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# IRAQ PRIVATE SECTOR GROWTH AND EMPLOYMENT GENERATION

November 20, 2006

## The Poultry Industry in Iraq



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## **DISCLAIMER**

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## EXECUTIVE SUMMARY

There is currently a crisis in the Iraqi poultry industry. It is attributable both to demand and supply factors:

- A significant drop in consumer demand – from 15kg/per capita in the pre-embargo era to 4kg/per capita in 2005 and probably still declining in 2006.
- Strong competition from imported whole Brazilian frozen chicken currently sold in the market at a retail price at about half of the price the Iraqi chicken.

### Poultry Market in Iraq: Domestic Production vs. Imported

	2003	2005	2006
Total Market (000 tons)	122	120	100
Domestic Production (000 tons)	74	52	26
<b>Market Share</b>	<b>61%</b>	<b>43%</b>	<b>26%</b>
Imports (000 tons)	48	68	74
<b>Market Share</b>	<b>39%</b>	<b>57%</b>	<b>74%</b>

### Poultry Market in Iraq: Production Costs – Retail Prices of Domestic vs. Imported

	Imported Frozen Brazil			Fresh Domestic Iraq		
	\$	IQD	%	\$	IQD	%
Production Cost	0.602	903	36.9%	1.19	1,785	38.4%
Import Price (CIF)	1.02	1,530	62.6%	---	---	---
Retail Prices (May 2006)	1.63	2,445	100%	3.1	4,650	100%
Retail Prices (October 2006)	2.2	3,300		3.9	5,850	

- Lack of competitiveness of the Iraqi chicken in all the main relevant costs, such as feed and chicks, is further aggravated by the government's new policy of no subsidies.
- Structural problems within the industry, such as excessive fragmentation and, above all, the absence of Integrated Contract Poultry Farming – the business model universally adopted in the most competitive countries such as the USA and Brazil.

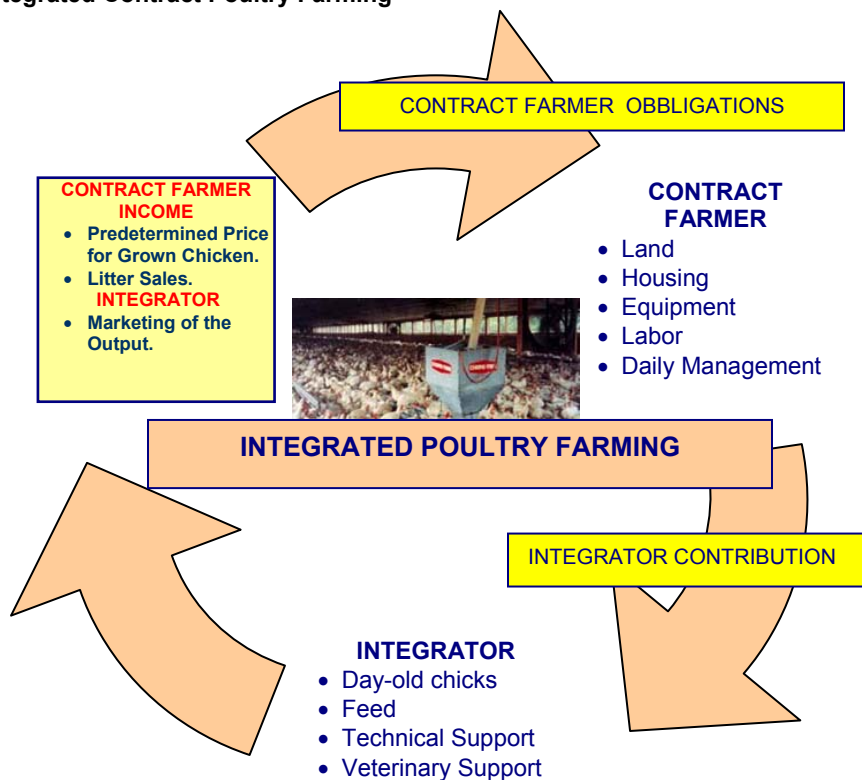
The development of an efficient, modern, more competitive poultry industry should be a priority for the newly elected Iraqi government since:

- Poultry is one of the few food markets in Iraq with viable volumes and critical mass;
- More efficient domestic poultry production is the vehicle to improve the current Iraqi diet, which is poor in protein. Furthermore, chickens have an efficient feed conversion rate, optimizing the transformation of scarce grain resources into added-value meat;
- Poultry farming could create a significant number of direct jobs in rural areas;

- The development of a poultry industry would have a beneficial effect on the Iraqi agricultural system, creating demand for alternative crops – such as oil seeds, corn, and sorghum – currently in short supply. It would also produce considerable quantities of organic fertilizer – litter – competitive in price and highly valuable, especially for vegetable and fruit production and soil enrichment.

Although Iraqi corn and soy meal production costs may never be as low as in Brazil, it is unquestionable to assume that the adoption of integrated chicken farming could benefit poultry farming in Iraq enormously, and provide the required leap in efficiency and productivity indispensable to making the industry more competitive.

**Integrated Contract Poultry Farming**



Contract broiler production operates on the basis of agreements between farmers (contract farmers) and companies (integrators) that specify conditions for producing and marketing broilers. The agreements between the integrators and contract farmers usually specify that the integrator provides the day-old chicks, feed, veterinary supplies in kind or on credit, and implements the final marketing of the output. Integrators are usually vertically integrated operations and own the breeder flocks, hatcheries, feed mills and processing plant, while contracting out the broiler growing to contract farmers. Under this system, the company retains ownership of the birds and expects contract farmers to grow their flocks under specific

management programs. Company field representatives normally visit the farms periodically, providing day-to-day technical assistance.

Contract farmers typically provide the space facilities (land and housing), equipment, labor (family and/or hired) and daily farm management. The average cycle is roughly 42-45 days, at the end of which the integrator buys the broilers from the contract farmers by paying a predetermined price per kg or unit. In most contracts the integrator stipulates an incentive scheme ( $\pm 20\%$  of the predetermined price) based on the weight of the broiler at the end of the cycle and on mortality rates. Under the agreement, contract farmers also own the litter produced during the cycle, and is therefore free to sell it independently in the market. Poultry litter is in high demand as an organic fertilizer and soil conditioner.

Integrated Poultry Farming has proven successful worldwide in lowering entry barriers to small farmers by providing access to the market, technical assistance, transfer of know-how, specialized inputs, and financial support, drastically reducing the amount of working capital required.

Contract farming offers several other potential advantages over independent farm: It has the potential to integrate low-income small farmers into an added-value commercial chain, at the same time reducing price fluctuations and volatility and part of the production risk.

Practically speaking critical factors in modern commercial poultry farming are limited to feeding, heat and light programming, and temperature management. Feed (and water) deserve particular attention, being the most significant costs of the entire operation. Feed costs usually account for 60% of the total variable costs.

Realistically, the adoption of integrated poultry farming in Iraq could reduce the current production cost by 25% - from \$1.198/kg to \$0.891/kg. The main savings would certainly be in chicks and feed costs, where an integrator would enjoy massive economies of scale, higher productivity, and lower margins than an independent farmer. Integrator know-how and state-of-the-art technology would also improve the currently poor feed conversion and mortality rates typical of independent farms in Iraq.<sup>1</sup>

#### Integrated Contract Poultry Farming: Estimated Impact on Cost Production in Iraq

	Iraq Traditional Farming	Iraq Integrated Farming	$\Delta$ %
Total Production Cost/kg	\$1.198	\$0.891	-25%
Feeding Costs	\$2.22	\$1.44	-35%
Feed Conversion Rate <sup>1</sup>	1: 2.80	1: 2.30	-18%
Mortality Rate <sup>1</sup>	10.5%	6.0%	-43%
Feed Ration Cost/kg	\$0.33	\$0.27	-18%
Day-old Chicks 40g Cost/Unit	\$0.313	\$0.277	-12%

Source: *Embrapa and Sadia based on Saudi Arabia and Brazil data available.*

<sup>1</sup> Feed Conversion Rate=Quantity (kg) of food (intakes) required for a 1kg gain in weight. Mortality Rate= % of chickens that die before the end of the cycle out of the total flock at the beginning of the cycle.

The conversion of the Iraqi poultry industry to the integrated poultry farming system appears to be *conditio sine qua non* for its very survival, providing an opportunity to drastically reduce a current production costs by some of 26%. Such a result would bring the current price gap compared to imported chicken from 90% to 40%, creating a baseline demand for domestic products estimated in the range of 20% of market share. Based on historical series of elasticity data supplied by IPPA – The Iraqi Poultry Producers Association - and comparable studies in the MENA region, the Iraqi poultry industry must narrow the price gap by approximately 25% in order to compete with imports and to reach a more significant market share: 35-40% would be a realistic target.

