CARD Briefing Paper 96-BP 13

The Feasibility of Broiler Production in Iowa

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December 1996

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This study was commissioned by the Iowa Soybean Promotion Board.

Desktop production by Roxanne Clemens and Rebecca Olson.

Contents

Executive Summary

- An ISU study completed in 1986 showed that an Iowa-based broiler industry would be financially successful. Since then, the U.S. broiler industry has grown enormously, but Iowa still imports almost all of the retail-ready broilers consumed in the state.

- This study updates the 1986 study and shows that Iowa's feed cost advantage has actually increased since 1986 compared with feed costs in areas such as coastal North Carolina.

- The broiler industry has responded to this change in the economic environment by moving toward the source of grain, and now most of the states surrounding Iowa have prosperous broiler industries.

- These economic forces have also renewed interest in Iowa among egg, hog, and turkey producers. The egg industry shows the impact of economic forces most clearly; after bottoming out in 1986, Iowa egg production has grown enormously.

- Because of the willingness of the U.S. broiler industry to move closer to the source of grain, Iowa must now compete for new plants with states such as Missouri and Kentucky. Parts of Iowa retain a 9 percent to 10 percent cost of production advantage over the newly emerging broiler industries in these states.

- The reasons for the absence of an Iowa-based broiler industry are not economic, technical, or climate-related. Part of the research conducted for this report consisted of nonscientific interviews with individuals involved in the U.S. broiler industry. These interviews suggest that there is a perception among industry executives that the business climate in Iowa is against corporate farming in general and the broiler industry in particular. These perceptions appear to be the main reason Iowa does not have a retail-oriented broiler industry.

- Some of the perceptions are well-founded. Iowa does prohibit broiler companies (corporations or cooperatives) from purchasing agricultural land in the state. Integrated broiler companies almost always require agricultural land for hatcheries, a parent flock, and some retained ownership; therefore, this restriction is of great importance.

- In addition, broiler companies have an understandable fear of making a large fixed investment in a state where the political climate restricts corporate farming.

- Some of the negative perceptions appear ill-founded. The experiences of the Campbell Soup Company and Louis Rich in Iowa and of poultry processors in other states show that farmers will sign contracts to raise broilers and bankers will finance the contracts so long as they are appropriately structured.

- The absence of any other broiler company in the vicinity has, however, made both farmers and bankers unwilling to sign traditional single-year contracts.

- The impact of Iowa law is most restrictive for broiler producers, but it also adds to costs for Iowa's existing turkey industry because it restricts growth.

- Iowa law does not seem to have had any impact on Iowa's egg industry, which has seen enormous growth. Iowa law does restrict hog production in the state, but the economic incentives are such that hog corporations have begun to find ways to locate here that do not violate Iowa's laws. If the incentive to locate

in Iowa remains strong, broiler companies will eventually locate here, much as they have done in Minnesota and Wisconsin.

- However, if Iowa changed its current restrictions and actively encouraged broiler production, it could quickly attract about four medium-sized processing plants. More would follow if the initial plants were profitable and well-received.

- These four plants would create valuable on-farm employment for about 500 producers. They would increase revenues of soybean farmers by about $3.5 million, increase state tax revenues by about $35 million to $40 million, and increase Iowa's nonfarm employment by about 3,000 jobs.

- However, as many as 1,600 of these jobs would be unskilled and many jobs might be filled by immigrants. This development would probably add to the state's social costs and might be viewed as a negative development by some.

- Also, the broiler-processing industry requires enormous amounts of water and produces a similarly large quantity of effluent. The buildings and barns associated with the industry could be viewed as unsightly.

- If the social and environmental concerns associated with the first four processors could be solved, Iowa would become a very important broiler-producing state. This development could eventually reduce or eliminate the discounts on Iowa's corn and soybeans associated with Iowa's distance from current markets. In the very long run, soybean prices could increase by 30¢ to 40¢ per bushel as more of the state's soybeans were crushed and consumed within the state. The same development could also benefit corn producers by 15¢ to 20¢ per bushel; however, for this to occur, Iowa's livestock industry would have to grow by about 50 percent. It is not clear whether this level of growth is politically viable.

THE FEASIBILITY OF BROILER PRODUCTION IN IOWA

I. Introduction

Industries that use heavy raw materials to produce lighter finished products almost always locate near the source of the raw materials. This strategy is especially true in agriculture: cows are fed close to pasture, hogs are fed close to sources of corn, and fruit and vegetable processors locate near orchards and fields. Exceptions to this rule do exist, but these exceptions are typically caused by government policies that interfere with free market forces (e.g., shipping hay and grain to Asia). Why is it, then, that Iowa (and the rest of the Upper Midwest) exports corn and soybeans and then imports those same products as retail-ready broiler meat?

This question motivated a study by Trede et al. titled "A Feasibility Study of Broiler Meat Production in Iowa" in 1986. The study includes a very detailed and careful economic/financial analysis and documents favorable returns available to the first broiler processor to locate in Iowa. The report created interest among broiler companies such as Cargill, Iowa producers and their representatives, and development groups. A follow-on study titled "A Feasibility Study of an Integrated Broiler Operation in Area 5" was published by the Area 5 Broiler Study Committee in 1987.

In addition, the Iowa Area Development Group entered into discussions with out-of-state broiler producers to encourage them to locate operations in Iowa. Despite all this effort and the favorable financial outlook, Iowa is still without a retail-oriented broiler industry. One purpose of this report is to update the earlier ISU study. This part of the report is motivated by the availability of new data and the commercial experiences of the Campbell Soup Company in the state. This report is also justified by the reversal in fortunes of the Iowa egg and pork industries and the economic forces that created this turnaround.

As with previous efforts of this type, the results in the first part of this study show a compelling financial advantage favoring locating broiler production in Iowa. However, because these financial incentives were not sufficient in the past, the study goes one step further and examines both the attitudes of senior executives in the broiler industry and the legal environment in Iowa. The results of the third section of this report reveal deterrents to the emergence of an Iowa broiler industry. Some of these deterrents are real–Iowa law prohibits large broiler companies from owning agricultural land within the state; and some are not–the perception exists that Iowa has a poor business climate. Both the economic analysis and the review of the state's business climate show that Iowa could quite easily attract a broiler industry if there was widespread agreement that the state wanted this industry. Consequently, the last section of this report discusses the likely benefits and costs of such an industry.

II. Updating the 1986 Feasibility Study

The executive summary of the 1986 study is presented in Appendix A of this report. Most of the conclusions of the 56-page report are still valid today, so this analysis focuses on factors that have changed since the 1986 report was written. Then, a similar methodology is used to re-create the financial analysis with the new data.

The 1986 study was optimistic about the likely growth of the U.S. broiler industry, but not optimistic enough. Projected per capita consumption was expected to increase to 85 pounds per year by 2000; actual consumption in 1996 will equal 96 pounds per person (76.4 pounds of broiler meat and 19.5 pounds of turkey

meat). Exports of poultry meat, which were not discussed in the earlier report, will exceed 14 percent of total production this year. As a result of these trends, U.S. high-protein-consuming animal units (HPCAU, a measure used to equate cattle, hogs, and poultry in terms of their use of soybean meal) have increased from 106 million units in 1986 to 130 million units ten years later. Almost all of this growth can be attributed to poultry (increasing from 51 million units to 72 million units), with smaller increases for hogs (up by 4 million units) and beef cattle (up by 0.5 million units). Use of soybeans by dairy and other animals fell slightly over the same period. The effect of these trends was to increase the volume of U.S. soybean crush used for domestic animals from 832 million bushels in 1986 to 1,113 million bushels in 1996.

