

**CHICK QUALITY CONTROL: A KEY TO A SUSTAINABLE POULTRY PRODUCTION IN NIGERIA**

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**SUMMARY**

Poultry industry is one of the fastest growing segments in the agricultural sector and undoubtedly it plays an important role in the Nigerian economy. However, the growth of this profitable sub sector is threatened by a number of factors critical among which is the quality of day-old-chicks supplied to farmers. The quality of day-old-chicks has a tremendous effects on the growing pattern and consequently on the final performance of the flock. Therefore, it has become necessary that day-old-chicks supply to farmers should be given proper assessment to determine their quality so as to reduce financial losses which could result from purchase of poor quality day-old-chicks. This paper highlights the various methods used for the assessment of day-old-chick's quality and also made recommendations for quality control of the products for the sustainability of the poultry industry in Nigerian.

**KEY WORDS:** Chick quality, assessment methods, poultry industry, Nigeria

## INTRODUCTION

Poultry industry is an emerging agri-business and has established its position as the fastest growing segment in the agricultural sector in Nigeria. With increased acceptance of chicken egg and meat, the demand for these products is ever increasing (Shrestha *et al.*, 2003). Poultry sector has tremendous employment potential and would go a long way in reducing unemployment problems in Nigeria. The growth of the industry is influenced by many factors, critical among which is the quality of day-old-chicks supplied to farmers. To succeed in poultry farming, chick quality assessment is most important for the poultry farmers as seed quality is to crop production. However, this important factor appears to be neglected in Nigeria, as no agency is charged with the responsibility of assessing the quality of day-old-chicks supplied to farmers.

The Nigerian poultry industry is characterized by few hatcheries (concentrated mainly in some parts of the country) and many small holder farmers (scattered across the nation). The farmers place their orders for day-old-chicks from these hatcheries through agents and distributors across the country. Consequently, the demand for day-old-chicks is by far more than its supply in most parts of the country; sometimes orders take as long as a month or more before they are supplied especially during peak periods of demand. Desperation on the part of the farmers and agents result in sourcing and supply of chicks from unknown and/or of questionable medical history. Some of the agents even supply chicks in unlabelled boxes, which sometimes contain many dead chicks. Such situations are expectedly characterized by heavy brooder losses at the expense of the farmers. Occasionally, when complaints become overwhelming, farmers are compensated. Ideally, farmers that buy from accredited stocks are often assured of freedom from all hatchery based infections like pullorum disease and fowl typhoid. When chicks are bought at day old, mortality should not exceed 3% by the third week, losses exceeding 5% requires an investigation. This paper, therefore, aims at highlighting the various methods used in the

assessment of quality of day-old-chicks for their possible application in the Nigerian poultry industry.

### Definition of chick quality

Quality is a critically important issue in almost every discipline, which often becomes a major goal. Achieving that goal is the challenge. Chick quality is a term that many breeders, hatchery operators and farmers still have difficulty defining. Most poultry farmers can identify good quality chicks, but when asked to define chick quality, different descriptions would be received (Fairchild, 2005). Currently, determination of chick quality is mainly based on observations such as whether or not the chick is alert, dry or wet, whether the navel is completely sealed and presence or absence of deformities. While these are a good start, there are chicks that can be dry, have completely sealed navels, with no deformities but will still perform poorly (Fairchild, 2005).

A one-day-old chick of good quality must be clean, dry and free from dirt and contamination, with clear and bright eyes, free from deformities, with a completely sealed and clean navel. No yolk sac or dried membrane should protrude from navel area. The body should be firm to the touch and there should be no sign of respiratory distress. The chick should be alert and interested in its environment, responding to sounds. The legs should have the normal conformation, with no swelling and no hock or skin lesions; the beak should be formed and the toes firm and straight (Funk and Irwin, 1955; Raghavan, 1999). However, Cervantes (1993) proposed a numerical standard for chick quality where he defined chick quality on the basis of three specifications viz., physical, microbiological and serological specifications to derive a numerical score for chick quality grading. Though this system was proposed only for broiler chicks, it has been applied very well for both pullet and broiler chicks (Koteeswaran *et al.*, 2004). Researchers will continue to search for an objective measurement (one that will not vary from person to person) but in the mean time, the best measurement is to use a combination of observations (Fairchild,

2005).

