AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

CHOICES
The magazine of food, farm, and resource issues
2nd Quarter 2015 • 30(2)

A publication of the
Agricultural & Applied
Economics Association

AAEA
Agricultural & Applied
Economics Association

The Broiler Industry: Competition and Policy Challenges

Tomislav Vukina and Xiaoyong Zheng

JEL Classification: L11, L66
Keywords: Merger and Acquisition, Competition, Production Contracts

The U.S. broiler industry is considered the role model of industrialized agriculture. Vertically integrated companies control all stages from breeding flocks and hatcheries to grow out, processing, and marketing. They typically run their operations through smaller divisions found throughout the country, but mainly in the South and Southeast. The finishing stage (final stage of production where one-day-old chicks are brought to the farm and grown to market weight) as well as the production of hatching eggs (broiler breeder operations) rely almost entirely on contracts with independent growers. In 2012, almost 97% of broiler chickens were raised under contracts. The main reason why the processors became the coordinators of the industry is because a large proportion of the value added is in the processing. In addition, significant economies of scale are likely to cause ever-increasing industry concentration. This concentration coupled with restructuring occurred either via replacing of existing plants with fewer, larger and more efficient ones, or via reorganization and consolidation of assets of existing firms into more efficient configurations, or both.

Although the consequences of mergers and acquisition in the poultry industry—such as on productivity, employment and wages, input and output prices and margins—have been considered in the literature (Weng, Vukina, and Zheng, 2014), comparatively little has been written on the direct impact of industry concentration on contract growers' welfare, including the number of growers and their earnings. The number of contract growers is determined by the firms' strategic decisions about varying the aggregate production volume and the scale of processing facilities, whereas the contract payments are determined in an oligopsony setting—with relatively few buyers—where the processing plants compete on the regional markets for contract growers. Vukina and Leegomonchai (2006) has established a relationship between oligopsony power and hold-up in the poultry industry. Hold-up is central to the theory of incomplete contracts. It arises when part of the return on a grower's relationship-specific investment can be ex-post appropriated by the integrator. They empirically showed that the severity of the contract growers' under-investment problem, as a defense against hold-up by an opportunistic integrator, is a function of the number of integrators in the area. The stronger the competition for grower services—that is, the larger the number of companies offering contracts—the smaller the hold-up problem. Consequently, with less hold-up, the number of chicken houses the grower is willing to invest in is closer to the efficient number. The efficient number is the number that would result if the integrator and the grower were to vertically integrate. MacDonald and Key (2012) has documented that in highly concentrated local markets, poultry integrators can exercise some monopsony power. Specifically, they showed that, in markets with a single integrator, growers received about 8% lower fees and growers in markets with two or three integrators received 4% lower fees compared to growers in markets with 4 or more integrators.

Industry Dynamics and Structure

In the last couple of decades, the increase in the broiler industry output in the United States came from the increased number of chickens grown and especially from the increase

©1999–2015 CHOICES. All rights reserved. Articles may be reproduced or electronically distributed as long as attribution to *Choices* and the Agricultural & Applied Economics Association is maintained. *Choices* subscriptions are free and can be obtained through http://www.choicesmagazine.org.

AAEA-0415-585

Table 1: Top-15 Firm Rank and Total Number of Processing Plants Owned by Top 15, 1997 to 2013