#### The Potential Positive Impact of Integrated Poultry Farming in Iraq

	2006	2010	2020
Total Market Size (000 Tons)	100,000	450,000	800,000
Per Capita Consumption - kg	3.8	15	20
<b>Estimate - Scenario 1</b>			
Market Share of Domestic with Price Differential +40% vs. Frozen Imported	20%	20%	20%
Domestically Produced Tons	20,000	90,000	160,000
Number of Chicken Houses - 7,000 birds/cycle -	400	1,800	3,200
Direct Job Creation	800	3,600	6,400
<b>Estimate - Scenario 2</b>			
Market Share of Domestic with Price Differential +25% vs. Frozen Imported	35%	35%	35%
Domestically Produced (Tons)	35,000	157,500	280,000
Number of Chicken Houses - 7,000 birds/cycle -	700	3,200	5,600
Direct Job Creation	2,100	9,600	16,800

A more competitive price compared to imported chicken could be achieved by manipulating three variables:

1. To incentivize the adoption in the industry of the integrated poultry farming model;
2. Introducing tariffs on imported chicken;
3. Pursuing aggressive market growth, thereby achieving significant economies of scale.

A rebound in poultry consumption largely depends on an overall improvement of the socio-economic situation of the country, something likely to happen in the medium term but a variable that can not be controlled.

Tariff introduction to protect the domestic poultry industry is an issue must be addressed head on. It would be naïve to think that a new Iraqi poultry industry could compete effectively with established players already enjoying a critical mass, economies of scale, high productivity and cost competitive advantage. Nonetheless, in light of Iraq's desire to join the WTO, care must

be taken to help establish industries that, once underway, are prepared to defend their market share positions in open, free-market competition.

The adoption of a new model – the integrated poultry farming system – seems the factor more appropriate to leverage in the short term. In consultation with the IPPA, the appropriate ministries and officials could devise a package of incentives aimed at attracting foreign investors with know-how in integrated poultry farming. Another viable alternative would be to identify local champions and to promote their adherence to integrated poultry farming through a specifically designed sectoral policy and incentive packages.

## **SCOPE AND OBJECTIVES**

The current study aims primarily at emphasizing the strategic role Iraq's poultry industry could play in providing jobs in rural areas, achieve import substitution, provide consumers with diets richer in protein, and indirectly support the development of alternative crops such as corn, sorghum and other oil seed crops, widely used in broiler feed.

In particular the study will analyze:

1. The current status of the poultry industry in Iraq in broilers and egg production, focusing on the broiler segment and on the possible causes of its current decline;
2. Competition and the impact of imported chicken on domestic production;
3. The importance of the poultry industry in providing consumers with a more diversified and reasonably priced protein-based diet;
4. Viable plans to make the Iraqi domestic poultry industry more competitive, efficient, and profitable, in order to boost domestic production and reduce the current high level of import dependency;
5. Possible business models for the industry, taking into consideration the Brazilian and USA experiences;
6. A detailed benchmark of broiler farming in Iraq utilizing the example of Brazil and showing the effect of poultry imports – mainly from Brazil – on the Iraqi poultry industry;
7. The deep links of the industry with agriculture, and the potential positive impact it may generate in terms of crop diversification, farm income generation, and productivity.

The profitability analysis in the study can also provide a baseline for the development of business plans for a broiler breeding operation, and support micro-finance or SME service institutions in credit evaluation for investments in the industry.

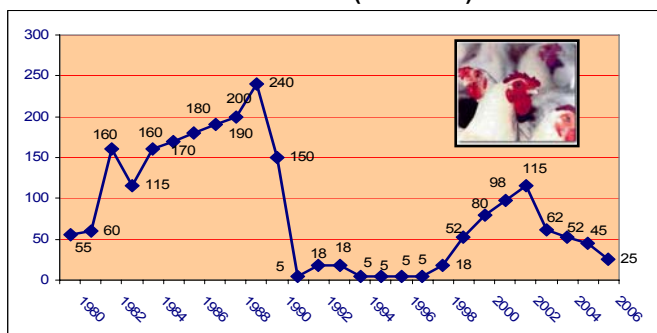


## 1. THE POULTRY INDUSTRY IN IRAQ

### 1.1 Status

After a near collapse in the aftermath of the Kuwait invasion and UN sanctions in 1991, the Iraqi poultry industry was revived by government in 1998 in an effort to raise the nutritional quality of the dietary intake of the Iraqi population improving the supply of protein. The government heavily encouraged the establishment of private enterprises with a program subsidizing hatching eggs, feed, vaccines, and electricity, but with no interference in the marketing of chicken or eggs. The IPPA (Iraq Poultry Producers Association) was also created as an organization to work effectively with the government to address regulations and standards, to establish commercial contacts, to deal with credit and input needs, and to update and modernize management practices. Despite government efforts to revitalize the poultry industry with a new free-market-oriented policy – cancellation of controlled prices to consumers and total privatization of the industry – in 2006 the broiler industry experienced ever lower levels of output, with only 25,000 tons of meat produced:

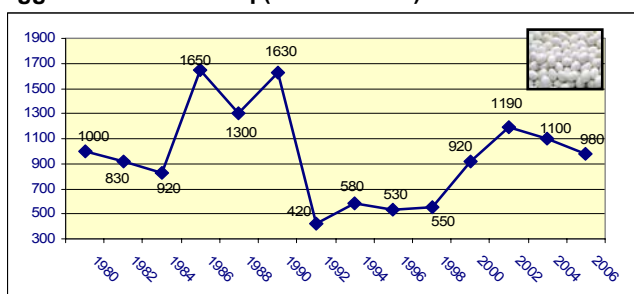
**Broiler Meat Production Trend (000 Tons)**



Source: US Grains Council – IPPA – Izdihar Investment Promotion, 2006

Contrary to poultry production, egg production - although considerably lower than pre-war levels - has rebounded since 1998 and stabilized around 900 million units per year (35 – 37 eggs/year per capita):

**Eggs Produced in Iraq (Million Units)**



Source: US Grains Council – IPPA – Izdihar Investment Promotion, 2006

According to IPPA numbers, there are presently in Iraq no more than 400 broiler farms in business, compared to 5,000 in 1988. The large current proportion of non-operational broiler

farms is an indicator of the gravity of the crisis affecting the industry. The causes of the industry's lackluster performance have roots both in demand and supply factors, in addition to strong competition from imported whole frozen chicken from Brazil:

1. Consumer demand for broiler meat has unquestionably collapsed: According to our estimate, per capita consumption dropped from 15kg of pre-embargo times (1992) to only 4,5kg in 2005.<sup>2</sup> There is growing evidence that consumption per capita has dropped further in 2006, mainly as a result of strong price rises and supply chain disruptions. Domestic fresh chicken is currently sold in the market (August, 2006) for an average of 5,850 Dinars/kg, an increase of 26% in comparison to January 2006. Reduced purchasing power among Iraqi consumers has also reduced demand for premium domestic fresh chicken – at 5,850 IQD/kg retail – in favor of cheaper whole frozen chicken from Brazil at 3,300 IQD/kg.
2. Escalating production costs due to the numerous constraints Iraq suffers in the supply chain and in the market system, and due to the cancellation in 2005 of generous subsidies. All applicable costs such as feed, day-old chicks, electricity, heating and veterinary services have soared dramatically, relentlessly pushing farmers out of business since the second half of 2005.

The Mesopotamia Seed Production Company (Mesopotamia) – the state company responsible for corn production for use in the poultry industry – used to pay farmers 130,000 IQD per ton of corn and sell grain to poultry farmers for 230,000 IQD/ton with a real subsidy in the range of 70,000 IQD per ton.<sup>3</sup> On the other hand, government also subsidized the industry through The State Company for Animal Resources (SCAR) that supplied farmers with day-old chicks, feed rations, and vaccines at a price 25-30% lower than the market. Subsidies for feed and corn were particularly important, since corn represents almost sixty percent of the broiler feed ration, which in turn account for almost sixty percent of the total variable cost in a broiler operation.

3. Competition is stiffening in the Middle East. Brazilian exporters have become even more aggressive in the Middle East, following a drop in EU chicken consumption in the aftermath of bird flu, and because the EU introduced tariffs aimed at protecting European poultry farmers.<sup>4</sup>
4. Persistent poor production and low yields of crops such as corn, sorghum and oil seeds - vital ingredients in the broiler feed ration - have fueled further increases in production costs for Iraqi poultry farmers.<sup>5</sup>

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<sup>2</sup> Based on *The Potential for Food Processing in Iraq* – an analysis in line with IPPA and The World Bank statistics.

