VM134

UNIVERSITY OF FLORIDA

IFAS EXTENSION

Broiler Production Goals - Important Numbers[1]

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Producing a profitable broiler requires that certain standards be met, some even before the chicks are placed on the farm and during the grow-out. The most important principle is to set the best quality fertile eggs in the machines and ensure that all eggs have been handled properly. It is preferred not to hold the eggs more than three days and the egg room must have the right temperature and humidity during storage to avoid killing or weakening the blastoderm. The longer the eggs are kept in storage the poorer the chick vigor, quality and hatch.

Optimum Egg Size

The most critical criteria are *cleanliness of the eggs* and *minimum weight*. The recommended minimum egg weight in the industry is 50 grams. In Table 1, egg weights related to breeder flock age are tabulated. If there is a shortage of hatching eggs, 45- to 50-gram eggs and even deformed eggs may be set, but they must be hatched separately and the chicks identified for more care at the farm.

There is no doubt that a direct relation exists between egg size and chick weight/quality. The larger the fertile egg, the larger the initial chick weight. The rule of thumb is that 68-72% of a small egg must be converted to chick, whereas 65-68% of a medium or large egg must be converted to chick. This can be achieved if the incubators and hatchers are working optimally. (Less than 60% dehydration and more than 75% edematous.)

Table 1. Egg and chick size according to breeder age.

Parameters	Egg wt. grams	Chick wt. grams
Minimum egg weight	50.00 gr.	35.00 gr.
Egg wt. Phase I (26-35 weeks of age)	56.00	40.00
Egg wt. Phase II (35-45 weeks of age)	63.00	43.00
Egg wt. Phase III (46-55 weeks of age)	66.00	45.00
Egg wt. Phase IV (56-85 weeks of age)	69.00	47.00
Average IV (26-65 weeks)	65.00	45.00

The Farm Standards

At the farm, all house preparations must be completed prior to receiving chicks. Brooding temperatures that are too high may be more damaging

1. This document is VM134, one of a series of the Veterinary Medicine-Large Animal Clinical Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date May 16, 2005. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.

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to chicks than temperatures that are lower than optimal. During the first week of age, brooding temperature should not exceed 90°F (32°C) for whole-house brooding. High temperatures dehydrate the chicks and adversely affect their one-week body weight. It is well documented that a recently hatched chick is composed of 85% water. A chick becomes weak when it is dehydrated 10% and dies if it loses 20% of its body water. Food and water must be readily available to all chicks. If the chicks have been held for a long time at the hatchery or traveled long distances, it is suggested to provide them with water and sugar (4% solution) for the first couple of hours. The lost weight can be recuperated rapidly if water is readily available. If all goes well, a chick should weigh 4.0+ times its original day-of-age weight at 1 week of age. Well managed farms commonly report that chicks weigh 4+ times their original arrival weight. How to achieve this depends on some very basic factors:

1. Good state of health.
2. Excellent chick quality.
3. Sufficient feeder and water space.
4. Adequate brooding area. If possible avoid making rings and practice partial brooding for the first 21 days.
5. Plenty of fresh air at the chick level from time of arrival.
6. Good quality feed with proper texture. If possible feed the chicks with chick-size crumble feed. Crumble feed has gone through high temperatures and is more likely to be free of contaminants. Crumble feed also encourages feed consumption and less feed wastage. A broiler chick must consume at least 150 grams of feed during the first seven days. All efforts must be made to achieve this goal. If this amount is consumed the first week, the broiler will have a good size frame and can grow to its potential.

Broiler Weekly Body Weight and Average Daily Weight Gains

The rule of thumb for average straight run broilers is outlined in Table 2:

Table 2. Proper weekly body weight for average straight run broilers.

Days of Age	Weight lb. must be at least:
7	4.0X chick wt. (4X is now common)
14	2.4X the 7 day weight
21	Above 1 pound
28	Above 2 pounds
35	Above 3 pounds
42	Above 4 pounds

The average gram daily weight gains play an important role in the optimum growth of the birds. Under normal practical conditions, a broiler must gain an average of 50 grams or more per day. The average daily weight gain is not uniform for each week and varies considerably depending on age and sex. Table 3 demonstrates the daily gains from 1 to 49 days on a weekly interval basis for straight run broilers.

Table 3. Daily gains at weekly intervals for straight run broilers.

