

We use social network analysis to make the scale of corporate power across sectors interactive for the public, and then also to propose alternatives to measuring control that are intuitively visual and more relationally based. Our project set out to study this backstage by identifying the leadership and ownership relationships among the many nodes of people and firms that make up the agribusiness network. We began by identifying known powerhouses in cattle, chemicals, fertilizers, grains, hogs, poultry, seeds, tractors and equipment, drawing on CattleFax Top 20 Feedlots, Cattle Buyers Weekly, Watt Poultry USA report, NavFarm and Tharawat Magazine, the U.S. Successful Farmers Pork Powerhouses Report. We also used scholarship on global agribusinesses, including Winders and Ranson (2019), Howard (2021), MacDonald (2017, 2020), Philpott (2020), and Hendrickson et al. (2020). In early 2023, we then consolidated these named powerhouses identified through these sources by using the Bloomberg's RELS Code to generate information about Global Ultimate Parent companies related to the companies we initially identified (see Column 1 in Table 1). We used a Bloomberg terminal to identify the direct and indirect subsidiaries of any named entities. Bloomberg defines direct subsidiaries as those where the parent directly owns 50% or more of the subsidiary, the company is owned directly by 50%, and indirect subsidiaries owned by greater than 50% but the direct parent is not known. The ultimate parent is the top company in the chain, regardless of the relationship. We also downloaded Lexis Uni reports for each company, which were particularly helpful for U.S.-based entities. Affiliated Tax Identification Numbers helped us identify businesses that might be doing business as a different company name, but have the same Taxpayer Identification Number for reporting purposes.

Table 1: The Big 47 and their Known Sectors

Powerhouse	Sectors
Ag Processing Inc	Grains
AGCO	Tractors & Equipment
AMVC Management Services	Hogs
Archer Daniels Midland Company	Grains
BASF	Seeds Chemicals
Bayer Monsanto	Seeds Chemicals
Bunge Ltd, Bunge North America	Grains
Butterball LLC	Turkey
Cactus Feeders	Cattle
Cargill, Continental, Wayne, Sanderson	Grains Poultry Turkey
Carthage Veterinary	Hogs
Cattle Empire	Cattle
Christensen Farms	Hogs
CLAAS	Tractors & Equipment
CNH & Case	Tractors & Equipment
COFCO, ChemChina, Syngenta	Grains Chemicals Seeds
Corteva Agriscience, Dow, DuPont	Seeds Chemicals
Deere & Company	Tractors & Equipment
Farbest Foods	Turkey
Five Rivers Cattle Company	Cattle
FMC Corp	Chemicals
Friona Industries	Cattle
Green Plains Cattle Company	Cattle
Iowa Select Farms	Hogs
JBS SA, JBS USA, Oklahoma, Pilgrim's Pride	Hogs Cattle Poultry
Jennie-O Turkey	Turkey
Koch Farms	Poultry
Kraft	Turkey
Kubota Corp, Kubota North America	Tractors & Equipment

KWS Saat, KWS Seeds Inc	Seeds
Land O'Lakes Inc	Grains
Limagrain, Vilmorin & Cie	Seeds
Louis Dreyfus	Grains
Mafrig / National Beef Packing, US Premium Beef	Cattle
Mahindra & Mahindra	Tractors & Equipment
Mosaic	Fertilizer
Mountaire Farms	Poultry
Nutrien Ltd, Agrium	Fertilizer
Peco Farms	Poultry
Perdue Foods, Perdue Farms	Poultry Turkey
Pipestone Veterinary	Hogs
Prestage Farms	Hogs
Seaboard Corp	Hogs Grains
The Maschhoffs	Hogs
Tyson Foods	Poultry Turkey
United Phosphorus Limited	Chemicals
WH Group, Smithfield	Hogs

