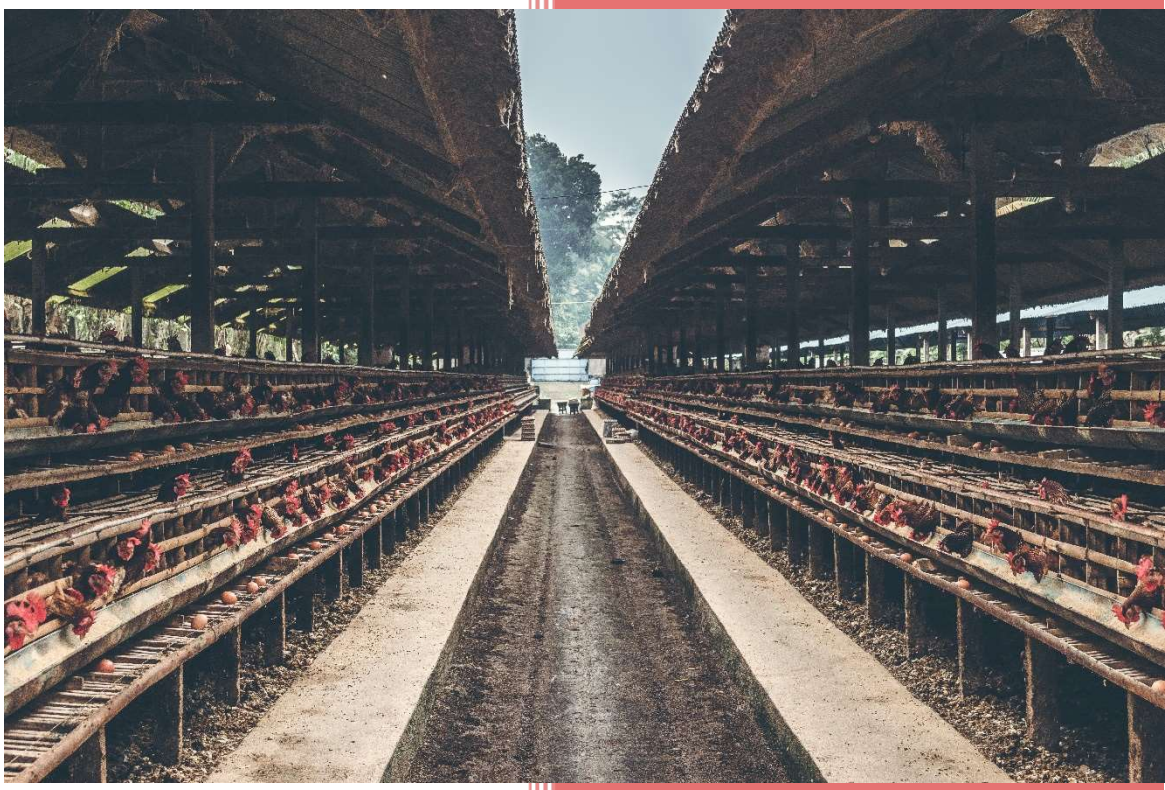
GUIDANCE MEMO

PREPARED FOR

TINY BEAM FUND

IDENTIFYING ECONOMIC AND FINANCIAL DRIVERS OF INDUSTRIAL LIVESTOCK PRODUCTION - THE CASE OF THE GLOBAL CHICKEN INDUSTRY



Dr Mehroosh Tak (Royal Veterinary College - RVC)

mtak@rvc.ac.uk,

Dr Ambarish Karamchedu (Kings College London-KCL)

Dr Ivo Syndicus (RVC)

IDENTIFYING ECONOMIC AND FINANCIAL DRIVERS OF INDUSTRIAL LIVESTOCK PRODUCTION - THE CASE OF THE GLOBAL CHICKEN INDUSTRY

1. ABSTRACT

Industrial production of broiler chicken and eggs is seen as an answer to persistent malnutrition and protein requirements in Low and Middle Income Countries (LMICs) amidst urbanisation, economic growth, and dietary transition. Corporate contract farming or industrialised integrated production are becoming dominant forms of meeting such demands. This guidance memo aims to investigate asymmetries of power relations and policy formulations that give rise to corporate concentration in livestock industries using the case study of poultry. In particular we identify the role of global finance and government policies as significant in shaping highly industrialising poultry production systems, evidence for which has been limited so far, due to a lack of transparency from corporate firms. We hope to provide a critical analytical framework to producing evidence that will enable frontline investigators to shed light on the power-sharing practices between international and domestic private and public capital that support industrial production systems and their negative externalities. These include dispossessing farmers through land grabs or control, creating breeding grounds for highly pathogenic diseases, making farmers susceptible to processes of globalisation that exclude or marginalise them in production networks increasingly dominated by rent-seeking corporate actors, exacerbated inequalities of animal source protein access, and an increasing burden of zoonosis on producer countries.

The guidance memo includes an analytical framework on how to research economic and global finance drivers of corporate expansion and concentration of industrialised livestock production systems in LMICs. The framework is followed by economic organisation of global poultry industry and a case of how global finance and corporate consolidation is linked with Indian poultry industry. In doing so, the memo examines how, corporate concentration and public policies shape the Indian poultry industry into vertically integrated broiler production systems.

CONTENTS

2. INTRODUCTION

Livestock production systems are industrialising at a fast pace as part of the industrial grain-oilseed-livestock complex. This guidance memo examines economic and financial drivers that support intensification of livestock production systems in low- and middle-income countries (LMICs).

This Guidance Memo first presents a framework on how to research economic and global finance drivers of corporate expansion and concentration of industrialised poultry production in LMICs. Second, using the case of India, the memo examines how, corporate concentration and public policies shape the domestic poultry industry into vertically integrated broiler production systems.

The memo will provide a step-by-step approach for front-line persons to generate evidence about leveraged processes of concentrated/overlapping control relations between global finance, the global genetics sector, industrialised farming, farmers and governments. More specifically, we will examine supply side drivers of the industrial grain-oilseed-livestock complex by illustrating:

1. Linkages between circuits of capital & economic growth agenda and corporatisation of poultry production, e.g. loans, subsidies by international financial institutions (IFIs) such as World Bank and international trade policies.
2. Historical and current public sector economic and financial incentives and/or barriers that influence the structure and governance of the Indian poultry sector across the production chain from genetic breeding, feed, processing, marketing, and exports.
3. Corporate concentration of the poultry production system from global to national level in India.

3. ANALYTICAL FRAMEWORK TO MAP ECONOMIC ORGANISATION OF LIVESTOCK INDUSTRIES FROM GLOBAL TO LOCAL LEVEL

3.1. MAIN FRAMEWORK

This guidance memo provides an analytical framework full of questions that aid unpacking of the current status of power in a livestock sector in a country of choice. The framework is constructed by keeping low and middle income countries (LMICs) in mind, due to the nature of interventions from national governments and international financial institutions (IFIs), but can be applicable to high income countries (HICs) also.

The guidance memo provides a framework for understanding/identifying how neoliberalism intensifies the compulsion to produce and thus sell, through offering a guide to enquiry on the financialisation – the phenomenon of increasing roles of highly leveraged financial instruments, markets, and institutions – of food systems and corresponding forms of provisioning.

The overarching aim of this framework is to provide a step-by-step guide through different tools that can help identifying which economic policies in the agriculture and livestock sector have shaped the structure of a country's livestock industry. The framework can be applied to any

country and livestock industry such as poultry, pigs or beef. More specifically, the framework provides a guideline to study economic organisation of livestock production systems from global to the local. The framework helps to identify-

1. Which economic and financial incentives shape the prevalent structure of the livestock sector of interest and how do the incentives influence the different modalities of livestock intensification?
2. Who governs which part of production systems in the country?
3. How do policies that govern production and trade of major livestock inputs such as feed ingredients of maize and soy and genetics relate to production systems and intensification?
4. What role do International Financial Institutions (IFIs) and Public Development Banks (PDBs) play in shaping the production systems?
5. How does global finance and private capital shape local production systems?

Table 1 provides details on the analytical framework. The analytical framework includes lines of enquiry in form of questions related to broad economic policy themes that shape industrial organisation and structure of commodity chains. These include,

1. History of agriculture and livestock policies including input subsidies
2. Financialisation
3. Trade liberalisation
4. Infrastructure

The economic policy themes are assessed at three spatial level, including global, national and sub-national levels. Each thematic and spatial level includes indicative question that act as a line of enquiry to aid identifying how neoliberal economic policies support intensification of livestock production systems. The questions can be used individually or as a portfolio of queries. When used from global to sub-national level, the framework aids in linking global finance to local production systems. Not all questions may apply to a country and/or industry.