Period Days of Age	Gram Average Daily Weight Gain/Week
1-7	12
8-14	27
15-21	42
22-28	57
29-35	65
36-42	71
43-49	76

Hatchery Numbers

Malpositions and Deformities

Malpositions and deformities incidences in a normal hatch of 85%. Refer to Tables 4 and 5.

Table 4. The number of embryos unable to hatch due to malpositions usually ranges from 1.2 to 1.8% and should not exceed 2%.

Malposition	Description	% Incidence
1	Head between thighs	12.5
2	Head in small end of egg	7.5
3	Head under left wing	7.5
4	Head not directed toward air cell	4.5
5	Feet over head	20.0
6	Beak above right wing	48.0

Table 5. The number of embryos that develop deformities ranges from 0.22 - 0.33% and should not exceed 0.33%.

Deformity	Deformity Description	% Incidence
1	Exposed brain	29
2	Without eye(s)	25
3	4 legs	10
4	Deformed beak	27
5	No upper beak	8
6	Deformed or twisted leg	1

Hatchability of Undergrade Eggs

Normally, the percentage of cull fertile eggs should not exceed 4.0%. If market demand for fertile eggs is great, culls can be lowered to 2.5-3.0% by decreasing cracks, saving mildly deformed and porous eggs, and reducing minimum egg weights for incubation. Refer to tables 6 and 7.

Table 6. Classification of undergrade eggs.

% of eggs	%
Cracks/broken	1.70
Double yolk	0.70
Pee Wee	0.70
Dirty	0.40
Deformed	0.25
Porous	0.25
Total	**4.00**

Table 7. Hatchability of undergrade eggs.

Egg type	% hatch
Small	60.7
Deformed	52.3
Large	45.8
Porous	31.6

Broiler Performance From Cull Eggs

Refer to Tables 8 and 9.

Table 8. Female broiler performance from undergrade eggs.

Parameter	Cntrl	Small	Deformed	Porous
BW (gr)	2182	2052	2256	2160
Gr/day	44.60	41.88	46.08	44.08
Conversion	1.905	1.999	2.038	1.93
% Mortality	3.64	0.00	2.63	0.00
Index	225	209	220	228
Cost/lb vs Control	0.00	1.44	1.28	1.1

Table 9. Male broiler performance from undergrade eggs.

Parameter	Cntrl	Small	Deformed	Porous
BW (gr)	2526	2423	2689	2642
Gr./day	51.55	49.45	54.87	53.92
Conversion	1.919	2.01	1.966	1.871
% Mortality	3.64	3.77	7.14	10.00
Index	259	237	259	259
Cost/lb vs control	0.00	1.46	0.43	0.86

Specific Gravity Technique

1.) 3 to 5 solutions needed, confirm with hydrometer, leave in egg holding room, allow eggs to cool to holding room temperature.

1.070

1.075 0.9lbs salt/gallon water

1.080 1.0lbs salt/gallon water

1.085 1.025lbs/gallon water

1.090

2.) First put the eggs in a 1.075 solution of water and salt. Remove those that float and take to next solution 1.080,...

3.) Calculate % in each category.

Embryodiagnosis

Ideally embryodiagnosis involes two steps: ovoscopy and then breakout of residue from the same eggs.

1.) Evaluate 3 trays from each breeder farm on a weekly basis.

2.) Data sheets should include: ID of breeder flock, age of flock, breed cross, health status, type of machine, storage duration and location of tray in hatcher. On each sheet, record:

- % hatch for lot
- % hatch for selected trays
- Total eggs/tray
- Number of healthy chicks
- Number of dead chicks
- Number of second quality chicks
- Number of exploders

3.) Collect pips, unhatched eggs, and dead chicks and put in flats. Then:

- Count pips, remove shell and ID malposition
- Open remaining eggs and ID the infertile ones. For the rest, determine time of death.

Table 10. Average for 40 week production cycle.

Parameters	%
Healthy chicks	85.00
2nd quality chicks	1.00
Dead chicks	0.25
Pips	1.25
Infertiles	4.5
1-4	2.5
5-10	1.25
11-17	1.25
18-21	2.5
Contamination	0.50
Total	100.00

Key developmental features

- 7-8 days eyes can be distinguished
- 13-14 days feathers have started to develop
- 15 days all structures have formed

Peak fertility 97%

Peak hatch of fertiles 93.5%

Hatch of fertiles by breeder age

25-33 weeks	35-50 weeks	51-68 weeks
90.2%	91.8%	88.6%