Iowa crushed or fed 215 million bushels of soybeans in 1986 and is expected to use 251 million bushels this year. However, growth in production means the state will have as much soybean volume available for export as it had in 1986–about 160 million bushels.

A very different pattern emerges when one examines the poultry-intensive states of the South and Southeast. The eleven states that comprise the south central and southeastern United States (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas) went from being large exporters of soybeans in the early 1980s to being large importers in 1996. (The region averaged 70 million bushels in annual soybean exports in the first half of the 1980s but will import 93 million bushels in 1996.)

A similar pattern occurs for corn. Iowa used 59 percent of the corn produced within the state in 1986 and is expected to use 60 percent in 1996/97, whereas the poultry-intensive states doubled corn imports to slightly over one billion bushels.[1]

These data reflect a very counterintuitive pattern. With the exception of corn processing, essentially all the growth in U.S. corn and soybean utilization has occurred in the wrong place (from an economic perspective). States that imported corn and soybeans in 1986 have greatly expanded their animal-feeding industries, whereas states that exported grain in 1986 have not seen any appreciable growth in the proportion of the crop utilized within the state.

The impact of this trend on U.S. soybean (and corn) producers was discussed in a previous report to the Iowa Soybean Promotion Board (Hayes 1996). To summarize the earlier ISPB report, think of the price of grain as a measure of height whereby areas that imported grain in 1986 would appear as small mountains and areas that exported grain would appear as valleys. Market forces (if working properly) should have guided new users to the valleys. Instead, the mountains in North Carolina and Arkansas have grown taller and larger as these states have been forced to source more distant supplies.[2]

Why Do Livestock Industries Move?

To understand what the broiler industry might do in the future, it is important to understand why it moved as it did in the past. The explanation for this movement is the subject of a recent publication by the author titled "Iowa Pork: An Industry at a Crossroads" (Hayes, Otto, and Lawrence 1996). The main arguments, augmented by recent discussions with broiler industry executives, are summarized as follows.

In the long run (i.e., periods greater than ten years), livestock feeding can be described as a very mobile industry. Livestock feeding can best be viewed as an industry that repackages grain into meat and that will locate where total costs (including transportation of inputs and final materials) are lowest. These costs include labor, land, and buildings. All else

[1] Iowa corn producers also benefit from Iowa's corn-processing industry, which now consumes about one-third of all grain produced in the state.

[2] Interestingly, all the poultry facilities built recently have been located at the base of these price mountains–Kentucky, Missouri, and Texas–and not at the top.

being equal, the livestock industry should locate in grain surplus areas as it did in the first half of this century. In the 1970s, however, Iowa had expensive land and unionized labor relative to the South. Also, federal management of railroad charges acted to subsidize rail transportation of grain, and federal loan rates (when operable) ensured that natural grain price differentials were blurred.

Internationally, food-importing countries also adopted policies that encouraged grain importation at the expense of meat importation. As a result, Iowa lost much of its animal-feeding industry, both to other states and to other nations.

At the same time, the broiler industry was undergoing a transformation to integrated units, which included new construction, and was therefore particularly sensitive to economic incentives and very mobile. As a result, Iowa grain producers lost one of their most prosperous customers. The cost of the loss described above to grain producers was also discussed in the two reports mentioned earlier (Hayes, Otto, and Lawrence 1996, Hayes 1996). These reports argue that whenever a county exports some grain to a particular location, all the grain sold in that county must be sold at a discount large enough to pay transportation costs for the grain that is transported. Suppose, for example, that a county uses 50 percent and exports 50 percent of its total grain production. Also suppose that it costs 30¢ per bushel to transport grain. The outcome of this trade pattern is that 100 percent of the grain in the county will be sold at a 30¢ discount relative to grain prices near the customer.

A Reversal of Fortunes?

Since about 1990, many of the factors that caused the livestock industry to move out of Iowa have been reversed. Deregulation of transportation and agriculture now encourage the livestock-feeding industry to locate where it makes the most sense. Deregulation on an international scale has caused feeding industries that use U.S. grain to relocate in the United States, thereby increasing U.S. meat exports.

These trends can best be shown by examining Iowa egg and turkey production (see Figures 1 and 2). Both industries were large in the 1950s and 1960s, both declined or were stagnant into the mid-1980s, and both have grown strongly since. (In 1996, Iowa became the fifth largest U.S. egg producer, with about 19.1 million laying hens.) Trends for egg and turkey would seem to suggest that the case for an Iowa-based broiler industry is stronger than in 1986, and this is indeed the situation.

How Would the Results Turn Out Today?

The 1986 study by Trede et al. was based on a price difference for corn and soybean meal of 1¢ to 1.5¢ per pound between Iowa and the South. The study calculated total feed consumption at 9.11 pounds of ration to produce 3.62 pounds of edible meat (assuming a 4.73-pound market weight and a 49-day grow-out). Assuming that corn and soybeans comprised 85 percent of the ration, these data translated into an Iowa advantage of about 2¢ per pound at the ready-to-cook stage. The study also found that feed costs per bird were 70¢ in Iowa compared with 77¢ in North Carolina and Georgia, a 10 percent cost advantage for Iowa. Because feed costs account for 67 percent of total costs, this 10 percent feed advantage would reduce total production costs for live birds by between 6 percent and 7 percent.

However, other production costs were not equal. The 1986 study assumed that housing costs in Iowa would be double those in the South based on the need for concrete floors and extra insulation. Fixed costs per bird were 15.6¢ in Iowa and 8.75¢ in North Carolina, thereby offsetting Iowa's 7¢ feed cost advantage. The study then used lower air conditioning costs to regain some of Iowa's advantage.

Now consider how these values would look today. Thanks to the decision of the Campbell Soup Company to grow broilers in Iowa, we now know that building costs are no greater in Iowa than in the South. A concrete floor is not required (in fact, it reduces performance), and the cost of extra insulation in Iowa is offset by the

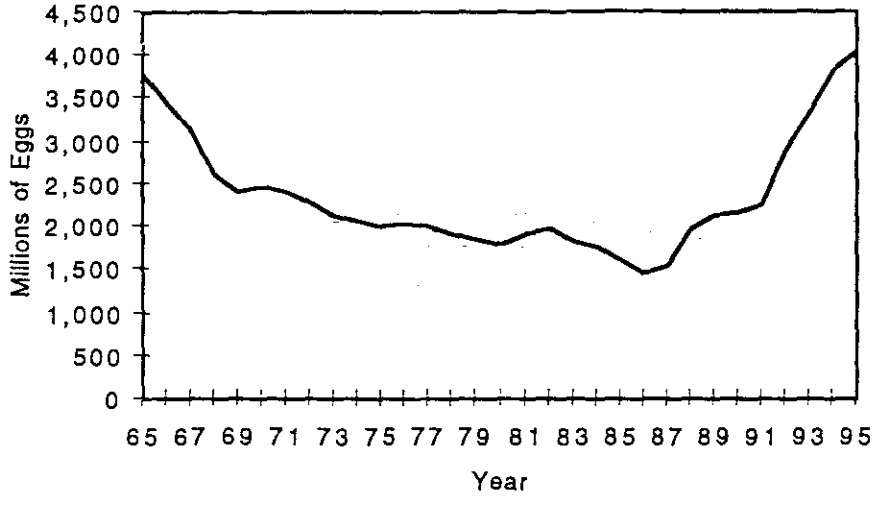

Figure 1. Egg production in Iowa, 1965-95
Source: Otto and Lawrence 1996, Owings 1994.

