



POULTRY SCIENCE **FACTS**

THE IMPORTANCE OF TRAYING EGGS WITH THE LARGE END UP

The egg possesses certain characteristics which promote the proper development of quality chicks. For instance, the shell permits respiration by allowing oxygen to pass through tiny pores in its surface. Until the chick is able to crack the shell, respiration can only occur with the help of oxygen that passes through these pores. In addition to the porous shell, the egg contains two membranes that also influence the chick's development. These membranes closely line the inside of the shell and are loosely bound to the shell and to one another. The shell membrane closest to the shell is called the "outer shell membrane," and the one in contact with the albumen is called the "inner shell membrane." During incubation, after the egg has been laid, an air cell will form at the large end as a result of the separation of the two membranes (See Figure 1).

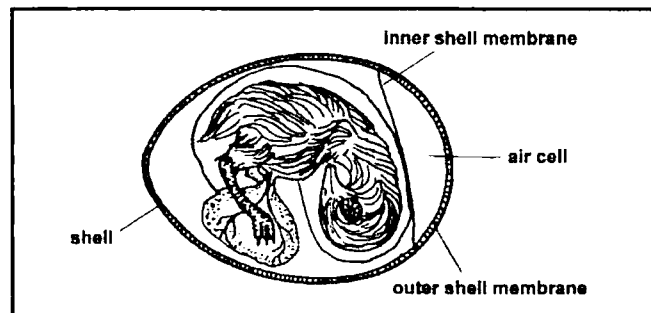


Figure 1. Embryo at 18 days, graphic design by Diane Probst, printed in *Embryology: 4-H Member's Manual II* (Raleigh, 1994) 11.

The embryo is normally oriented with its head in the large end of the shell. At day nineteen, the embryo will poke its beak between the separated membranes and use the air cell to breathe for the first time. The chick is allowed to "practice" breathing while remaining inside the shell, which allows for the maturity of different organs.

Effects of Placing Eggs Small End Up

In the event that an egg is placed small end up, the chances are greater that an embryo will situate its head in the small end of the egg. When an embryo is not situated correctly, reduced hatchability and lower chick quality are common problems that may occur. Sometimes a chick embryo is unable to locate the air cell and accidentally pips the small end of the shell, which causes the chick to hatch too early.

A recent study conducted by Bauer, Tullett, and Wilson found a significant difference between eggs set large end as opposed to small end up. When a commercial broiler strain was used, the eggs set small end up had a high percentage of disoriented embryos. Only 38.6% of the embryos situated themselves correctly and pipped the large end of the egg, while the remainder of the embryos became disoriented: 39.2% pipped the small end of the egg and 22.2% pipped at the equator. In addition, the researchers found that chick quality is lessened, and hatchability is

reduced by approximately 17% when eggs are set small end up, as shown in Table 1. An increase in mortality occurred during last week of incubation--after day nineteen--when the embryo is normally poking its beak into the air cell, called "internal pipping."

Table 1

Effect of Setting Eggs Small End Up On Hatchability and Posthatching Performance of Broilers

Treatment	Mortality Before Transfer	Mortality After Transfer	Hatchability of Fertile Eggs
Experiment 1: Set Large End Up	3.9%	6.8%	89.3%
Set Small End Up	2.4%	26.4%	71.2%
Experiment 2: Set Large End Up	5.3%	1.5%	93.2%
Set Small End Up	5.2%	18.0%	76.8%

Source: Bauer, F., S. G. Tullett, and H. R. Wilson, *British Poultry Science* (1990) table 3

The "pipping time," or when the beak makes the first hole in the shell, was observed in this study to be advanced by 7 to 10 hours for small end up embryos when compared to normally oriented ones. While the large end up embryos were penetrating the air cell, the disoriented embryos were arriving early into the incubator.

Care in Preparing Egg Pack--A Necessity

Eggs may be placed upside down for several reasons, some of which include simple carelessness and the inability to determine which end is, in fact, the large end. Despite these difficulties, a concerted effort must be made to place the eggs large end up. Without this simple precaution, the egg cannot properly provide an environment for the developing embryo to hatch and become a high quality chick.

Works Cited

Bauer, F., S.G. Tullett, and H.R. Wilson. "Effects of Setting Eggs Small End Up On Hatchability and Posthatching Performance of Broilers." *British Poultry Science* 31.3-4 (1990): 715-724.

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**Published by
North Carolina Cooperative Extension Service**

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This public document was printed at a cost of \$0.15 per copy.