<sup>3</sup> Mesopotamia and the Ministry of Agriculture both claim that the true cost per ton of corn was around 300,000 IQD per ton in 2005.

<sup>4</sup> The EU recently approved the introduction of a 70% tariff on Brazilian chicken or €1,074/ton – whichever is higher – with a free exempted quota of only 300,000 tons/year.

<sup>5</sup> According to the IPPA, the estimated quantity of corn produced in 2005 was around 46,000 tons, and the estimate for 2006 is even lower at 34,000 tons. In particular, corn productivity is consistently low, with average yields below 1.0 ton/ha according to ICARDA in 2006.

5. The industry business model in Iraq is clearly outdated. Independent poultry farming – predominant in Iraq’s industry – has proved unable to compete with the more efficient, integrated poultry farming system adopted almost universally in the USA and Brazil.<sup>6</sup>

The current state of the poultry industry in Iraq is a clear example of the incapacity of the local industry to compete with imports in a suddenly liberalized market. Exposed to Brazilian competition and having to face deep increases in production costs, most Iraqi poultry farmers – especially the small ones with flocks of less than 5,000 birds/cycle – simply have gone or are going out of business.

According to the IPPA market analysts, under the current circumstances there are no signs that the negative trend for Iraqi poultry farmers has come to an end. Market share of domestic poultry could realistically find itself confined to a meager 5-10% in the short term.

#### Poultry Meat Retail Prices for Iraqi Domestic Chicken and Brazilian Imported

	Imported Frozen Brazil			Fresh Domestic Iraq		
	\$	IQD	%	\$	IQD	%
Production Cost	\$ 0.602	IQD 903	36.9%	\$ 1.19	IQD 1,785	38.4%
Import Price (CIF)	\$ 1.02	IQD 1,530	62.6%	---	---	---
Retail Prices (May 2006)	\$ 1.63	IQD 2,445	100%	\$ 3.10	IQD 4,650	100%
Retail Prices (October 2006)	\$ 2.20	IQD 3,300		\$ 3.90	IQD 5,850	

Source: IPPA – Izdihar

#### Poultry Meat Market: Market Share of Iraqi Locally Produced vs. Imports

	2003	2005	2006
Total Market (000 tons)	122	120	100
Domestic Production (000 tons)	74	52	26
<b>Market Share</b>	<b>61%</b>	<b>43%</b>	<b>26%</b>
Imports (000 tons)	48	68	74
<b>Market Share</b>	<b>39%</b>	<b>57%</b>	<b>74%</b>

Source: IPPA – Izdihar – Perdigao Brasil

## 1.2 Competition

Brazil is the most aggressive player in the Middle East chicken market. Brazilian agribusiness exports to the Arab countries generated \$2.98 billion from January to September 2006, an increase of 15.7% in comparison to the same period in 2005. The main markets are Egypt, Saudi Arabia, Algeria, UAE and Yemen. The main exports are sugar, meat (chicken and beef), soy and soy derivatives, coffee, tobacco and dairy products.

According to the Poultry Union Exporters Association (Uniao Brasileira dos Avicultores UBA), Brazil exports around half of its poultry production, with a 43% market share of poultry worldwide. However, in the Middle East Brazil holds a 73% market share and a particularly

<sup>6</sup> The Integrated poultry farming system will be fully analyzed in Chapter Five.

strong position in the Gulf States. Exports to the Middle East in the first half of 2006 were valued at \$314 million and represented almost 300,000 tons, a market second only to Asia – 380,000 tons – but bigger than EU25, where a tariff of 70% or € 1,074/ton – whichever is higher – was recently applied to Brazilian chicken.

The most successful Brazilian food company in Middle East is Sadia currently exporting 20% of its \$705 million in foreign sales (predominantly chicken) – to the region. The market is so important to the company that it even has an exclusive regional advertising campaign. Its Middle East business is run through an office in Dubai.

#### **Sadia Advertising Campaign in the Middle East**



Brazilian whole frozen birds dominate chicken exports to the Middle East. During 2005 the average CIF export price to the region for whole frozen Brazilian chicken has been \$1.07/kg – with water content not over 6%. During the first half of 2006, the price declined to \$1.02/kg due to the bird flu crisis, and in a global market with supply outstripping demand.

For the past several years, Brazil has been also the leading frozen broiler meat supplier to the Kingdom of Saudi Arabia, followed by France. Last year Saudi Arabia imported 484,202 tons of broiler meat, of which 380,523 tons (almost 78% of total imports) came from Brazil. It is worth mentioning that the price of Brazilian poultry fell to \$800/ton in early 2006 due to reduced demand caused by bird flu. The considerable price increase recorded in recent months is largely attributed to demand in Egypt, a stronger Brazilian Real exchange rate, and a partial recovery from the bird flu crisis.<sup>7</sup>

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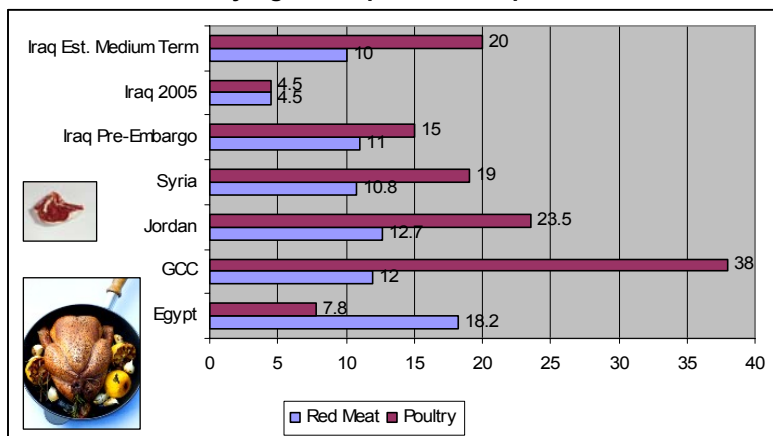
<sup>7</sup> C&F prices for Brazilian poultry shipped to the Middle East soared to an average of \$1.07/kg in the second half of 2006.

## 2. THE POULTRY INDUSTRY AND A HIGH PROTEIN DIET IN IRAQ

There are good reasons to consider poultry as a premier building block in an effort to raise the nutritional quality of the Iraqi diet:

1. Iraqis – in line with the general regional trend – have a strong preference for poultry:

### Red Meat and Poultry Kg Per Capita Consumption in the Middle East



Source: Izdihar – The World Bank – Icarda.

There is a trend towards higher poultry consumption throughout the entire Middle East, even in places like Turkey and Egypt, where red meat consumption is still stronger. Actual per capita consumption in Saudi Arabia is 33kg, and in UAE almost 50kg.

Poultry consumption in Iraq could easily forge higher in the future, jumping from the current 4.5kg per capita to the pre-embargo level of 15kg or even higher. A conservative figure would probably be 20kg considering the low price of poultry in and positive health perceptions in comparison to red meat.

By the year 2010 the poultry market in Iraq could easily worth 600,000 tons - \$900 million in value – becoming one of the most important food markets in the country.<sup>8</sup> A poultry market of such a dimensions would have a strong negative impact on Iraq's balance of payments unless a more competitive domestic industry develops.<sup>9</sup>

2. A return to a richer diet is likely to happen in Iraq, with a strong rebound in protein consumption. Chicken consumption looks not only to be a potential source of protein easy to expand, but also an industry with efficient feed conversion – something important in Iraq, a country with chronic deficit in grains and/or animal feed. Broilers in Brazil and the USA have an average feed conversion of 1 to 1: 2, second only to fish such as Tilapia, but far more efficient than pigs, goats, sheep and cows.<sup>10</sup>

<sup>8</sup> Based on Izdihar numbers, poultry would become the fifth biggest food market in Iraq after cereals, dairy, sugar and fruit and vegetable, surpassing vegetable oil.

<sup>9</sup> Iraq's current poultry production capacity is in the range of 30,000-50,000 tons/year.