Yet the relationships between firms and the people that compose them are more than their parent and subsidiary structure. We moved on to a network analysis that drew from Sayari, a repository of public documents around the globe that helps identify connections between entities in over sixty countries globally (Sayari 2023). Sayari provides relational data (nodal attributes and relationships), by drawing on over 6.3 billion public records pertaining to 645 million companies and 711 million people. Records include, for example, company data from Afghanistan, which includes profiles of companies registered with the Afghanistan Central Business Registry. Other countries, like the United Kingdom, have more extensive data available, like parties that received UK government grant awards, ownership information for freehold and leasehold in England and Wales, profiles subject to financial sanctions imposed by HM Treasury, and more. Sayari has extensive data in the United States, collecting company data on a state and national basis, for example registered companies, Paycheck Protection Program loans, SEC-registered companies, and broker-dealer IDs, and state-level incorporation documents. All of this information is then reorganized via data scraping into entity files that organize the information into nodes and their ties on the Sayari graph platform. We researched our 47 named entities through keyword searches pertaining to each of these entities on Sayari's interface (see Table 2).

We downloaded generated files and developed a python script to consolidate each of these entity files into one spread sheet which generated sector specific master sheets and an overall master sheet. From late 2023 to 2025, we cleaned the dataset. We created a [code](#) to record the data, remove duplicates, and create summary statistics for the nodes entered in Sayari. We then generated a cleaned primary node (ego) and alter ID using a Fuzzy Wuzzy colab file customized for finding similar rows. Fuzzy Wuzzy examines every row to provide a percentage

of similarity between entries by using a similarity algorithm to detect patterns across names that could be associated. Because documents filed with government repositories do not always have accurate information, this process helped correct such errors. However, Fuzzy Wuzzy can still overlook important merges that pertain to people, for example not recognizing different orders of first and last name, and failing to consolidate names that perhaps have a middle initial and others that do not. Further, while Fuzzy Wuzzy is excellent for the English language, it is less attuned to other languages. We then took this refined dataset and reviewed it for any manual corrections that were necessary. Spanish, Bengali, Mandarin, Farsi, and French speakers helped refine the list. Mainly, this called for reversing first and last name order to make them consistent. However, it also required a line-by-line review of company names to ensure that Fuzzy Wuzzy had not incorrectly consolidated companies that appear similar, but had important differences, (i.e. PrestageFarms and Prestage Farms, as our searches had earlier identified). For a small subset of untranslated entities, we used Google Gemini for line-by-line translations, reviewing the suggested translation before applying the revision to our dataset. We created a [code](#) to ensure that an alter node was connected to a primary node that might have name variations to identify them as the same node rather than making new ones. We created dictionary rules based on the different source names to create one consolidated name and then applied that dictionary to the target column. These name variations appear in the explorer tool and a crucial to understanding how companies can diffuse their identity by doing business as an alias.

Table 2: Keyword searches used to generate related entity files in Sayari, spring 2023. Primary nodes are those identified by primary file downloads.

Entity/Conglomerate	Keyword Searches	Primary Entity Files Generated
Ag Processing Inc	Ag Processing Inc, Ag Processing Incorporated, AGP Grain	94
AGCO	AGCO Corp, AGCO Corporation	138
AMVC Management Services	AMVC Cares, AMVC Employee, AMVC Management, AMVC Nutritional, AMVC Veterinary	25
Archer Daniels Midland Company	ADM Grain, ADM Holdings, Archer-Daniels-Midland Co	427
BASF	BASF Agriculture, BASF Corporation, BASF SE, BASF Seeds	742
Bayer, Monsanto	Bayer Agi, Bayer Agriculture, Bayer CropScience, Bayer Seeds, Bayer Southern Production, Monsanto Company, Monsanto Crop, Monsanto Seeds	958
Bunge Ltd, Bunge North America	Bunge Finance, Bunge Foods, Bunge Holding, Bunge Limited, Bunge Ltd, Bunge Milling, Bunge North America	378
Butterball LLC	Butterball Conagra, Butterball Foods, Butterball LLC, Butterball Turkey, Carolina Turkeys	138
Cactus Feeders	Cactus Feedyard, Cactus Feeders	28
Cargill, Continental, Wayne, Sanderson	Cargill Agricultural, Cargill Food, Cargill Inc, Cargill Incorporated, Cargill Meat, Cargill Protein, Conti Financial, ContiGroup, Continental Grain, Sanderson Farms, Sanderson Farms Inc, Sanderson Farms, Wayne Farms Inc, Wayne Farms LLC, Wayne Farms	1836
Carthage Veterinary	Carthage Innovative, Carthage Veterinary Service, Professional Swine Management	8
Cattle Empire	Cattle Empire, Cattle Empire LLC	5
Christensen Farms	Christensen Family Farms, Christensen Farms & Feedlots, Christensen Farms Midwest	23
CLAAS	CLAAS kgaA mbh, CLAAS kgaA, Claas Kommanditgesellschaft auf, CLAAS of america, CLAAS Tractor, CLASSofAmerica	109
CNH & Case	Case New Holland Industrial, CNH America, CNH Industrial NV	310

