

Kate Schneider, Associate Professor Mary Kay Gugerty,  
Professor C. Leigh Anderson, & Professor Robert Plotnick

*Prepared for the Market Access Team  
of the Bill & Melinda Gates Foundation*

May 25, 2010

**Evans School Policy Analysis and Research (EPAR)**

*Professor Leigh Anderson, PI and Lead Faculty*

*Associate Professor Mary Kay Gugerty, Lead Faculty*

**Overview**

Demand for livestock products, including poultry, is expanding in West Africa as a result of population growth and increased urbanization. Trade liberalization has had differing effects on poultry markets in the region, with some countries experiencing large import flows of frozen poultry from the European Union and others receiving very little. This report provides an overview of poultry market trends in Mali for comparison with trends in the wider West African region.

The West African poultry sector faces high production costs, safety concerns from poor sanitary controls, and limited processing and marketing capacity and technology. Production costs are high due to the lack of an integrated and automated industrial poultry sector. Farmers lack reliable access to inputs, including chicks and feed, and face high costs for veterinary services.<sup>1</sup> African livestock markets are also limited by global concerns about product safety.<sup>2</sup> The persistence of animal disease outbreaks continues to limit domestic and export production potential.<sup>3</sup> In addition to biological issues, the lack of breeders, marketing, and processing technology present technical constraints to poultry sector growth.<sup>4</sup>

The introduction of the Common External Tariff (CET) in West Africa reduced the tariff rate applied in most countries, facilitating an influx of cheap poultry imports from Europe and decreasing the ability of the domestic sector to compete with imported products. Under the CET, import tariffs on final consumer goods (including poultry) are set at 20 percent.<sup>5,6</sup> No recent tariff data is

available for Mali, however, in the wake of the avian flu epidemic the only poultry products currently legal to import are eggs for reproduction and day-old chicks. No poultry meat has been imported into Mali since March 2004.<sup>7</sup>

The main resource available for this analysis is the FAO-ECTAD poultry sector review from 2006.<sup>8</sup> Appendix 1 presents an overview of Mali's poultry sector in comparison with West Africa as a whole and several other individual countries.

**Mali**

*Figure 1. Mali*



Source: CIA World Factbook

Between 40 and 80 percent of Mali's population raise poultry, and the sale of poultry products is considered an

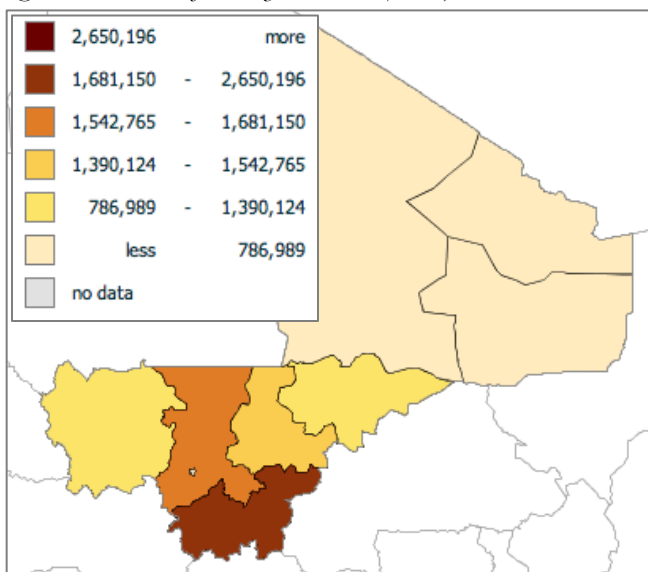
NOTE: The findings and conclusions contained within this material are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

important source of revenue in rural areas.<sup>9</sup> Raising several species of livestock is common practice in Mali, although chickens are the most widespread, followed by guinea fowl, turkeys, ducks and pigeons.<sup>10</sup> Guinea fowl, ducks and pigeons are only available seasonally.<sup>11</sup>

Consumption & Consumer Preferences

Urban and rural divisions characterize poultry consumption in Mali. People in rural areas generally consume poultry they have raised themselves.<sup>12</sup> Demand for purchased chicken is highest in urban areas and in the mining areas, such as the Kayes region.<sup>13</sup> The urban restaurant sector is the main consumer of commercially raised chicken.<sup>14</sup> Figure 2 illustrates the geographic distribution of poultry stocks in Mali. While geographic information per capita is unavailable, the distribution of poultry stocks roughly mirrors the population: 90 percent of Malians live in the southern part of the country.<sup>15</sup>

