Animals in Intensive Production Systems

POULTRY – LAYER (EGG) INDUSTRY

LECTURER: DR ANDRES DIAZ

Andrés is a lecturer in production animal health and researcher in veterinary virology in the Faculty of Veterinary and Agricultural Sciences at The University of Melbourne. Andrés earned his veterinary degree from the Universidad de La Salle in Bogotá, Colombia in 1998, where he then worked as a poultry veterinarian. After moving to Canada in 1999, he pursued his postgraduate education at the Ontario Veterinary College, University of Guelph, where he earned his MSc in clinical studies in 2006 working on equine respiratory viruses and a PhD in veterinary virology in 2012 focused on the picornavirus equine rhinitis A virus. After graduation, Andrés worked as a postdoctoral fellow at the Firestone Equine Respiratory Research Laboratory at the University of Guelph. Since his relocation to Melbourne, Australia in 2014, his research has focused on avian and equine virology including work on infectious laryngotracheitis virus (ILTV), infectious bronchitis virus (IBV) and equine herpesviruses (EHV).

Email andres.diaz@unimelb.edu.au

INTENDED LEARNING OUTCOMES

At the end of this lecture, you should be able to describe:

- Describe the market share of eggs produced by different production systems
- Describe the key performance indices in the egg industry
- Describe the advantages and disadvantages of egg layer housing systems
- Describe the life cycle of a layer hen
- Describe the egg production cycle

KEYWORDS

Layers, eggs, egg production, pullet, poultry

LECTURE OVERVIEW

Table egg production

Table egg producers may either rear their own pullets from day old or receive pullets at the point of lay from specialist pullet producers. Unlike the broiler industry egg production is not vertically integrated; egg producers purchase pullets from primary breeding companies and own and manage their birds till the end of lay. Only female birds are used for the production of eggs for human consumption.

Commercial egg producers typically have multi-aged farms to enable the production of eggs continuously during the year. This is managed by having multiple flocks of different ages on the farm at a single time. As flocks go out of lay new flocks are introduced to maintain continuous supply of eggs.

Growth and production pullet/layer
Pullets are delivered to the rearing farm as day old chicks. As with breeding flocks the key management phases are brooding, rearing and production.

Brooding and rearing may occur in cages or in floor-based systems. Birds are reared until around 16-18 weeks of age at which time they may be moved to separate production facilities. The key production aim during this phase is to produce a uniform flock of birds ready for egg production.

Key production performance indicators
Key performance indicators for commercial table egg layers vary depending on the strain or line of bird in production. All management objectives aim to meet standard targets for egg production; but they will only be met under optimal management conditions where flocks have a high degree of uniformity, good nutrition and optimal light stimulation at the right age.

	Days	Weeks
Age of flock when first egg laid	112	16
Age of flock at 5% hen-day egg production	130	18.6
Age of flock at 50% hen-day egg production	150	21
Age of flock at peak hen day egg production	182	26

Egg production indices
Hen-day production
Used to calculate the egg productivity of hens on any given day or week. It is an important indicator of how well the birds are laying, but does not consider egg size, quality or past mortality.

Used to calculate the egg production of the flock to a certain point of time. Usually expressed as a total number of eggs produced per hen. Takes into account mortality over the time period.

Number of eggs produced / number of live hens x 100 = % hen day production for 1 day

Hen-housed day production
Used to calculate the egg production of the flock to a certain point of time. Usually expressed as a total number of eggs produced per hen. Takes into account mortality over the time period. It is not meaningful over a short period of time and is most useful at the end of production. A better measure of economic performance of a flock.

Total number of eggs production / Number of hens housed = hen housed egg production for the period

Both measures are used to compare the performance of the flock with the expected standard figures and can be used to identify problems with flock health or management.

Egg weight
First laid eggs are smaller than those laid later in production, with egg size increasing to about 40 weeks of age, where it reaches maximum. Egg size is important for maximizing profit and a key management aim is to maximize egg weight as early as possible. Egg weight is closely related to body weight distribution in the flock and is an important measure to determine optimal bird nutrition and management.

Nutrition

As with the breeder, diets are managed according to the age of the bird.