COFCO, ChemChina, Sygenta	COFCO Americas, COFCO Capital, COFCO Chemical, COFCO Corporation, COFCO Grain, COFCO Group, COFCO US, Noble Agri	2698
Corteva Agriscience, Dow, DuPont	Corteva Agriscience, Corteva Inc, Dow Chemical, Dupont de Nemours	2279
Deere & Company	Deere & Co, Deere & Company, John Deere Capital, John Deere Finance	537
Farbest Foods	Farbest Farms, Farbest Foods	16
Five Rivers Cattle Company	Five Rivers Cattle, Five Rivers Ranch, Pinnacle Arcadia Cattle, Pinnacle Asset Management L.P., Pinnacle Asset Management, LLC	85
FMC Corp	DuPont Agricultural Chemicals Ltd, FMC Corp, FMC Corporation, FMC Dupont, FMC Specialty	406
Friona Industries	Friona Agricultural Credit, Friona Cattle, Friona Industries	30
Green Plains Cattle Company	Green Plains Cattle, Green Plains Inc	35
Iowa Select Farms	Hansen Ag Solutions, Iowa Select Farms, ISF Production LLLP	13
JBS SA, JBS USA, Oklahoma, Pilgrim's Pride	J&F Oklahoma Holdings, JBS Food Company, JBS S.A., JBS USA, Pilgrim's Pride Corp, Pilgrim's Pride	852
Jennie-O Turkey	Jennie-O Turkey International, Jennie-O Turkey, Shanghai Hormel Foods	329
Koch Farms	Koch Foods Inc, Koch Foods LLC, Kock Foods	120
Kraft	Kraft Heinz Co, Kraft Heinz Foods Company, The Kraft Heinz Company	233
Kubota Corp, Kubota North America	Kubota Corp, Kubota Corporation, Kubota Credit Corporation, Kubota North America, Kubota Tractor Corporation	55
KWS Saat, KWS Seeds Inc	Ag Reliant, KWS Agriculture, KWS Saat, KWS Seeds Inc, KWS Seeds	184
Land O'Lakes Inc	Land O'Lakes Feed, Land O'Lakes Finance, Land O'Lakes Inc, Land O'Lakes Purina Feed	389
Limagrain, Vilmorin & Cie	Groupe Limagrain Holding SA, Limagrainm, Societe CooperativeAgricoleLimagrain, Vilmorin and Cie, Vilmorin Holdings	341
Louis Dreyfus	Akira BV, Akira Holdings, Louis Dreyfus Commodities, Louis Dreyfus Holding, Louis-Dreyfus Group	683
Mafrig, National Beef Packing, US Premium Beef	Mafrig, National Beef Packing, US Premium Beef	425
Mahindra & Mahindra	Mahindra Agri, Mahindra USA, Mahindra&Mahindra Financial, Mahindra LTD, Mahindra&Mahindra	175
Mosaic	Mosaic Fertilizer LLC, IMC Phosphates, The Mosaic Company	125