Figure 2. Number of Poultry\* in Mali (2004)



Source: FAO Global Livestock Production and Health Atlas  
 \* Poultry includes chickens, turkeys and ducks

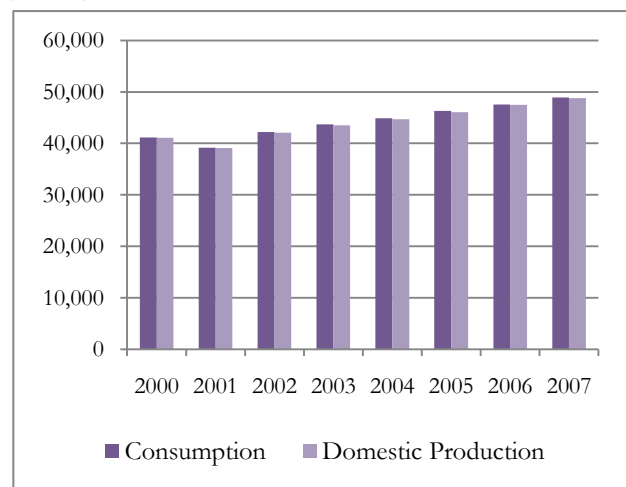
Rural populations consume meat, including poultry, only occasionally because of its high cost.<sup>16</sup> Total meat consumption (excluding fish) is highest in the easternmost regions of Gao and Kidal at 65 and 64 grams per person per day, respectively, where there is a substantial nomadic population who derive a majority of their diet from meat.<sup>17</sup> Meat consumption is lowest in the southernmost region of Sikasso at 22 grams per person per day. Unfortunately, there is no data regarding the percentage of meat consumption accounted for by poultry.<sup>18</sup>

Hen eggs and chicken meat together account for 0.69 percent of daily calories in Mali. Per capita chicken meat production in 2008 was 3.01 kg, more than three times the quantity of per capita egg production that year. While there is no specific information regarding cultural preferences for eggs, the low ratio of egg to chicken meat production suggests that eggs are not widely consumed. The available data support the idea that most eggs raised in rural areas are used for chicken reproduction, and not consumption.<sup>19</sup> The varieties of chickens raised in Mali include many commercial breeds as well as several local types. The most well known local varieties are the Koko-Ché, found in the Fana zone of the central Ségou region, and the Semba-Ché, found in the Ségou and Sikasso regions.

Domestic Production

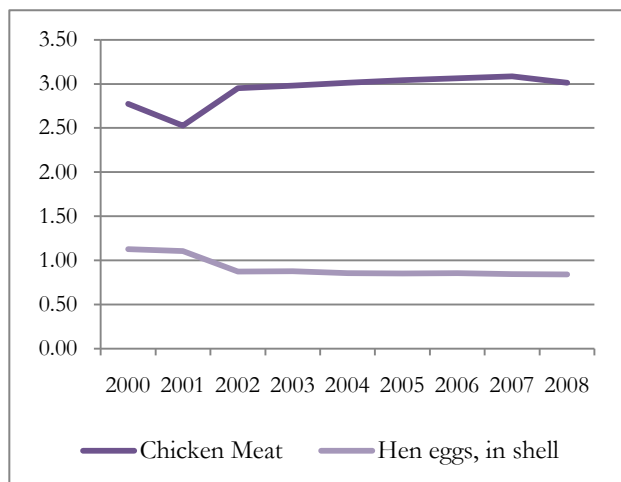
As Figure 3 demonstrates, Mali produced over 99.5 percent of the chicken meat and hen eggs consumed domestically in every year between 2000 and 2007, though they imported more than half of the hatching eggs and day-old chicks to support poultry stocks.<sup>20</sup> This translated to an average production of 3.01 kilograms of eggs and 0.84 kilograms of chicken meat per capita in 2008, as illustrated by Figure 4.

