tr>
<td>1980</td>
<td>6</td>
</tr>
<tr>
<td>1983</td>
<td>5</td>
</tr>
<tr>
<td>1986</td>
<td>4</td>
</tr>
<tr>
<td>1989</td>
<td>3</td>
</tr>
</tbody>
</table>

*Sources: Eggs, Chickens & Turkeys (USDA) - US Ag Stats - Census of Ag - IA Ag Stats - Poultry & Live. Sit. & Outlook Report*
Figure 5

Average Iowa Layers and Pullets
- Iowa yearly inventory levels -
(compared with 1988 production leaders)

Source: U.S. Ag Stats.
Census of Agriculture
Poultry Prod. & Val., 1988 Sum.
Average Iowa Layers and Pullets
- Iowa yearly inventory levels -
(with five other selected states)

Total Birds in Inventory (Millions)

Source: U.S. Ag Stats.
Census of Agriculture
Poultry Prod. & Val., 1988 Sum.
Nebraska and Missouri continued to decline throughout the period but Iowa had begun to regain numbers by 1988.

The production shifts occurred precipitously during the 1960s and 1970s. Production efficiency and location close to metro consuming markets were important factors. Iowa’s location in the western corn belt left it more or less isolated from these markets. The relatively small number of growers willing to adopt the large scale low unit cost production practices was also in part responsible for the decline in Iowa egg production.

Recent increases in the eastern corn belt states of Indiana, Ohio, and nearby Pennsylvania indicate that the economics of egg production may once again be biased toward the midwest. A similar movement away from west coast production toward Iowa appears to be developing. While these trends may not be well established at this point, egg production in Iowa is poised for significant growth if the trends continue.

**Industry Structure**

The structure of the egg production industry is shown in figure 7. Production begins with breeder flocks producing eggs designed to produce pullets genetically well suited for laying eggs. The breeder eggs are hatched and provided as chicks (1-2 days old) to pullet producers for placement in pullet grower facilities. In some cases, hatching operations have been integrated with pullet production. Once pullets are 18-19 weeks old they are transferred from grower houses to laying facilities. Laying facilities vary in size. A single building may house between 30-120,000 laying hens. In the case of larger producers, such facilities are often arranged in "complexes" of two or more laying buildings.
Figure 7

BREEDER FLOCK PRODUCER

HATCHERY

PULLET PRODUCER (GROWER)

LAYER OPERATION

BREAKER

REPacker

RETAILER PACKER

MANUFACTURER OR PROCESSOR

FULLY INTEGRATED EGG PRODUCER

NON-INTEGRATED EGG PRODUCER

NON-INTEGRATED MARKETING FIRM

NON-INTEGRATED FOOD MANUFACTURER

PRODUCTION SYSTEM FOR SHELL & BREAKER EGGS
Once the eggs have been collected from laying facilities they may be marketed in several ways. Some laying operations have contractual arrangements with a wholesaler or retailer and directly deliver the eggs packed into dozen lot consumer packages. Others deliver to "breakers" who remove shells and sell liquid, frozen, or dehydrated eggs and egg components into the manufacturers market. Others sell palletized shipments of bulk trays to repackers for packaging into consumer cartons and sale into retail markets.

Various parts of the industry have been integrated through direct ownership, through contracting, or a combination of both. In a few cases the entire operation from breeder flock through the retail packing operation has been totally integrated. It is becoming more common in Iowa for the breeder flock and hatching operation to be integrated and for the pullet grower-layer operation and wholesale packer function to be integrated by separate firms.

There are still a number of independent pullet growers who produce and sell pullets. However, the desire of egg producers to control the genetics and management practices during the first 18 weeks of life serves as an incentive to integrate pullet production into the laying operation. As a result, it is likely that integrated pullet production and laying operations will continue to increase as a force in the market.

A second force increasing the likelihood of integration is the so-called "in line" production facilities. An example of such a system is shown in figure 8. In this system a number of layer houses are set up headed into a collector building. Eggs are brought from laying buildings by conveyers. They are continuously loaded onto a central conveyor running the length of the complex to the grading and packing lines. Various forms of the "in line" system have been in use for approximately 20 years.
EXAMPLE OF "IN LINE" EGG PRODUCTION FACILITY

Figure 8
This type of system eliminates at least two handlings of the eggs and provides improved labor efficiency in the grading and packing function. However, as a consequence, all the production must be concentrated at the same point where grading and packing are done. This has led to large "in-line" installations with between 400,000 and 2,000,000 birds laying in one location and under direct management of a single producer.