Mountaire Farms	Mountaire Farms Inc, Mountaire Farms	42
Nutrien Ltd., Agrium	Agrium Inc, Nutrien Ag Solutions, Nutrien LTD	205
Peco Farms	Peco Farms, Peco Feoods Inc, Peco Foods	31
Perdue Foods, Perdue Farms	Perdue Farms, Perdue Foods	169
Pipestone Veterinary	Pipestone System Services, Pipestone Vet Clinic, Pipestone Veterinary, PipestoneVeterinary	48
Prestage Farms	Prestage Farms, PrestageFarms, Prestage Foods	51
Seaboard Corp	Seaboard Corp, Seaboard Corporation, Seaboard Foods, Seaboard Grain, Seagrain Co, Syngenta	1752
The Maschhoffs	Maschhoff Environmental, Maschhoff Family, Maschhoff Northwest, Maschhoff Pork, Maschhoff Transport, Maschhoff, The Maschhoffs	78
Tyson Foods	Tyson Foods Inc, Tyson Foods	365
United Phosphorus Limited	Advanta Holding BV, Advanta Seeds, Arysta LifeScience, United Phosphorus Limited, UPL Limited, UPL Ltd Port Louis, UPL Ltd	679
WH Group, Smithfield	Clougherty Packing, Murphy Brown LLC, JohnMorrell&Co Smithfield, Smithfield Foods, Smithfield Foods Inc	250
Total Primary Entity Files:		18,899

We narrowed our focus to only leadership and ownership ties identified in these files and aggregated them into two networks. The ownership network is composed of shareholders, subsidiaries, beneficial owners, partners, legal successors and legal predecessors. Our leadership network is composed of directors, officers, board members, founders, and managers. Table 1 provides Sayari’s definition of each type of these ties.

Table 3: Sayari’s Definition of Tie Type for Leadership and Ownership Network

Network	Tie Type	Definition
Leadership	Board Member Of	The source entity is part of a corporate or statutory body exercising.
	Director Of	The source entity is reported to be a director of a company.
	Founder Of	The source entity is reported to be the founder of a company
	Officer Of	The source entity is reported to be a CEO, president, treasurer, etc.
	Founder of	The source entity is reported to be the founder of a company.
	Manager Of	The source entity is reported to be a manager of a company.
Ownership	Beneficial Owner Of	The source entity is reported to be the indirect or beneficial owner of a company. Signifies ownership.
	Partner of	The source entity is reported to be a business partner. Signifies ownership.
	Legal Predecessor Of	The source entity created or otherwise gave rise to a company.
	Legal Successor Of	The source entity inherited the legal personality of a company.
	Shareholder Of	The source entity is a direct owner of a company. Signifies ownership.
	Has Subsidiary	The source entity is reported to have a subsidiary, or to indirectly own a company. Signifies ownership.

Our data can be understood as composed of primary entities and alter entities. Primary entities are those identified through primary keyword searches in Sayari and downloaded as primary files. These contain the most complete information, including attributes such as address, business purpose, company type, country, and position, as well as relational ties to other entities.

Alter entities are those that appear within primary entity files through one or more of the relationship ties listed above. An alter may be connected to multiple primary entities. However, alters represent the boundary of our data collection: we did not download their entity files, and therefore do not have much data on their attributes or additional relationships.

Limitations of the New Relational Approach

Our approach offers a frame for moving firm centered analyses forward on a global scale, but with a series of notable limitations. Our data is limited to when we acquired this information in 2023 and then the years we spent cleaning the data. Our data includes all relationships found in these documents, regardless of time. The data we have compiled and analyzed is referential to the quality of the information contained in public documents that provide the nodes and relationships visualized in the Big Ag Network. Further, our approach is referential to the sectoral giants and related entities we could explore through the methodology we employed. Thus, it is not comprehensive of all agribusinesses. A publicly available, global repository of business organization records could help overcome the most serious limitations of our work. Even though Sayari provides access to 6.3 billion records, it none-the-less is not public nor mandated. Having access to this information consistently and overtime would provide better data to explore the outcomes related to concentration of economic power through the proliferation of backstage firms. An opportunity exists for a new and open platform, where people transnationally can engage with records on firms and how they tie leaders and benefactors together.

Sources

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