Figure 3. Domestic Poultry Production & Consumption (Tonnes)



Source: FAOSTAT

Figure 4. Domestic Chicken Meat and Egg Production (Kilograms per Capita)



Source: FAOSTAT

Domestic poultry production in Mali is characterized by two systems: commercial operations and traditional rural family and village production. Commercial poultry utilizes imported hatching eggs and day-old chicks and produces meat and eggs mainly for the urban market.<sup>21</sup> At the village level, eggs are primarily for poultry reproduction and poultry meat is for own consumption.<sup>22</sup>

Commercial operations account for only five to ten percent of total poultry production in Mali, but provide an important source of food, especially for urban and peri-urban consumers.<sup>23,24,25</sup> The Koulikoro region accounts for 65 percent of industrial poultry production, followed by the district of Bamako with 22 percent.<sup>26</sup> The central Ségou, southern Sikasso, and westernmost Kayes regions contain the remainder of commercial operations.<sup>27</sup> The commercial poultry sector is stratified according to the size of operations, with over 50 percent containing between 500 and 2,000 animals; only twenty operations contain more than 2,000 while 115 operations contain fewer than 500.<sup>28</sup>

Family poultry production accounts for between 90 and 96 percent of the entire poultry population in the country.<sup>29,30,31</sup> Families typically possess fewer than twenty animals.<sup>32</sup> Traditional backyard chickens and other poultry (guinea fowl, ducks and pigeons) are generally of mixed genetic origin, consisting of multiple commercial and locally adapted varieties.<sup>33</sup>

The efficiency of traditional village poultry production is quite poor; with low per chicken egg production and birds

typically weighing less than one kilogram at six months of age.<sup>34</sup> Some village poultry producers practice improved production, which is distinguished by its more commercial orientation and improved practices such as proper habitats and regular provision of feed.<sup>35</sup> Output is usually higher than under the traditional system. Survival rates are around 75 percent, egg production is significant enough for marketing, and chickens grow to between 1.5 and 2.5 kilograms by six months of age.<sup>36</sup> No data is available regarding the percentage of rural smallholders using improved practices.

#### Production Costs

In its 2006 poultry sector analysis, the FAO reported that many members of the poultry sector in Mali were unsatisfied with several trade measures that significantly increased production costs, including the value added tax under the ECOWAS trade agreement.<sup>37</sup> In the commercial poultry sector, day-old chicks or hatching eggs are generally purchased. Domestic production met only 40 percent of demand for day-old chicks and hatching eggs in 2006 with imports covering the remainder. There were distinct differences between the costs of locally produced male (broiler) and female (hen) chicks; 2005 average prices for broilers were between 350 and 450 CFA francs (U.S.\$0.66-\$0.85) and nearly twice that amount (600 to 750 CFA francs (U.S. \$1.13-\$1.42), for hen chicks. The average price for imported chicks was 1100 CFA francs (U.S. \$2.08).<sup>38</sup> In village poultry production, eggs are hatched from already owned adult animals or purchased locally.<sup>39</sup>

Industrial poultry producers purchase feed from commercial suppliers.<sup>40</sup> According to the FAO-ECTAD analysis, there were 18 different poultry feed factories in Mali in 2005, up from only five in 2001.<sup>41</sup> By 2007 there were around thirty small feed factories. That year, they formed the Coopérative des Proviendiers du Mali (COPROMA) and produced nearly 34,000 tonnes of poultry feed. The installation of the nation's second industrial facility the following year doubled Mali's feed production capacity.<sup>42</sup> In traditional village production, animals receive feed only occasionally and must meet most of their food needs by grazing. Improved village poultry production provides regular feed, especially to chicks.<sup>43</sup>

#### Processing & Marketing

A modern industrial processing chain serves the industrial poultry sector around Bamako.<sup>44</sup> According to the

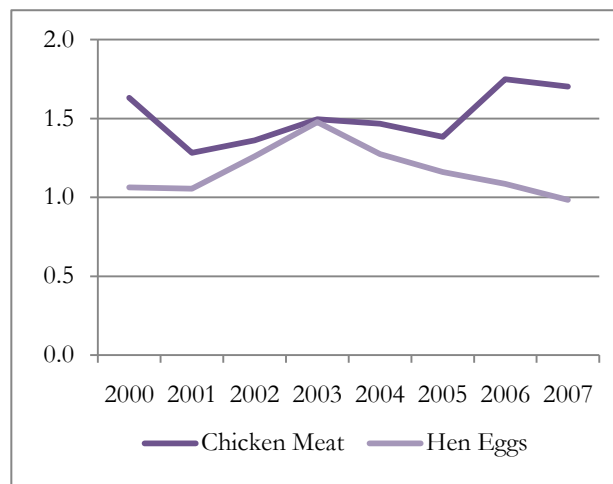
UOFA/UEMOA Technical Poultry Workshop in 2007, the Malian slaughter sector has improved hygiene and product quality.<sup>45</sup> For traditional poultry production sold in rural markets, improvised slaughterhouses are organized around points of sale.<sup>46</sup>