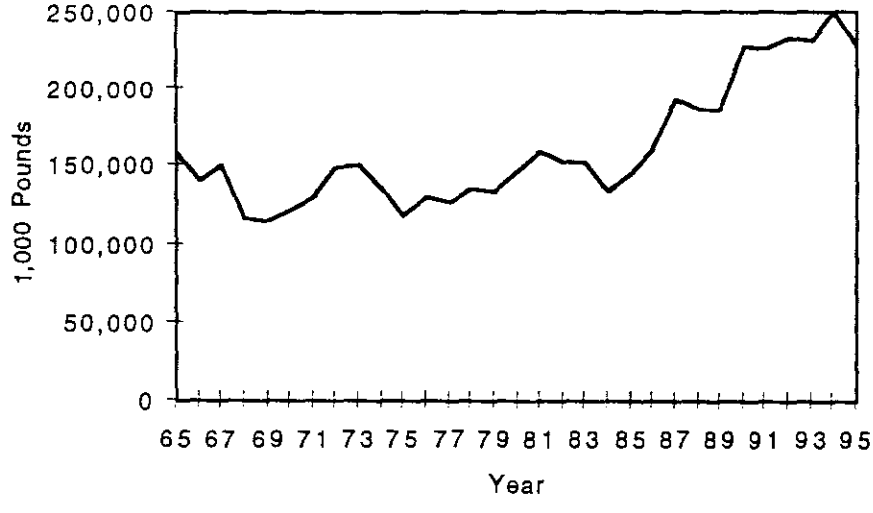

Figure 2. Turkey production in Iowa, 1965-95
Source: Iowa Agricultural Statistics 1996, Otto and Lawrence 1996.

cost of measures used to reduce heat loss in the South (Hayse 1996).

Cash price differences between Iowa and the major broiler-producing states vary from quote to quote, month to month, and location to location. Discussions with industry representatives (Trimble 1996, Aho 1996) indicate that many larger broiler companies now organize their own 100-car unit grain trains, which results in feed costs that are only $30 per ton higher in the South than at southeastern Iowa loading points. This difference corresponds to about 1.76¢ per pound for corn and soybean meal because these two ingredients comprise 85 percent of the ration.

The differential just mentioned ignores two very important variables. First, if a large broiler operation moved to Iowa, it would not locate near a southeastern rail or barge loading point. Differences *within* Iowa can amount to 1¢ per pound as one moves from southeast to north central and northwest Iowa. Second, a large permanent user of feed could negotiate slightly lower prices among producers or with a local elevator, possibly reducing feed costs by an additional 0.5¢ per pound, much as has happened with some of the large hog operations now located in Iowa. In other words, a broiler company can be expected to use the same ingenuity currently being used to minimize transportation costs to minimize acquisition costs once it located here.

Totaling these costs, the current feed price differential is between 2¢ and 2.5¢ per pound between the peaks of the mountains (i.e., coastal North Carolina) and the two valleys (i.e., north central Iowa) using the mapping concept discussed earlier. Using a conversion factor of 9 pounds of ration to produce 3.62 pounds of edible broiler meat, these price differentials translate into a cost advantage of 5¢ to 6¢ cents per pound of broiler meat on a retail-ready basis.

Feed costs in the summer of 1996 were 70¢ per bird, much as they were in 1986. A 2¢ per pound feed cost advantage translates into an advantage of 18¢ per bird (assuming 9 pounds of feed), thereby implying that feed costs in north central Iowa would be 25 percent lower than at the high-price points in the South.

As mentioned earlier, however, broiler companies have begun placing new facilities outside the traditional growing areas in acknowledgment of the large feed cost disadvantage in states like North Carolina. A more realistic comparison would be with states such as Missouri and Kentucky, where feed costs are between 1¢ and 1.5¢ per pound above the lowest price points within Iowa. A 1¢ per-pound Iowa advantage translates into a 12 percent Iowa advantage in feed costs, implying that by relocating outside traditional growing areas broiler companies in the South have already captured approximately half of the feed cost advantage that would be gained from moving to Iowa.

Two other factors also work against Iowa's feed cost advantage. First, the state does not have as much unskilled labor as do southern states. The Campbell Soup plant in eastern Nebraska pays about the same hourly rate as the Tyson Foods, Inc., plants in the South, or $8.50 per hour (Hayse 1996, Trimble 1996). However, the Campbell Soup plant has great difficulties attracting workers, whereas southern plants apparently do not. Given Iowa's current employment situation, it is probably realistic to add about 20 percent to the Iowa wage rate, about half of which can be expected to be accounted for by the extra productivity of the Iowa worker. This 10 percent labor cost difference would reduce Iowa's cost advantage by 1.8¢ per bird, or about 3 percent, thereby reducing Iowa's overall advantage to about 9 percent.

Other factors not discussed in the earlier study include the *additional* costs of obtaining and using litter (wood shavings) in Iowa compared with costs in states where forestry is a major industry and the *reduced* costs (or even benefits) associated with manure disposal. Each broiler barn requires about 300 acres of land for manure disposal–land that has become increasingly difficult to find in the South. Poultry manure has a high nitrogen-to-potassium ratio and is very suitable for corn production. Assuming that Iowa's advantage in manure disposal offsets the disadvantage in litter costs, we

find about a 9 percent to 10 percent Iowa advantage in production costs.

Putting It All Together

In summary, a study completed in 1986 showed that Iowa was a very suitable location for new broiler facilities. As it works out, the study was finished at a time when Iowa's competitive advantage was at its lowest. Since then, feed prices have shifted to enhance Iowa's advantage. In addition, we have discovered that fixed costs in Iowa need not be any greater than in the South because concrete floors are not required. As a result of these favorable developments, the U.S. broiler industry has been forced to move toward sources of grain. Missouri and Kentucky have newly established processing facilities, and Wisconsin, Minnesota, and Nebraska have seen substantial growth. Iowa has benefited slightly from this trend and now feeds a small number of broilers for use in soup production in facilities located outside the state. The same economic forces that enhance Iowa's broiler production advantage also have favored turkey, hog, and egg production. After bottoming out in the mid-1980s, egg production in Iowa has soared, and Iowa may well regain its number one position in egg production in the foreseeable future.

Because of the willingness of the U.S. broiler industry to move toward the source of grain, Iowa must now compete with states outside the traditional growing areas of the South. This situation reduces Iowa's attractiveness to broiler companies, as does the state's lack of unemployed, unskilled workers. However, the analysis discussed above shows that parts of Iowa have a 9 percent to 10 percent cost of production advantage once these factors are taken into account. The state's advantage is stronger than once thought because the development of a broiler industry in the Upper Midwest has shown that production efficiencies and fixed costs in Iowa are about equal to those of other states.