Table 1: Analytical framework

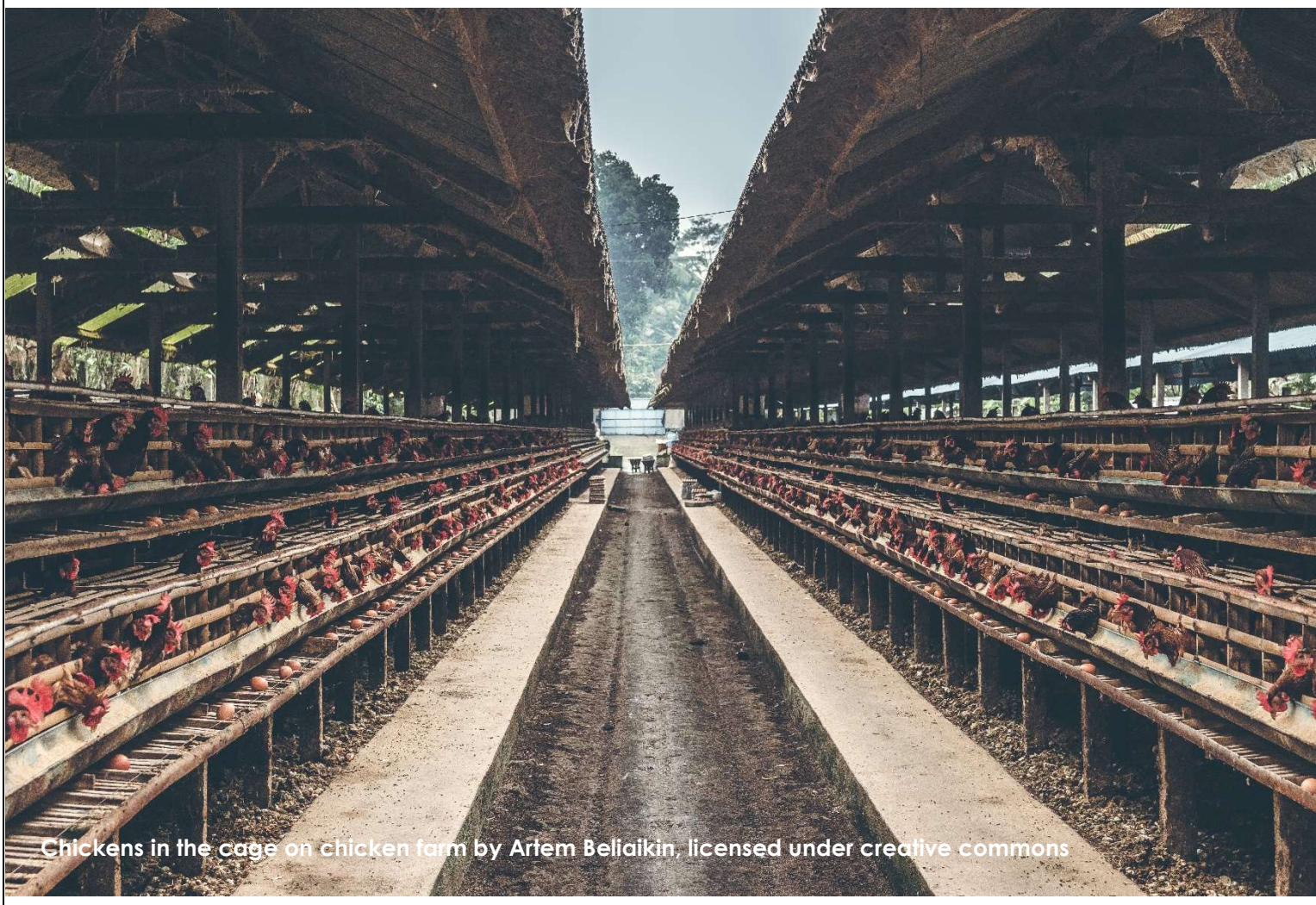
Levels	Economic policies			
	History of agriculture and livestock policies including input subsidies	**Financialisation**	**Trade liberalisation**	**Infrastructure**
Global	1. What role do international finance institutions such as the World Bank/IMF and other public development banks play in determining technology transfer and inputs?	1. Corporate concentration map: How many and which firms exist in the industry? What role do private multi-nationals corporations play in determining the structure of industry? 2. What is the role of private equity in shaping the market mergers, acquisitions, and firm ownership? 3. Do public development banks invest in the intensification of the sector?	1. Have World Bank/IMF debt restructuring programmes shaped trade liberalisation for the country?	
National	1. What subsidies are provided for inputs in the livestock sector? Who determines them? 2. What is the nature of public expenditure in the industry, if any? For example, setting up parastatals, research, and development (R&D) centres for livestock research. 3. Have veterinary public health services been reduced under IMF and World Bank implemented economic programmes such as structural adjustment plans (SAPs) or Poverty reduction strategy papers (PRSPs)?	1. How have global developments in breeding shaped the domestic livestock industry? 2. What role does the national government play in determining the flow of capital from global to national level? 3. How do they determine who receives these resources? 4. Are there any financial controls or restrictions of foreign direct investment in livestock	1. What are levels of import and export duties and tariffs on livestock inputs and outputs and how do they determine the structure of the industry? Are there joint ventures or franchises with global genetic firms? 2. What are the key trends in trade imports, exports, quotas, and rules	1. What is the level of institutional strength of the national government to govern property rights and regulatory power? 2. How does access to roads networks or the lack there of shape production corridors? What impact does this have on land prices?

		genetics and production sector?	for inputs (feed, pharma, genetics) and outputs?	3. Is there investment from the state in value add for livestock processing units?
Subnational level – such as state/ provincial level	1. What subsidies are provided for inputs in the poultry sector? And to whom?	1. What role do subnational governments play connecting with global integrators and how does that determine the vertical integration in the sector? 2. Are there any special loans programmes for poultry sector?	1. What subnational policies support local firms and farmers to vertically integrated value chain?	1. What is the state of infrastructure development that support or act as barriers for distribution networks within the subnational level?

Readers of this guidance memo are encouraged to use the questions in Table 1 to gather information through publicly available insights about the industry they are concerned with. The information gather can then be presented using the frameworks described below. These additional frameworks assess economic structure of a livestock industry more specifically than the broad analytical framework described above. The frameworks include,

1) Spheres of influence
2) Corporate concentration of market power maps
3) Firm ownership structures
4) Investment portfolios of public development banks

First, the spheres of influence showcase actors and their varying degrees of control over shaping the industry. Second, the corporate concentration maps explore if and how the market has transformed from multi-firm and highly competition market to a few firms and low competition market. A highly concentrated industry will have very few firms at the top, which would have formed through mergers and acquisitions (M&A) of smaller firms. Third, an assessment of firm ownership structures of the biggest firms in an industry and how they have changed over time can reveal the role of global finance in shaping the industry. Fourth, given the rising role of public development banks in livestock production we explore the investment portfolio of public development banks of concern. Below we provide more details of these frameworks and how to consolidate this information.



Chickens in the cage on chicken farm by Artem Beliaikin, licensed under creative commons

3.2. SPHERES OF INFLUENCE GUIDANCE

The sphere of influence (SOI) framework is useful to determine and map the power dynamics of actors involved in a livestock sector/industry. One can choose the scale and region to populate the corresponding SOI (Overseas Development Institute, 2014). SOI helps to identify the actors at the centre of your research query and who and who does not affect change to the structure of the industry. It highlights the economic power structure between industry actors by classifying them into three tiers of affecting change. We define power as economic power[1] to deny market access, withdrawal of investments, the ability to influence price and/or reduce competition.

We can consider actors within the sphere of control to be those who have complete control over the industry direction and those that determine upstream of downstream economics of the value chain. These actors are central to the behaviours and activities you are interested in researching or identifying.

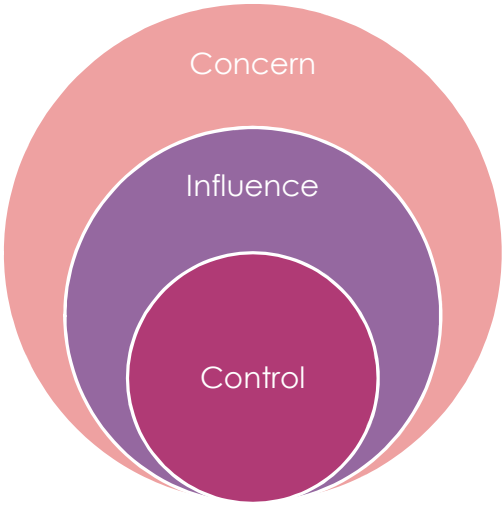
The sphere of influence is the area where actors may not be directly related to the industry in question, but have the power of changing the outcomes of interest. The actors in the sphere of control collaborate with the actors in the sphere of influence to effect change but do not control them. The power to effect change rests with the actors in the sphere of influence but via pushes and/or pulls from the actors in sphere of control.

The sphere of concern includes actors whose conditions, behaviour, capacities, attitudes, or knowledge is impacts the demand or supply of livestock products or industry inputs. These actors do not have the capacity or power to influence the industry structure directly. It is useful to use the SOI framework when evaluating the impact of a policy or strategic direction in a livestock industry.[2]

Figure 1: Spheres of Influence

[1] Power is multidimensional and endogenous concept that manifests in multiple ways. For the purpose of this document, we refer specifically to dynamics that shape industry structure through market and investment access and influence price and/or competition in the said industry.

[2] For example, the role of public development banks in intensifying livestock production. Or the change in feed availability and prices on the global poultry industry. Who are the actors that control the direction of change for feed availability and price of feed?



3.3. CORPORATE CONCENTRATION OF MARKET POWER

Corporate concentration of market power is a useful way to understand the extent of corporate consolidation of different parts of the livestock industry e.g. eggs, meat, genetics and feed, both over time and with regards to scale. This can influence policies on expanding industrial livestock production in a country based on the level of concentration of market power, reducing competition for new entrants, benefiting disproportionately from lack of oversight in regulatory governance and share of subsidies.

One way to represent this is by constructing market concentration maps, which chart the mergers and acquisitions over time within a particular livestock industry and shows the progression of market concentration. An example can be seen below in Figure 4. Finding information for market shares within different sectors can be collated and accessed from public sources such as NGO reports, news websites and market research from trade association reports. The difficulties arise in accessing specialist market research reports, however, which are often behind paywalls and require investments of thousands of USD, which could provide greater industry insights and analysis accessible in one location.

Although pulling together data from disparate sources can take time, as many major industrial livestock firms are publicly listed, research on market concentration can be conducted extensively using openly available sources.

3.4. FIRM OWNERSHIP STRUCTURES

The corporate concentration map will provide information on how many firms govern the market. Identifying their ownership structure provide information on whether global financial structures such as private equity firms or sovereign investments fund these companies. Further, reviewing the history of ownership of firms, i.e., when they were merged or acquired can provide key insights into market governance patterns.