Company Name	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	1997
Tyson Foods	1	1	1	1	1	2	2	2	1	1	1	1	1
Pilgrim's Pride	2	2	2	2	2	1	1	1	2	2	2	3	4
Sanderson Farms	3	3	3	4	4	4	4	5	6	5	6	7	11
Perdue Farms	4	4	4	3	3	3	3	3	4	4	4	5	3
Koch Foods	5	5	7	5	5	9	9	9	15	15	13	14	
Wayne Farms	6	7	5	6	6	5	5	4	5	6	5	6	7
Mountaire Farms	7	6	6	7	7	6	6	6	7	7	7	8	
Peco Foods	8	8	8	10	11	11	13	12	9	10	15		
House of Raeford Farms	9	9	9	8	8	7	7	7	10	11	10	11	
Foster Farms	10	10	10	9	10	10	11	10	8	8	8	10	9
George's	11	12	12	15	15	14	12	13	12	13	12	12	
Keystone Foods	12	11	11	11	9	8	8	8					
Case Foods	13	14											
Amick Farms	14	13	14										
O.K. Foods	15	15		13	12	12	10	11	11	9	11	15	15
Fieldale Farms			13	14	13	13	14	14	14	12	14	13	13
Simmons Foods			15	12	14	15							
Allen Family Foods							15						
Townsends								15					12
Gold Kist									3	3	3	2	2
Cagle's									13	14	9	9	8
ConAgra Poultry												4	5
Wampler Foods													14
Seaboard Farms													10
Choctaw Maid Farms													
Hudson Foods													6
Total # of Plants by Top-15 Firms													

"Note: Number of plants specific to companies is available from the authors upon request.
Source: Watt Poultry USA, various issues.

in their slaughter weights. At the same time, the increase in the number of slaughter and processing plants was only modest. Table 1 lists the rank of the top-15 firms in the industry from 1997 to 2013. The total number of plants owned by these firms increased only slightly, from 124 in 1997 to 127 in 2013. The total number of chickens slaughtered in 2013 was 8.5 billion, an increase of only 10.4% from 1997 (Table 2). However, during the 1997-2013 time period, the production grew from 27.3 billion pounds of ready to cook (RTC) chicken meat to 37.8 billion pounds—a 38.5% increase. The average RTC processed weight increased by 26%. This phenomenon is largely demand driven and occurred in response to consumer preferences for white (breast) meat. During this period, the growth has been rather uneven. As a matter of fact, in post-2008, the production stagnated and even decreased in some years such that the industry growth in 2008-2013 period amounted to only about 0.4% per year on average.

During the same period, the broiler industry has become more concentrated. Industry concentration is typically measured by considering the market share of the top-4 and top-8 firms in the industry as well as a more complex Herfindahl-Hirschman Index (HHI) (Table 3). The industry's top-4-firms concentration ratio increased from 40.9% in 1997 to 57.9% in 2013, with a peak of 60.1% in 2012. During the same time period, the top-8-firms concentration ratio increased from 53.1% in 1997 to 79.3% in 2013, with a peak of 80.7% in 2012. For comparison purposes, the rest of the meat complex in the U.S. is even more concentrated with beef and pork industries' concentration ratios exceeding that of the broiler industry. In 2007, the 4-firm concentration ratio of beef packers was 83.5% and of pork packers 66%, compared to only 59.5% for broilers (Hendrickson and Heffernan, 2007).

The entire studied period, and especially the post-2008 period, was characterized by a significant number of bankruptcies and intense merger and acquisition activity. The meltdown of the financial services sector and high corn prices were mostly to blame. For example, in 1998, Tyson Foods, Inc. and Hudson Foods Company merged. The same year Peterson Farms, Inc. was acquired by Simmons Foods, Inc. In 2000, Seaboard Farms, Inc. was acquired by ConAgra Poultry Company and in 2002 BC Rogers Poultry, Inc. was acquired by Koch Foods, Inc. Most acquiring firms were larger while most acquired firms were smaller. The exception to this is Gold Kist who was No. 3 when it was acquired by Pilgrim's Pride Corporation who was then No. 2. Pilgrim's sent an unsolicited proposal

Table 2: Number of Chicken Slaughtered and Ready-to-cook (RTC) Chicken Meat Produced from 1997 to 2003

Year	RTC Chicken Meat Produced (Million Pounds)	# of Chicken Slaughtered (Million Heads)	Average RTC Chicken Meat Produced per Slaughtered Head (Pound)
2013	37830.2	8530.75	4.45
2012	37309.4	8429	4.39
2011	37202.5	8537.64	4.36
2010	36909.8	8649.34	4.27
2009	35510.3	8519.97	4.17
2008	36906.3	8921.07	4.14
2007	36159.1	8903.07	4.06
2006	35499.6	8837.54	4.02
2005	35364.8	8853.81	3.99
2004	33745.8	8663.38	3.9
2003	32749	8536.87	3.84
2002	32239.7	8546.24	3.77
2001	31265.8	8406.31	3.72
2000	30495.2	8261.11	3.69
1999	29741.4	8111.66	3.67
1998	27862.7	7837.69	3.55
1997	27270.7	7735.9	3.53

