

## Air quality guidance note

# Egg production

This guideline deals with air pollution issues. It does not deal with water pollution or noise.

## 1 Industry description

Egg production establishments that are intended to accommodate more than 250,000 birds are scheduled under the POEO Act. They need to hold an Environment Protection Licence and DECC is the Appropriate Regulatory Authority. Local government is responsible for environment protection in relation to egg farms with capacity smaller than 250,000 birds.

Councils can influence the initial siting of all intensive agricultural industries through the development approval process. This is usually the most important decision on air quality management for these premises.

There are many similarities between egg production and poultry production, both being based on managing large numbers of chickens. However, there is a separate guidance note in this series for chicken meat production.

### 1.1 Industry structure

#### Breeding farms

Breeding farms keep breeding hens and roosters to produce fertile eggs. The birds that produce the egg chickens are known as parent or secondary stock. They are housed in large, deep litter sheds. The fertile eggs produced by the parent stock are collected daily and stored for transport to the hatchery.

At the end of their 12-month productive life breeding birds are removed for meat processing. The litter is cleaned from the sheds at the end of each 12-month cycle and the process repeated.

#### Hatcheries

Hatcheries incubate the eggs from the parent stock until they hatch. The chickens produced are consigned to egg chicken farms within hours of hatching. They are promptly graded for quality, sexed and vaccinated. They are then either kept on site for laying hens or sold to other egg farms as pullets or day old chicks. Because egg farms and breeder farms have different requirements, it is common for egg producers to purchase day-old chicks or pullets (young birds), rather than operating their own breeder farm.

## Production systems

In most operations, day old chicks are obtained from hatcheries and reared to around 17 weeks of age when they begin to lay.

At around 21 weeks of age the birds reach about 50% of their productive capacity, which peaks at around 27 weeks. By about 80–85 weeks the productivity of the birds has significantly declined and they are removed for slaughter.

There are three distinct egg production systems:

- caged hens
- barns
- free-range systems.

Each has different impacts on air quality.

## 1.2 Egg production housing

### Caged hens

Caged systems represent over 90% of egg production in NSW. There are currently two forms of cages used in egg production:

#### Older-style cages

Older-style conventional cages have limited environmental control and automation. In accordance with the *Model Code of Practice for Welfare of Animals—Domestic Poultry* (4th edition) these cages will be decommissioned by 1 January 2008. Thereafter, all egg farms using caged hens must meet the requirements of the new standard.

#### Modern cages

Modern cages (environmental cages) meet the *Model Code of Practice for Welfare of Animals—Domestic Poultry*:

- Modern cages have computerised climate control and tunnel ventilation.
- Many of the modern environment control systems include automated feeding systems.
- Most of these cages are also fitted with manure belts that collect the manure from under the cages and automatically remove it from the sheds.
- These manure belts are often fitted with a drying system that removes moisture from the manure.
- Cages are designed to allow eggs to roll clear of the hens for daily collection either manually or automatically via a conveyor belt.

### Barns

The barn system in NSW represents about 2% of the eggs produced. These systems generally consist of an automated deep-litter system, with the hens group-housed in sheds with nest boxes and perches. No more than two-thirds of the shed is slatted. The flooring of the barn consists of litter, slats or wire.

The space allocation per bird is greater in barn systems than in cages. Barn systems generally have lower production than cage systems, although this can partly be overcome with recent advances in management.