#### **Methods used in chick quality assessment**

**Visual score:** most people use a purely subjective visual score in terms of good, average and poor chick quality, either for individual chicks or for a whole batch. Although this score is subjective, it is often rather accurate, as most people will look at a chick more or less in the same way.

i. The first parameter will often be the colour of the chicks. People want their broiler chicks to be as yellow as possible. Although there is no much literature on the value of this colour, it is not unlikely that it has to do with embryologic development. The pigment of the feathers comes from the yolk, and as yolk is the fuel for the development of the embryo, a good yolk uptake will probably mean a more yellow, and at the same time a more developed chick. The yellow colour can be induced by formaldehyde in the hatchers as well, but this will not lead to a better-developed chick (Meijerhof, 2005).

ii. The second is the visual score at the development of the chicks in general, including the development of the feathers, the firmness of the legs, the size of the beak and eyes among others.

iii. The navel quality is the third criterion of score. A poorly closed navel is an indication of navel/yolk sac infection which could result in mortality.

iv. The Day-old-chicks must be vital and alert. Chicks that have difficulty standing on their feet will have a low rating on the quality score table. This vitality will be influenced largely by the conditions in the hatchers.

Although a visual score of an experienced hatchery manager gives a good estimate of the quality of the day-old-chick, such system still remains subjective and poorly reproducible (Meijerhof, 2005).

**Tona or Pasgar score:** Several attempts have been made to put the visual score into a repeatable number. More recently the University of Leuven developed the Tona score, which was adjusted by Pas Reform to a more simplified and more practical method termed Pasgar score. Both methods put the visual score of a hatchery manager into a measurable scale and to some extent

reproducible figures. With this method, a series of observations are scored from 1 to 10, and trained observers are able to determine and score the quality of a day-old-chick in a more accurate and reproducible form. The measurements that are focused on include the chick's viability, yolk sac uptake, navel closure and the ability of the chick to get up after being placed on its back. Any abnormality detected in the chick is also noted and such physical defects often reduce the overall score (Manoharan *et al.*, 2004). Though a correlation between Tona or Pasgar score and broiler performance has not been demonstrated yet, a possible positive correlation between these scores and chick survival in the first week has been suggested (Tona *et al.*, 2003; Tona *et al.*, 2004).

**Weights of Day old chicks:** In many cases, average weight of a day old chick is recorded and used as an indicator for chick quality assessment. Although this is an easy and highly objective measurement, the value is relative. Day old chick weight is highly correlated with egg weight, but does not give a good indication for chick development. This is because day old chick weight contains the real chick weight and remaining yolk residue. Embryos use the fat in the yolk as fuel for their development, and therefore the deviation between real chick weight (without remaining yolk sac) and yolk residue is an indicator for development. If a lot of yolk is left over, then less development has occurred and the chick quality should be considered low. However, this is not apparent using this form of assessment.

**Yolk free body mass:** The yolk free body mass (body weight without residual yolk) is a better indicator for chick development and therefore for determination of the quality of the chicks. In newly-hatched chicks, the remaining yolk, i.e. the yolk sac content, provides the so-called internal feed for survival in the first few days of life, until the introduction of external feed intake (Anthony *et al.*, 1989; Sklan, 2000). The remaining yolk contains fats, proteins and maternal antibodies which protect chicks from infections from the causative agents the dams had been exposed to (Viera and Moran, 1999). It could be affirmed that in birds, the yolk sac content has the same role as the colostrum in

mammals. Its proper utilization is therefore very important for the chick's future, vitality and health (Mikec *et al.*, 2001). However, taking yolk free body mass is a rather labour intensive method, for which a rather high number of chicks have to be sacrificed, which makes it a less practical method for field evaluation.