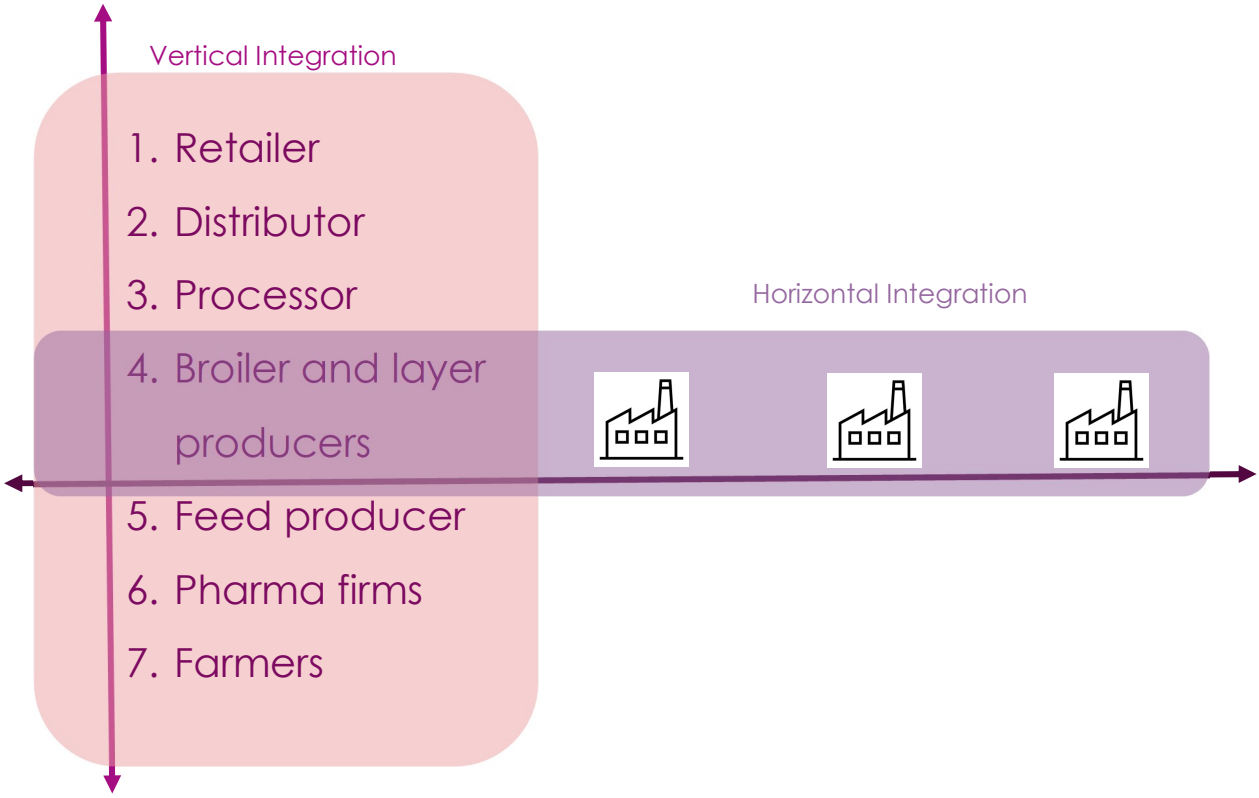
The key sources for this information are the websites, press releases and annual reports of the companies themselves. In addition, market research and investment news agencies have information on M&A deals. Triangulating this information from multiple sources is useful to

acquire correct information. If the company is listed on a stock exchange, they must make company structure information available for all shareholders to view[3].

Another way of assessing ownership structures is the level of integration of the industry. Vertical integration is where a few companies control over many stages of production and/or distribution of a product. While horizontal integration refers to the process of one company acquiring other companies conducting the same line of business as them.

Figure 2 describes how vertical and horizontal integration occurs. Most industrial livestock industries are vertically integrated, where a few companies produce by providing genetics, feed, pharmaceutical products and other inputs to the farmers. They often also sell the produce directly to consumers.

Figure 2: Integration in the Industry



3.5. INVESTMENT PORTFOLIOS OF PUBLIC DEVELOPMENT BANKS

[3] Access to specialised company databases such as Factiva and Bloomberg can be useful but are difficult to access.

The International Finance Corporation (IFC) is the investment arm of the World Bank group, which *makes direct investments into large scale businesses in developing countries in the form of loans, grants or equity based investments. This includes large scale livestock agribusinesses*.[4]

Key information such as company names, countries, investment size in USD and details of what types of activities were funded by IFC investments can be found. This can provide insights into the nature and scale of investments made into the livestock sector over time in a country or region. It also *provides evidence of how the IFC enables corporate consolidation of livestock sectors in developing countries through the explicit investments into expanding activities* e.g. building bigger feed mills, meat processing plants in existing large scale livestock agribusiness.

[4] To find information on IFC investments, researchers can visit https://disclosures.ifc.org/. This website provides an open source database of all IFC investments made in developing countries since the 1990s. Investments can be found via key word searches for different livestock types and industry e.g. poultry, beef, pigs, agribusiness or by region/country within a time period. The database can be extracted and downloaded into a CSV format for Excel, where the raw data can be filtered, sorted and cleaned.

Thousands of hen in my dad's farm by Forideed, licensed under creative commons

4. ECONOMIC ORGANISATION OF THE GLOBAL POULTRY GENETICS INDUSTRY

In this guidance memo, we use the above mentioned analytical framework as a starting point to gather information on global poultry genetics industry with special focus on chicken broiler and layer industry at a global level. As described in section 3, we use the questions in Table 1 to guide the assessment. This is followed by using the four frameworks that include mapping spheres of influence, corporate concentration of market power, ownership structure and reviewing the investment portfolios of public development banks in shaping the industry. While the analysis below is poultry industry it primarily focuses on broiler and layer chickens.

4.1. SPHERES OF INFLUENCE

Figure 3 categorises the stakeholders according to their role in driving economic policy and the development of the global poultry sector. These are the spheres of control (deep purple sphere), influence (light purple sphere), and interest (light pink sphere), going from most to least effect on policy development in the poultry sector. Due to the share of feed and genetics in the cost of production, we include them in the control sphere. Other input industries are included in the sphere of influence. *The three global poultry genetic companies - EWG, Tyson, and Hendrix are in the sphere of control.* Additionally, we have included firms leading poultry production at country level – e.g. in India these are: Srinivasa, Venkys and Suguna. We also include international financial institutes (IFIs) such as the World Bank, International Monitory Fund (IMF) and the World Bank Group's financial arm, the International Finance Corporation (IFC).

IFIs have had a two-fold impact on the poultry sector in most LMICs. First is due to IFC's investments in large scale poultry production systems. Second is the role IMF and The World Bank have played in liberalising the livestock sector in LMICs through a range of developmental policies such as the structural adjustment programmes (SAPs), poverty reduction strategy papers (PRSPs) and good governance agenda.[5] We also map the feed industry in the sphere of control due to the importance of feed supply and prices to industrial livestock production.

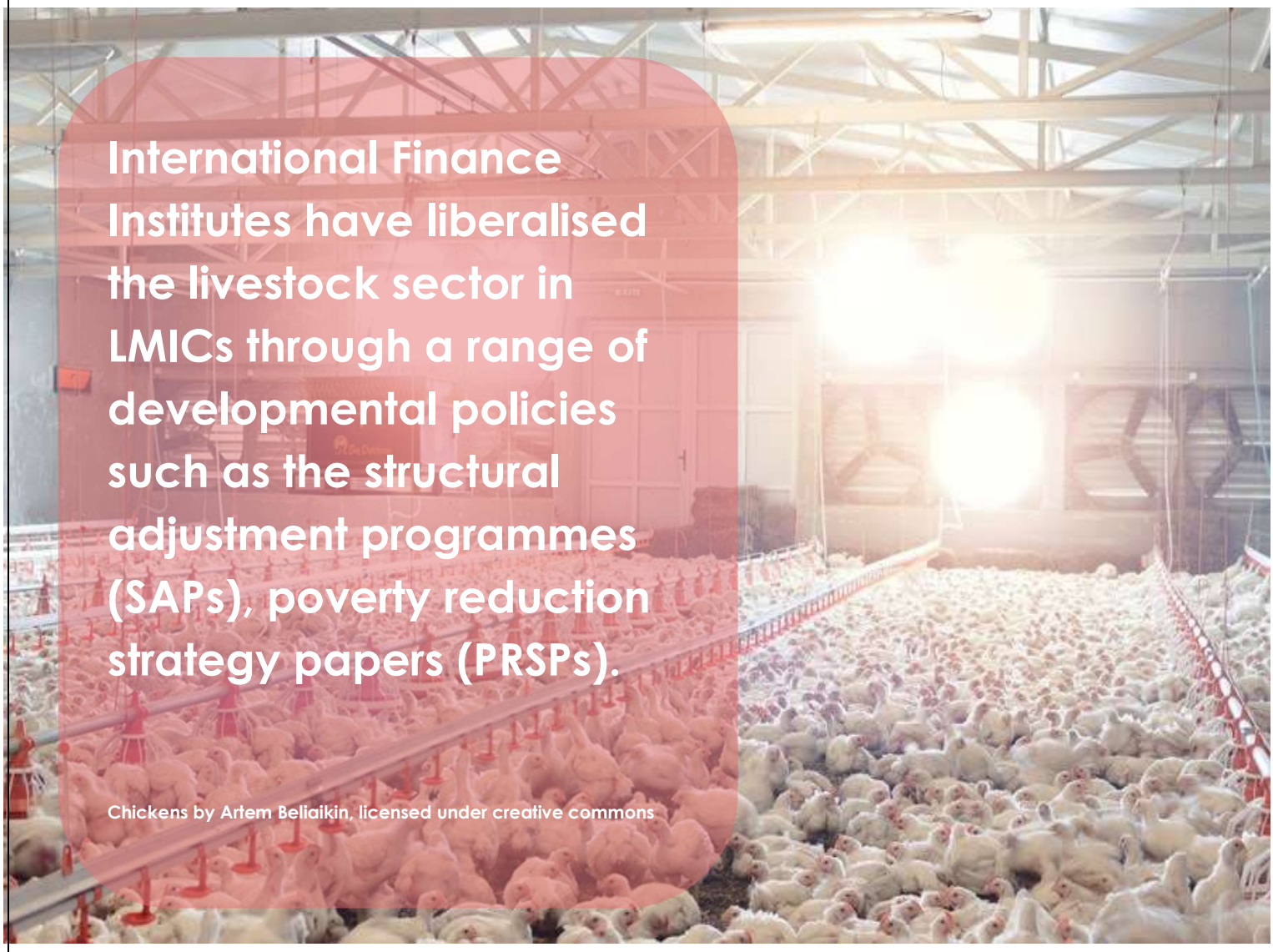
In the spheres of influence, national governments and domestic food safety regulators are included, due to their regulatory oversight in LMICs. Here we also include veterinary medicine producers as they often support intensified production system. Industry bodies can also play a role as the represent portions of the industry at multi-stakeholder platforms. These include international organisations such as the International Egg Commission. *At country level, industry bodies can play a big role in coordinating efforts of large producers.* For example, in Indian

[5] In addition, the liberalisation policies implemented by the IFIs have included reducing veterinary public health capacity in many LMICs that creates negative externalities for disease prevention as they squeeze smallholder practices to become economically unviable or reduce their access to veterinary and para-veterinary professionals.

the National Egg Coordination Committee (NECC) and the Broiler Coordination Committee have lobbied the national government to import GM soy in 2021.