### **Free-range systems**

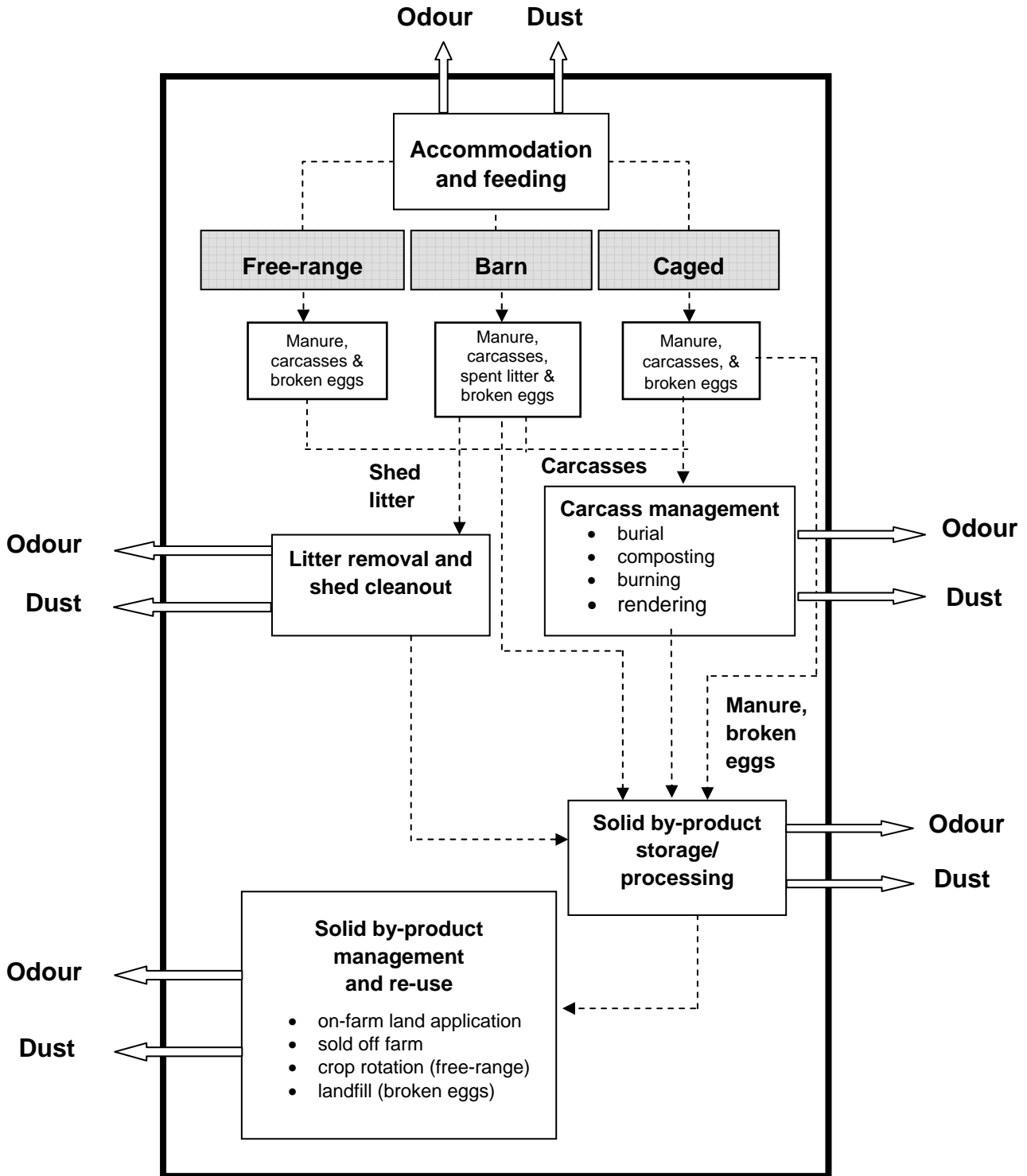
Free-range accommodation represents about 5% of eggs produced in NSW. The average flock size is much smaller than in the other systems, typically being only 1,000 to 2,000 birds. However, a few free-range farms in NSW have flock sizes ranging from 5,000 to 20,000 birds.

Free-range systems consist of a weatherproof shed where hens can roost, lay, drink and eat. Adjoining the shed is an open-aired outdoor range. The sheds protect the birds from the elements and predators while the free-range area allows them access to open space and vegetation.

Free-range egg production is considerably more expensive than the alternatives because of the greater land area needed, increased labour requirements, higher feed consumption and small economies of scale. Mortality rates can be considerably higher.

## **1.3 Egg production cycle**

This diagram shows the flow of by-products through a typical egg production farm and the relevant air quality issues with each stage of the production system.



## 2 Potential emissions to air

Before going on site for an inspection or assessment the following should be checked:

- the consent conditions for the premises or the activity, and
- any previous reports on file including diagrams, photographs, maps, etc.

The main air pollutants from egg production are odour and dust.

### 2.1 Odour

Odours in egg production arise from:

- manure, and storage of the removed manure
- cleaning out shed litter between cycles
- composting litter materials
- applying stored or treated bird waste to land
- disposing of bird carcasses
- transporting treated and untreated wastes off site.



Removing waste litter in a large poultry shed

### 2.2 Dust

Dust in egg production arises from:

- cleaning out shed litter between cycles
- applying stored or treated bird waste to land
- handling feed materials
- transporting treated and untreated wastes off site.



Modern feed handling in egg production

## 3 Managing air pollution

There are limitations to the control techniques available to egg producers to limit air pollution because:

- anaerobic processes are necessarily involved
- large odorous surface areas are exposed, and
- large ventilation air flows through sheds and cages are needed to maintain suitable production conditions.

### 3.1 Location of establishments

Initial location of egg production establishments and their relationships to sensitive neighbours is critical, since dispersion is the main method of amelioration for both odours and dust. This is discussed in Module 3 Part 1, 'Air pollution control techniques' sections 3 and 5.3.

