

Numbers for Successful Poultry Production¹

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Fertile egg production and incubation and production of broiler meat are both an art and a science. People have taken full control of incubating fertile eggs by artificial means to supply the increasing world demand for poultry meat. It is estimated that worldwide more than 35 billion fertile broiler eggs are incubated annually. If eggs were still incubated naturally and broilers raised in small backyard farms, the poultry industry would not have been able to grow and prosper as it has and supply the world demand for poultry products.

Table 1. Per capita consumption of poultry and livestock, 1965 to estimated 2016, in pounds

Year	Poultry	Beef	Pork	Fish	Total
1965	44.4	74.7	51.5	10.9	181.5
1975	46.9	88.2	42.9	12.1	190.1
1985	61.9	79.0	51.5	15.0	207.4
1995	86.5	66.4	51.5	14.8	219.2
2005	103.0	65.4	49.6	16.2	234.2
2015	105.6	54.3	49.7	N/A	

Source: USDA. <http://www.nationalchickencouncil.org/about-the-industry/statistics/per-capita-consumption-of-poultry-and-livestock-1965-to-estimated-2012-in-pounds/>
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Table 1 demonstrates how poultry consumption in the United States has increased dramatically in the last five decades. The same pattern is also visible in other countries. There is a considerable variation in the consumption of

poultry products among various countries ranging from 0.5 to 104 pounds per person. However, with the new economic reforms and the establishment of free trade zones, consumer consumption of poultry products around the world will likely increase. The most practical manner of feeding the increasing human population, now growing at 100 million annually, is through producing even more high-quality and economical protein sources, such as poultry meat and eggs. However, this end requires means that increase production efficiency while cutting costs.

The Most Efficient Survive

World production of poultry meat and eggs in 2012 is estimated at 90.9 billion pounds of meat and more than 900 billion table eggs. More than 30% of the world's poultry meat is produced in the US, while 50% of the world egg production is in China. It is important to note that among the poultry producers in the US, there exists considerable variation in the costs to produce a pound of meat or a dozen eggs. Table 2 shows the total costs to produce a pound of broiler meat in the United States in 2014 according to the National Chicken Council.

There are dramatic differences in performance among farms in the same company and region, utilizing the same feed and genetics. The only major difference is in the level of management skills among the growers. The calculation to quantitate losses when a poultry grower is not attentive to

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the economic consequences of good management is simple and is demonstrated in the following paragraph.

Table 2. Broiler price breakdown for mid-2014

Live Chicken (cents per pound)	Eviscerated (cents per pound)	
42.24		Average live broiler costs
28.14		Feed costs per pound
	80.33	Price required to break even

75% Efficiency Rate

Due to disease challenges and variations in management, it is commonly noted that for every 100 fertile broiler eggs produced, only 50 to 75 eggs are actually converted to broiler meat. Losing between 25 to 50% of the total fertile eggs produced may seem dramatic, but it is a reality. However, these losses can be decreased if a poultry grower is willing to practice biosecurity and pay close attention to management details in an operation.

Magic Numbers

From the time of oviposition until an egg is converted to meat, it goes through many processes. At each step there will be losses. These valuable fertile eggs are lost for many reasons, some acceptable and unavoidable, while other losses occur due to poor management. Each egg must be converted to at least 2.5 kilos (or 5.5 pounds) of meat at 40 days of age under normal conditions. Thus each breeder hen should be able to produce at least 750 pounds of broiler meat during a 40-week production cycle. The difference between poultry managers who know what to expect in performance, including the limits and standards for each performance category, and managers who do not have an idea of what is going on in their operations is very obvious. If the performance results are below expectations, the problem needs to be detected and fixed promptly. Tables 3 through 5 contain the basic, rule of thumb numbers for breeders, broilers, and layers and should be committed to memory. These numbers could vary, however, depending on the operation and breeder types used.

Breeder Performance

The broiler breeder has experienced dramatic changes in the last few years and has primarily been selected for increased breast yield and more efficient feed conversion. Due to these selection pressures, the heavy breeders are now more sensitive to stressors. Their production performance and hatchability are adversely affected when less than ideal conditions are provided in the farm. Table 3 provides the

basic production parameters for review and evaluation of today's breeder.

Table 3. The 40-week production cycle ideal standards

Parameter	Expected result
# total fertile eggs produced/ hen	175–185
% hen mortality	<10%
% male mortality	< 20%
% peak egg production	86%
% of undergrade egg	less than 4%
Average egg size	65 grams
% hatch	86%

Egg Size

Depending on breeder age, the percent of hatch and egg size vary considerably. When visiting a breeder farm and lacking access to the egg weight standard table for the breed, which is the average compiled from weighing millions of fertile eggs, the following table may be used. To estimate the egg weight at any age, just add the Constant Egg Factor number as provided in the center column (Table 4) to the hen's age. The egg weight calculated is not exact, but it may serve as an accurate estimate during the on-farm investigation.

Table 4. The 40-week rule of thumb formula to calculate egg weight

Week of age period	Egg Factor	Egg weight range (grams)
25–35	25	50–60
35–45	20	60–65
45–55	15	65–70
55–65	10	70+

Broiler Standards

These vary considerably depending on the genetics, management practices, feeding program, health status, and climatic conditions, among other factors. The standards provided below in Table 5 are to be used for comparison purposes. The broilers of today have changed dramatically over the last couple of decades. With a good biosecurity program, optimum management/housing, and adequate nutrition, it is quite common to have broilers of more than 2.0 kilos at 35 days of age. The modern broiler of today is gaining an average of 65 grams per day under current field conditions, but it is estimated that the same broiler has the genetic capability to double this rate of gain. This will only

be possible when all factors needed for broiler growth are provided, such as optimum management, superior health, excellent environmental conditions, and most importantly, an understanding of the nutritional requirements of the changing broiler. Table 5 provides the expected results for today's broiler raised under optimal conditions.

Table 5. The average broiler performance at 40 days of age.

Parameter	Expected performance
Broiler weight (1 day of age)	45 g
Broiler weight (7 days of age)	1 day of age weight × 4
First week % mortality	Less than 0.80%
Body weight	2.5 kg
Average daily wt. gain	65 g
Conversion	1.75
% Total mortality	Less than 4%
EPEF index*	360
*European Efficiency Factor: grams gained per day × % survival rate/conversion × 10	

The Commercial Layers

These birds have come to the rescue of more than 2 billion undernourished people in the world. Table eggs provide an excellent nutritional package in places where there is a dearth of other protein sources, such as meat. A well-managed and fed hen from a respected and known genetic line can easily produce more than 360 eggs in a 50-week production cycle. This is equivalent to 22 kilos of the best and most balanced food source that one can find at a very reasonable price. Table 6 shows some of the basic standards expected from today's egg layer.

The above tables provide the poultry managers of today with some basic production numbers for poultry raised under optimal conditions. These standards should be used as a guide to let managers know how their birds are performing under local conditions versus established standards in other operations.

Table 6. The table hen production performance 80 weeks

Parameters	Expected performance
# eggs/hen	+359
% of cull eggs	< 5%
Egg weight (g)	+60
Feed conversion (kg/egg)	1.93
Peak production	95%
Weeks above 90%	15
% Mortality	≈7%