Suppliers of poultry products are included at the periphery of sphere of influence (light purple sphere) and partly in the sphere of concern (light pink sphere). This is because the penetration of supermarket retailers varies across LMICs. Depending on food cultures and habit of a country wet markets and restaurants, they have a varying influence on consumption of poultry in these countries. Farmers are included in the sphere of concern. Given the rise of contract farming in poultry production systems around the world, we differentiate between contract and non-contract farmers.

Finally, consumers, livestock extension workers and veterinary & para-veterinary professionals are included in the sphere of concern. These actors through their role as price takers and/or consumption and uptake of production practices indirectly affect the industry.



International Finance Institutes have liberalised the livestock sector in LMICs through a range of developmental policies such as the structural adjustment programmes (SAPs), poverty reduction strategy papers (PRSPs).

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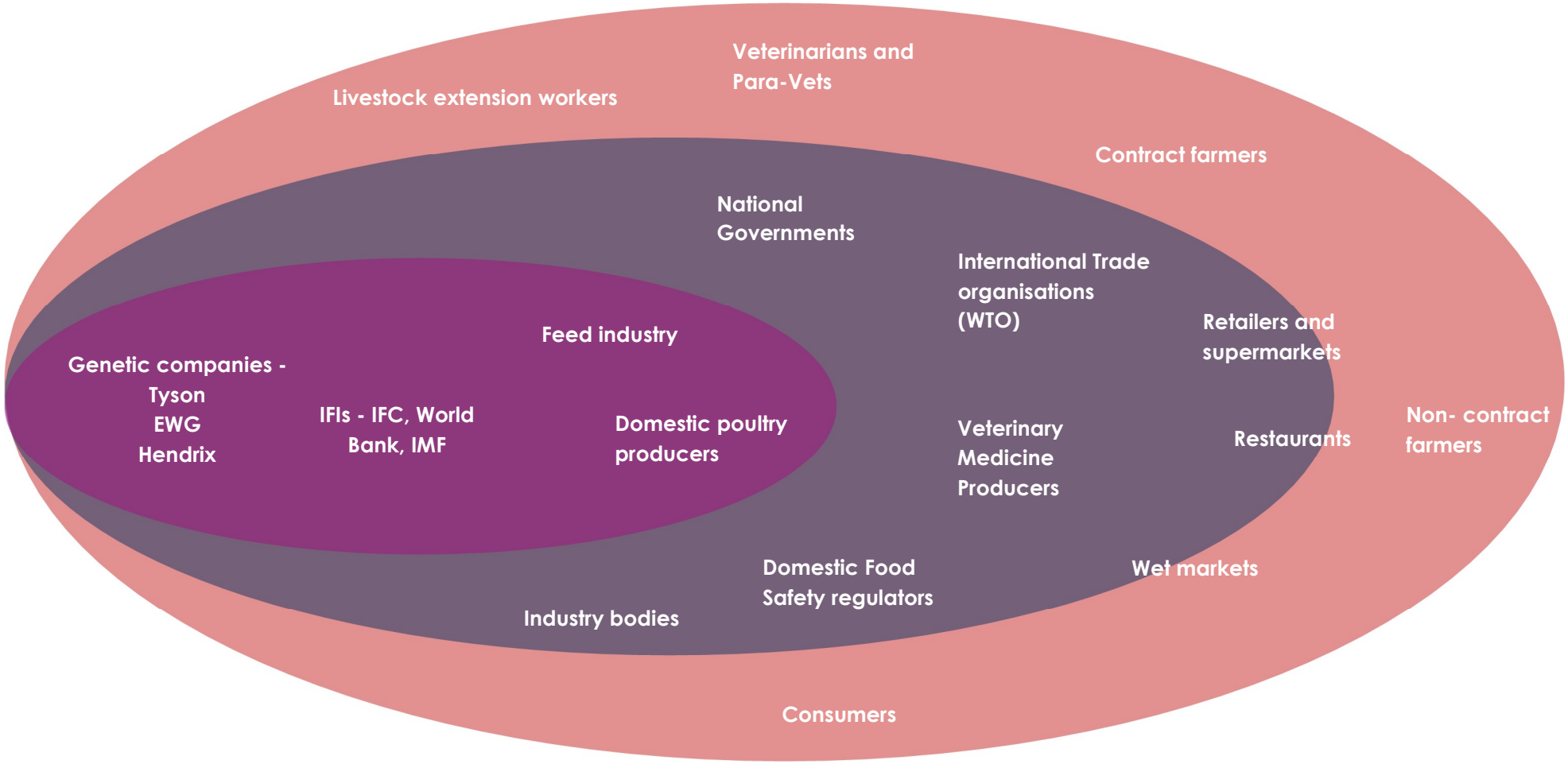
Figure 3: Spheres of Influence for Economics Drivers of Global Broiler and Layer Industry



4.2. CORPORATE CONCENTRATION OF MARKET POWER

As of 2007, there were in total 18 companies worldwide that engaged in poultry breeding. However, this has increasingly become concentrated as the market has consolidated. Of these 18 companies only four accounted for majority of the market share and 97% of the global R&D (Fuglie et al., 2011). *In 2022, there are only four firms that produce majority of the world's poultry genetics. Of these only three produce broiler and layer genetics.* Namely, EW Group (Germany) for broiler and layer, Tyson Foods (USA) for broiler and Hendrix Genetics (Netherlands) for layer genetics.

Figure 4 shows the transformation of broiler and layer breeding industry since the 1960s, when many firms were in the market. During a four decade period between 1960 and 2000, the 18 firms were consolidated into only six firms. Further concentration occurred in the market during the last two decades since 2000, where firm numbers halved to three firms.[6]

Two companies supply 95% of the commercial breeding stock for broilers: EW Group (Germany) and Tyson (USA). It is not only the concentration of market by a few firms that governs the sector, but also that *only two breeds, Ross from EWG and Cobb from Tyson make up ~90% of the broiler market within this.*

Furthermore, two companies, EW Group (Germany) and xHendrix (Netherlands) control an estimated 90% of layer poultry genetics globally (IPES-Food, 2017).[7] *These companies also have a large geographical footprint.*[8]

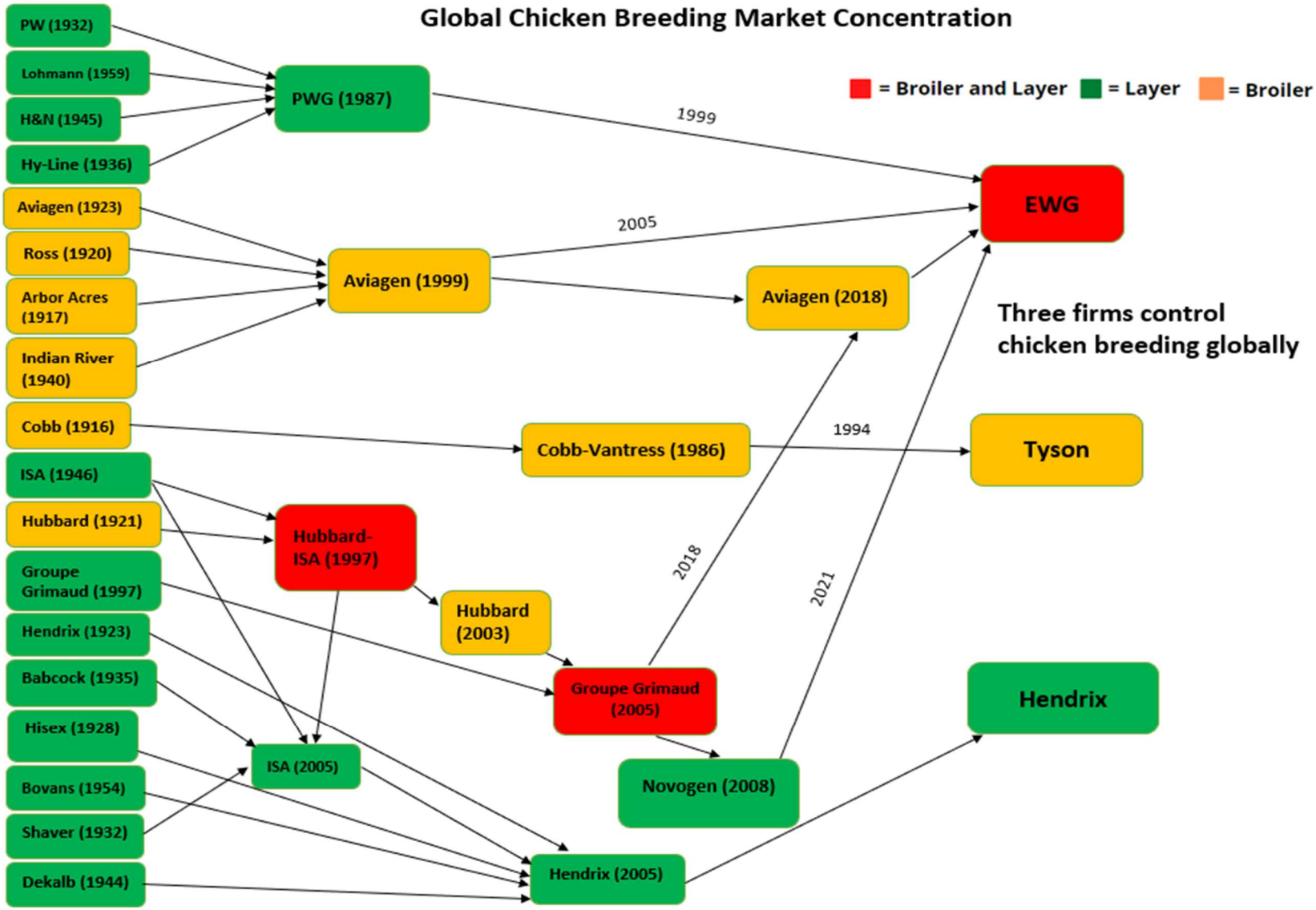
This makes poultry the most concentrated animal genetics market, higher than swine and cattle where the top three firms account for 2/3rd of the market share (ETC Group, 2013). While the role of corporate concentration of poultry genetics has not led to a reduction in biodiversity, *commercial broilers rely on three genetic lines of chickens, while layers come from only one specialised line* (Muir et al., 2008), narrowing the genetic resource and reducing global capacity to respond to future disease spread.

[6] Between 1999 and 2005, Aviagen, the producer of Ross breed saw multiple ownership change including a VC and finally being acquired by EWG, a German family owned agribusiness conglomerate. Until December 2021, Groupe Grimaud also produced layer genetics under its Novogen brand, which was sold to EWG. Making EWG one of the two main companies producing broiler genetics in the world.