Although most village poultry is for own consumption, there is an emerging trend of selling to local markets and urban centers.<sup>47</sup> For example, according to the president of the poultry farmers' cooperative in Barouéli (200 km southwest of Bamako), most of the cooperative's sales are in the capital.<sup>48</sup> Transporting village poultry to market utilizes all available forms of transport from bicycles and motorcycles to buses and truck taxis (*taxi-brousses*). The birds are usually transported alive in cages or suspended in open-air and tied together in bunches at their feet. Significant losses often result during transport, particularly due to heat and excessive congestion.<sup>49</sup>

#### *Producer Prices*

The FAO-ECTAD analysis of Mali's poultry sector suggests that the multitude of actors in an inefficient and uncoordinated commercial arena contributes to increased prices of poultry products to consumers and reduced profit margins for producers.<sup>50</sup> Figure 5 shows the ratio between Malian producer prices and the world average for chicken meat and hen eggs. The producer price of chicken meat in Mali is well above the world average price. This could result from higher costs of production and probably does not signify greater profitability. There is a declining trend in producer prices for hen eggs in recent years, which has brought the Malian price in line with the world average.

Figure 5. Ratio of Mali's Producer Price to World Average Price for Chicken Meat & Hen Egg



Source: FAOSTAT

#### *Safety Concerns*

The government has traditionally been the main supplier of veterinary services in Mali. Insufficient human and physical resources, however, have prevented the effective control of animal diseases, which continue to contribute to low levels of animal production and productivity.<sup>51</sup> While economic liberalization has allowed development of a private veterinary sector, it appears to have improved access to these services only for farmers and herders in areas where there is strong effective demand.<sup>52</sup> Vaccinations and veterinary care are nonexistent in traditional poultry production. Some improved village poultry producers apply elementary hygiene and disease prevention practices.<sup>53</sup>

In transporting village poultry to market, birds that perish during the journey are often left in the cages with live birds that will be sold, presenting safety concerns. Furthermore, the improvised slaughterhouses provide an opportunity for the dissemination of infectious diseases.<sup>54</sup>

#### Trade Flows

Although the FAO-ECTAD reports no chicken meat or eggs imports in Mali since March 2004, FAOSTAT data suggests that Mali does import small amounts of these products.<sup>55,56</sup> Imported hatching eggs must be of certified origin and domestic producers are strict about biosecurity in both hatching eggs and day-old chicks.<sup>57</sup> Day old chicks are imported from Europe, South America, and other West African countries and supply over 60 percent of domestic demand for chicks.<sup>58</sup> Mali effectively imports

more than half of its poultry stocks from France and another portion from Senegal in the form of hatching eggs and day-old chicks.<sup>59</sup>

Until 2006, Mali exported no poultry products, with only minimal chicken meat and canned chicken exports in 2006 and 2007.<sup>60</sup> Major constraints to meat export include the high cost of refrigerated transport and the need for tight coordination to maintain the cold chain. In addition, coastal markets place a high value on animal byproducts and therefore exporting live animals is more profitable from the Malian perspective.<sup>61</sup>

### Policy & Organizational Environment

The Government of Mali (GoM) has made several investments in the domestic poultry industry since the inception of the Programme de Développement de l'Aviculture au Mali (PDAM) in 2001.<sup>62</sup> The main objectives of PDAM are to increase poultry production to contribute to the country's self-sufficiency in animal protein and to increase poultry productivity. PDAM has sought to increase the efficiency of the commercial sector by coordinating the large number of actors that, as noted above, raise consumer prices and reduce profits. To do so, it succeeded in coordinating the sector by increasing the number of producer organizations and associations. Several organizations and associations are now active at different levels of the supply chain, particularly feed production factories, hatcheries, and commercial chicken meat production operations.<sup>63</sup>