The previous discussion poses the question as to why the state continues to import almost all the broilers it consumes. The answer is complex and is the focus of the next section of this report.

III. Iowa's Business Climate

In all the interviews conducted for this report, the state's "business climate" for broiler production was criticized. Curiously, criticism seemed to be worse among those who knew least about the state. However, the criticism was also cited by those who had in-state experience.

First and foremost among criticisms is Chapter 9H of Iowa's legal code. As is true with many legal documents of this type, some ambiguity exists about what is actually meant. The discussion that follows includes the interpretation of Chapter 9H made by those in the broiler industry who have read the regulation.

The key paragraph in this discussion is 9H.4, which states that ***"A corporation . . . shall not, either directly or indirectly, acquire or otherwise obtain or lease any agricultural land in this state."*** Agricultural land is defined as ***"land suitable for farming"*** (section 9H.1.2), and farming is defined as ***". . . the raising of poultry, the production of eggs. . . ."*** (section 9H.1.11).

Integrated broiler production typically requires a parent laying flock and a hatchery to produce the young birds that are placed in the barns. Broiler processing involves relatively large fixed costs, which encourages maximum use of the facilities (i.e., two shifts and few stoppages). Most broiler companies therefore prefer to own parent flocks, hatcheries, and some barns. This ownership gives companies control over genetics and allows them to keep the processing facility at capacity. This kind of control is not critical, and there are exceptions (i.e., broiler companies that do not use agricultural land).

However, Iowa law creates the impression that the state is not enthusiastic about attracting the broiler industry. This perception is extremely important because states that have attracted broiler facilities have been willing to offer incentives. Companies that are contemplating an investment in excess of $100 million in unmoveable facilities and barns are understandably concerned about current and future regulations. The existence of a state rule that prevents them from owning

land for purposes of raising broilers or producing eggs is evidence of an anti-broiler alliance that presumably would be prepared to impose additional restrictions should the industry attempt to gain a foothold.

A detailed comparison of all state rules of this type is presented in Professor Neil Harl's *Agricultural Law* §51.04 [2] (51.50 to 51.82). This comparison can be summarized as follows: Corn belt states restrict corporate farming and southern states do not. Among the corn belt states, Iowa's regulations on broiler companies are most restrictive. This latter point was also made by Professor Harl during an interview for this report.

How Did the Turkey Industry Get Around the Corporate Farming Law?

The existence of the rule appears to conflict with the reality of existing turkey production in Iowa. However, the restriction is on *acquiring* land, and turkey companies located here before 1975 were grandfathered in. The law still influences these turkey companies because it places a one-way limit on how they can grow. In an industry as dynamic as the poultry industry, some firms will grow and others will go out of business. The nature of the grandfather clause is such that the Iowa turkey industry cannot fully participate in the industry's growth.

The recent decisions to sell the Louis Rich turkey plant and the Campbell Soup poultry facility are of some relevance here. The decisions were made by somewhat distant corporate executives, and although the financial soundness can be questioned, decisions like this are a normal part of U.S. corporate culture.

Now consider what the Iowa state code does to the resale value of these plants. Corporations that might want to buy and *expand* the Louis Rich plant and that traditionally own the bird at some point in its lifetime are automatically excluded from the bidding. The Campbell Soup plants are located outside the state but are supplied with birds that must first be transported *into* Iowa and then back out. The Campbell facilities are designed around single-shift production, and any company that might want to double production to use the facilities more efficiently is also barred from the bidding process (so long as the company wants to own the birds at some point). The overall impact of the code is therefore to bar most new entrants and to impose some costs on those who are already here.

The restriction on entry also makes it much more expensive for companies to start operations. Again, the Campbell experience serves as an example. Any producer who attempted to borrow money to take ownership of a barn for the Campbell Soup Company exposed themselves to financial risk in the event that Campbell's decided to close operations. Iowa-based banks were both understandably concerned about this exposure and understandably unwilling to participate. As a result, the Campbell Soup Company was forced to offer a multi-year contract that reduced the company's flexibility.

Contrast this situation with that of a new facility at the edge of the major broiler-producing areas. Producers who grow for Tyson Foods know that they can switch to Gold Kist, Inc., for example, and so are prepared to accept the standard one-year contract. This process in turn gives Tyson Foods a way to penalize growers who do not meet performance criteria. Thus, the concentration of the industry within a relatively narrow area gives both buyer and seller an alternative and encourages competition and efficiency. In other words, if Iowa is to succeed in broiler production, it will need at least two, and preferably four, different processors. Attracting the first may be the most difficult.[3]

Are Iowa's Bankers and Producers Anti-Broiler Industry?

Other factors that have been mentioned in connection with Iowa's business climate are the apparent unwillingness of Iowa bankers to loan money for new barns and the apparent unwillingness of Iowa producers to grow broilers on a contract basis. The initial

[3] The Campbell barns may help facilitate partial entry by the first processor.

experience of the Campbell Soup Company in Iowa may have given rise to these concerns, but subsequent experience has diminished them. After encountering difficulty attracting producers and bankers with traditional one-year contracts, the company now has a long list of producers who want to grow broilers under their current contract, and local (or outside) financing does not seem to be restrictive. Many larger companies may find it optimal to act as financial middlemen to source low-interest financing; however, there is also a surplus of local Iowa funds available for well-structured business ventures.

Another frequently cited business climate concern is the perception that Iowa workers are more likely to unionize than are workers in the South. This concern may have been justified based on the early experience of large-scale meat processors in the state, but it does not reflect the state's labor market in the recent past. Jack Frost/Gold'n Plump has processing facilities in both Minnesota and Wisconsin and has not had any serious difficulty with labor relations.

Iowa's relative labor scarcity is a serious concern; however, because this scarcity also gives workers other opportunities, it creates a willingness by employers to offer better working conditions and offers underpaid workers the option of working elsewhere rather than striking. Given Iowa's current employment situation, it would appear that broiler companies would have more to fear from losing production workers or from having to pay more to attract them than from having workers present unjustified labor demands. The analysis in the previous section incorporates these additional labor costs and so no further mention need be made here.

Is the Corporate Farming Law the Only Binding Restriction?

There are companies for whom Iowa's restrictions on acquisition of agricultural land appear not to be binding, including cooperatives (such as Farmland Foods and Gold Kist) and integrated broiler companies that have evolved production practices that do not require land ownership. These companies apparently have chosen not to locate in Iowa for reasons other than the state's legal code, and their decisions are particularly important to an understanding of how the rest of the industry would behave if current restrictions were lifted.

Case Studies

Fortunately for the purposes of this study, serious attempts have been made to lure broiler companies to the state, and consequently information has become available on why they chose not to locate here.

In the mid-1980s, a consortium of rural and municipal electric utilities, concerned about the loss of consumers, targeted the broiler industry to create a new customer base. Jack Bailey directed the effort under the name of the Iowa Area Development Group (IADG). Bailey agreed to be interviewed for this study and to allow the author access to files relating to previous efforts. Three experiences are relevant.

Case 1.