**Chick length:** Another, more practical way to measure chick development is determining the length of the chick, either by measuring the spinal cord length, the shank length or the length of the stretched chicken, from the tip of the beak to the middle toe. Research findings have shown that the length of the chicken is a rather accurate and reproducible means way of measuring development (Meijerhof, 2005), and that large samples of chicks can be checked in a relative short time frame. It has a positive correlation with broiler performance at 6 weeks of age, substantially higher than the correlation between day old body weight and broiler performance (Meijerhof, 2005). The length of the chicken is related more to the size of the egg, than to its body weight.

**Microbiological quality:** The examination of pathogenic microbiological content of chicks is important in the assessment of chick quality. This is carried out by collecting samples from chicks three days after hatch and attempting bacterial isolation from cloacal swabs and yolk sac using different selective media such as Tryptic soy agar, mannitol salt agar for Staphylococci sp. and MacConkey agar for coliforms (Manoharan *et al.*, 2004). Additional yolk sac swab and materials from ileo-caecocolic junction will be saved in tetrathionate brilliant green broth for Salmonella sp. culture (Manoharan *et al.*, 2004). Also, tissues such as the right lung from each chick are checked for evidence of fungal infection using Saubouraud's dextrose agar. The results are then collated and interpreted for final assessment of the chick quality (Manoharan *et al.*, 2004).

**Presence of maternal antibody:** Vaccination of parent stock against some important endemic diseases is vital to ensure protection and survival of the chicks in their first few days of their life. Therefore, detection of maternal

antibodies in the day old chicks is an important tool in the assessment of the quality of chicks. Serum samples from chicks are collected to determine maternal antibody status for specific diseases such as Newcastle disease and infectious bursal disease using haemoagglutination test (Alexander, 1988) and quantitative agar gel immunodiffusion (QAGID) test (Cullen and Wyeth, 1975) respectively.

**Seven-day mortality profile:** For the assessment of the quality of day-old-chicks, a seven-day mortality profile is another criterion that could be used effectively (Manoharan *et al.*, 2004). The quality is inversely proportional to the seven-day mortality recorded.

#### **Comparison of different methods**

If we examine all methods available for measuring chick quality, Tona or Pasgar score and the chick length technique may be more accurate and reproducible for assessing chick quality. Earlier work compared Pasgar score and chick length methods and reported a poor correlation of the two and occasionally even negative (Meijerhof, 2005). The reason for this is that the Pasgar score is mainly influenced by the conditions in the hatcher, such as navel closure, yolk uptake and vitality which have a large influence on the chick quality score. This will influence mainly the condition of the day-old-chick and its ability to start and survive the first week (Meijerhof, 2005).

Chick length deals more with development, which is related with conditions in the setter, and has less influence on the survival rate in the first week of life but more on the performance of the chick itself. The reason for the low and sometime negative correlation can be that a good development in the setter (large chick length) will increase the heat production of the embryo. If this is not compensated in the hatcher by more cooling, the embryo will suffer in the last few days of incubation and show a low Pasgar score (Meijerhof, 2005). Depending on the goal of the hatcheries, the importance attached to the scores will vary. For instance an integrated company,

where the hatchery is part of the production chain will benefit from high chick performance. Meijerhof (2005) proposed that probably a combination of these two methods will be optimal, with approximately 75% of the final score based on chick growth potential (chick length) and 25% on the survival rate in the first one week (Pasgar score).

### **CONCLUSION**

To ensure a sustainable and profitable poultry industry in Nigeria there is an urgent need for adoption of applicable methods of chick quality assessment for use under Nigerian conditions.

### **RECOMMENDATIONS**

To ensure that day-old-chicks are produced from our hatcheries in Nigeria, the following recommendations are made:

- That a directorate of livestock Services should be established under the National Agency for Food and Drug Administration and Control (NAFDAC) and charged with the responsibility of assessing and monitoring activities of hatcheries in Nigeria and ensure that high quality day-old-chicks are produced.
- That only accredited hatchery should be allowed to produce and supply day-old-chicks to farmers.
- That all supplies must carry labels/certificate of the hatchery which should contain information such as the hatchery name, date of hatch, type of birds, breed of birds and the disease(s) that the birds have been vaccinated against at day-old among others.