The Table Egg Subsector

Total consumption of eggs has fallen by about 8.6% since 1960. This reduction in total shell egg consumption has been tempered by the 25% population increase which occurred during the same period. The per capita egg consumption levels between 1960 and 1989 exhibited a much steeper decline. U.S. per capita consumption of eggs and egg products in 1960 was approximately 320 eggs (or equivalent egg products) per person. By 1988, the number of eggs (or equivalent egg product) consumed per capita had fallen to 243.

U.S. Trends in Table Consumption

The egg market for table consumption consists of eggs in-shell, graded and segregated into a variety of sizes (e.g., jumbo, large, medium, small). The table egg consumption component of the market dropped even more than the total egg and egg product consumption figures indicate. This occurred in part because consumers used more eggs in processed form. Per capita consumption of equivalent processed egg products actually increased during the period. Egg product consumption in 1960 was the equivalent of 29 shell eggs. By 1986 consumers used the equivalent of 46 shell eggs in the form of processed egg products. Consequently the per capita purchases of table eggs in-shell was approximately 200 by 1988 - down from about 290 in 1960.
There are a number of reasons suggested for the downward trend in shell egg consumption over the past 25 years. Health concerns about Serum Cholesterol and heart disease is often cited as a possible cause for reduced consumption of eggs. As the U.S. population ages and becomes more health conscious, this cannot be ignored as a major factor. But the consumer’s desire for greater levels of convenience and reduced time spent in meal preparation are perhaps equally important as contributory factors. These desires are manifested in a variety of ways including the consumption of more processed food products, more formulated food products, and more away-from-home meals. All of these consumption patterns have favored the use of processed eggs over shell eggs.

Shell eggs for table consumption have been marketed as a commodity and are viewed by most consumers as a homogeneous undifferentiated product. In general, there is little that can be done to effectively differentiate the shell eggs marketed for table consumption. Unlike many other food products, minor changes in form or convenience packaging is not a viable strategy. In many ways the shell egg, as produced, is already packaged in convenient form.

Carton size, shell color, carton material, and freshness have all been tried as means to differentiate shell eggs and obtain higher prices. Some attempt has been made through breeding to change the intrinsic cholesterol content. Although some limited market success has been achieved, the fact remains that table eggs remain largely undifferentiated in the consumers mind. Prices have increased more slowly than prices in the overall economy or prices of more effectively differentiated food products. As a consequence of the commodity nature of eggs and the declining per capita consumption, holding a position as a low cost producer has been essential.
Maximum production efficiency has been a critical factor in the ability to survive as a producer of shell eggs for table consumption. Therefore, adoption of production technology to reduce unit costs has been rapid in the industry. Moreover, the fragile nature of shell eggs makes their transportation to final markets a key variable in the cost equation. The transportation cost and a desire to provide the product to consumers as fresh as possible has tended to favor production in areas closer to the major consuming areas and has provided an incentive for shorter marketing channels.

These forces have been reflected in the steady movement of production away from the Central plains states toward the east coast, the west coast and southeast over the past 30 years. Table A shows the top five egg production states in 1960 compared to 1989.

<table>
<thead>
<tr>
<th>Rank</th>
<th>1960</th>
<th>Rank</th>
<th>1989</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>California</td>
<td>1</td>
<td>California</td>
</tr>
<tr>
<td>2</td>
<td>Iowa</td>
<td>2</td>
<td>Indiana</td>
</tr>
<tr>
<td>3</td>
<td>Pennsylvania</td>
<td>3</td>
<td>Pennsylvania</td>
</tr>
<tr>
<td>4</td>
<td>Minnesota</td>
<td>4</td>
<td>Ohio</td>
</tr>
<tr>
<td>5</td>
<td>Texas</td>
<td>5</td>
<td>Georgia</td>
</tr>
</tbody>
</table>

Central U.S. production serving the east coast population centers has tended to move to the eastern corn belt states of Indiana and Ohio and the southeastern state of Georgia. Production serving the western population and centers moved west to California. Production has migrated to these areas both in response to production efficiency and nearness to markets.