Jack Frost/Gold'n Plump, a company based in St. Cloud, Minnesota, is currently the 29th largest U.S. poultry company, slaughtering 1.18 million head per week (see Appendix B). Because the company originated in Minnesota, it writes multi-year contracts, helps producers find financing, and does not take ownership of the birds. In 1990 and 1991, the company was looking for a site for a second processing facility and gave serious consideration to north central Iowa. The company would probably not have violated any of Iowa's corporate farming laws had it decided to move here. Also, IADG was able to find four sites (Spencer, Estherville, Iowa Falls, and Mason City) with surplus effluent capacity and an available workforce.[4]

Company officials were extremely concerned about the enormous capital outlays involved in the expansion, and when an existing facility became available

[4] The surplus effluent capacity originated from previous closings of processing plants.

in Wisconsin, they decided to move there rather than to Iowa. This decision was not driven by Iowa's legal code or lack of competitiveness, but rather by an unfortunate coincidence of timing (from the IADG perspective).

Case 2.

Gold Kist, Inc., is the second largest U.S. poultry producer, with about 11 plants slaughtering 13.5 million birds per week in Georgia, Alabama, Florida, and the Carolinas. The company is a producer-owned cooperative, but for purposes of Iowa law is defined as a corporation. Note that many Iowa decision makers interviewed for this study and for the studies that preceded it did not seem to be aware of this prohibition on cooperatives. In section 9H.1.7, a corporation is defined as ***a domestic or foreign corporation subject to chapter 490, a nonprofit corporation, or a cooperative.***

The stated reason for not moving to Iowa was the desire to remain close to the Atlanta operations base. This reason makes sense, given the producer ownership. An additional, though unstated, reason may have been Iowa's prohibition on Gold Kist buying land to construct a hatchery–Gold Kist owns 17 hatcheries in the South.

Case 3.

Simmons Foods, Inc., also examined the possibility of an Iowa-based operation (in the old Farmland Foods plant at Iowa Falls). The company sent a delegation to examine Iowa possibilities, but company officials decided not to move here, citing Iowa's corporate farming laws and labor market.

Conclusions Regarding Iowa's Business Climate

Iowa's cost advantage is offset to a large extent by its restriction on corporate ownership of agricultural land. There are ways around the law (contracting out hatcheries or hauling in birds from out of state), but these alternatives add to the cost base. Further, the absence of any existing processor adds to the costs of financing new facilities and makes producers reticent to build barns because producing for only one customer greatly increases financial risk. This problem may have given rise to the *perception* that Iowa bankers and producers are not interested in the broiler industry, a perception that is not borne out by the limited experience of the small poultry and turkey operations that do exist in the state.

The economic forces that favor Iowa as a broiler producer also favor surrounding states. As a result, broiler processors are now located in Missouri, Wisconsin, Nebraska, and Minnesota. In the absence of changes in state laws, a plant will eventually be built in Iowa, but this may take some time. If state laws were changed so that farming did not include hatcheries or the growing of broilers and if the state made an aggressive effort to attract a plant, Iowa would quickly attract broiler companies to the four locations where existing effluent capacity and a tradition of livestock processing exist. The presence of these four facilities–if they were financially successful and if they were perceived as beneficial by Iowa voters–would ensure that Iowa attracted a large share of the subsequent growth in the U.S. broiler industry.

Given that the decision rests with Iowans and Iowa's lawmakers, it is important to understand what the benefits and costs of such a change would be. These costs and benefits are the topic of the fourth and final section of this report.

IV. Benefits and Costs of an Iowa-based Broiler Industry

Benefits to the State

In the short to medium term, the state could expect to attract about four processors, each of whom would test the waters before making subsequent large-scale commitments. The state would also have an opportunity to evaluate these processors and to make further changes in the law based on this experience. Therefore, the purpose of this section is to examine the impact of these initial investments.

Employment

One of the site evaluations discussed in the previous section describes in great

detail the type of facility that would be built in Iowa. The proposed facility has a five-year development period, after which further optional expansion would occur. The analysis presented next is based on the size of the facility in the fifth year.

The company would build a single hatchery employing 32 workers and would either build or purchase the output of a feed mill employing 26 people. About 60 full-time truck drivers would be required, as would 20 maintenance, 7 service, and 25 management/office staff. Thus, a total of 463 production workers would be required for each processing facility.

The company would contract the construction of 177 barns and provide birds, fuel, litter, medication, vaccinations, load-out, and service support staff. Each barn would require about 3.25 hours of labor per day from the producer/owner, or an average of about 80 full-time workers. Each barn would house slightly more than 50,000 birds and would turn over six times per year. The litter from each barn would be used to fertilize 300 acres of crop ground each year, thereby reducing or eliminating fertilizer use on about 50,000 acres of land for each of the four facilities. The expected annual income per barn would be slightly in excess of $30,000, excluding production bonuses.

Because producers would be able to use the barns to provide additional income, these 80 full-time job equivalents (FTEs) can be viewed as desirable, as can the management positions. Table 1 shows the employment breakdown, assuming that 163 of the 463 processing jobs involve supervisory or semiskilled workers.

Table 1. Number of jobs from broiler-producing facilities

	1 plant	4 plants
	(number of jobs)	
Skilled/desirable	107	428
Semi-skilled	351	1,404
Unskilled	400	1,600

Feed Demand

Allowing for mortality, producing 50,000 birds in each of the 177 barns would yield a weekly kill of 1,027,356 birds, a medium-size plant by modern standards. Assuming 9 pounds of feed per bird, each of the four feed mills would produce 240,000 tons of feed per year, of which 150,000 tons would be corn and 55,200 tons would be soybean meal. Assuming a four-plant initial capacity, Iowa would feed an additional 600,000 tons of corn and 220,000 tons of soybean meal, the equivalent of 34 million bushels of corn and 11 million bushels of soybeans (about 2.5 percent of the corn and 3 percent of the soybeans produced in Iowa in 1996). The four feed mills together would justify constructing an additional small to mid-size soybean-processing facility in the state.

Corn and soybean producers within the draw area for the four feed mills and processing plants would obtain premiums of about 10¢ per bushel for corn and 15¢ per bushel for soybeans.[5] These premiums would be offered for all nearby corn and soybeans, and not just for the corn and soybeans used to feed broiler. The net benefits to corn and soybean producers in the draw areas would be about $7.0 million for corn producers and $3.3 million for soybean producers. The per bushel benefit would increase as the industry grew and could eventually equal 40¢ per bushel for corn and 45¢ per bushel for soybeans.

Value Added and Tax Returns

The state's economy would expand by the amount of direct value added (i.e., the value of the birds less the value of the corn and soybeans that would otherwise have been exported). Assuming that each bird produced 3.62 pounds of ready-to-cook meat worth 52¢ per pound, the value of the birds from one plant would be about $100

[5] Note that these small premiums of about one-third of one cent per pound have not been factored into the economic analysis discussed in Section II of this report. These premiums simply reflect the transportation advantage of producers who are fortunate enough to be located near a large customer. The premium has to be large enough to attract grain from the edge of the draw area. Producers near the plant get the premium, despite the absence of any transportation costs because plants offer the same price to all producers on a given day.

million per year, or $400 million for the initial four-plant industry.

