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HATCHERY/BREEDER TIP . . .

IMPACT OF NEW HATCHERY EQUIPMENT ON CHICK WELL BEING

Introduction

In recent years there has been a tremendous interest by hatcheries to incorporate new automated equipment in their day-to-day hatchery operations and processing of chicks. The hatcheries have had, as their goals, to reduce labor, to improve efficiency, and to improve hatchability and chick quality. Certainly, chick processing equipment will not improve hatchability, but other automated equipment such as transfer machines, pressure controlled ventilation systems, timed central fogging systems for sanitation and clear egg removal systems have been responsible for improved hatchability and chick quality. Hatchery managers install chick processing equipment to reduce labor and to improve chick quality. This paper examines how this equipment influences the health and welfare of the newly hatched chicks.

History of Hatchery Automation

The history of hatchery automation can be broken down into two historical eras—before and after *in ovo* injections for Marek's disease. In the late 80's and early 90's hatcheries were increasing their automation by adding automated transfer machines, central fogging systems, hatcher tray and chick box washers, waste disposal systems, and chick conveying systems. From the mid 90's until the present time much of the automated equipment has revolved around chick processing. This newest trend was made possible when Embrex™ developed the process of vaccination for Marek's disease by an *in ovo* method. As a result, hatcheries were able to eliminate vaccinating crews in the chick processing room. Currently, 90 % or more of the broilers produced in the US are vaccinated *in ovo*. Before, chicks were counted as they were vaccinated by hand or by pneumatic system. After *in ovo* vaccinations were established, there was an immediate need for automated chick counters. Shortly after, chick/shell separators were developed. Then came several more automated in-line chick processing and equipment needs such as chick and box conveyors, hatcher tray destackers, paper padders, boxing systems, and more conveyors. The spray vaccination system for Newcastle disease was added in-line for chick processing. Due to these developments, hatchery chick rooms do not resemble those of only 10 years past. Besides the addition of all this equipment, the first thing one notices is the dramatic reduction in the number of employees in the chick processing room.

In the early years of chick processing automation (mid 90's) there were a few setbacks in the operation and efficiency of use. Most of the early automation was developed in Europe and interest and implementation

PUTTING KNOWLEDGE TO WORK

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by the US followed. Consequently, breakdowns in equipment posed fairly serious problems. There were instances when chick counting machines malfunctioned and parts had to be ordered from Europe. This required company presidents, field service personnel and others to count chicks by hand until the machines were returned to service. However, the US allied poultry industry, and some European manufacturers responded fairly quickly to offer equipment that could be quickly repaired with off-the-shelf parts. Secondly, the industry soon realized that some of this equipment was very difficult to clean and sanitize. The evolution in the development of automated equipment was very fast. Currently, breakdowns can be corrected within 15 minutes and the new equipment is generally easy to clean.

Impact of equipment on chick welfare

Without experiencing visits to hatcheries one might get the idea that the replacement of humans with robotic-like equipment would significantly decrease the welfare of the chicks being processed. The truth is the opposite of this. There are four main reasons why chick welfare is improved by hatchery automation.