- 0-4 weeks – Starter diet
- 4 to 10 weeks - Grower diet
- 11-16 weeks – Developer diet
- 16-18 weeks – Pre lay (till 2% production)
- 19 -26-28 weeks –Layer 1
- 26-65 weeks – Layer 2/3

Diets are adjusted according to energy and protein requirements to manage growth and frame development and develop the digestive system until the point of lay. One of the key objectives during rearing is to develop appetite and feed intake so that birds can increase consumption during lay. Any delays in growth in the first few weeks of life will be reflected in lower body weights at transfer and in production. Just prior to lay diets are adjusted to ensure that there is sufficient calcium in the diet to provide an adequate bone reservoir for future egg production.

As the layer progresses into the production phase diets are balanced to provide energy and protein requirements for the birds depending on age of the bird and their stage of development or production, egg mass, and calcium requirements to maintain good egg -shell quality.

Feed may be given in the form of crumbles usually in the first diets, after which mash feeds are used. Some producers prefer to use pelleted feed. Different feed forms affect bird appetite and intake, and this is very dependent on particle size. Small particles are not tolerated, whilst whole grains can be used to supplement diets and encourage gizzard development.

Farm management systems
Table egg layers may be managed during production in a number of different systems including cages, barns or free range. There are advantages and disadvantages to all systems.

Cage systems can take the form of a number of different arrangements:

- Conventional cages may house five to six birds, with automated feeding, watering and egg collection
- Colony cages - large group size 50 to 60 birds
- Enriched cages - may house small or large numbers of birds but contain scratching and dust bathing areas, perches and nesting areas.

Barn systems
May contain fully slatted, or littered floors, or partially slatted and littered floors. Birds can roam freely, access feed and water and nest box areas.

Free-range
Free range systems can take many different forms including barn type systems with pop holes or doors allowing birds access to range areas, portable huts that can be moved around range areas, to totally free range with no/little shelter provided except nest boxes and feed/water outside.

Aviary systems
Birds are managed in sheds that have perches nest boxes and feeding on multiple vertical levels.

Animal welfare legislation framework
Animal welfare is highly regulated in Europe, the UK, Australia and New Zealand with nationally legislated requirements to meet animal welfare standards in the form of Acts, regulations and codes of welfare. In the USA there are no National or State based animal welfare codes or legislation and industry bodies or companies develop and implement codes of practice.

Australian legislation typically follows the lead of European legislation, but animal welfare legislation and codes of practice are developed in partnership between government and industry with input from the various animal welfare bodies such as the RSPCA. Despite national development of animal welfare codes of practice, individual States are responsible for the implementation of these codes and regulations and they may be implemented differently between States.

The current Australian welfare code of practice is the National Code of Practice for the Welfare of Poultry 4th Edition.

Key welfare issues for the egg industry include:

- Beak trimming
- Cage systems – space allowance and the provision of sufficient space to allow natural behaviours
- Free Range systems – allocation of space, definition of free range
- Cage layer fatigue and osteoporosis
- Transportation at the end of production
- Humane destruction at the end of lay
- Feather pecking, cannibalism
- Male chick destruction
- Moulting birds for a second lay

End of production
At the end of production, around 65-70 weeks birds may be moulted, or the flock depopulated. Egg laying birds will naturally cease laying eggs after about 75 weeks of age and go through a moult. During moulting birds will lose some of their plumage and go off the lay. When they regrow their feathers, they will then come back into production. Producers may stimulate this natural event by providing a low-quality feed and induce moult in all birds at the same time. Moulted birds will continue production for an additional 8 months of production. It is not a practice that is encouraged but may be used when prices are low, and it is difficult to get birds processed.

At the end of production spent hens are depopulated and may be processed at the abattoir, or humanely destroyed. Unfortunately, the markets for this type of meat are small and processing capacity is limited.

Egg processing
Eggs for human consumption are graded according to size, weight and quality and then packed for sale. Grading may occur on farm or eggs may be sent to large grading facilities where they are graded and packed on behalf of the producer.

Egg production and processing is conducted according to the Primary Production and Processing Standard for Eggs (FSANZ). Eggs that are not suitable for the whole egg market may be sold as pulp. Pulp eggs are sold for pasteurization and made into whole egg pulp or powder and then sold for export or retail.

Animal health and disease
Layers are extensively vaccinated during rearing to prevent disease occurring during production, as many disease events will compromise egg production.

Significant diseases affecting layers are many but may include:

- Mycoplasma
- Infectious Bronchitis
- Egg Drop syndrome
- Infectious coryza
- Colibacillosis
- Pasteurellosis

Free range birds are particularly susceptible to internal and external parasites as many of these parasites require intermediate hosts that may survive for extended periods in a free-range environment.