PDAM activities aimed at increasing smallholder productivity include vaccination campaigns, training participants in the supply chain including breeders, merchants and hatchery operators, and implementing infrastructure for commercialization and marketing. The GoM provided one fourth of the funding for PDAM (1 million CFA francs) in Phase I of the project from 2001–2006. The Arab Bank for Economic Development in Africa (BADEA) funded the remaining three fourths of the program during that period.<sup>64</sup> On its website, the Government of Mali lists 12.5 million CFA francs for Phase II of PDAM as part of the plan for the country's social and economic development.<sup>65</sup>

The FAO Special Program on Food Security has been under implementation in Mali since 2004. One of its goals is to increase food security by promoting rural poultry production. The program particularly targets women and

children in rural areas.

### Opportunities for Poultry Development

According to the FAO analysis of Mali's livestock sector, opportunities exist for increasing meat consumption given both the growing population and per-capita income. Additionally, current per capita consumption is well below the developed and developing countries average, suggesting that Mali's consumer market can absorb greater production as incomes increase.<sup>66</sup>

Supply-side opportunities include increasing the productivity of current operations and new production.. Smallholders in rural areas could increase productivity through the dissemination of improved practices, particularly access to vaccinations and proper feed.

Increased domestic production could help meet consumer demand. As of 2004, chicken accounted for four percent of total agricultural production; eggs accounted for only 1.1 percent.<sup>67</sup> In their 2004 study of the competitiveness of agricultural sectors in the ECOWAS region, Dupaigne et al project that though the region will have a 24,000 tonne surplus of chicken and eggs in 2020, Mali will have a 1,449 tonne deficit. Domestic commercial production could eliminate this deficit.<sup>68</sup>

Demand for hatching eggs from the commercial poultry production sector presents another market opportunity. The Société Mali-Volailles, the largest producer of day old chicks, currently imports hatching eggs from Brazil to produce 8,000 hen chicks and 16,000 broiler chicks per week. The second largest hatchery, SODOUF, was the first to raise broilers for reproduction and now produces an estimated 3,000 broiler chicks and 1,500 hen chicks per week. These account for only 15 percent of SODOUF's total chick production, with the remainder hatching from imported eggs.<sup>69</sup> Given that rural areas contain over 90 percent of domestic poultry stocks and that eggs from these animals are mostly used for reproduction, smallholders could potentially offer a domestic supply source for hatching eggs.

### **Conclusion**

A majority of Malian families raise poultry and it is an important source of both nutrition and income.<sup>70</sup> Mali produces over 99 percent of its chicken meat and eggs for consumption domestically. Over 90 percent of this

production occurs in rural areas, mostly under traditional practices.<sup>71,72,73</sup> However, to achieve self-sufficiency in chicken meat and hen eggs for consumption, Mali imports over 60 percent of the hatching eggs and day-old chicks required to replenish its poultry stocks.

The policy and organizational environment appears favorable for expanding the sector. There is an ongoing government initiative to support the poultry sector and several producer organizations at all levels of the supply chain.<sup>74,75</sup> Analyses of Mali's poultry sector suggest that market opportunities exist to increase domestic poultry reproduction capacity, production of poultry products and poultry consumption.

*Please direct comments or questions about this research to Leigh Anderson, at [eparx@u.washington.edu](mailto:eparx@u.washington.edu)*