Source: USDA

Table 3: Top-4 and Top-8 Firms Concentration Ratios and HHI from 1997 to 2003

Year	Top-4 Firms Concentration Ratio (%)	Top-8 Firms Concentration Ratio (%)	HHI
2013	57.9	79.3	1195
2012	60.1	80.7	1275
2011	56.5	74.7	1180
2010	55	72.2	1164
2009	56	72.8	1171
2008	56.8	71	1257
2007	57.5	73.6	1341
2006	62.2	76.3	1442
2005	49.1	61.8	1220
2004	52.7	65.2	1211
2003	52.7	64.8	1228
2002	45.1	57.2	1150
2001	45.3	56.9	1130
2000	45.2	56.7	1198
1999	45.6	57.2	1259
1998	44.8	56.8	1230
1997	40.9	53.1	1103

Sources: Watt Poultry USA and USDA.

Note: HHI, or Herfindahl-Hirschman Index, is defined as the sum of the squares of the market shares of 50 largest firms.

to Gold Kist offering to purchase all of the outstanding shares for $20.00 per share in cash on August 18, 2006. The agreement was reached on December 4, 2006 at the price of $1 higher than Pilgrims' initial offer. The Pilgrim's Pride's case is compelling: after a series of aggressive acquisitions (Wampler Foods Inc. in 2001, ConAgra Poultry Co. in 2003, and Gold Kist in 2006), Pilgrim's filed for Chapter 11 bankruptcy protection on December 1, 2008, because of the deterioration of poultry pricing combined with an increase in input costs and the company's lack of liquidity to withstand the downturn. Pilgrim's Pride successfully emerged from bankruptcy protection on December 28, 2009 after 64% of its stake was acquired by the Brazilian conglomerate JBS S.A. earlier that year.

More recently, O.K. Foods, Inc., ranked No. 10 in 2007, was acquired by Mexico's Industrias Bachoco S.A. de C.V. in October 2011. The firm is now ranked No. 15. Allen Family Foods which used to be on the top-15 list in 2007 filed for bankruptcy and was acquired by Harim Holdings, Co. Ltd., of South Korea, in September of 2011. Townsends Inc. whose rank was No. 10 in 1998 entered bankruptcy in 2011. Its Arkansas complex was acquired by Peco Foods, Inc. and North Carolina operations by Omtron Ltd. (owned by a Ukrainian oligarch), who subsequently filed for bankruptcy and closed down the complex in Siler City leaving dozens of growers without contracts. Cagle's Inc. which used to be No. 7 in 1998 entered bankruptcy in 2011. Its assets were acquired by Koch Foods. Also in 2011, Coleman Natural Foods, LLC was acquired by Perdue Farms, Inc. and Park Farms, Inc. was acquired by Case Farms Processing, Inc. in 2012.

Despite substantial mergers and acquisitions activity, the rankings of the leading players remained relatively stable during the analyzed period, and especially since 2007 (Table 1).