It is hoped that these measures if taken will greatly enhance the efficiency of the poultry industry, improve livestock production and protect poultry farmers from losses resulting from supplies of poor quality day-old-chicks from our hatcheries in Nigeria.

### **REFERENCE**

SALEXANDER, D.J. (1988): Newcastle disease diagnosis In: Alexander D.J. editor, Newcastle disease, Boston, USA, Kluwer Academic Publishers;147-

160.

ANTHONY, N.B., DUNINGTON, E.A. and SIEGEL, P.B. (1989): Embryo growth of normal and dwarf chickens from lines selected for high and low 56 day weight. *Archiv fur Gefluegelkunde.*, 53: 116-122.

CERVANTES, H. (1993): A new formula for chick quality. *Broiler Industry* September; 20-27.

CULLEN, G.A. and WYETH, P.J. (1975). Quantitation of antibodies to infectious bursal disease. *Vet. Rec.*, 97: 315.

FAIRCHILD, B.D. (2005): Defining chick quality. *Poultry science*, University of Georgia. [Http://www.google.com](http://www.google.com)

FUNK, M.E. and IRWIN, M.R. (1955): Hatchery operation and management. 2nd Ed. John Willey and Sons Inc. New York; 23-31.

KOTEESWARAN, A., MANOHARAN, S., CHANDRAMOHAN, A. and CHANDRAN, N.D.J. (2004): Studies on physical and microbiological qualities of day old chicks. *Cheiron.*, 33: 63-68.

MANOHARAN, S., RAMESH, S., PARTHIBAN, M., KOTEESWARAN, A., CHANDRAN, N.D.J. and REDDY, M.R. (2004): Effect of poly herbal ingredient on day old chick quality by feeding in parent flocks. *International Journal of Poultry Science.*, 3(12):773-778.

MEIJERHOF, R. (2005): What counts for chick quality? *Hybro B.V.* P.O. Box 30, 5830 AA Boxmeer, The Netherlands. [Http://www.hybro.com](http://www.hybro.com).

MIKEC, M., BIDIN, Z. and VALENTIC, A. (2001): Utjecaj temperature okolisa I nacina hranjenja na resorpciju zumanjcane vrecice i prirast u tovnih pilica (The impact of atmospheric temperature and feeding methods on the yolk sac resorption and broiler growth). 4th symposium "Poultry days 2001 with international participation",

- proceedings. Porec, May 16-19, 2001., 50-55.
- RAGHAVAN, V. (1999). Give day-old-chicks the best start. *World Poultry Science.*, 15:28-29.
- SHRESTHA, P., AHASAN, M.M., ISLAM, K.M.D., BILLAH, M.M., ISLAM, M.E., MEHEDI, M., MITRA, S. and ISLAM, M.R. (2003): Seroprevalence of infectious bursal disease virus (IBDV) specific antibody in Chicken. *Pakistan J. of Biol. Sci.*, 6(14): 1234-1240.
- SKLAN, D. (2000): Development of the digestive tract of poultry. *World Poultry Congress. Abstract and Proceedings.* Montreal., 20-24, August 2000.
- TONA, K. F., BAMELIS, B., KETELAERE, D., BRUGGEMAN, V., MORAES, V.M.B., BUYSE, J., ONAGBESAN, O. and DECUYPERE, E. (2003): Effects of egg storage time on spread of hatch, chick quality and chick juvenile growth. *Poult. Sci.*, 82: 736-741.
- TONA, K., ONAGBESAN, O., JEGO, Y., KAMERS, B., DECUYPERE, E. and BRUGGEMAN, V. (2004): Comparism of embryo physiological parameters during incubation, chick quality and growth performance of three lines of broiler breeders differing in genetic composition and growth rate. *Poult. Sci.*, 83: 507-513.
- VIEIRA, S. L. and MORAN, E.T. (1999): Effects of eggs of origin and chick post hatch nutrition on broiler live performance and meat yields. *World's Poult. Sci. J.*, 56:125-142.