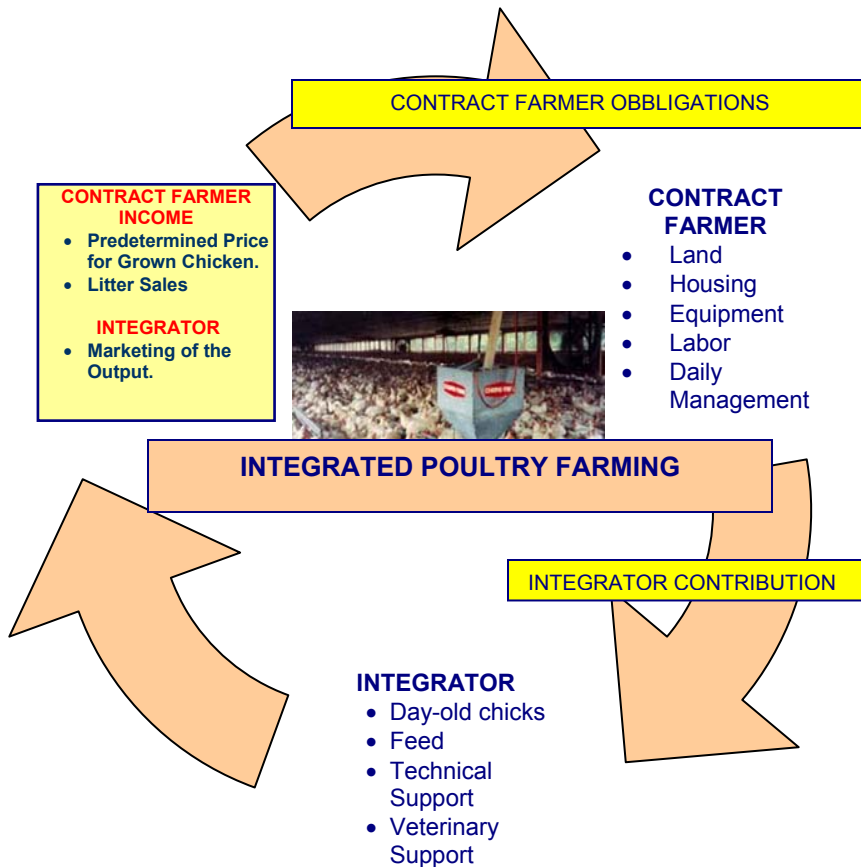
<sup>10</sup> Feed Conversion Rate=Quantity (kg) of food (intakes) require for a 1kg gain in weight.

### 3. A NEW BUSINESS MODEL FOR POULTRY IN IRAQ

The necessary leap in efficiency and productivity required by the Iraqi poultry industry to become more competitive can only occur realistically with the adoption of a new business model. Integrated Contract Poultry Farming is probably the model to be followed, considering the results that system has brought about in the USA and Brazil – the leading poultry exporting countries in the world.

#### 3.1 The Integrated Contract Poultry Farming

Contract broiler production means agreements between farmers (contract farmers) and companies (integrators) that specify conditions of producing and marketing broilers. The term “Contract” in broiler production may vary from country to country, as may the nature of the integrator company. In most of the developed countries, the contract farming system in broiler production was launched before 1960. It was enormously successful in countries like Brazil and the USA, where it accounts for 95% and 98% of the broiler production respectively, and where it is now virtually impossible to be in the broiler business as an independent farmer except in certain niche or specialty markets.



The agreements between the integrators and contract farmers usually stipulate that the integrator provides the day-old chicks, feed, veterinary supplies in kind or on credit, and implements the final marketing of the output. The integrators are usually vertically integrated and own the breeder flocks, hatcheries, feed mills and processing plant, while contracting out the broiler growing to integrated farmers. Under this system, the company retains ownership of the birds and expects contract farmers to grow their flocks under specific management programs. Company field representatives visit farms periodically, providing day-to-day technical assistance.

Contract farmers typically provide the space facilities (land and housing), equipment, labor (family and/or hired) and daily farm management. The average cycle is roughly 42-45 days, at the end of which the integrator buys the broilers from the contract farmers by paying a predetermined price per kg or unit. In most contracts, the integrator stipulates an incentive scheme ( $\pm 20\%$  on the predetermined price) based on the weight of the broiler at the end of the cycle and on mortality rates.<sup>11</sup> Under the agreement, contract farmers also own of the litter produced during the cycle and are therefore free to sell it independently in the market.<sup>12</sup> Poultry litter is in high demand as organic fertilizer and soil conditioner.<sup>13</sup>

### **3.2 The Advantages of Integrated Contract Poultry Farming**

Where introduced, well organized Contract Poultry Farming has contributed enormously to expanding poultry production and to creating added value and efficiency along the entire production chain. Furthermore, data from the Brazilian market and a recent study in Bangladesh showed that the Contract Poultry Farming system consistently outperforms independent farming in terms of profitability and return on investment, both for the integrators and for the contract farmers.

Integrated Poultry Farming has proven successful worldwide in lowering entry barriers to small farmers, providing access to the market, technical assistance, transfer of know-how, specialized inputs, and financial support, thereby drastically reducing the amount of working capital required. The development of the Integrated Contract Poultry system could revolutionize the poultry market in Iraq, where most small farmers often have trouble accessing credit, obtaining information on market opportunities or new technology, purchasing certain inputs, and accessing markets. If properly introduced, vertically integrated contract farming could realistically be the key to providing small local farmers with:

**Credit access:** Lack of capital is the reason most frequently cited by small farmers for not entering the industry in Iraq, despite favorable consumer demand for the product. With integrated poultry farming, integrators contractually provide feed, day-old chicks, and veterinary care, inputs that represent over 90% the total cost of production, resulting in a substantial reduction of the required working capital.

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<sup>11</sup> In reality an indicator of efficient feed conversion is the ratio between broiler final weight and consumed feed in the cycle. A normal, average mortality rate is usually set at 3%/cycle.

<sup>12</sup> Poultry litter is a mixture of manure and bedding – straw – material.

<sup>13</sup> In Brazil according to Embrapa, poultry litter is currently sold at an average price of \$40-50 per ton.

**Risk reduction:** Risk reduction is undoubtedly one of the greatest assets of the Contract system. Risk is an important feature of poultry farming. There are two types of risk in poultry production: One is production risk and the other is price risk. Price risk is one important contributor to revenue variability, since broilers are perishable. If farmers fail to sell at the proper time, they face a great loss. Contract farmers are not much affected by fluctuating prices, since the price agreed upon at signing is fixed and predetermined, regardless of market price changes.

Production risk is another contributor to income variability. Production risk mainly occurs in broiler farming due to death loss of birds. Outbreaks of disease cause a considerable economic loss and erosion of confidence in poultry farming. Contract farmers are freed from dreaded pests and diseases or an epidemic risk, since the chickens belong to the integrator. Their loss during the growing cycle would therefore represent an income reduction rather than a real loss for the integrated. Furthermore, integrators usually provide technical assistance, and frequently insurance.

**Marketing facility:** Lack of a proper marketing capability is another reason for entering the contract system. Marketing is an important problem for small poultry farmers. By entering into contractual agreements, the contractor can guarantee the purchase of the grown chickens and their commercialization.

**Technical knowledge:** Modern commercial poultry farming requires highly technical knowledge to run a farm efficiently. The contract system enables this transfer of technology from contractors to integrated. The knowledge of keeping temperatures at different stages for rearing poultry appropriately, timing of feeding, lighting programs, and vaccination, are all important factors ignored by independent farmers not in touch with state-of-the-art technology.

Contract farming offers several other potential advantages over independent farms: It has the potential to integrate low-income small farmers into an added value commercial chain, while at the same time reducing price fluctuations and volatility, and part of the production risk.

### 3.3 Critical Factors

Critical factors in modern commercial poultry farming are in practice limited to feeding, heat and light programming and temperatures management.

**Feed:** Feed and water deserve particular attention, being the most significant costs of the entire operation. Feed costs usually account for 60% of total variable costs.

Feed and feeding instructions are provided by the integrator. A common ration for broiler in Brazil would have the following composition:



**Broiler feeding: Ration Composition**

Broiler Feed Composition	Starter	Grower	Finisher
<b>INGREDIENTS %</b>	(0-19 days)	(19-35 days)	(35-42days)
Corn	58	63	70
Soybean meal (48% protein)	34	30	22.2
Fish or bone meal	1.4	--	--
Fat	3.0	3.7	3.8
Ground limestone	1.58	1.85	1.8
Dicalcium phosphate	1.20	1.08	1.24
Salt	0.38	0.3	0.23
DL-Methionine	0.19	0.19	0.20
L-Lysine	--	0.02	0.09
Vitamin premix	0.05	0.05	0.05
Mineral premix	0.05	0.05	0.05
Chloride	0.05	0.04	0.04
Avatek (Lasalocid)	0.05	0.05	0.05
Copper sulfate	0.03	0.03	0.03
Selenium premix	0.010	0.015	0.015
<b>Crude protein %</b>	<b>22.2%</b>	<b>20.2%</b>	<b>17.3%</b>
<b>Metabolizable energy (kcal/kg)</b>	<b>3077</b>	<b>3154</b>	<b>3299</b>

Source: Embrapa Brazil

The ration would heavily rely on grain for energy content – usually sorghum or corn in Brazil – and on seed oil meal – usually from soybean in Brazil – for CP (crude protein) content. Traditional dogma on Brazil on the feeding of meat-type poultry (broilers) holds that birds should be fed diets with decreasing protein energy as they approach market age or final targeted weight. Broilers are commonly fed three diets with increasing energy and decreasing protein content:

**Recommended Broilers Diet in the cycle**

Broiler Feed Composition	Starter	Grower	Finisher
<b>INGREDIENTS %</b>	(0-19 days)	(19-35 days)	(35-42days)
<b>Crude protein %</b>	22.2%	20.2%	17.3%
<b>Metabolizable energy (kcal/kg)</b>	3077	3154	3299

Source: Embrapa Brazil

**Temperature:** Control of temperature inside the chicken houses and ventilation are key factors in poultry farming in order to minimize the death rate, to enhance weight gain and feed conversion. Good ventilation is required to replace oxygen used by the birds, and to remove the moisture and ammonia produced by manure.