[7] Over the years, EWG has acquired the biggest broiler and layer companies Aviagen, H&N, Hyline, Novogen, Hubbard and Lohmann and 150 other companies.

[8] For example, EWG supplies to customers in 150 countries (Bovensiepen & Groß, 2021). Similarly, Cobb-Vantress, a broiler breeding stock subsidiary of Tyson, has business interests in 120 countries worldwide in 40 facilities and 65 distributors (Della Rosa, 2016; Tyson Foods, 2021). Finally, Hendrix Genetics has partner networks in 140 countries and 500 joint working ventures to distribute their layer breeds (Farming UK, 2008; Hendrix International, 2021).

Figure 4: Concentration of Global Broiler and Layer Genetics



4.3. OWNERSHIP STRUCTURE

A key characteristic of the poultry industry is the increasing vertical and horizontal integration in the industry. This is true of other industrialised livestock industry also, including cattle and swine. The poultry industry is vertically integrated as it often works closely with feed producing and/or meat processing companies, such as Tyson that not only produces broiler and layer genetics, but is one of the largest processors of chicken in the world. *With the sale of Groupe Grimaud's layer brand Novogen to EWG, the poultry industry is at it leanest horizontally*. As such Figure 4 presents the horizontal integration of the chicken broiler and layer genetics over time.

As shown in Figure 4, the industry has transitioned from small family-owned business in the early 20th century to highly concentrated, where only three companies own breeding genetics of broiler and layer hens globally. Of the three firms two continue to have family-owned structures. The third[9] firm, Tyson Foods, although a listed company, until 2017 was run by a CEOs from the co-founding Tyson family. Apart from the historical role of large family-owned businesses, more recently the industry has been steered by private equity firms. Many firms have been acquired for as few as two years before being sold again to family-owned businesses.

Although Hendrix Genetics is under the family ownership of its co-founders, Thijs Hendrix and Antoon van den Berg with 50% ownership, until early 2022, NPM capital, a private equity (PE) firm owned 50% of the company. NPM Capital sold its share ownership to another US based private equity firm, Paine Schwartz.[10] NPM Capital sold its shares after owning Hendrix for approximately 6 years since 2015 (Paine Schwartz, 2022; Wattagnet, 2021).

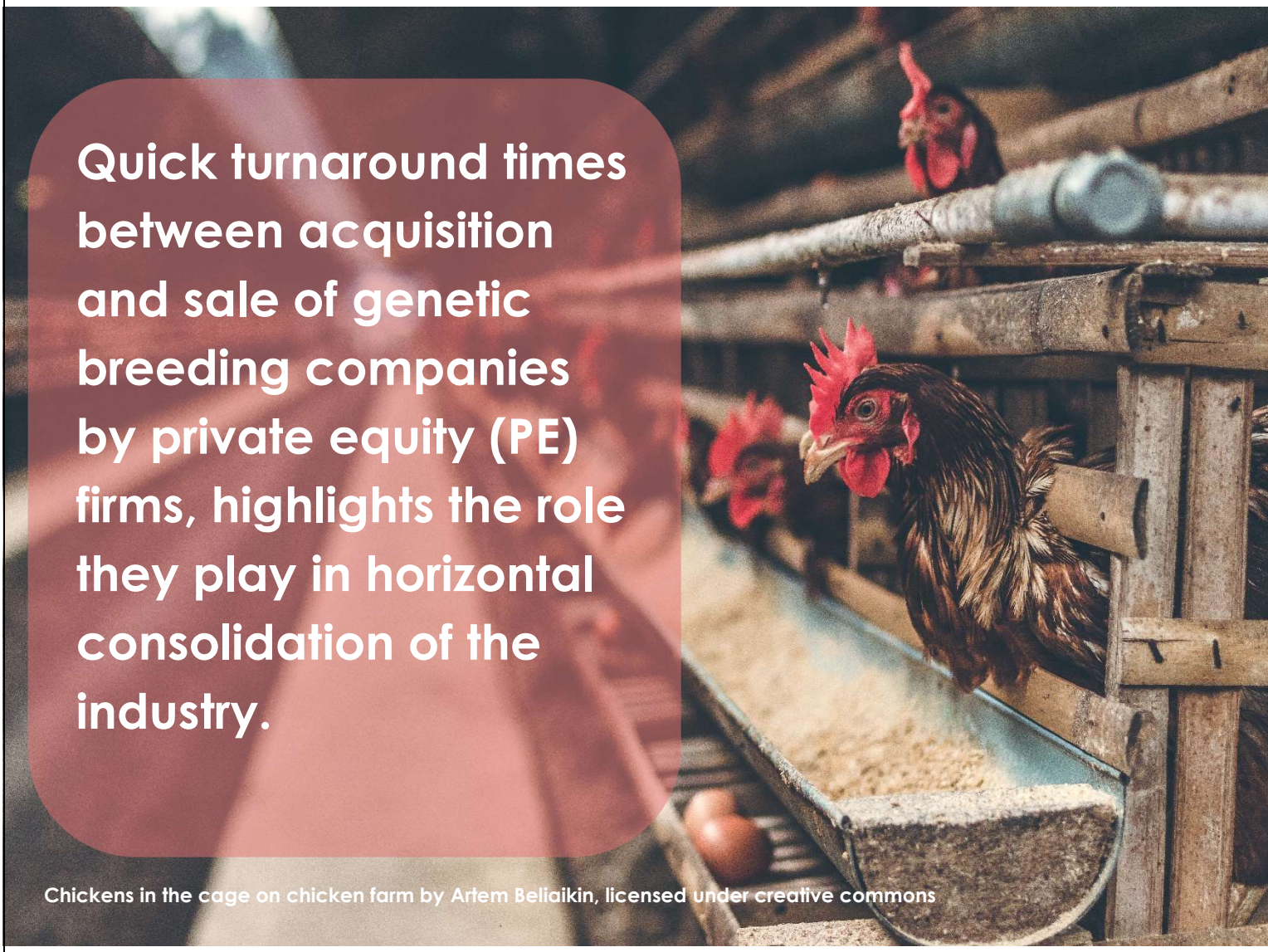
In the last couple of decades, both Aviagen and Hendrix Breeders have also become 'family owned businesses'. It is suggested that the fluctuations in the poultry breeding market have led to genetic firms moving away from multinational corporations with shareholder structure to family owned businesses[11].

While a few years is a short turnaround time for the ownership of a large-scale breeding agribusiness, this is not a new phenomenon. In 2005, Aviagen was sold to the EW Group from its then private equity owner, Advent International. Advent itself had only acquired Aviagen less than two years ago in May 2003 before selling it in 2005, through a secondary buyout from BC Partners, another private equity firm. During its ownership of Aviagen, Advent made three acquisitions to increase the company's distribution in Europe and America, which led to a 25% increase in Aviagen's turnover (The Poultry Site, 2005). It is reported that BC partners expected to make £300 million from the sale of Aviagen, but eventually settled for £255 million secondary buyout. Even though, BC Partners did not receive its expected price for Aviagen, it is suggested

[9] Groupe Grimaud is the fourth poultry genetic producer in the world. Since it sold its layer production line, Novogen to EWG in December 2021, it now focuses on Turkey genetics. The company is primarily owned Fred Grimaud and his family (70%). The remaining 30% is owned by France's Sovereign Wealth Fund, French Strategic investment (FSI) Fund and many private equity firms including Ouest Croissance, Océan Participations, Naxicap Partners (Wattagnet, 2010).
[10] Paine Schwartz and its affiliated co-investors, include Mitsui & Co. and Rabo Investments (the investment arm of Rabobank Group).
[11] This is due to the pressure of dividends to be paid on annual profits year to shareholders of multinational corporations. Family owned business are better able to respond to market fluctuations and reinvest profits in Research and development activities (Positive Action Info, 2003).

the PE firm achieved a return of more than three times its investment. BC partners initially acquired Aviagen from a UK based listed conglomerate Hillsdown Holding and merged it with its competitor Arbor Acres (Private Equity International, 2003).

While PE firms may not create the same pressure to generate profits in a tumultuous breeding market as shareholders for multinational corporations, they have played a key role in acquiring and selling breeding companies from one owner to another in a short span of two decades, highlighting their role in horizontal consolidation and thus shaping the concentrated structure of the industry.



Quick turnaround times between acquisition and sale of genetic breeding companies by private equity (PE) firms, highlights the role they play in horizontal consolidation of the industry.

Chickens in the cage on chicken farm by Artem Beliaikin, licensed under creative commons

Figure 5 maps the reliance of top ten broiler companies globally on EWG and Tyson. As mentioned above, these *two firms provide 95% of the commercial breeding stock for broilers globally, and two specific breeds, Ross and Cobb, make up 90% of all broiler genetics* (IPES-Food, 2017). This is reflected in the top 10 broiler producers. Ross 308 and Cobb 500, the two most dominant broiler breeds globally, are used by Industrias Bachoco (Mexico), JBS (Brazil), BRF (Brazil), Kazi Farms (Bangladesh) and Purdue Farms (USA).

The rest of the top ten firms, Shandong Yasheng (China), CP Group (Thailand) and ACOLID (Saudi Arabia) use genetics from Hubbard and Arbor Acres, two firms also owned by the EW Group under the Aviagen Group. Looking more broadly, *the top ten broiler firms worldwide slaughtered 12.9 billion chickens in 2020, 51% of chicken production globally*[12].

