

## **New management techniques in poultry for egg and meat production in India**

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**ARTICLE ID: 005**

### **Introduction**

India ranks third in egg production and fifth in poultry meat in the world India accounts for about 5.65 per cent of the global egg production, whereas, India contributes 3 per cent of global meat product, Poultry industry have gained an enormous attention due to fast growing sector. Egg and meat from poultry become important sources of cheap protein available for consumption of human beings. By the year 2050, global demand for poultry meat will be over double what it was in 2005 and the demand for chicken eggs will be almost 40 per cent greater so employing smart poultry management systems is necessary to increase production while minimizing costs and the use of resources.

### **Biggest challenges to Indian poultry industry**

One of the major challenges:

1. Emerging and re-emerging diseases of poultry
2. Potential environmental hazards such as poultry waste management, dead birds disposal etc.
3. Inadequate linkage between research and development organizations and industry

### **Problems of poultry farming**

High cost of feed, high bird density, high mortality rate, inadequate ventilation, inadequate drugs, poor managerial practices and lack of governmental support.

### **New technologies to poultry production**

Smart poultry housing environment, Precision feeding system, Real time monitoring and automatic system

### **Smart housing management**

Poultry are sensitive to external environment and slight change in the ambient surrounding may affect the health and thereby affecting production level. A well-equipped housing environment can facilitate flock welfare and increase the production such as meat and egg within a short period of time.

### **Environmental monitoring systems**

The environment of the poultry house is an important factor for production that can be monitored and optimized. Environmental inputs include temperature, air velocity, ventilation rate, litter quality, humidity and gas concentrations, including carbon dioxide and ammonia. Multi-sensor systems capable of tracking temperature, air velocity and differential pressure in broiler houses have been shown to effectively assess barn ventilation system functioning. Robotics are another potential technology that could be used to monitor and maintain the environment of poultry houses, these robots could enhance bird health and activity levels by inducing bird movement. Robots like this allow the environment to be monitored remotely, decreasing the need for human workers to enter the poultry house, thereby enhancing bio-security.

### **Commercial robotics in poultry production**

One of the most practical applications of digital technology in the poultry industry is that of robots. France-based Octopus Robots designs entirely autonomous robots to prevent and control disease and infection in poultry houses and also monitor laying hens. Another French robotic company, Tibot, explains that robots can discourage chickens from laying eggs on the floor and also keep the birds moving for an added health benefit. Harvesting robots is a robotic system for picking the floor eggs, also known as eggs harvesting.

### **Recent innovations in poultry production**

Gohbot, the poultry house robot that navigates poultry house floors using imaging sensors and machine learning, has the capability to detect and pick up floor eggs and sense

environmental temperatures, gasses and light levels. Developers at Georgia Tech Research Institute project overall cost under \$6,000. 2. 3D Bird Deboning Cutting Virtual Reality generates cutting trajectories for automated poultry processing systems. It was development at Georgia Tech Research Institute. 3. Woody Breast Detection with machine vision and high-speed cameras is capable of detecting and/or sorting breast fillets at normal line speeds without contacting or damaging fillets. Muscle rigidity is measured as the fillets move on and fall off a conveyor.

### **Evaporative cooling systems (EVAPs)**

Evaporative cooling systems (EVAPs) are one of the smart indoor equipment systems used to control and adjust the environment suitably for poultry houses. EVAPs has a water-cooling fan-pad and a fan-controller with optional vent box and curtain controller are the main features used to alter the air volume flow for temperature and humidity adjustments in environments, including light intensity controls.

### **Wireless sensor networks (WSNs)**

One of the most promising approaches technologies with worldwide deployability is the use of multi-functional wireless sensor networks (WSNs) With wireless connectivity and coverage, the cost of extreme wiring-based connection and improbable access to environments have been reduced in addition to the overall operation cost Using portable monitoring devices, production performance parameters of poultry such as egg laying time, egg weight and feed intake are being monitored.

### **Use of sensing or automation technologies**

A novel wireless body-mounted accelerometer sensor has been developed and used to remotely monitor activity of laying hens (egg production) in cage-free housing systems. A good example for modern poultry management is the highly automated machines for collecting and sorting eggs for layers. Several technologies are unique to broiler production, such as precision weighing systems that are essential analysis tools for economic success in growing broilers.

### **Precision feeding systems**

A novel precision feeding (PF) system was developed at the University of Alberta. Feeding on poultry farms is an important aspect of raising poultry and it is an area where PLF technologies can have a major impact on production. Achieving precise feed conversion rates or maintaining optimal bird weight, new technologies can optimize poultry feeding. By limiting meal size and feeding bout duration with the PF system, it is possible for birds to eat more often than once per d while at the same time achieving a high degree of flock uniformity. Controlling feed consumption on farms results in large differences in body weight and a decreased efficiency of quality broiler chick production Laying hens, could also benefit from sensor technologies that can more precisely assess and control levels of feed intake An experimental precision feeding system has been developed that regulates the release of feed to individual birds for egg product

#### **Internet based smart sensing poultry farm**

Internet of Things (IoT) was first introduced by Kevin Ashton in the multinational supply chain of food industry including poultry industry. Wireless systems expand the connectivity possibilities for IoT, with Wi-Fi being the widely used technology. Remote monitoring of poultry farm is achieved by acquiring all sensor values and passing the values to the web. Devices that will be incorporated into smart poultry management systems will be connected to the Internet allowing for the formation of Internet of things (IoT) farm networks. IoT technologies allow for communication between farm sensors, devices, and equipment, and will lead to the automation of multiple farm procedures. The main advantage the IoT provides for the poultry industry is the capability for communication between sensors and equipment that are used on the far.

#### **Artificial neural network (ANN)**

ANNs can be regarded as an alternative modelling approach to traditional statistics particularly poultry ANNs defines a collection of simple computational units interlinked by a system of connections used to either model complex relationships between inputs and outputs or discover patterns in specific data ANNs are massively parallel computing systems consisting of an extremely large number of simple processors.

#### **Four basic parameters**

1. The interconnection pattern between different layers of neurons (network topology)
2. The learning process for updating the weights of the interconnections (connection pattern)
3. The activation function that converts a neuron-weighted input to its output activation
4. Training strategy and ability for data processing.

### **Bio-security in poultry farm**

The FAO and OIE (World Organisation for Animal Health) define bio-security as the implementation of measures to reduce the risk of the introduction and spread of disease agents. Bio-security is an important management steps to be followed strictly in poultry far.

### **Conclusion**

Poultry housing is very important to procure good production level Smart poultry housing using new technologies can bring out better flock health Adopting sophisticated devices and technologies to run a poultry farm may be expensive Problems of housing and farming are to be examine scientifically to enhance production performance.