Temperature control is vital since chickens are extremely vulnerable to heat shock that leads to sudden death. Body temperature is between 39.8 °C and 43.6 °C and the pineal body regulates the chicken's body temperature and the sense of temperature in the environment. Chickens tolerate sharp coldness better than temperatures over 28 °C, because they have no perspiratory gland. So they open their beaks continuously and lift their wings a bit to feel cooler. When the weather is hot they stick their beak into cold, fresh water to cool the blood in the carotid artery. For drinking, they put their beaks deep into the water, then they quickly lift their head so that the water can run down the throat.

Temperature should be kept at optimum level, responding to changing weather conditions night and day according to the following values during the cycle:

#### Temperature Values along the Cycle

WEEK	TEMPERATURES (°C)
1	32-35
2	29-32
3	26-29
4	23-26
5	20-23
6	20
7	20

Source: Embrapa Brazil

Temperature control is crucial during the first 24 hours of the chick's life and even throughout the first two weeks of life. Broiler chicks have an immature thermo-regulatory system that cannot regulate internal body temperature.

In the specific case of Iraq, heat control would probably be a more critical factor than in Brazil, since the extremes temperatures common in most of the country would require massive evaporative cooling in the summer, in addition to fans. Evaporative cooling refers to the cooling effect produced when water evaporates. The energy used to evaporate water is taken from the air, cooling the air as energy is removed. Evaporative cooling is the least expensive way to cool air. The pumps and fans needed for evaporative cooling are less costly to buy and much less expensive to operate than conventional air conditioning that uses refrigerants and compressors.

**Light:** Light is also an important parameter in poultry production. Light may be the most critical of all environmental factors to birds. Light allows the bird to establish rhythmicity and synchronize many essential functions, including body temperature and various metabolic steps that facilitate feeding and digestion. Of equal importance, light stimulates the secretory patterns of several hormones that largely control growth, maturation, and reproduction. Light as an environmental factor consists of three different aspects: Intensity, duration, and wavelength.

**Light intensity:** Broiler behavior is strongly affected by light intensity. Generally, brighter light will foster increased activity, while lower intensities are effective in controlling aggressive

acts that can lead to cannibalism. Most modern lighting programs begin with a high light intensity ( $\pm 20$  lx) that is decreased to around 5 lx by day 14 to 21, and then maintained at 5 lx or less for the remainder of the grow-out period.

**Light duration:** Light duration (photoperiod) is the second major aspect of light that will alter broiler performance. Different photoperiodic regimes have been tested by Embrapa in Brazil over the years as an alternative to conventional near-continuous lighting. Lighting duration is largely dependent upon the age of the chickens involved and type of housing in use. Research and discussion continue in an attempt to define the optimal photoperiodic regime. The table below is representative of the lighting program in use in Brazil with primary breeders;

#### Light Program during the Cycle

Days	Light Intensity (lx)	Photoperiod L=Light D=Dark
0-7	30-40	23 L - 1 D
8-28	10-15	20 L - 4 D
29-end	3-5	23 L - 1 D

Source: Embrapa Brazil

**Color of light (wavelength):** Color is the third major aspect of light. It is dictated by wavelength and it exerts variable effects on broiler performance. Blue light has a calming effect on birds, while red light provokes feather pecking and cannibalism. Blue-green light stimulates growth in chickens, while orange-red stimulates reproduction.

There are in the market four kinds of lamps available to poultry producers: incandescent, fluorescent, metal halide and high pressure sodium. The incandescent bulb is the current standard in the industry. With regard to wavelength, blue or green light are the standard adopted by most of the primary broiler breeders.

**Disease control:** Disease prevention and control are important flock management factors, but relatively easy to handle. To protect the flock, access to the poultry house must be limited to authorized personnel. Producers should avoid visiting other poultry farms and eliminate any contact with other poultry. A vaccination program is the responsibility of the integrator, and may vary depending on the diseases in the area, usually including vaccination against Marek's disease, Newcastle disease, fowl pox and bronchitis.

## 4. INTEGRATED POULTRY FARMING: FINANCIAL ANALYSIS – BENCHMARK VS. BRAZIL



### 4.1 Production Cost Benchmark: Brazil vs. Iraq

Many states in Brazil enjoy almost perfect conditions for poultry farming: Temperatures are stable (26-27 ° C), the main feed ingredients such as corn, sorghum and soy meal are abundant and available at very competitive prices in the market and the hatching industry is efficient and well developed, fully enjoying economies of scale. It therefore comes as no surprise that the actual cost of producing chicken meat in Iraq (independent farmers) is double that in Brazil, where integrated poultry farming is the predominant business model: \$0,602/kg in Brazil compared to \$1,198/kg in Iraq.

#### Chicken Production Cost in Brazil and Iraq

			Brazil			Iraq		
			Cost per Unit-Chicken			Cost per Unit-Chicken		
			R\$ Brazil	\$ US	%	\$ US	%	
CONTRACT FARMER	1	<b>FIXED COSTS</b>						
	1	1	Depreciation Production Facilities (Construction-Equipment)	0.031	0.013	1.0%	0.013	0.5%
	1	2	Financial Costs on Fixed Capital Investment	0.021	0.009	0.7%	0.009	0.3%
	1	3	Financial Costs on Working Capital	0.023	0.010	0.7%	0.010	0.4%
	<b>TOTAL FIXED COST CONTRACT FARMER</b>			0.075	0.033	2.4%	0.033	1.2%
	2	<b>VARIABLE COSTS</b>						
	2	1	Litter	0.048	0.021	1.5%	0.025	0.9%
	2	2	Heating	0.054	0.023	1.7%	0.031	1.1%
	2	3	Energy	0.026	0.011	0.8%	0.019	0.7%
	2	4	Water	0.004	0.002	0.1%	0.002	0.1%
	2	5	Maintenance	0.008	0.003	0.3%	0.003	0.1%
	2	6	Others	0.011	0.005	0.3%	0.005	0.2%
	<b>TOTAL VARIABLE COSTS CONTRACT FARMER</b>			0.151	0.066	4.7%	0.086	3.1%
	<b>TOTAL COST CONTRACT FARMER</b>			0.226	0.098	7.1%	0.118	4.3%
INTEGRATOR	3	<b>FIXED COSTS</b>						
	3	1	Financial Costs on Investment	0.021	0.009	0.7%	0.009	0.3%
	4	<b>VARIABLE COSTS</b>						
	4	1	Chicks 40g	0.58	0.252	18.2%	0.313	11.4%
	4	2	Feed Costs	1.878	0.817	59.0%	2.226	80.8%
	4	3	Pre-established price/unit paid to Contract Farmer	0.31	0.135	---	---	
	4	4	Veterinary Costs	0.008	0.003	0.3%	0.007	0.3%
	4	5	Technical Assistance	0.008	0.003	0.3%	0.003	0.1%
	4	6	Others	0.151	0.066	4.7%	0.079	2.9%
	<b>TOTAL PRODUCTION COSTS INTEGRATOR</b>			2.935	1.276	92.2%	2.628	95.4%
<b>TOTAL PRODUCTION COST (UNIT/CHICKEN)</b>			<b>R\$ 3.182</b>	<b>\$ 1.383</b>	<b>100.0%</b>	<b>\$ 2.756</b>	<b>100.0%</b>	
<b>TOTAL PRODUCTION COST KG/CHICKEN</b>			<b>R\$ 1.383</b>	<b>\$ 0.602</b>	<b>100.0%</b>	<b>\$ 1.198</b>	<b>100.0%</b>	