**IOWA Opportunities in Table Eggs**

The effect of these forces on Iowa production can be seen in figure 9 which shows
Figure 9

Egg Production
(total Iowa egg production per year)

Total Egg Production (millions)


Year

Eggs Produced

Sources: IA Ag Stats - US Ag Stats
-Poultry & Live. Sit. & Outlook Report
-Poultry Prod. & Val. Sum. - Census of Ag
a drop of over 2/3 in Iowa egg production from approximately 5000 mil dozen in 1960 to about 1500 mil doz in 1986. But it is worth noting that after 1986, Iowa production increased by 25 percent to more than 2000 million eggs in 1989. Although data are not available for 1990, there is strong evidence that this trend has continued and is accelerating.

The effects of transportation costs on Iowa shell egg prices is an important factor. The prices received by Iowa producers and the average prices received by all U.S. producers are shown in figure 10. Iowa prices have consistently run between 8 to 12 cents per dozen below the average prices for all U.S. eggs. This disadvantage compared to prices for eggs produced closer to major consumption areas was partially responsible for production declines in Iowa and the central United States.

Between 1985 and 1989, this three decade long trend began to reverse. Data in figure 11 shows a decline in California production and an increase in Iowa production. Some in the industry attribute much of the recent increase in Iowa shell egg production to pressures on the California industry. First, many of the production facilities built in California during the 1960s and 1970s now need or will soon need major renovation. Urbanization and the accompanying rise in real estate values have resulted in high opportunity costs for many California producers. Second, the higher feed costs on the west coast were offset by the lower unit costs associated with large scale production when present facilities were built more than 20 years ago. Despite higher feed costs, the west coast operations could effectively compete with the smaller Iowa producers who were using less intensive management practices. However, competing production areas have since adopted large scale production practices and significantly reduced the relative
Figure 10

U.S. vs. Iowa Egg Prices
- Wholesale Egg Price Trends -
(egg prices by the dozen, per year)

Price Per Dozen (cents)

Year

Sources: The US Broiler Industry (USDA)
-Live. & Poultry Sit. & Outlook (USDA)
Figure 11

Egg Production By State
(six state comparison, by year)
- Iowa vs. 1989 production leaders -

Total Eggs Produced (Billions)

Source: U.S. Ag Stats.
Census of Agriculture
Poultry Prod. & Val., 1988 Sum.
advantage. Finally some producers are less willing to make expensive capital improvements in the face of environmental restrictions that are becoming increasingly stringent. The fact that costs for major renovations must be spread over a period of 10-20 years creates a significant amount of uncertainty about retrofitting existing facilities.

Although California has been the leading egg production state for over three decades, these pressures appear to be dampening west coast production levels. Declines in west coast production permits an opportunity for growth in the Central U.S. including Iowa. Many of the markets which have been served by California production in the past can now be challenged. Data from one Iowa producer indicated that Western Iowa eggs could be landed in California at approximately current local production costs. In the Arizona market, Iowa table eggs can meet and beat the California price consistently. Iowa table eggs can be landed in Colorado markets at a price about equal to those originating in other major production areas.

Heavy production in the eastern corn belt states and eastern states (Indiana, Ohio and Pennsylvania) is well positioned to serve the population centers in the East. Iowa production is not likely to compete favorably in eastern markets against production from those states. Likewise, Georgia is in a better position for reaching many of the southern and south central markets. For example, the egg producers in the south central U.S. currently hold an advantage in serving the large markets for shell eggs in Texas. It appears that Iowa could use its cost advantage most effectively in reaching western and southwestern table egg markets now served by California producers.

**Egg Product Subsector**

The egg product subsector consists of eggs for human consumption in other forms
than shell eggs. Egg products are sold in several forms. They may be marketed as processed whole eggs or processed white and yolk components after separation. Both whole liquid and the separated components are then marketed in liquid, frozen or dehydrated form. Thus a total of nine unique pure products and assorted blends of yolks and whites may be marketed from an egg breaking plant (see figure 12).

Breaker eggs may be either checks or ungraded shell eggs (where a high fraction would not be Grade A large). Shell eggs are often not graded when the hens are producing a high proportion of eggs that are too large or small to meet the standard of grade A large. This may also occur when some type of problem exists in shell quality. It is also becoming more common for eggs that meet size and shell quality standards for the table markets to be sold to breaker markets.