The opportunity cost of the corn and soybeans (assuming $3.00 per bushel for corn and $7.50 per bushel for soybeans) would equal $180 million per year, indicating that about $220 million of direct value added would occur. If we acknowledge that each $1 in direct livestock value added creates an additional $1.50 value added in the rest of the economy, the total increase in Iowa would be about $550 million, of which about $35 million to $40 million would accrue as tax revenues.

Costs to the State

Along with the economic benefits just presented, the presence of a large broiler industry in Iowa would bring some costs and concerns. In the scenario just presented, for example, each of the four processing plants would generate about 800,000 gallons of effluent per day, in addition to 40,000 pounds of feathers and 70,000 pounds of blood. These wastes could be handled by appropriate disposal facilities, but their presence would create some environmental concerns. The processing facility and barns might be viewed as unattractive to many, and neighbors may voice concerns about spreading of the manure.

In addition, the nature of the 1,600 unskilled positions created by four processing facilities is such that many would be filled by immigrant workers or by unskilled workers who move in from out of state. These workers and their families might be difficult to assimilate into existing communities and might require above-average expenditures on education and social services.

Other issues involve dislike among Iowans for "corporate farming" and some loss of freedom among producers who become corporate employees. While it is relatively straightforward to measure the benefits such an industry would bring, it is not possible to put a dollar value on costs. Note that the enormous expansion in Iowa's egg-laying industry does not seem to have created environmental or social disputes; however, the processing side of the egg industry is much less intensive in its use of unskilled workers and creation of effluent.

Conclusions Regarding Benefits and Costs

In summary, producers in general and corn and soybean producers in particular would benefit from the presence of an Iowa-based broiler industry, as would producers who contract to feed birds for the processing facility. Employees of the plants would benefit, as would those who supply the industry with medicines, legal services, and other inputs. The average Iowan might see some very small benefit via the extra tax dollars generated but would also incur some costs associated with the presence of unskilled and/or possible immigrant workers and the changes in Iowa's landscape associated with the construction of hundreds of growing barns.

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APPENDIX A.

Executive Summary from "A Feasibility Study of Broiler Meat Production in Iowa"

by
L. D. Trede, W. J. Owings, G. A. Futrell, and L. Aldinger

Broiler meat production in Iowa is virtually nonexistent. The industry is located primarily in a few southeastern states where two-thirds of all commercial broilers are produced. Recent changes in many input costs in broiler production suggest that Iowa might be more competitive in broiler meat production.

Per Capita Consumption

1. Few major commodities have had such rapid growth as poultry meat. Per capita consumption of poultry meat has risen steadily from 26 pounds per person in 1995 to a current consumption of more than 70 pounds per person.

2. The declining price of poultry meat relative to beef and pork and dietary and health concerns regarding cholesterol intake have contributed to this rapid growth.

3. Consumption in the year 2000 is projected to rise to about 85 pounds per person (70 pounds of poultry and 15 pounds of turkey meat) if the rate of increase over the next decade is the same as the past decade.

Broiler Meat Production Potential in Iowa

1. Iowa currently consumes 850,000 broilers per week. Within 300 miles of central Iowa, nearly 2.7 million broilers are consumed each week. Nearly all of these are imported from the southeast and south central states.

2. Additional facilities will be built for the broiler industry in the future. Whether some of that future expansion occurs in Iowa depends upon the expected investment returns obtainable in Iowa relative to locating elsewhere. Several items seem especially critical:

a. *Poultry Feed Costs and Conversion Rates.* A comparison of corn and soybean meal prices from 1981-85 shows that Iowa corn prices are 16¢ to 40¢ per bushel less than the major broiler producing states. Soybean meal prices for the same time period were $1.01 to $1.62 per hundredweight lower in Iowa. Feed conversion rates between the two areas are similar on a year-round basis; therefore, combining the effects of lower feed prices with similar feeding rates shows that Iowa has a large advantage in poultry feeding costs compared with the other major broiler states. Feed costs per pound of liveweight bird are estimated to be 0.4¢ to 1.4¢ per pound less in Iowa. When measured as feed costs per pound of ready-to-cook meat, these same data reveal that the feed cost differential is approximately 1.9¢ to 2.6¢ per pound in favor of Iowa.

b. *Building Investments and Operating Costs.* Part of Iowa's advantage in feed costs is offset by its disadvantage in housing costs. Poultry housing investments generally are higher in Iowa because of extra insulation and concrete needed to compensate for Iowa's harsh winters and springtime muddy conditions. However, computer simulation models show that fuel, electricity, and other operating costs for these buildings are nearly the same as comparable

buildings in the Southeast. Wintertime disadvantages in Iowa are offset by summertime disadvantages in the Southeast. Combining the effect of higher building costs and comparable operating costs, Iowa's disadvantage is approximately 1.5¢ per pound of ready-to-cook meat. Eliminating the concrete floor in the Iowa building greatly reduces this disadvantage.

c. *Labor Costs for Farm Production Activities.* USDA data on farm wage rates paid for livestock production activities do not show an appreciable difference in labor wage rates between Iowa and other broiler production states. However, actual wages paid will vary from community to community depending upon supply and demand for farm labor and other alternatives available.

d. *Labor Costs in Processing, Feed Milling, and Hatchery Operations.* No data are available to directly compare these costs; however, data from turkey processing plants in the two areas show little differences. A comparison of unemployment insurance rates and workman's compensation rates reveals that Iowa is not at a disadvantage compared to other states.

e. *Processing Plant Investments and Operating Costs.* The purchase, installation, and interest costs of equipment, machinery, and heating and cooling systems for a poultry processing plant should be similar regardless of plant location. The building "shell" may be more expensive in Iowa. However, a well-designed and efficiently operated plant in Iowa should be more efficient than established plants located in other regions that are older or not operated as efficiently.

f. *Transportation Costs.* It is not clear whether Iowa is at a competitive advantage or disadvantage relative to transportation costs of broiler meat. For broiler meat moving to the east or west coast by truck, Iowa may be at a disadvantage because of the transportation patterns and backhaul possibilities related to the movement of commodities. However, transportation rates from an Iowa processing plant to an Iowa regional market are competitive with rates to the same market from the south central or southeastern states. Transportation costs represent less than 5 percent of the total cost. Even if Iowa has a 20 percent disadvantage in transportation rates, this translates to less than 1 percent disadvantage in total costs when comparing regions.

Investing in a Broiler Meat Complex in Iowa

A complete broiler meat production industry in Iowa requires a number of integrated activities, ranging from breeder replacement flocks to processing plants. The complex requires careful coordination of the various aspects of the business. Several factors need to be considered:

1. To prevent disease outbreaks, the various enterprise units of the business would need to be spread over a somewhat large geographic area probably no more than 50 miles in diameter from the centralized processing plant.

2. A detailed marketing and distribution plan needs to be completed. Broiler meat produced in Iowa and supplied to any Iowa or regional market must be competitively prices to meat being imported from the Southeast. Expansion of the industry must be based upon being able to produce and market the product at a lower cost than can southern competitors. Alternative forms of financing and organizational structure of the complex would need to be identified and studied.

3. An assessment of size of operation, investment required at each level, and the appropriate organizational and production structure must be made.