Table 4: Regional Distributuon of Broiler Contract Production

Year	2012			2007			2002		
State	Rank	# of Broilers	# of Growers	Rank	# of Broilers	# of Growers	Rank	# of Broilers	# of Growers
Georgia	1	1368084390	3166	1	1398907034	2905	1	1286408810	3361
Alabama	2	1000938553	2708	3	1015912076	2997	3	1050807076	3091
Arkansas	3	975715223	2622	2	1171417704	3194	2	1181903903	4246
North Carolina	4	783717524	2244	5	769746946	2512	5	739554718	3050
Mississippi	5	761135155	1612	4	822957432	1678	4	749052989	2027
Texas	6	596078606	964	6	577143316	1050	6	495428765	1115
Kentucky	7	305306532	568	7	309722752	592	7	271162663	621
Maryland	8	303326274	696	8	296341690	712	8	287080129	819
Missouri	9	272246533	489	9	278336596	478	9	239618204	551
Virginia	10	237563811	621	11	245168464	628	11	265682369	886
South Carolina	11	225838335	462	13	230213351	475	13	181609864	433
Delaware	12	211537760	636	10	246098746	719	10	255868231	827
Oklahoma	13	211195704	504	12	240818895	653	12	227837765	844
Tennessee	14	165766400	455	14	206123367	677	14	179919495	694
Pennsylvania	15	164668494	792	15	146621106	709	15	130389089	792
U.S. Total		8159857456	20358		8600795123	21895		8330584759	25808

Note: # of growers is the sum of the number of farms with broiler, hatching eggs and pullet contracts.
Source: USDA, NASS, Censuses of Agriculture, various years.

Tyson was and remained the No. 1 U.S. broiler company, except briefly in the 2006-2008 period when its leading position was taken over by Pilgrim's, and the No. 3 and No. 4 positions were always occupied by either Sanderson Farms, Inc. or Perdue Farms. Perdue represents an interesting case because it is the only privately-owned, large company in this market segment which is dominated by publicly held companies.

Regional Distribution of Contract Production

The gradual increase in industry concentration was paralleled with the continuous decrease in the number of contract growers, at least since 2002. The total number of poultry (broilers, hatching eggs, and pullets) farms with contracts decreased from 25,808 in 2002 to 20,358 in 2012, an astonishing 21% decline (Table 4). An even more pronounced decline is recorded separately for the contract broiler finishing farms which declined 31%. This result is even more remarkable taking into consideration the fact that the production expressed on the weight basis grew about 15.7% during the same time period 2002-2012 and the number of birds slaughtered declined by only 1.4% (Table 2). Essentially, the same number of birds—but much larger birds—were grown by a substantially smaller contract grower force. Obviously, on average, contract grow-out facilities must have gotten significantly larger (in square footage of the floor space) during the last decade.

The information displayed in Table 4 can be used to tell the story about changes in the regional distribution of poultry contract production during the period spanned by 3 Censuses of Agriculture. Yet, the data on plants' openings, closures, and ownership changes displayed in Table 1 is only available at the national level. However, the fact that live birds transported from the broiler farms to processing plants cannot travel very far (to prevent mortality and weight loss), virtually all broiler farms have to be located approximately within the 60 miles radius from the plant. Therefore, the degree of regional rearrangement of the contract production of live birds has to correspond to the geographical realignment of plants.

The geographical distribution of broiler production has been fairly stable in recent years. During the 12-year period, the composition of the group of top-15 broiler producing states has not changed but their share of total contract broiler production has increased from 90.5% in 2002 to 92.9% in 2012. The ranking within this group has changed very slightly from census to census. Some of the smaller subgroups of leading states have also gained production share.

For example, the composition of the top-9 group—Georgia, Alabama, Arkansas, North Carolina, Mississippi, Texas, Kentucky, Maryland, and Missouri—has not changed during the analyzed period and its share of total contract production has increased from 75.6% in 2002 to 77.2% in 2007 and to 78% in 2012. This group also increased its share in the total number of contract farms from 73.2% in 2002 to 73.6% in 2007 and finally to 74% in 2012. So, as a general tendency, in addition to a significant reduction in number of contract operations and an increase in size of those that remained in the industry, we also see a gradual shift in contract production from the periphery to the core. The core states are gaining shares both in terms of production volumes and in number of contract farms.