### Assumptions in the Estimated Production Cost of 1kg of Live Chicken in Iraq and Brazil

COST PRODUCTION ASSUMPTIONS		
<b>Business Model</b>	Integrated Chicken Farm	Independent
<b>Chicken House Handling</b>	Automated	Manual
<b>Chicken House Dimension</b>	1250m <sup>2</sup> Length105m – Width 12m – Height 4.20m	1250m <sup>2</sup> Length105m – Width 12m – Height 4.20m
<b>Cycles/Year (Days)</b>	42 Days	42 Days
<b>Cycles Intervals</b>	14 Days	14 Days
<b>Litter (Straw) Volume/Cycle</b>	500 g/Chicken	500g/Chicken
<b>Heating</b>	GLP 20 Cylinder/13kg/Cycle + 12m <sup>3</sup> Wood	N.A
<b>Energy (kwh/Cycle)</b>	1,550 kwh/Cycle	2,250 kwh/Cycle
<b>Water Consumption/Cycle</b>	200m <sup>3</sup> /Cycle	200m <sup>3</sup> /Cycle
<b>Chicks Initial Weight</b>	40g	40g
<b>Chicken Final Weight (42 Days)</b>	2300g	2300g
<b>Feed Conversion (FC)</b>	1.9	2.8
<b>Feed Cost/kg</b>	\$ 0.20	\$ 0.33
<b>Mortality Rate</b>	2.70%	10.5%

Source: Embrapa Minas Gerais Brazil – IPPA Iraq

The main differences between the chicken production costs in Brazil and Iraq are due to:

- Feed Cost: \$0.20 in Brazil - \$0.33 in Iraq.
- Less efficient feed conversion rate in Iraq (2.8 vs. 1.9 in Brazil) probably due to factors such as better feed quality in Brazil, more efficient business model, more favorable climatic conditions, superior technology and farmers' superior know-how.
- Higher average mortality rate in Iraq than in Brazil – 10.5% vs. only 2.7%.
- Higher cost of chicks: \$0.31 in Iraq vs. \$0.25 in Brazil.

Other costs such as heating and - above all - electricity are also higher in Iraq than in Brazil due to the harsh climatic conditions and wide temperature variation. Electricity consumption in Iraq – where evaporative cooling is imperative – would probably be much higher than in Brazil possibly reaching 3,000 kwh/cycle and negatively affecting production costs were it not for the subsidies in place.<sup>14</sup>

Although Iraqi corn and soy meal production costs may never be as low as in Brazil, it is unquestionable to assume that the adoption of the integrated chicken farming could enormously benefit Iraq and provide the required leap in efficiency and productivity indispensable to make the domestic poultry industry more competitive.

<sup>14</sup> Electricity for production activity is still nominally subsidized in Iraq for any manufacturing or processing activities, although not always available.

There is no question that integrated poultry farming would significantly improve Iraq's current poor feed conversion rate, reduce mortality, improve productivity, and reduce feeding costs through economies of scale and a more efficient supply chain.

Whole frozen Brazilian chicken has been imported in Iraq in 2006 for \$1.07/kg (CIF Baghdad), and at a price close to \$1.02/kg in the months following the outbreak of bird flu in Europe that drastically reduced Brazilian chicken consumption there and pushed Brazilian stocks to record of 400,000 tons.<sup>15</sup> At the moment, despite the overall consumer preference for fresh poultry in Iraq, Brazilian frozen chicken - or defrosted and sold as fresh - still dominates the Iraqi market, pushing domestic farmers out of business.

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<sup>15</sup> The equivalent of 80 days exports, based on the current export trends following the outbreak of bird flu.

## 5. INTEGRATED POULTRY FARMING IN IRAQ

Integrated poultry farming in Brazil has proved highly successful, providing a satisfactory level of profitability to both integrators and contract farmers. In the case of integrators, the average net profitability in the sector is around 5.8%, generally in line with that of the food processing industry but with higher Return on Investment (R.O.I.) values due to higher capital rotation. On the other hand, the development of integrated poultry farming has considerably lowered the capital barrier, creating valuable rural jobs for farmers possessing capital as low as \$30,000-35,000 including the cash invested in working capital.

### Integrated Poultry Farming in Brazil: Average Profitability per Cycle

<b>CONTRACT FARMER</b>	<b>\$/Chicken</b>	<b>\$Total/Cycle</b>	<b>%</b>
Total Revenue	0.235	3,290	100.0%
Revenue from Chicken	0.135	1,890	57.4%
Revenue from Litter	0.100	1,400	42.6%
Total Costs	0.099	1,386	42.1%
Free Cash Generated/ Cycle	0.136	1,904	57.9%
Free Cash Generated/Month	0.068	952	28.9%
<b>INTEGRATOR</b>	<b>\$/Chicken</b>	<b>\$Total</b>	<b>%</b>
Wholesale Price	0.791	11,074	100.0%
Total Production Costs	0.602	8,428	76.1%
Commercialization Costs	0.056	784	7.1%
Total Costs	0.658	9,212	83.2%
Gross Margin	0.133	1,862	16.8%
Other overheads	0.087	1,218	11.0%
Net Profit	0.046	644	5.8%
Return on Investment	---	---	17.8%

Source: Embrapa Brasil, 2006

Revenue for contract farmers derives from two different sources: the contract with integrators buying the grown chickens at a predetermined price of \$0.135/unit (after a growing cycle of 42-45 days) and the litter sold in the market as organic fertilizer for a minimum of \$40/ton. The operation yields net cash (after depreciation and amortization) of \$952/month on average, an amount usually able to support the cost from two to four workers per house in a non-automated operation. The key point is therefore to analyze how replicable the model of integrated contract poultry farming can be in Iraq and its ability to generate the level of positive cash flow shown in the Brazilian operations .

## 5.1 Capital Investment

The modern poultry houses used in Brazil are modular and standardized: The typical house for 15,000 birds would measure 120m (length) x 12m (width) x 4.20m (height) for a total of 1,440m<sup>2</sup>. Bird density may vary a little according to temperature, being in the range of 10 birds (± 20%) per square meter in most of the states.<sup>16</sup>

### Poultry Houses in South Brazil



There are two different options available: automated houses – where the entire feeder and watering system is centralized and automated – and manual houses. With today's automated equipment it is estimated that a grower can easily take care of two houses, while in a manual operation two workers – one per shift – are required for each house. Most of the manual houses are family businesses, usually employing as many as 3-4 person per house.

The investment for a manual house facility of 1,440m<sup>2</sup> is around \$26,500 in Brazil, while for an automated operation no less than \$46,000 should be invested. In our estimate, the cost for a manual house in today's Iraq should be approximately the same as in Brazil: construction costs are similar in the two countries and Turkish, Iranian, Chinese and Indian equipment is available in the Iraqi market at competitive prices in line with the Brazilian market - perhaps even 5-7% cheaper. Nevertheless, taking into account the size of the Iraqi market and the fragmentation on the supply side, hangars of 7,000-8,000 birds – half of the size of the Brazilian standard – may prove more appropriate in Iraq and also minimize the capital investment at the same time.

The great financial advantage of integrated poultry farming lies in the fact it drastically reduces the working capital: a cycle with 14,000 birds could in fact started with as little as \$3,000, while in an independent business model almost \$30,000 would be needed. Under these circumstances, it is easy to understand how the absence of integrated poultry farming may have actually hindered the development of the poultry industry in Iraq, where working capital acted as a powerful barrier, in addition to the invested capital requirement.

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<sup>16</sup> The highest density is 12 birds/m<sup>2</sup> in the cooler southern states of Parana and Santa Catarina. The lowest density is in the states of the central west and northeast with only 8 birds/ m<sup>2</sup>.



## 5.2 Potential Positive Effects in Iraq

Unquestionably, the adoption of the integrated poultry farming in Iraq could reduce the domestic production cost, making local production more competitive with imports of whole frozen chicken from Brazil.