For this study, an economic model incorporating these factors for an Iowa complex has been constructed. The processing plant is the focal point of the complex with all other functions "sized" to it. A processing plant designed to slaughter, process, and package 140 birds per minute (8,400 birds per hour) was assumed. Plant output is 57.7 million pounds of ready-to-cook broiler meat per year. The poultry integrator owns the processing plant, hatchery, feed mill, and related transportation equipment. Company employees manage and operate this segment of the complex. The integrator contracts with growers to raise breeding stock and broilers for meat. The breeding stock, chicks, and feed resources are owned by the integrator. An analysis of this system reveals the following conclusions:

1. *Total Capital Investment.* Total capital investment for the poultry integrator is estimated at $11.7 million. Eight million dollars is required for the processing and packaging plant, $1.2 million for a hatchery, and $2.0 million for a feed mill. If water treatment and sewage facilities are adequate, the capital investment can be reduced by $2.0 million. Contracting for feed milling and delivery eliminates the capital investment needed for a new mill.

2. *Processing Plant Operating Costs.* Based upon the plant design and technology used in processing, labor requirements are estimated to be 106 full-time employees to process 63,000 birds per day for a 7.5-hour working day. Operating expenses in the processing plant are estimated at $5.5 million dollars, or 9.51¢ per pound of ready-to-cook meat.

3. *Hatchery Operating Expenses.* Operating expenses for the hatchery are estimated at $0.72 million, or 1.24¢ per pound of ready-to-cook meat.

4. *Farmer-Grower Payments.* Grower payments to farmers include payments for raising breeder stock and growing broilers. Total grower payments are estimated to be $5.01 million. This does not include feed costs since the feed is provided by the integrator. The payment to the grower includes estimates for utilities, repairs, building ownership costs, and return to labor. Grower payments to farmer-producers feeding broilers amount to $3.7 million. Expressed as a cost per pound of ready-to-cook meat, all grower payments account for 8.69¢ per pound.

5. *Projected Operating Income and Expense.* A projected operating income and expense statement for the poultry integrator is shown below. The major source of income to the integrator is broiler meat. Major expense items are feed, grower payments, labor wages and fringe benefits, meat packaging expenses, and transportation.

   The total cost of operating the complex is 47.51¢ per pound of ready-to-cook meat. Nearly 50 percent of the total cost ($12.3 million) is feed. The next largest item is grower payments. Payments to the breeder farms and grow-out farms are approximately $5.0 million per year, or 19 percent of the total expenses. Direct labor costs account for 6.14 percent of the total expenses; corporate overhead, supervision, and management amount to an additional 2.6 percent. Packaging costs are slightly more than 7 percent of the total. Most other input costs represent less than 5 percent of the total. The profit margin before federal and state income taxes and startup costs is 3.94¢ per pound.

6. Sensitivity analysis on the major output and input prices reveals that wholesale poultry meat prices and feed input prices have more impact upon total costs and profits than do any other major input. For example, when 1986 feed grain and loan prices are combined with poultry meat prices of 45¢, 47.5¢, and 50¢ per pound, profits varied from 2.71¢ to 7.71¢ per pound. Changes in feed prices had more impact upon production costs than did changes in labor costs, farm-grower payments, packaging, or transportation costs.

Item	Total (dollars)	Totals per Pound of Ready-to-Cook Meat (cents/lb.)
Operating Income:		
Broiler Meat	$ 29,550,883	51.20
Byproducts and Other	142,628	.25
Totals	$ 29,693,511	51.45
Operating Expense:		
Feed Costs	$ 12,327,020	21.36
Labor - Direct	1,621,237	2.81
Labor - Supervision and Management	685,000	1.19
Grower Payments	5,015,093	8.69
Chicks, Fuel, Equipment	2,152,954	3.72
Medications, Supplies, Misc.	461,733	.80
Packaging	2,020,080	3.50
Transportation	975,410	1.69
Insurance and Property Taxes	340,500	.59
Depreciation	1,691,429	1.16
Interest on Operating Expenses	127,995	.22
Totals	$ 27,418,451	47.51
Pre-tax Profit Margin	$ 2,275,060	3.94

7. Capital budgeting analyses show a reasonable after-tax (federal income tax) rate of return when a 15-year discounting period is used. Competitive rates of return to a poultry integrator are possible under a wide range of price levels. All examples earned a rate of return above the predetermined 12 percent discount rate.

Economic Benefit to Iowa

1. A broiler meat complex would add a $2.0 million payroll to the trade area where the complex is located. More than 125 jobs would be created, ranging from the processing plant to corporate supervisors and management personnel.

2. Grower payments to farmers would likely exceed $5.0 million. These direct payments would, in turn, provide added economic activity for agricultural suppliers and support industries.

3. The broiler meat complex requires 2.19 million bushels of corn and 17,500 tons of soybean meal annually. This provides another market outlet for grain produced in Iowa and adds value to the grain.

Summary and Conclusions

Even though broiler meat production in Iowa is almost nonexistent, this study suggests that Iowa can be competitive in broiler meat production.

Iowa's greatest advantage is in its feed production resources. Feed costs to the broiler industry are low in Iowa. These low feed costs more than offset the higher housing and transportation costs. Other production costs for the industry are nearly the same as in the major broiler producing states.

In conclusion, this study demonstrates that Iowa can be competitive in broiler production, provided the complex is properly located, well managed, and operated efficiently. A complex located in Iowa can produce broiler meat for the local Iowa and regional markets at a cost that is competitive with the major broiler producing areas. This cost structure will yield a reasonable profit and investment return to the poultry integrator.

Appendix B.

Top U.S. Broiler Companies

Firm	Slaughter Plants	Further Processing Plants	Million Head	Million Pounds Liveweight	Average Liveweight	Million Pounds R-T-C[a]
Tyson Foods, Inc.[b]	35	20	34.30	150.90	4.40	117.20
Gold Kist, Inc.	11		13.50	60.75	4.50	46.17
Perdue Farms, Inc.[c]	14	3	11.74	58.77	5.01	44.95
ConAgra Poultry Co.[c]	10	5	10.50	50.38	4.79	38.27
Pilgrim's Pride Corp.	8	1	9.00	39.15	4.35	28.00
Wayne Poultry Div.	8	2	4.88	27.33	5.60	21.52
Hudson Foods, Inc.	6	3	5.40	25.92	4.80	19.70
Seaboard Farms, Inc.	4	1	4.20	19.06	4.50	14.30
Cagle's, Inc.	4	2	3.13	17.41	5.43	14.09
Townsends, Inc.	4		2.90	16.50	5.69	12.64
Foster Farms	4	1	3.67	17.84	4.86	12.53
Fieldale Farms, Inc.	3	1	3.21	14.70	4.58	12.00
Wampler-Longare, Inc.	4		3.26	14.67	4.50	11.00
Sanderson Farms, Inc.	5	1	3.35	14.07	4.15	10.98
Allen Family Foods, Inc.	3		2.55	13.64	5.35	10.43
Marshall Durbin Cos.	4	1	2.77	11.68	4.20	9.20
O.K. Foods, Inc.	2	4	2.10	11.55	5.50	8.66
Chocktaw Maid Farms	3		2.00	9.46	4.73	7.43
Simmons Foods, Inc.	3	3	2.05	9.02	4.40	6.94
B.C. Rogers Poultry	1	3	1.60	8.24	5.15	6.50
George's Inc.	2	1	2.15	8.00	4.00	6.10
Herider Farms, Inc.	4		1.33	7.30	5.50	5.40
Green Acre Foods, Inc.	2		1.30	6.50	5.00	5.10
Mountaire Farms, Inc.	1		1.32	6.70	5.08	5.08
Peco Foods, Inc.	2	1	0.95	5.70	6.00	4.55
Peterson Industries, Inc.	1	1	1.39	6.00	4.30	4.50
Rocco Enterprises, Inc.	1	1	1.43	5.85	4.10	4.37
Zacky Foods	2	2	1.20	6.00	5.00	4.36
Gold'n Plump Poultry	2	1	1.18	5.63	4.82	4.11
Columbia Farms, Inc.	2	1	1.35	5.40	4.00	4.05
Case Foods, Inc.	2		0.87	5.09	5.89	3.88
Claxton Poultry, Inc.	1		1.05	4.83	4.60	3.67
Empire Kosher Poultry	2	2	1.50	4.90	4.20	3.50
Golden-Rod Broilers	2		1.10	4.57	4.15	3.47
Burnett Poultry Co.	1		0.80	3.60	4.50	3.00