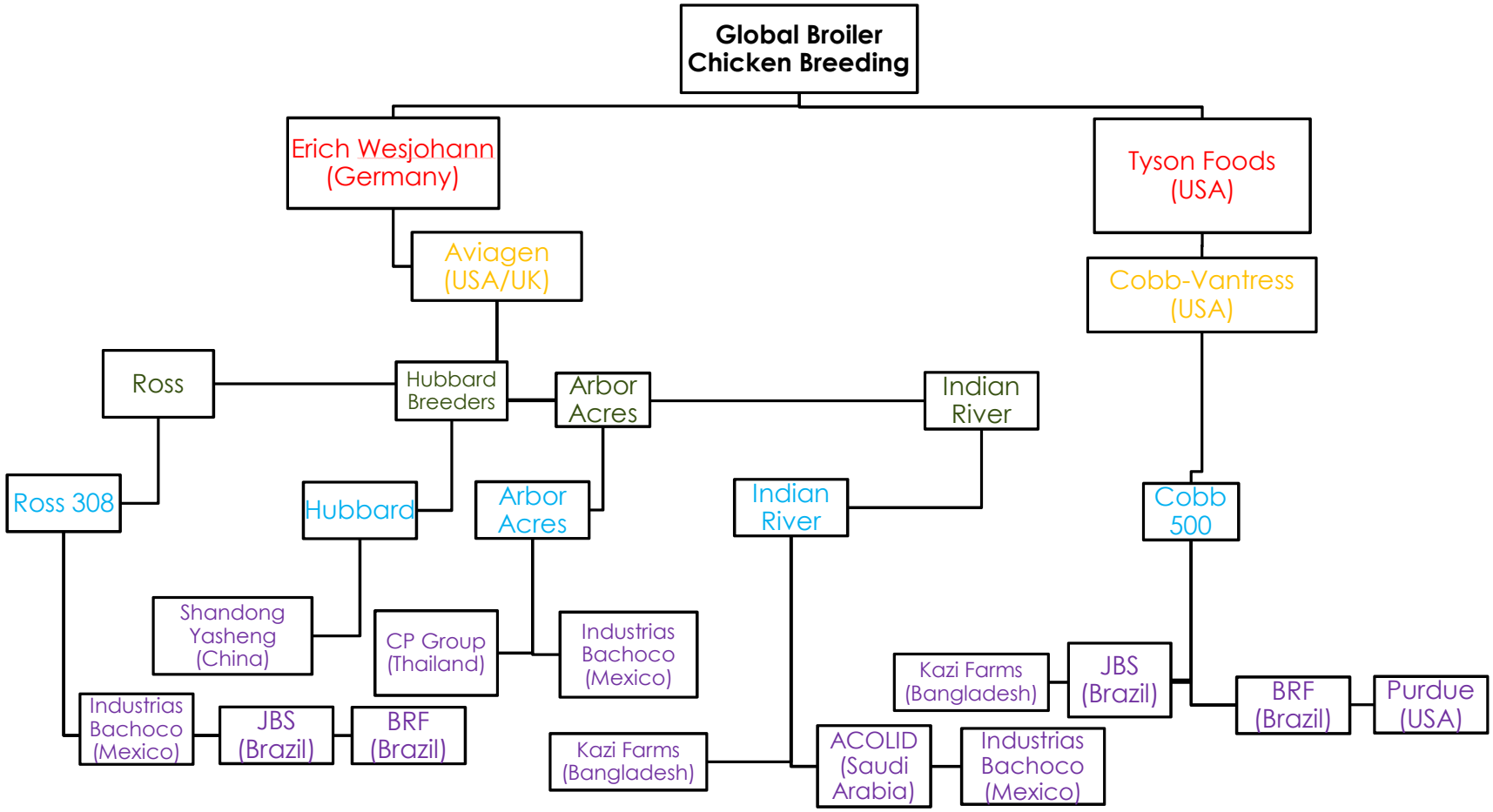
The total chicken population globally is 25.947 billion (Feed & Additive, 2021), meaning that 99% of chicken production globally is from the top 50 broiler companies (WATTPoultry International, 2020).

Figure 6 maps the reliance of top 10 global layer firms[13] on the two layer breeders, EWG and Hendrix. *EWG (Germany) and Hendrix (Netherlands) control an estimated 90% of layer poultry genetics globally* (IPES-Food, 2017). This market concentration is also reflected by the specific breeds used by the top ten egg producers globally. Hy-Line (USA), owned by the EW Group, supplies genetics to the CP Group (Thailand), Kazi Farms (Bangladesh) and PROAN (Mexico). Hendrix (Netherlands) provides genetics to Industrias Bachoco (Mexico).

Almost 400 million laying hens are managed by the world's leading 25 producers (WATTPoultry International, 2020). This represents only 7% of the total laying hen population of approximately 6.0 billion laying hens (in rearing and production) (Hendrix International, 2021). While the layer genetics used by the top ten biggest egg producing companies globally reflects market concentration, *egg production globally is not as concentrated as it is for broiler*.

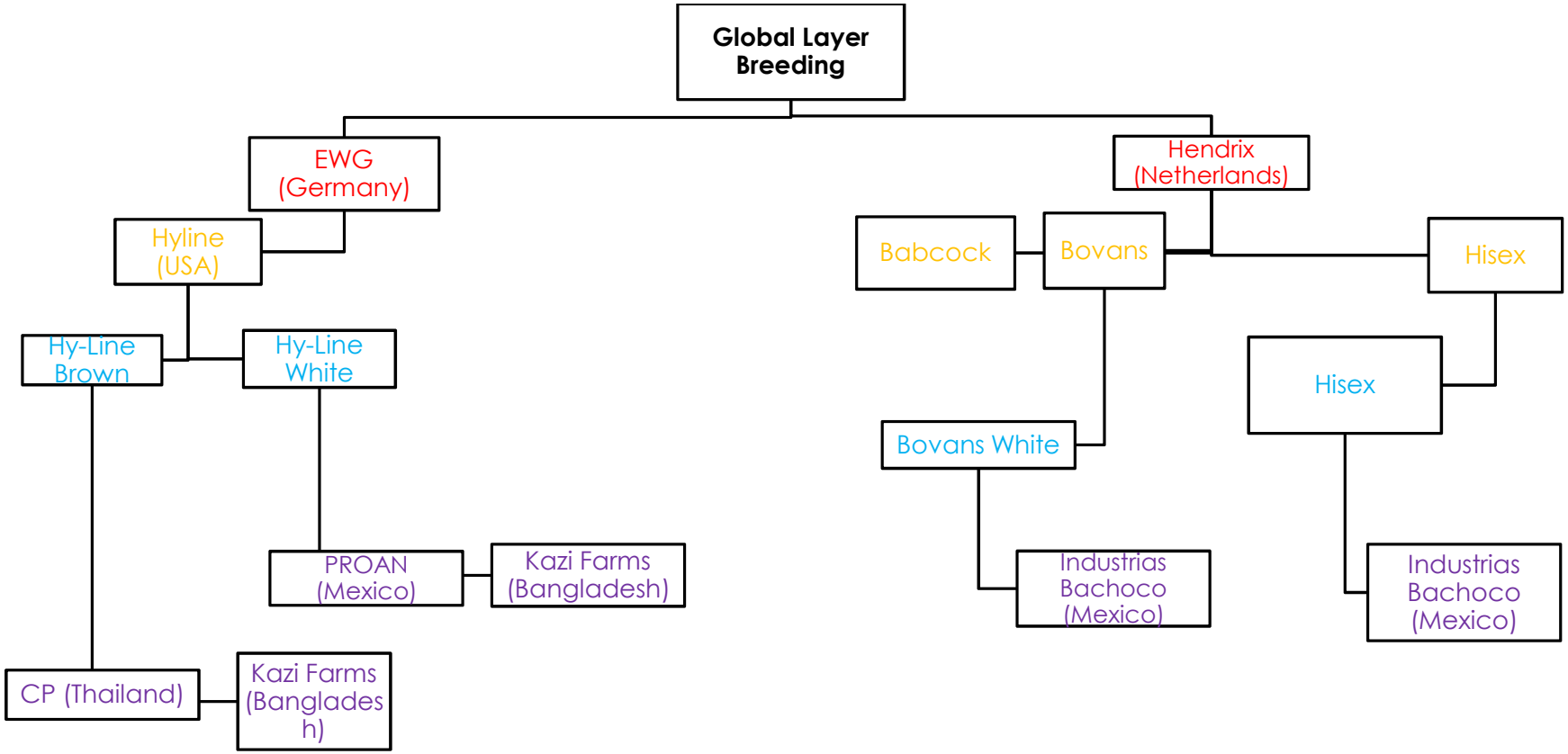
[12] See Table 3 for the list of companies.
[13] See Table 4 for the list of companies.

Figure 5: Top 10 Global Broiler Companies Genetic Breeding Map



Legend – Parent Company (Red) Main Breeding Arm (Orange) Subsidiaries (Green) Breed Name (Blue) JVs/Distributors (Purple)

Figure 6: Top 10 Global Layer Companies Genetic Breeding Map



Legend – Parent Company (Red) Main Breeding Arm (Orange) Breed Name (Blue) JVs/Distributors (Purple)

4.4. INVESTMENT PORTFOLIO OF PUBLIC DEVELOPMENT BANKS

The majority of poultry sector investments in developing countries by the IFC have been in large scale poultry integrators. The main scope of the investments has been to increase feed, DOC, broiler and layer production using commercial genetic strains, expansion of soy, maize and wheat and rice bran feed mills, employment, hatcheries, cold storage, transportation and chicken processing facilities.[14]

IFC loans in the form of equity loans, corporate loans and debt-based loans have financed working capital and long term investments over 3-5 years both for domestic and regional geographical and firm scale expansion of vertically integrated poultry firms across 27 developing countries across 48 projects and 34 companies since 1995, totalling ~$1.4bn. Figure 7 showcases the geographical coverage of IFC investments around the world[15].

The top five companies IFC has invested in are MHP (Ukraine), PRONACA (Ecuador), Suguna (India), Wadi (Egypt) and BGK (Russia), totalling USD 1,146 or 82% of total IFC investments into the poultry sector.

MHP alone has attracted $471.25m in IFC investments, making up 34% of the total IFC investment. Likewise, the *top five countries IFC has invested in are Ukraine, Ecuador, India, Brazil and Russia, totalling $970.17m or 69% of total IFC investments*.

In India, IFC has invested in 2 of the 3 largest integrator poultry producers, Suguna (USD 96.2 million) and Srinivasa (USD 23 million).

14 For example, IFC investments have been made to diversify firm activity from supplying domestic markets with broiler chicken to upgrading their infrastructure for meat processing and value added products such as pet food and feed, sausages, nuggets, burgers, higher quality eggs, marketing and retail for export to other countries.