### The Possible Impact on Chicken Production Cost with Integrated Farming in Iraq

			Brazil Integrated Farming			Iraq - Traditional Farming		Iraq - New Integrated Farming	
			Cost per Unit-Chicken			Cost per Unit-Chicken		Cost per Unit-Chicken	
			R\$ Brazil	\$ US	%	\$ US	%	\$ US	%
			<b>CONTRACT FARMER</b>						
1		<b>FIXED COSTS</b>							
1	1	Depreciation Production Facilities (Construction-Equipment)	0.031	0.013	1.0%	0.013	0.5%	0.013	0.6%
1	2	Financial Costs on Fixed Capital Investment	0.021	0.009	0.7%	0.009	0.3%	0.009	0.4%
1	3	Financial Costs on Working Capital	0.023	0.010	0.7%	0.010	0.4%	0.010	0.5%
		<b>TOTAL FIXED COST CONTRACT FARMER</b>	0.075	0.033	2.4%	0.033	1.2%	0.033	1.6%
2		<b>VARIABLE COSTS</b>							
2	1	Litter	0.048	0.021	1.5%	0.025	0.9%	0.025	1.2%
2	2	Heating	0.054	0.023	1.7%	0.031	1.1%	0.031	1.5%
2	3	Energy	0.026	0.011	0.8%	0.019	0.7%	0.019	0.9%
2	4	Water	0.004	0.002	0.1%	0.002	0.1%	0.002	0.1%
2	5	Maintenance	0.008	0.003	0.3%	0.003	0.1%	0.003	0.1%
2	6	Others	0.011	0.005	0.3%	0.005	0.2%	0.004	0.2%
		<b>TOTAL VARIABLE COSTS CONTRACT FARMER</b>	0.151	0.066	4.7%	0.086	3.1%	0.084	4.1%
		<b>TOTAL COST INTEGRATED</b>	0.226	0.098	7.1%	0.118	4.3%	0.117	5.7%
<b>INTEGRATOR</b>									
3		<b>FIXED COSTS</b>							
3	1	Financial Costs on Investment	0.021	0.009	0.7%	0.009	0.3%	0.009	0.4%
4		<b>VARIABLE COSTS</b>							
4	1	Chicks 40g	0.58	0.252	18.2%	0.313	11.4%	0.277	13.5%
4	2	Feed Costs	1.878	0.817	59.0%	2.226	80.8%	1.440	70.2%
4	3	Pre-established price paid to Contract Farmers (unit)	0.31	0.135	---	---	---	0.135	6.6%
4	4	Veterinary Costs	0.008	0.003	0.3%	0.007	0.3%	0.003	0.1%
4	5	Technical Assistance	0.008	0.003	0.3%	0.003	0.1%	0.003	0.1%
4	6	Others	0.151	0.066	4.7%	0.079	2.9%	0.066	3.2%
		<b>TOTAL PRODUCTION COSTS INTEGRATOR</b>	2.935	1.276	92.2%	2.628	95.4%	1.924	93.9%
		<b>TOTAL PRODUCTION COST (UNIT/CHICKEN)</b>	<b>R\$ 3.182</b>	<b>\$ 1.383</b>	<b>100.0%</b>	<b>\$ 2.756</b>	<b>100.0%</b>	<b>\$ 2.05</b>	<b>100.0%</b>
		<b>TOTAL PRODUCTION COST KG CHICKEN</b>	<b>R\$ 1.383</b>	<b>\$ 0.602</b>	<b>100.0%</b>	<b>\$ 1.198</b>	<b>100.0%</b>	<b>\$ 0.891</b>	<b>100.0%</b>

Realistically, the adoption of integrated poultry farming in Iraq could reduce the current

production cost by 25% - from \$1.198/kg to \$0.891/kg. The main savings would certainly be in chicks and feed costs, where integrators massively outperform independent farmers. Integrators' know-how and state-of-the-art technology would certainly have a positive impact on feed conversion and mortality rates - also indicators that usually show poor values among independent farmers.

In our model, based on IPPA and Embrapa experience, mortality rates have dropped from 10.5% to 6% and feed conversion rates improved from current 1: 2.8 to 1: 2.3. More importantly, big integrators are in a position to import directly and more efficiently their feed ration inputs – corn and soy meal for instance – and produce their own in-house feed ration, reducing considerably the cost/kg. In our model we estimated a reduction from \$0.33/kg to \$0.27/kg.

In Saudi Arabia, the adoption in large scale of integrated poultry farming during the '90s has had a significant positive impact on production costs, reducing them from \$1.28/kg in 1992 to the current \$0.928/kg.<sup>17</sup>

#### Traditional and Integrated Poultry Farming in Iraq: Estimated Production Costs Reduction

	Iraq Traditional Farming	Iraq Integrated Farming	Δ %
Total Production Cost/kg	\$ 1.198	\$ 0.891	-25%
Feeding Costs	\$ 2.22	\$ 1.44	-35%
Feed Conversion Rate	1: 2.80	1: 2.30	-18%
Mortality Rate	10.5%	6%	-43%
Feed Ration Cost/kg	\$ 0.33	\$ 0.27	-18%
Day-old Chicks 40g Cost/head	\$ 0.313	\$ 0.277	-12%

The switch to integrated poultry farming could also bring about other minor savings in variable costs that we ignored in order to simplify the analysis in our model. With all the mentioned savings in place, domestically produced chicken would regain some ground on competitiveness, but it would still have a production cost per kg +50% vs. the Brazilian imported - \$0.891 compared to \$0.602.

#### Cost Comparison of Chicken Production cost/kg in Brazil and Iraq

	Brazil	Iraq Traditional Framing	Iraq Integrated Farming
Total Production Cost/kg - \$/kg	0.602	1.198	0.891
Index - Brazil=100	100	199	148

Source: IPPA Iraq – Embrapa Minas Gerais Brasil

<sup>17</sup> Data from Saudi Arabia's Cooperative Society for Poultry Producers.

Taking into account other variables such as commercialization costs and margins, whole frozen Brazilian imported chicken would probably be sold in the retail market, *ceteris paribus*, at a discount of 40%/kg in comparison to Iraqi product produced in integrated poultry farming operations. In order to reduce this gap, other measures should be explored, such as import tariffs or subsidies, as has been done in the past, at least in the early stages of establishing an industry.

Subsidies are widely regarded in today's Iraq as a game of the past, and tariffs looked upon with suspicion. Subsidies are nevertheless employed in Saudi Arabia, where the government pays 25 percent of the cost of selected poultry equipment and provides a subsidy of \$42.67/ton to importers of corn or soy meal for chicken feed. Imported barley is also subsidized at \$66.67/ton.<sup>18</sup>

In liberal GCC Countries the local poultry industry is heavily protected with a customs duty on imported chicken of 20% or \$0.267 per kilogram, whichever is higher. Saudi Arabia's Cooperative Society for Poultry Producers is engaged in a high profile lobbying effort to convince the Saudi government to increase the import duty on poultry meat from the current 20 per cent.

Assuming the successful adoption of integrated poultry farming takes place in Iraq, two different scenarios can be envisaged, depending on the level of protection domestic poultry will be granted. In the absolute absence of protection, Iraqi product will have to be sold at considerable premium in the market – at least +40% in comparison to the imported frozen chicken. Under these circumstances, it is unlikely to surpass 20% of market share. Conversely, a certain degree of protection for the Iraqi product would reduce the price gap vs. the imported product and possibly push Iraqi chicken market share to a level of 35%.

#### Scenarios for the Development of the Integrated Poultry Farming in Iraq

	2006	2010	2020
Total Market Size (000 Tons)	100,000	450,000	800,000
Per Capita Consumption - kg	3.8	15	20
<b>Estimate - Scenario 1</b>			
Market Share of Domestic with Price Differential +40% vs. Frozen Imported	20%	20%	20%
Domestically Produced Tons	20,000	90,000	160,000
Number of Chicken Houses - 7,000 Birds/cycle -	400	1,800	3,200
Direct Job Creation	800	3,600	6,400
<b>Estimate - Scenario 2</b>			
Market Share of Domestic with Price Differential +25% vs. Frozen Imported	35%	35%	35%
Domestically Produced (Tons)	35,000	157,500	280,000
Number of Chicken Houses - 7,000 Birds/cycle -	700	3,200	5,600
Direct Job Creation	2,100	9,600	16,800

<sup>18</sup> The Saudi government encourages the establishment of new integrated poultry farming by also subsidizing cold stores, automated farm equipment, investment in facilities, and the adoption of the latest broiler production and management techniques.

Scenario 1 is based on the following assumptions:

- Domestically produced chicken is sold in the market at a price +40% vs. whole imported frozen.
- Domestic product commands a 20% market share despite a higher price, based on existing consumer preference for fresh product, compliance with halal slaughtering requirements, and because of easy availability in the market – the sheer distribution effect.<sup>19</sup>
- Integrated Poultry Farming with houses of 7,000 birds producing ±100 tons/year, handled by three full time workers.

Scenario 2 is basically based on a minor price differential (domestic +25% vs. imported) leading to an increase in market share for the domestic production (from 20% to 35%).

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<sup>19</sup> Compliance to Halal requirements is a competitive advantage – to a certain extent – for the Iraqi domestic poultry since many consumers question halal certification of the imported products. All imported products are formally Halal certified.