Appendix B. Continued

Firm	Slaughter Plants	Further Processing Plants	Million Head	Million Pounds Liveweight	Average Liveweight	Million Pounds R-T-C
Mar-Jac, Inc.	1		0.85	3.57	4.20	2.80
Harrison Poultry, Inc.	1		0.70	3.52	5.03	2.62
Amick Farms, Inc.	1		0.74	3.50	4.75	2.55
Sylvest Farms, Inc.	1	2	0.65	2.75	4.23	2.12
Piedmont Poultry Co.	1		0.63	2.65	4.20	2.10
House of Raeford Farms	1	3	0.63	2.80	4.50	2.10
Farmers Pride, Inc.	1		0.56	2.55	4.60	1.75
Pennfield Farms	1		0.47	2.23	4.75	1.70
Park Farms, Inc.	1		0.33	1.52	4.60	1.19
Pederson's Fryer Farms	1		0.32	1.57	4.90	1.13
Gentry Poultry Co., Inc.	1		0.32	1.42	4.45	1.08
Draper Valley Farms	1		0.29	1.43	5.03	1.06
Lady Forest Farms, Inc.	1		0.35	1.42	4.05	1.06
College Hill Poultry	1		0.20	0.99	4.99	0.73
Total	177	66	152.07	709.03	4.73	541.64

Source: *Broiler Industry* 1(January 1996):26C-26D.

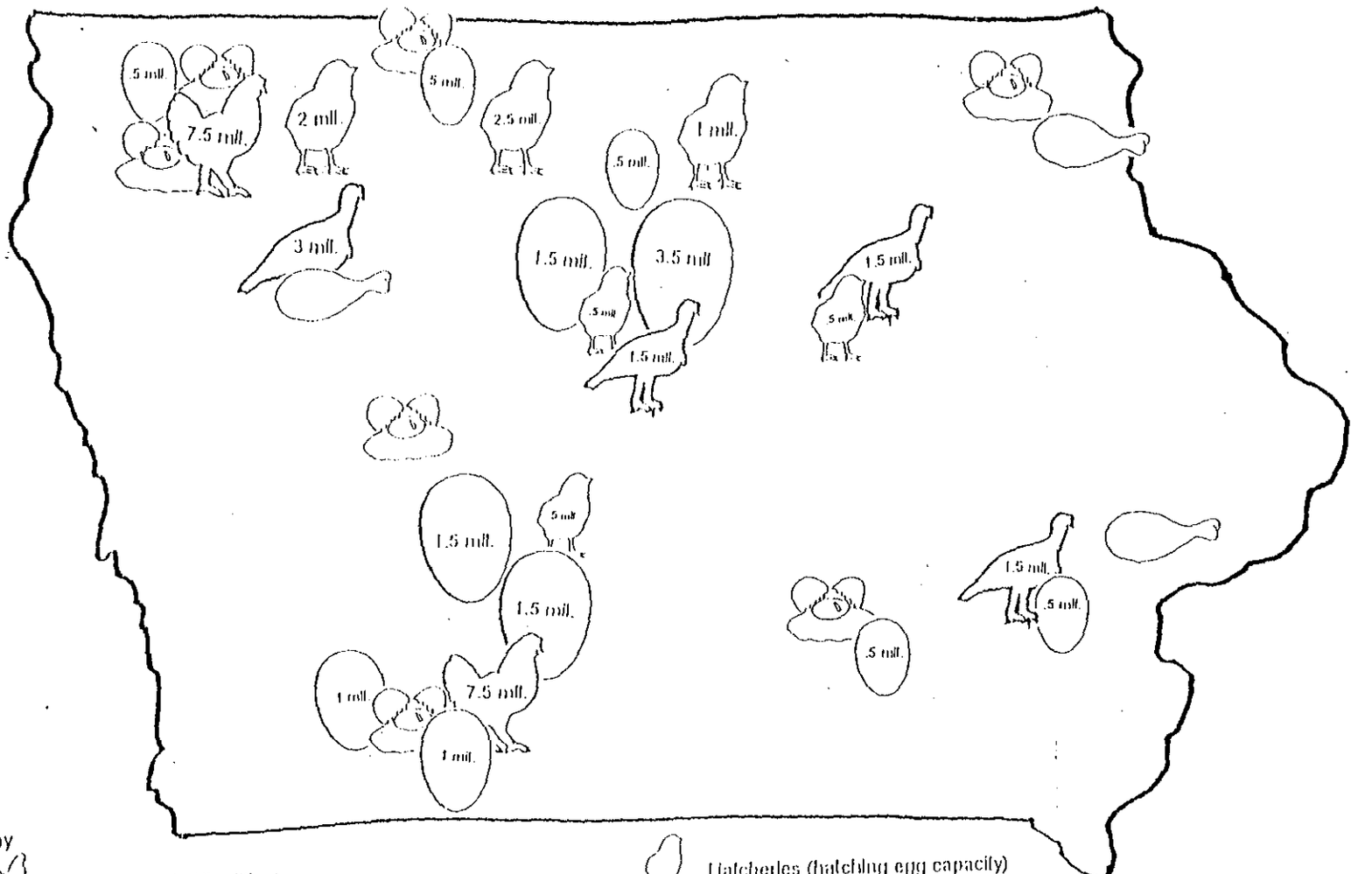
[a]Ready to cook.

[b]Tyson Foods figures reflect full-year weightings from its acquisitions of Cargill, Inc., broiler operations and McCarty Farms, Inc.

[c]Perdue acquired ConAgra's Millsboro, Delaware, plant in October. Each company's figures for this portion of totals are prorated for partial year of ownership.

Appendix C. Poultry Production in Iowa

Poultry Production in Iowa



Key

- Broilers (1995=15 million)
- Turkeys (1995=7.7 million)
- Commercial Egg Laying Hens (1995=15 million)
- Hatcheries (hatching egg capacity)
- Turkey Processors
- Further Egg Processors (breakers)

*Broilers, Turkeys, Commercial Egg Laying Hens, and Hatcheries are shown by area on the map only if they have more than 500,000 population.

June, 1995