15 Author calculations using data extracted from IFC website - https://disclosures.ifc.org/.

Figure 7: IFC Investments in Poultry Intensification

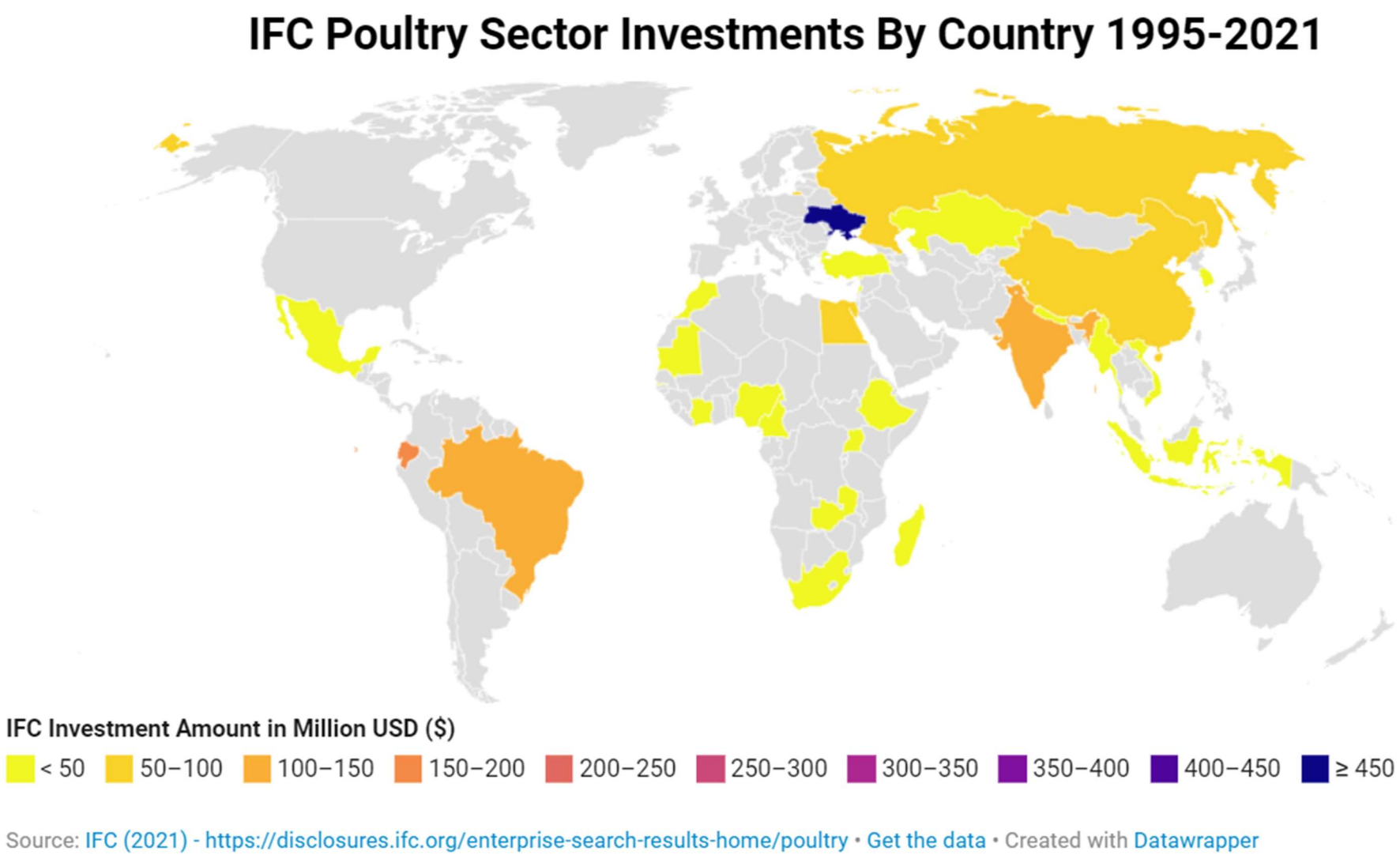


Table 2: IFC Volume Investment Top 5 Poultry Companies 1995-2021

Company Name	Country	Investment Time Period	Description of Investment	Total Cumulative Investment Million USD ($)
Myronivsky Khliboprodukt, Publichne AT (MHP)	Ukraine	2003-2014	Expansion of soy feed mills, parent stock farms, broiler growing farms and hatcheries, upgrading slaughter processing plants and transport infrastructure for feed, eggs, day old chicks and finished product.	471.25
Procesadora Nacional De Alimentos C.A. (PRONACA)	Ecuador	2004-2021	Improving efficiency and capacity expansions of feed mills, poultry processing facilities both domestically and abroad.	170
Suguna Foods	India	2006-2020	Expanding poultry infrastructure including hatcheries, processing plant, environmentally controlled sheds, processing plant and pre-mix feed plant capacity in India – UP, Odisha and West Bengal. Construction of feed mills, hatcheries, breeders in Kenya, Bangladesh	96.21
Wadi Holdings SAE	Egypt	2005-2017	Establishment of new poultry grandparent and parent breeder sites setting up a soybean crushing plant to support its feed mill operations; Expansion of table eggs production by 10x, construction of a mono-calcium phosphate (feed ingredient) plant.	84.6
Belgrankorm-Rakitnoe OOO	Russia	2007	Increase poultry production, broaden its product offering through the introduction of higher valued-added processed products. Expansion of poultry breeder, broiler farms and hatcheries; - start-up of a new poultry production complex, expansion of feed mill capacity, and - working capital increase and refinancing of the existing debt.	80

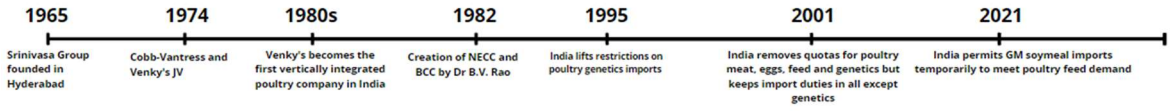
5. CASE STUDY OF INDIA

In this section, we describe how the global poultry genetic industry is interlinked with the domestic poultry sector in India. In India, the sector has undergone rapid changes in the last three decades, driven primarily by private sector vertically integrated broiler and layer farming production systems innovations. The poultry sector provides direct and indirect employment to 50million people in India and the Gross Value Added contribution of the sector stood at USD $17.3 billion in 2019 (Kolluri, Tyagi, & Sasidhar, 2021). *India is the third largest egg producer at 114 billion eggs a year and the eighteenth largest broiler chicken producer globally at 4.3m tonnes as of 2019/20, growing at 6-7% per year and set to double by 2030* (Kolluri et al., 2021; USDA, 2021).

Yet, annual per capita consumption of poultry meat is only at 3.5kg and 30 eggs respectively, far behind the recommended animal source protein guidance from the Indian Council of Medical Research at 10.5kg and 180 eggs per year (USDA, 2021). Nevertheless, higher disposable incomes by India's growing urban middle classes, more variety of increasingly processed poultry products, their wider availability and consumption opportunities, and changing socio-cultural perceptions and practices around meat consumption, combine into a mutual reinforcement of spiralling supply and demand (Bruckert 2016, 2021).

While consumer demand has been slowly rising over the last few decades, the poultry industry in India has undergone many economic and industrial changes. Figure 8 highlights the key events that have shaped the structure of the industry so far.

Figure 8: Key Economic and Industry changes in Indian Poultry Industry



Srinivasa Group was the first to establish a large poultry business in India in 1965. However, it was not until 1974, through a joint venture (JV) between Venkateshwara Research and Breeding Farm (Venkys) and the USA-based Cobb Vantress called Venco, that grandparent stock of foreign breeds were imported to India. Venco cross bred Cobb with indigenous pure-lines in India to improve productivity while adapted to local Indian conditions, particularly high temperatures in India (Gulati, Zhou, Huang, Tal, & Juneja, 2021). *The feed conversion ratio (FCR) for broilers reduced from 3.1 in 1970 to 1.65 in 2016–17 and the egg production of birds increased from 260 to 320 plus eggs per annum in this time* (Gulati et al., 2021; Mehta, Narrod, & Tiongco, 2008)

In the mid-1980s, in line with the Indian government's self-sufficiency policy for the economy, the import of grandparent stock was prohibited for the purpose of self- sufficiency in poultry genetic development. *The import ban on grandparent stock created a dependence on Venkys, which subsequently in the 1980s became the first vertically integrated company from grandparent and parent flocks, day old chicks, feed, vet extension and marketing* (Gulati et al., 2021).

In 1982, the then owner and founder of Venkys', Dr B.V. Rao founded the National Egg Coordination Committee (NECC) and the Broiler Coordination Committee (BCC), two voluntary umbrella organisation of national egg producers in India (India Today, 2002). NECC provided institutional support to poultry farmers, including publishing of market prices daily of eggs, price supports and marketing eggs as a health and protein food via publicity campaigns (Sendhil, Babu, Kumar, & Srinivas, 2013). *Funded by its nationwide members within regional branches, both NECC and BCC still continues to publish market prices per local areas using the latest demand and supply figures*. The bodies also promote production for export and lobbying the Indian government for policies and welfare schemes on issues affecting the industry (FAO, 2007). Most recently, the BCC has been on the forefront on negotiating GM Soy imports for feed in 2021.

To support export oriented agricultural producers, The Agricultural and Processed Food Export Development Authority (APEDA) was set up by the Indian government in 1986. With regards to the poultry sector, APEDA conducted export promotion and quality upgrading export standard quality and control and provided air-freight subsidy primarily for layer eggs export North Africa, South East Asia and Commonwealth of Independent States (CIS) countries (FAO, 2007)[16].

The IMF and World Bank's structural adjustment programmes (SAPs) policies of 1992, liberalised the poultry sector. *The key change in the 1993-94 budget was the reduction of import duties on grandparent poultry germplasm from 105% to 40% with the idea to develop the domestic private poultry R&D via overseas knowledge* (Gulati et al., 2021). Until 1995, imports of genetic stock were restricted to pure lines only, with the intention of protecting domestic broiler growers. In 1995, these import restrictions were lifted, allowing other firms to import grandparent stock and develop their own strains, which lead to an increase in productivity (FAO, 2007). This still required competitors to develop their own breeds for Indian conditions, as well as promote and create genetic stock for sale, providing further advantage to Venkys. For this reason, *the Cobb 100 breed maintained a 60-70% market share of the broiler market in India as of 2004* (Landes, Persaud, & Dyck, 2004).

To follow up with the easing of import restrictions of grandparent stocks, import duties on grandparent stocks were further reduced from 40% to 20% (Gulati et al., 2021). Further

[16] While APEDA was established in the 1980s, its remit to promote poultry exports has been limited to date with India primarily exporting egg powder globally and eggs to the global south and markets such as the EU and USA remain difficult to enter due to higher quality requirements.

liberalisation of the sector took place in 1999, when import tariffs for poultry products were reduced to 15% for poultry meat (chilled, fresh or frozen) and to 40% (processed meat from live poultry) (FAO, 2007).