The presented results are consistent with Weng, Vukina, and Zheng (2015) who studied the productivity-survival link using the longitudinal data constructed from 5 Censuses of Manufactures between 1987 and 2007. Their plant-level results showed that higher demand-specific factors decrease the probability of exit and increase the probability of ownership change. The effect of physical productivity on the probability of exit or ownership change turned out to be generally insignificant. They found that similar results hold at the firm level as well. The magnitude of the demand specific factors effect was economically significant: a unit increase in demand factors, leads to an increase in the probability that a firm will expand by 8.07%. One of the potential sources of demand-specific factors could be transportation costs. Differences across local markets can give rise to some localized market power even in industries producing homogenous products. Yet another source of differentiation are the totally non-transparent collection of relationships between producers and buyers. If physical productivity were a decisive factor determining the probability of plant/firm exit or acquisition, we would not observe the industry reallocation towards the core states as it would be very difficult to explain why peripheral poultry processing plants are physically less productive than their core counterparts.

Policy Implications

The overall economic position of the U.S. broiler industry changed in the post 2008 recession period. This new environment could have important consequences for competition in the market for contract grower services presenting challenges for policy analysts and regulators.

The most concentrated attempt of the federal government to regulate livestock production contracts so far is the Grain Inspection, Packers, and Stockyards Administration (GIPSA) 2010 proposal to amend the Packers and Stockyards Act under the 2008 Farm Bill (Wang and Vukina, 2014). In December 2011, GIPSA published the Implementation of Regulations Required under Title XI of the Food, Conservation, and Energy Act of 2008 (Federal Register Vol. 76, No. 237, December 9, 2011, pp. 76874-76890) which went into effect on February 7, 2012. Most of the original proposals were dropped or modified. Only four remained: (1) provisions regarding the suspension of delivery of birds, (2) rules about the additional capital investment criteria, (3) provisions regarding the breach of contract, and (4) provisions regarding arbitration.

The intention of the law has clearly been the mitigation of the hold-up problem. Among the adopted rules, the most important are the rules about the additional capital requirements, in particular, those that will prevent integrators to require frequent upgrades of facilities and equipment without making adequate provisions in the contract that will secure the grower's market rate of return on this additional investment.The rest of the adopted ones appear to have a rather limited bite whereas some of those that did not pass (such as, the tournament payment truncation proposal), suffer from unintended detrimental consequences and should be permanently abandoned. The rest, arguably still on the table, need to be considered very carefully in light of the new situation on the ground. The newest available data and research results seems to be indicating that the competition in the markets for grower services should be improving in the core producing regions of the country as production is gradually shifting from the periphery to the core and the competition is intensifying in the sense that the number of plants per contract grower is increasing. Of course, some micro-regional competition issues still remain as well as the potentially more precarious position of the remaining contract growers in the peripheral production regions faced with the prospects of plant closures and permanent loss of contracts. This new asymmetric regional distribution of contract production makes any new regulatory proposal difficult to design and even more difficult to implement and enforce.

For More Information

Hendrickson, M. and W. Heffernan. 2007. "Concentration of Agricultural Markets – April 2007." Department of Rural Sociology, University of Missouri, Columbia, MO 65211. Available online: http://www.foodcircles.missouri.edu/07contable.pdf.

MacDonald, J.M. and N. Key. 2012. "Market Power in Poultry Production Contracting? Evidence from a Farm Survey." *Journal of Agricultural and Applied Economics* 44 (November): 477-490.

Vukina, T. and P. Leegomonchai. 2006. "Oligopsony Power, Asset Specificity and Hold-Up: Evidence from the Broiler Industry." *American Journal of Agricultural Economics*, Vol. 88 (3), (August): 589-605.

Wang, Z. and T. Vukina. 2014. *Welfare Effects of Payment Truncation in Piece Rate Tournaments.* Department of Agricultural and Resource Economics, North Carolina State University, working paper, Raleigh, NC, September.

Weng, T., T. Vukina and X. Zheng. 2015. "Productivity or Demand: Determinants of Plant Survival and Ownership Change in the U.S. Poultry Industry." *Applied Economic Perspectives and Policy, Vol. 37(1): 151-175.*

Tomislav Vukina (vukina@ncsu.edu) is Professor, Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, North Carolina.

Xiaoyong Zheng (xzheng@ncsu.edu) is Associate Professor, Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, North Carolina.