Liquid product (whole or component) is typically pasteurized to kill bacteria prior to processing and marketing. Liquid product has an expected shelf life of about ten days. Thus it must be transported and consumed quickly. When a somewhat longer storage is desirable, or where proper refrigeration is not available for the liquid, frozen eggs may be used. When longer storage periods, or dry product characteristics, are needed the dehydrated whole egg or component product is the most desirable form. For example, baking mixes, commercial baking mixes, cake mixes and other dry products may incorporate dehydrated egg products as a component.

Figure 13 shows the proportion of egg product marketed in various forms in 1960, 1970, 1980 and 1987. The fraction of broken eggs marketed in frozen form has remained relatively constant at about 350 million pounds. Demand for dehydrated product was about half the level of frozen in 1960. By 1987, demand for dehydrated product had
FIGURE 12. EGG PRODUCT SUBSECTOR
Figure 13

Processing Egg Prod. by Type
U.S. Liquid Production from Eggs Broken
-Immed. Cons., Frozen, Used for Drying-

Million Pounds

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td>Immed. Consumption</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Frozen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used for Drying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
Plus various other issues.
outstripped the demand for frozen with annual volume at approximately 400 million pounds. The fastest growing segment has been the liquid product for immediate consumption. Egg product used in liquid form for immediate consumption by processors or by the institutional food service sector increased six-fold from about 45 million pounds in 1960 to nearly 400 million pounds in 1989.

Total domestic egg product consumption is shown in figure 14 in relation to available supply of egg product. These data indicate domestic consumption has absorbed the majority of production with amounts less than 10% going to exports. Production exceeded domestic consumption in all years 1960-1987. The excess of supply over consumption fell in a range between 30 million dozen equivalent to 130 million dozen equivalent with the excess going to carryover stocks and filling the inventory pipeline.

Imports and exports are shown in figures 15 and 16. Imports have been very low compared to domestic consumption. The importation of egg product exceeded 5 million dozen equivalent in only three years during the period 1960-1987. In most years the processed egg import levels were less than 500,000 dozen equivalent and in many years less than 100,000 dozen equivalent.

Exports exceeded imports by a substantial margin through the period. Although the level of exports was erratic between 1977 and 1987, shipments to foreign countries exceeded 35 million dozen equivalent in all years and were above 50 million dozen equivalent in most years.

Unlike the situation with shell eggs, per capita consumption of egg products has steadily increased from 1960. The trend has been particularly obvious from 1980 to 1989 when per capita egg product consumption increased by about 25 percent. These data are
Figure 14

Egg Product Supply & Utilization
U.S. Total Consumption Compared
to U.S. Total Supply

Million Dozen Shell Equivalent

Source: Livestock & Poultry Situation &
Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
Figure 15

U.S. Egg Product Imports
- Million Dozen Shell Equivalent -
(By Year, 1960-1987)

Source: Livestock & Poultry Situation &
Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
Figure 16

U.S. Egg Product Exports
- Million Dozen Shell Equivalent -
(By Year, 1960-1987)

Exports: Million Dozen Shell Equivalent

Year

Source: Livestock & Poultry Situation & Outlook Report, LPS-29, May 88
from: "Egg Product Subsector"
shown in figures 17 and 18.

U.S. production of eggs for processing has been heavily concentrated in the North Central region for the past 30 years (see figure 19). Early in the 1960s, processing activities were located in the North Central region as a direct result of the high levels of egg production occurring there. In addition to meeting the growing demand for breaker products these operations served as salvage operations to handle checks and other eggs not fitting proper size categories for the table egg market. As production moved to other regions in the 1960s and 1970s, there was some increased breaker plant activity in those regions but at no time was the North Central region seriously challenged as the leader in egg product processing. The North Central egg processing sector growth continued into the 1980s and continues to grow.

When total egg production by region (see figure 20) is compared to breaker egg volume by region (see figure 19) the importance of processing in the North Central region becomes even more obvious. Despite an overall declining level of egg production in the North Central region the total number of cases of processed eggs steadily increased. Although egg processing activity also increased in other regions growth in those regions was much slower than the growth in total egg production those regions experienced.