Further liberalisation continued in the 1990s. In order to meet the 1994 Uruguay Round market access commitments within the WTO, India removed its quantitative restrictions on poultry meat imports in April 2001, while maintaining import duties (Landes et al., 2004). India also dropped all quantitative restrictions on imports of poultry items, so grandparent breeding stock could be imported without any barriers. This incentivised more private investment in poultry breeding via imported grandparent stock, leading to higher productivity of pure line stock of improved parent lines (Gulati et al., 2021).

Since the 90s*, the main intervention by the Indian government have been related to feed imports as India does not produce enough feed inputs such as maize and soy. Maize import quotes are often reduced to artificially suppress food price and for poultry and starch supply sectors, noted the Indian government* (Hindu Businessline, 2020; Pandey, 2020). In August 2021, the Indian government permitted import of 1.2 million tonnes of GM soymeal, as all food related GM products are not allowed to be imported. The temporary removal of import restrictions on GM Soy was allowed after months of lobbying by industry associations. The delayed approval meant that only 54% of the quota was used by the industry by October 2021 (Hellenic Shipping News, 2021).

Figure 9 conceptualises the different stakeholders in the poultry industry and their role in influencing economic policy and the development of the Indian poultry industry. In the sphere of control are both domestic and global poultry firms. *The IFIs are at the periphery of the sphere of control and influence, due to their role of enabling industrial production through trade liberalisation and investments in two of three largest poultry producers Suguna and Srinivasa.*

Additionally, *we include NECC and Compound Livestock Feed Manufacturers Association (CLFMA) due to its prominence in determining prices of eggs and lobbying Indian government for changing import restrictions for feed manufacturing respectively*. In comparison, we have included the Broiler Coordination Committee (BCC) and other industry bodies such as Poultry Breeders Association (PBA), All India Poultry Breeders Association (AIPBA), Soybean Processors Association of India (SOPA) and others in the sphere of influence, due to their important but limited role in shaping industry structure.

The sphere of influence includes various government bodies including relevant Ministries and agencies such as Food Safety and Standards Authority (FSSAI) and APEDA. The FSSAI, located within the Ministry of Commerce and Industry implemented the GMO crop ban in 2014, directly impacting on maize and soy feed imports in India (Ambwani & Jayan, 2021). To import GM foods, the Genetic Engineering Appraisal Committee (GEAC) within the Ministry of Forest,

Environment and Climate Change needs to provide approval. Hence, we include the GEAC in the sphere of influence.

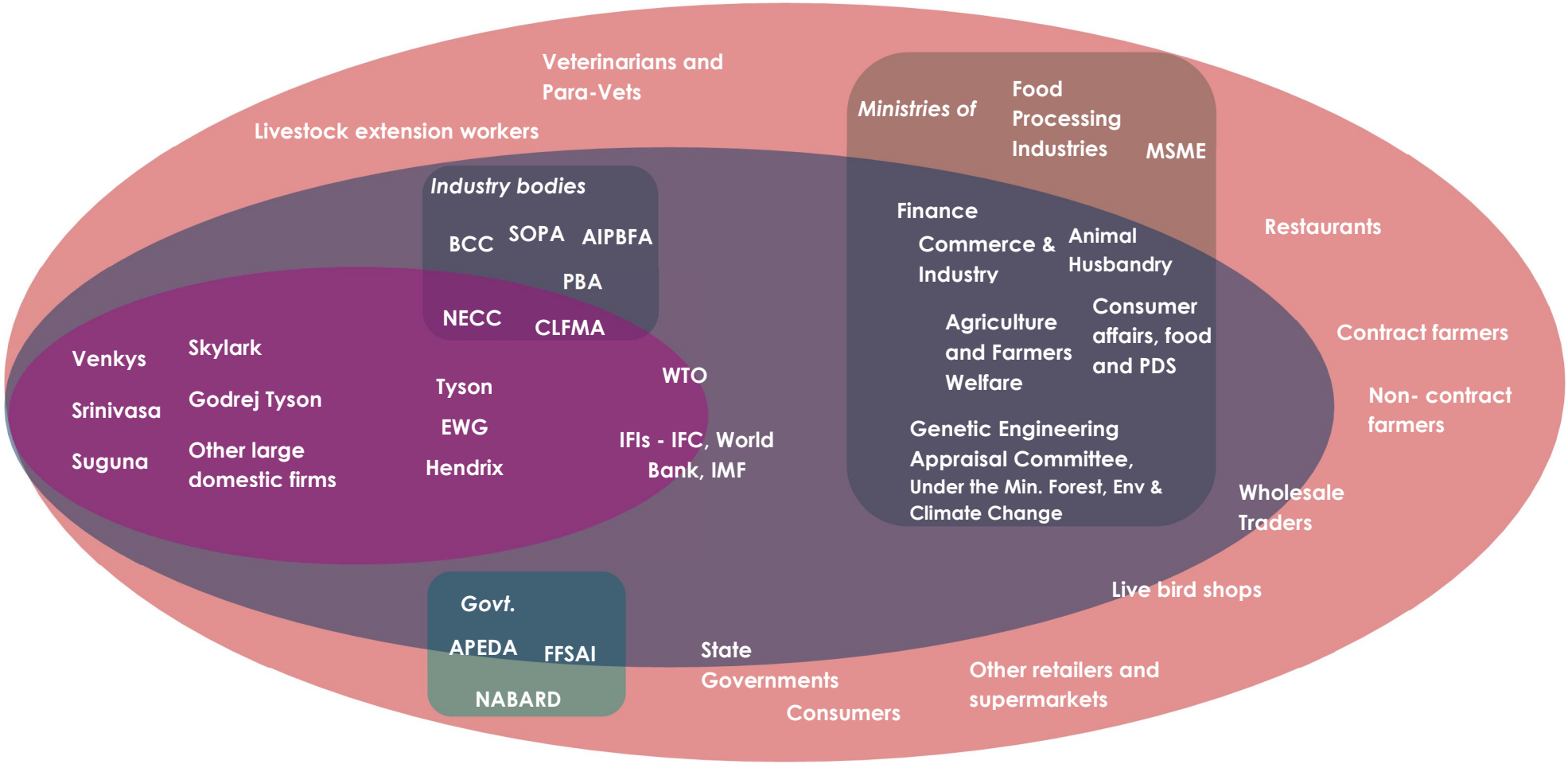
Moreover, the Ministry of Trade and Industry also determines the import tariffs on eggs, soy, maize, and broiler chicken, as well as housing APEDA, which incentivises poultry exports in the sector (FAO, 2007). For this reason, the Ministry of Commerce and Industry is an important policy player in the poultry sector in India.

At the periphery of the spheres of influence and interest, we have included governments of Indian states as animal husbandry and agriculture are both state and central govern policy making mandates. That is, both state and India can determine policy for poultry. Wholesaler traders who act as middlepersons between integrated farms and consumer markets can be influential actors depending on the local market structures. They are thus at the periphery of the sphere of influence. These traders sell the birds to owners of live bird shops that caters to majority of the poultry consuming Indian population, as there is a preference for slaughtering birds just before cooking so the meat is fresh.

Due to the small market share of supermarkets and other retailers for buying chicken meat, retailers apart from live bird shops are placed in the sphere of interest. Farmers both contract and non-contract farmers, vet and para-vets, livestock extensions workers, restaurants are also included in the interest sphere. National Bank for Agriculture and Rural Development (NABARD) is a central government agency that that provides small investment schemes to promote rural economy such as the Poultry Venture Capital Fund and credit in collaboration with other government ministries, including the Animal Husbandry Department and Ministry of Micro, Small and Medium Enterprises (India Filings, 2015).

This section has shown how chicken and eggs are seen as the low cost solution to solve India's malnutrition and protein problem and create high value added farming livelihoods, led by the private sector. The stepping back of governments and facilitation of private sector growth has instead led to the corporate consolidation of the sector, with a few firms reaping benefits and controlling the market, with multifarious social, political and economic adverse effects. Despite these warning signs, the private sector poultry production system in India continues unabated, set to double in size and USD value by 2030 (USDA, 2021)and positioned as the pro-poor answer to rural India's economic development trajectory.

Figure 9: Spheres of Influence for Economics Drivers of Indian Broiler and Layer Industry



CONCLUSION

We hope this analytical framework and evidence will deepen front-line persons' understanding of pathways through which circuits of capital produce industrial production systems and their potential negative externalities. Taking India as example, the memo has illustrated how global capital articulates with domestic economies, integrating local commodity chains into global production networks and thus rendering local actors vulnerable to the processes of globalisation and intensification. Additionally, it has pointed to how these processes of globalisation and intensification correlate with consumption practices and regulatory oversight. The critical framework provides evidence to be utilised by both front-line persons and local governments and policymakers to create sustainable livestock production systems as it will help to identify and address power imbalance in a financialised livestock industry by demonstrating existing spheres of influences and political clientelism between IFIs, LMICs governments, multinational firms and domestic agribusinesses.

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Table 3: Global Top 10 Broiler Chicken Producer Companies 2020

Company	Country	Annual Production (Birds in Millions)	% of total broiler chicken production by top 50 broiler companies globally
JBS S.A.	Brazil	4,036	16
Tyson Foods	United States	1,992	8
BRF	Brazil	1,554	6
New Hope	China	1,300	5
Wen's Food Group	China	748	3
CP Group	Thailand	685	3
Koch Foods Inc.	United States	681	3
Perdue Farms	United States	668	3
Sanderson Farms Inc.	United States	622	2
Industrias Bachoco	Mexico	622	2
Total production by top 10 firms		12,908	51%

Source: Wattagnet (2020); WATTPoultry International (2020)

Table 4: Global Top 10 Egg Producer Companies 2020

Company	Country	Layer Birds (Millions)	Percentage of total egg layers by top 25 companies
Cal-Maine Foods	United States	45.0	11
Proteína Animal (PROAN)	Mexico	34.0	8.5
Rose Acre Farms	United States	26.6	6.65
CP Group	Thailand	22.0	5.5
Versova Holdings LLC	United States	21.1	5.275
Hillandale Farms	United States	20.0	5
Ise Inc.	Japan	20.0	5
Arab Company for Livestock Development (ACOLID)	Saudi Arabia	14.4	3.6
Daybreak Foods	United States	14.0	3.5
Michael Foods	United States	13.3	3.3

Source: WATTPoultry International (2020)

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