Appendix 1. West African Poultry Market Comparison

	West Africa*	Burkina Faso	Ghana	Mali	Senegal	
<i>Demographic Overview</i>	Population	291,266,000	15,234,000	23,351,000	12,705,700	12,211,200
	Percent rural population	59%	80%	50%	68%	58%
	GDP per capita	\$807	\$522	\$713	\$688	\$1,087
	Percent annual GDP growth	4.9%	4.5%	7.3%	5.0%	3.3%
	Major urban areas <sup>^</sup>	N/A	Ouagadougou, pop. 1,475,000 Bobo-Dioulasso, pop. 490,000	Accra, pop. 1,847,000 Kumasi, pop. 1,170,000	Bamako, pop. 1,475,000 Segou, pop. 490,000	Dakar, pop. 1,009,300 Touba, pop. 451,300
<i>Consumption &amp; Preferences</i>	Per capita consumption of poultry products <sup>§</sup>	5.1 kg/capita	5.5 kg/capita	6.0 kg/capita	3.94 kg/capita	5.84 kg/capita
	Percent of daily calories from poultry and eggs	0.78%	0.89%	0.60%	0.69%	1.00%
	Percent daily calories from all livestock	9.5%	8.4%	6.6%	14.8%	10.1%
<i>Domestic Production &amp; Market Structure</i>	Per capita poultry production**	4.4 kg/capita	5.5 kg/capita	2.5 kg/capita	3.93 kg/capita	5.76 kg/capita
	Producers	Varies by country	Mostly rural smallholders and peri-urban, semi-industrial producers	Dominated almost exclusively by urban, industrial production	Mostly traditional rural production, industrial sector produces at most 10% of domestic total	Both traditional, rural producers and semi-industrial producers in urban areas
	Smallholder Production Share	--	--	--	90–96%	47%
	Percent of consumption** supplied by domestic production	86.3%	99.94%	41.7%	99.7%	98.6%

		<b>West Africa*</b>	<b>Burkina Faso</b>	<b>Ghana</b>	<b>Mali</b>	<b>Senegal</b>
<i>Trade Flows***</i>	Imports	0.68 kg/capita	0.004 kg/capita	3.52 kg/capita	.011 kg/capita	.094 kg/capita
	Exports	.001 kg/capita	.0002 kg/capita	.002 kg/capita	.002 kg/capita	.012 kg/capita
<i>Policy &amp; Organizational Environment</i>		Common External Tariff of 20%; growing need to address negative externalities of livestock production	Non-profit producer organization (MDA) working to increase the domestic poultry sector	International and domestic NGOs promoting poultry development in eight of ten regions	Several producer organizations at all levels of the supply chain supporting industrial production	Ban on poultry imports from all countries since 2006

Sources: FAOSTAT, World Development Indicators, ^ Encyclopædia Britannica Online & Gale Virtual Reference Library, §World Food Programme (2004 – 2006 data)

-- indicates no data

\*Includes Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

\*\*Chicken meat & eggs, \*\*\*Chicken meat, turkey meat, duck meat, canned chicken, hen eggs



## References

Dupaigre, B.F., Baris, P. & Liagre, L. (2004). *Étude sur la compétitivité des filières agricoles dans l'espace UEMOA: Elaboration d'un argumentaire de choix de filières*. Retrieved from [http://pdmas.org/pdf/Etude\\_competitivite\\_filieres\\_agricoles\\_espace\\_UEMOA.pdf](http://pdmas.org/pdf/Etude_competitivite_filieres_agricoles_espace_UEMOA.pdf)

FAO. (2010). *Profil nutritionnel de pays: République du Mali*. Retrieved from <http://ftp.fao.org/ag/agn/nutrition/ncp/mli.pdf>

FAO. (2009). *Evolution de l'aviculture malienne entre 2007 – 2008* [Powerpoint Presentation]. UOFA/UEMOA Technical Poultry Workshop, June 16 – 18, 2009, Dakar, Senegal. Available from <http://www.fao-ectad-bamako.org/fr/UOFA-UEMOA-Deuxiemes-journees?lang=en>

FAO. (2005). *Livestock sector brief: Mali*. Available from [http://www.fao.org/ag/againfo/resources/en/pubs\\_sap.html](http://www.fao.org/ag/againfo/resources/en/pubs_sap.html)

Government of Mali, (2010). *Projet pour le développement économique et social de Mali*. Retrieved from the Government of Mali's Web Site: [http://www.primature.gov.ml/index.php?option=com\\_chantiers&Itemid=37](http://www.primature.gov.ml/index.php?option=com_chantiers&Itemid=37)

Integrated Regional Information Networks, UN Office for the Coordination of Humanitarian Affairs. (2009, December 17). *MALI: The missing egg in food security basket*. Available from <http://www.irinnews.org/Report.aspx?ReportId=87464>

Library of Congress – Federal Research Division. (2005). *Country profile: Mali*. Retrieved from <http://lcweb2.loc.gov/frd/cs/profiles/Mali.pdf>

Traore, A. (2006). *Revue du secteur avicole: Mali*. Retrieved from <http://www.fao-ectad-bamako.org/fr/Poultry-sector-reviews?lang=en>