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## 6. POSSIBLE IMPACT ON AGRICULTURE

The development of a modern poultry industry in Iraq could favorably impact the agricultural sector in many aspects:

1. It would immediately create a market and an incentive for expanding corn production, offering farmers the opportunity to exploit alternatives to the traditional wheat and barley crops – both winter crops.
2. It could become the engine to incentivize sorghum (*Milo*) production, a crop with higher potential than corn in most of the areas in Iraq, according to ICARDA analysis. Three characteristics of sorghum give it a potential advantage over corn in dry areas:<sup>20</sup>

**Sorghum Fields**



- Corn is cross-pollinated. Severe drought at silking time may cause barren ears (no kernels). Sorghum is self-pollinated and produces heads over a longer period because shoots develop over several weeks. Consequently, short periods of drought do not seriously affect pollination and fertilization. In a longer drought, sorghum produces fewer and smaller heads, but they are rarely without kernels.
- An optimum relationship between plant population and moisture supply is often critical with corn but is unimportant with sorghum. When soil moisture is plentiful, sorghum heads grow large and shoots produce heads. But, if drought occurs, heads are small and fewer shoots develop. Consequently, sorghum growers can plant at high density for potentially high yields. Corn growers can choose between high density for maximum yields or lower densities with less chance of serious loss from drought.
- Sorghum foliage resists drying. At equal moisture stress, corn leaves lose a greater percentage of their water content than do sorghum leaves. The waxy coating on sorghum leaves and stems may be an important cause. Sorghum is also more tolerant of wet and poorly drained soils than most grain crops.

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<sup>20</sup> ICARDA – International Center for Agricultural Research in the Dry Areas.

The nutrient needs of sorghum closely resemble those of corn in that sorghum uses relatively large amounts of nitrogen and moderate amounts of phosphorus and potassium. In dry conditions, or if subsoil moisture is very low, sorghum consistently out performs corn, reaching yields of 2-3 tons/ha.<sup>21</sup>

3. The poultry industry produces a significant amount of poultry litter/manure, a valuable organic fertilizer and soil conditioner. Poultry litter is an excellent, low cost fertilizer if used properly. Land application of litter returns nutrients and organic matter to the soil, building soil fertility and quality. In addition to the micronutrients, N, P, and K, poultry manure contains calcium, magnesium, sulfur, and other essential nutrients in lesser or trace amounts. Unfortunately, the concentration of nutrients in litter, as compared to commercial fertilizers, is unpredictable. Phosphorus and potassium become most readily available in soil, while nitrite has the slowest release rate of the three major nutrients. Most of the nitrogen found in poultry manure or litter is in the form of organic nitrogen. A smaller amount is in the form of ammonium-nitrate. Organic nitrogen can be converted to inorganic nitrogen by bacteria in the soil. The maximum value of poultry litter as a fertilizer occurs at the time of its removal from the poultry house. The longer the litter is held prior to application, the more available nitrogen is lost to the atmosphere in the form of ammonium.

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<sup>21</sup> Corn yields/ha in Iraq are consistently < 1 ton/ha.

## 7. CONCLUSIONS

The current crisis of the Iraqi poultry industry is attributable both to demand and supply factors:

- A significant drop in consumer demand – from 15kg/per capita in the pre embargo era to the current 4kg/per capita, and probably still decreasing.
- Strong competition from imported whole Brazilian frozen chicken, currently sold in the market at a retail price at about half of the price.

### Poultry Market in Iraq: Domestic Production vs. Imported

	2003	2005	2006
Total Market (000 tons)	122	120	100
Domestic Production (000 tons)	74	52	26
<b>Market Share</b>	<b>61%</b>	<b>43%</b>	<b>26%</b>
Imports (000 tons)	48	68	74
<b>Market Share</b>	<b>39%</b>	<b>57%</b>	<b>74%</b>

### Poultry Market in Iraq: Production Costs – Retail Prices of Domestic vs. Imported

	Imported Frozen Brazil			Fresh Domestic Iraq		
	\$	IQD	%	\$	IQD	%
Production Cost	\$ 0.602	IQD 903	36.9%	\$ 1.19	IQD 1,785	38.4%
Import Price (CIF)	\$ 1.020	IQD 1,530	62.6%	---	---	---
Retail Prices (May 2006)	\$ 1.630	IQD 2,445	100%	\$ 3.10	IQD 4,650	100%
Retail Prices (October 2006)	\$ 2.20	IQD 3,300		\$ 3.90	IQD 5,850	

- Lack of competitiveness in all the main costs such as feed and chicks, further aggravated by the government's new policy of no subsidies.<sup>22</sup>
- Structural problems within the industry such as excessive fragmentation and, above all, the absence of Integrated Poultry Farming – the business model universally adopted in the most competitive countries such as the USA and Brazil.

The development of an efficient, modern, more competitive poultry industry should be a priority for the new Iraqi government since:

- Poultry is one of the few significant food markets in Iraq;
- More efficient domestic poultry production is an important component to improve current Iraqi poor protein diet. Chickens have an efficient feed conversion rate, optimizing the transformation of scarce grain resources into added value meat;
- Poultry farming can create a significant amount of direct jobs in rural areas;

<sup>22</sup>The Iraqi poultry industry was heavily subsidized by the government until 2005.

- The development of a modern poultry industry would have a beneficial effect on Iraqi agriculture, creating demand for alternative crops – such as oil seeds, corn, and sorghum – currently in short supply. It would also produce considerable quantities of organic fertilizers – litter – at a competitive price, highly valuable for vegetable and fruit production and soil enrichment.

Although Iraqi corn and soy meal production costs may never be as low as in Brazil, it is unquestionable to assume that the adoption of integrated chicken farming could enormously benefit Iraq and provide the required leap in efficiency and productivity indispensable to making the domestic poultry industry more competitive.

#### Traditional and Integrated Poultry Farming in Iraq: Estimated Production Costs Reduction

	Iraq Traditional Farming	Iraq Integrated Farming	Δ %
Total Production Cost/kg	\$ 1.198	\$ 0.891	-25%
Feeding Costs	\$ 2.22	\$ 1.44	-35%
Feed Conversion Rate	1: 2.80	1: 2.30	-18%
Mortality Rate	10.5%	6%	-43%
Feed Ration Cost/kg	\$ 0.33	\$ 0.27	-18%
Day-old Chicks 40g Cost/head	\$ 0.313	\$ 0.277	-12%

Realistically, the adoption of integrated poultry farming in Iraq could reduce the current production cost by 25% - from \$1.198/kg to \$0.891/kg. The main savings would certainly be in chicks and feed costs, where integrators greatly outperform independent farmers. Integrator know-how and state-of-the-art technology would certainly have a positive impact on feed conversion and mortality rates also – indicators that usually show poor values among independent farmers.

The switch to integrated poultry farming could also bring about other minor savings in variable costs that are ignored in order to simplify the analysis in our model. With all the mentioned savings in place, domestically produced chicken would regain some ground on competitiveness, but it would still have a production cost per kg +50% vs. the Brazilian imported - \$0.891/kg compared to \$0.602/kg. Taking into account all the relevant factors such as margin policy, commercialization costs, and others, domestic production would be sold at retail price with a premium of +40% vs. frozen imported. In order to reduce this gap, other methods should be explored, such as import tariffs or subsidies, as has been done in the past and is currently done in the GCC Countries.

In the absence of any government intervention, domestic poultry potential would probably be limited to 20% of market share, based on historical series of elasticity data supplied by IPPA and comparable studies in the MENA region. Based on the same elasticity model, we estimate that the Iraqi domestic poultry industry could reach a market share of 35% reducing the retail price gap vs. frozen imported from 40% to 25% - an objective supposedly in line



with a possible light protection scheme similar to the one adopted in the GCC Countries. (20% flat tariff on all imported chicken).

#### Cost Comparison of Chicken Production cost/kg in Brazil and Iraq

	2006	2010	2020
Total Market Size (000 Tons)	100,000	450,000	800,000
Per Capita Consumption - kg	3.8	15	20
<b>Estimate - Scenario 1</b>			
Market Share of Domestic with Price Differential +40% vs. Frozen Imported	20%	20%	20%
Domestically Produced Tons	20,000	90,000	160,000
Number of Chicken Houses - 7,000 Birds/cycle -	400	1,800	3,200
Direct Job Creation	800	3,600	6,400
<b>Estimate - Scenario 2</b>			
Market Share of Domestic with Price Differential +25% vs. Frozen Imported	35%	35%	35%
Domestically Produced (Tons)	35,000	157,500	280,000
Number of Chicken Houses - 7,000 Birds/cycle -	700	3,200	5,600
Direct Job Creation	2,100	9,600	16,800

The future development of the Iraqi poultry industry seems to depend primarily on the introduction of the integrated poultry farming system in the country, supported by a rebound in demand, likely to happen once the country is stabilized. Along with the IPPA, the appropriate ministries and officials should devise a package of incentives aimed at attracting foreign investors with know-how in integrated poultry farming. Another viable alternative could be to identify local champions and to promote their adoption of integrated poultry farming through a specifically designed sectoral policy and incentive packages. Financial institutions with loans at special rates could also play an important role and accelerate the process.