The dominance of the North Central region can be seen in figure 21. Nearly 30% of North Central egg production went to breaker markets by 1987 - up from about 17% in 1960. The South Central region also enjoyed rapid growth in the percentage production going to breaker markets during the 1960s, the 1970s, and the 1980s. However, total production in the South Central region has been lower and the total case
Figure 17

U.S. Per capita Consumption - Shell Eggs -

Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
Plus various other issues.
Figure 18

U.S. Per capita Consumption
- Egg Products -

Per capita Consumption (shell equiv.)

Year


Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
Figure 19

Processed Egg Production
-millions of equivalent shell egg cases-
(by region, in selected years)

Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
Figure 20

Total Egg Production by Region
-millions of equivalent shell egg cases-
(by region, in selected years)

Millions of Equivalent Shell Egg Cases

Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
Figure 21

Egg Processing Levels
(as a percentage of tot. egg production)
- selected years, by region -

Percent of Tot. Egg Production Processed

Year

Source: Livestock & Poultry Situation & Outlook Report. LPS-29, May 88
from: "Egg Product Subsector"
volume broken was only about one third the case volume broken in the North Central region. Figure 21 indicates that the South Atlantic, North Atlantic and Western regions break a much smaller fraction of their total production - about 5-10%.

Iowa Opportunities in the Egg Products Subsector

Iowa’s current breaker plant capacity provides a sound beachhead in the egg products subsector. Current upward trends in egg product consumption and the downward trends in shell egg consumption point to increasing dependence on the products subsector as a market for Iowa eggs. Breaker plant products (especially dehydrated product) are more easily and cheaply transported to major consumption centers. As a consequence competing egg producers located near major population centers have a much diminished cost advantage over more distant producers located in Iowa.

On the input side, location in areas where abundant feed stuffs are available provides an additional transportation cost advantage to Iowa producers over competitive producers located in major consumption areas. These two factors definitely work in Iowa’s favor as a production center for processed egg products.

Beyond cost advantages for Iowa based production, changing overall demand patterns for food may accelerate the egg product consumption trends already underway. Continuing public concern about fat and cholesterol in the diet will tend to favor the use of processed egg products over traditional shell eggs. Two recent developments point to increased demand for breakers.

Recent experiments involving a fluid extraction processes for removing serum cholesterol from egg yolks at the University of Nebraska may hold promise for a reduced
cholesterol egg product. The process removes up to 85% of the cholesterol without affecting the cooking or textural qualities of the processed egg product. At present, there is some question whether the process is economically practical.

A second (and potentially more important) development is the fat substitute SIMPLESSE® which can be used in a variety of processed foods to replace fat. Although SIMPLESSE® is made from milk or egg protein its taste is said to be nearly indistinguishable from fat in many processed food products. Products made with SIMPLESSE® are currently being test marketed and approval for widespread application in food products is anticipated. If egg protein were to be used as a raw material in this product a large market could develop for processed eggs.

**Recommended Actions for the Shell Egg and Egg Product Sector**

Several actions can be identified to promote and enhance the shell egg and egg product sector. The increasing problems in scheduling processing of "spent hens" (no longer suitable for egg production) must be addressed. Recent shifts by traditional processors of spent hens toward broiler processing have created a disposal problem for Iowa egg producers. Disposing of "spent hens" through the normal channels requires advance scheduling that interferes with the egg producer management flexibility. The problems of processing "spent hens" and the potential for accessing specialty markets for poultry products from these birds should be investigated. Failure to do so could create a barrier to expansion of the layer/egg industry to its full potential in Iowa. Furthermore a more severe disposal problem could develop as a result of any expansion that does occur.
The potential for egg products with reduced cholesterol using the carbon dioxide extraction technique under development and other techniques should be investigated and evaluated. If any of these processes become economically practical, Iowa firms should be encouraged to pursue product development of lower cholesterol products. The possibility of developing products for the institutional food sector would appear promising.

Finally, the industry and state government should investigate and monitor the progress in the development of oelestra fat substitutes such as SIMPLESSE®. At present, little is known about the plans for raw product procurement if such oelestra fat substitute products come into widespread use. Such nontraditional egg based products could represent a true increase in market demand for egg products on a huge scale. As was the case of corn sweeteners and Nutra-Sweet®, widespread use in consumer products can occur over a relatively short time period when significant economic and/or health benefits exist in a product and the product is perceived by consumers to be of superior quality. This may allow unique growth opportunities. Efforts by the industry and state government to promote the advantages of Iowa as center for purchasing and processing the egg protein raw product for SIMPLESSE® should not be overlooked.