- 1. Less handling by humans.** Research has shown that one of the most significant stressors that a chicken can have is to be handled by humans. The stress responses of chickens as measured by the elevation of adrenal hormone secretions and heterophil to lymphocyte ratios were shown to be more indicative of stress when handled by humans than when they were subjected to environmental stresses such as heat or cold.
- 2. Shorter processing time.** Before the installation of automated chick processing, a day's broiler placements would often continue until late in the day and chick placements were frequently after nightfall. After the installation of automation it is common for a broiler hatchery to have all the broilers placed in poultry houses before noon. Now the chicks are presented with feed, water, and a favorable, nurturing environment several hours quicker than just a few years ago.
- 3. Increased accuracy in each of the processes.** Comparison of the accuracy of vaccinating for Marek's disease *in ovo* with pneumatic and hand vaccinating has revealed far greater accuracy *in ovo*. Mistakes by vaccinating *in ovo* are generally 1 % or less while hand and pneumatic vaccinations can be 3 to 5 %. Further, mistakes with hand and pneumatic vaccinations often involve injuries to the chicks by the vaccination needle. Missed vaccinations by hand or needle can result in the chick succumbing to Marek's disease, which certainly reduces well-being. Currently, the automated chick counters are very accurate and exactly 100 chicks are placed in each box. The automated counters have achieved an accuracy of plus or minus 1 chick per 1000 chicks counted. Prior to today's accuracy level, it was customary to put 102 chicks in every box to err on the side of the producer so that at least 100 chicks are placed in every box. Because of this, the improved accuracy can be viewed as achieving a 2 % increase in hatchability. Also, more accuracy in counting results in about a 2 % decrease in stocking density on the farm, which would improve bird welfare slightly. Early in the use of chick counters there was concern regarding the line speed of conveyor belts that practically threw the chicks through the process with some hard landings. Currently this problem has been dramatically alleviated by the incorporation of multiple lines, rounding of sharp surfaces, and reduction of drop distances for chicks to be moved from one area to another.
- 4. Introduction of additional equipment due to market driven welfare demands.** Many franchise consumers of commercial broilers (Wendys™, MacDonald's™, etc.) place a welfare demand on the suppliers. For example, Wendys insists that all birds culled in the hatchery must be euthanized by humane means (gas or instant maceration).

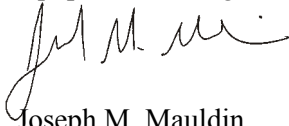
Automated Hatchery Equipment not Associated with Chick Processing also Improves Chick Well-Being

There are numerous examples of automated equipment for hatcheries not associated with chick processing that improves chick quality and hatchability. Following are some examples. Central fogging systems provide hourly or even more frequent mists of disinfectants into various hatchery environments including setters and hatchers. This practice greatly reduces the potential for contamination and embryo mortality. Pneumatic transfer machines provide a gentler transfer to avoid the cracking of eggs. Only recently employed for use in hatcheries is the clear egg removal system. This equipment was developed by Embrex to candle and remove clear eggs (infertile, early embryo mortality, and contaminated) during the *in ovo* vaccination and transfer process. This has been shown to improve hatchability and chick quality especially when eggs from high yielding broiler lines are incubated. Production of these strains of broilers has been the industry trend for the last 5 to 8 years. Eggs from high yielding strains of hens are larger than eggs from conventional

broiler strains. A larger egg mass in incubators and hatchers has been the result. The larger egg mass has been restrictive to optimum airflow and circulation within the incubators. It is more difficult to remove the excess heat, humidity, and carbon dioxide from areas deep within the egg mass of the setter or hatcher. This has resulted in areas of “hot” spots that have increased embryo mortality, especially in hatchers, in recent years. Removal of clear eggs allows more empty spaces within the incubators so that airflow is improved and improvements in hatchability and chick quality result. Since better airflow removes excess heat, one would have to assume that the embryos have improved welfare. On the average, 7 to 8 % of all the eggs set are clear at the time of transfer. Further improvements in ventilation have recently been installed in hatcheries by incorporating air pressure controlled ventilation systems. These systems help to provide more uniform temperature and humidity environments while isolating clean and dirty rooms to avoid cross-contamination.

Summary

The recent trend toward increasing automated equipment in hatcheries has been beneficial to hatcheries in reducing labor, improving efficiency, and improving comfort of chicks and embryos. This provides a good story to tell when evaluating the impact of new equipment on chick welfare. Further fine-tuning of the equipment in the gentle handling of chicks should improve chick welfare in the future.



Joseph M. Mauldin
Extension Poultry Scientist

Extension County Coordinator/Agent

****Consult with your poultry company representative before making management changes****

“Your local County Extension Agent is a source of more information on this subject.”