USAID. (2010). *Mali livelihood zone descriptions*. Available from <http://v4.fews.net/Pages/livelihoods-country.aspx?loc=6&gb=ml&l=en>

---

## Endnotes

<sup>1</sup> Dupaigre et al, 2004, p. 147

<sup>2</sup> Perry et al, 2005, p. vii

<sup>3</sup> Dupaigre et al, 2004, p. 147

<sup>4</sup> Dupaigre et al, 2004, p. 147

<sup>5</sup> Dieye et al, 2004, p. 7–8

<sup>6</sup> World Trade Organization Statistics

<sup>7</sup> Traore, 2006, p. 16

<sup>8</sup> Traore, 2006, 2006

<sup>9</sup> Traore, 2006, p. 13, 23

<sup>10</sup> Traore, 2006, p. 13

<sup>11</sup> Traore, 2006, p. 15

<sup>12</sup> Traore, 2006, p. 13

<sup>13</sup> Traore, 2006, p. 6

<sup>14</sup> Traore, 2006, p. 6

<sup>15</sup> Library of Congress, 2005, p. 6

<sup>16</sup> FAO, 2010, p. 20

<sup>17</sup> USAID, 2010

<sup>18</sup> FAO, 2010, p. 29

<sup>19</sup> Traore, 2006, p. 6

<sup>20</sup> FAOSTAT

---

<sup>21</sup> Traore, 2006, p. 6

<sup>22</sup> Traore, 2006, p. 6

<sup>23</sup> Traore, 2006, p. 6

<sup>24</sup> Dupaigre et al, 2004, p. 142

<sup>25</sup> FAO, 2009

<sup>26</sup> FAO, 2009

<sup>27</sup> FAO, 2010, p. 14

<sup>28</sup> Traore, 2006, p. 10

<sup>29</sup> Traore, 2006, p. 13

<sup>30</sup> Dupaigre et al, 2004, p. 142

<sup>31</sup> FAO, 2009

<sup>32</sup> Traore, 2006, p. 13

<sup>33</sup> Traore, 2006, p. 19

<sup>34</sup> Traore, 2006, p. 13

<sup>35</sup> Traore, 2006, p. 13

<sup>36</sup> Traore, 2006, p. 13

<sup>37</sup> Traore, 2006, p. 22

<sup>38</sup> Traore, 2006, p. 14

<sup>39</sup> Traore, 2006, p. 6

<sup>40</sup> Traore, 2006, p. 12

---

<sup>41</sup> Traore, 2006, p. 18

<sup>42</sup> FAO, 2009

<sup>43</sup> Traore, 2006, p. 13

<sup>44</sup> Traore, 2006, p. 16

<sup>45</sup> FAO, 2009

<sup>46</sup> Traore, 2006, p. 17

<sup>47</sup> Traore, 2006, p. 13, 15

<sup>48</sup> Integrated Regional Information Networks, 2009

<sup>49</sup> Traore, 2006, p. 15

<sup>50</sup> Traore, 2006, p. 15

<sup>51</sup> FAO, 2005, p. 16

<sup>52</sup> FAO, 2005, p. 16

<sup>53</sup> Traore, 2006, p. 21

<sup>54</sup> Traore, 2006, p. 15

<sup>55</sup> Traore, 2006, p. 6

<sup>56</sup> FAOSTAT

<sup>57</sup> Traore, 2006, p. 16

<sup>58</sup> Traore, 2006, p. 14

<sup>59</sup> Traore, 2006, p. 25

<sup>60</sup> FAOSTAT

<sup>61</sup> FAO, 2005, p. 13

<sup>62</sup> Traore, 2006, p. 22

<sup>63</sup> FAO, 2009

<sup>64</sup> Traore, 2006, p. 27

<sup>65</sup> Government of Mali, 2010

<sup>66</sup> FAO, 2005, p. 10

<sup>67</sup> Dupaigne et al, 2004, p. 143

<sup>68</sup> Dupaigne et al, 2004, p. 36

<sup>69</sup> FAO, 2009

<sup>70</sup> Traore, 2006, p. 13, 23

<sup>71</sup> Traore, 2006, p. 13

<sup>72</sup> Dupaigne et al, 2004, p. 142

<sup>73</sup> FAO, 2009

<sup>74</sup> Government of Mali, 2010

<sup>75</sup> FAO, 2009