Stacks are not feasible for the large air volumes or large areas involved in egg production, so distance separation is the only practical means of dispersion. Correct assessment at the development approval stage is paramount.

Many existing egg production facilities in Australia are located in outer-fringe urban areas. These areas were often semi-rural when the facilities were first established, but have since been encroached upon by urban or semi-urban development, with resulting consequences for neighbourhood amenity.

### 3.2 Odour

Measures that can be adopted to manage odour in egg production include:

- **preventing excessive moisture build-up** in the manure in floor litter; this has to be balanced against maintaining suitable temperature and humidity for the birds
- **keeping collected manure dry** before spreading it on land, composting it or transferring it off site
- **storing manure in trapezoidal piles** (wider at the base than the top) to maximise pile drainage; storage should be covered wherever possible
- moving manure and litter piles, or recovering solids from them, **during conditions that favour dispersion**, that is, during sunny periods with moderate winds blowing; anaerobic conditions in the piles mean that odorous gases are likely to be released when they are moved
- **using manure and waste litter soon after it has been collected**, i.e. spreading it on land or composting it as soon as possible rather than leaving it in stockpiles
- **covering the load** when manure or waste litter are transported off site
- making sure that **composting systems are designed and operated according to recognised principles** to minimise odours, especially during windrow turning (see Module 3 Part 1, 'Air pollution control techniques' section 5.6)
- **burying carcasses in deep trenches** that are well-removed from ground water and protected from surface water infiltration; carcasses need to be covered with a substantial layer of soil or clay



Carcass burial trench



Carcass burial trench covered

- taking extra care when **changing the rations fed to birds** because in some circumstances this can result in significant changes in their excretion pattern, with the litter becoming very moist and more odorous; avoiding certain feeds or sudden changes can sometimes alleviate the intensity of odour (see Module 3 Part 1, 'Air pollution control techniques' section 5.4)
- **clearing litter from sheds during the day when the wind is blowing away from close receptors** and dispersion conditions are favourable; clearing during early morning, evening or night should be avoided
- where natural ventilation is to be replaced by fully enclosed forced ventilation, the **exhaust end of the shed** should, wherever possible, be the end **furthest from sensitive neighbours** so as to maximise the separation distance.



The ventilation system on the shed at bottom left should be located away from neighbouring houses

### 3.3 Dust

The main method for managing dust emissions is to separate the source of the dust as far as possible from sensitive receptors. The same management principles apply for both odours and dust.

Wherever possible, activities such as cleaning sheds, moving waste materials (manure, litter, etc.) or spreading wastes on land should not be carried out during strong wind conditions because this would enhance dust generation and transport.

Some additional measures for dust control are:

- **erecting wind breaks, wind barriers or screens** in locations where dusty materials are stored; key locations are around manure, compost and waste litter storage
- locating storage areas for dusty materials **as far away as possible from sensitive neighbours**
- scheduling activities which involve moving dusty materials **during the day** whenever possible
- **applying water sprays to unsealed road and other dusty surfaces** to reduce dust raised by vehicle movement—but water sprays should not be used extensively on stockpiles of stored manure because of the risk of generating odours
- if dust emissions are a problem when cleaning out shed litter, **applying water to the litter** beforehand could help—but extra moisture could also lead to an increase in odour levels.



## 4 Considerations for consent conditions

Other conditions may be necessary to control environmental impacts other than air pollution.

### 4.1 Standards to be met

- In cases where odour modelling and testing is to be undertaken, odours from the premises to comply with the requirements of DEC draft policy *Assessment and management of odour from stationary sources in NSW* (2001).
- Solid particle emissions to comply with POEO (Clean Air) Regulation 2002 for any stack discharges on the site:
  - 400 mg/m<sup>3</sup> for plant installed before 1 Aug 1997 (not for a new development consent)
  - 250 mg/m<sup>3</sup> for plant installed between 1 Aug 1997 and 1 Sept 2005 (not for a new development consent)
  - 100 mg/m<sup>3</sup> for plant installed after 1 Sept 2005.
- Smoke emissions to comply with Ringelmann 1 or 20% opacity.
- Plant to be operated and maintained in a proper and efficient manner which does not cause air pollution, in accordance with s. 124 and 125 of the POEO Act.
- Materials to be handled in a proper and efficient manner which does not cause air pollution, in accordance with s. 126 of the POEO Act.

### 4.2 Operational and control requirements

- Odours from the premises not to be detectable at the nearest sensitive land use.
- All sheds to be constructed to prevent entry of water from external sources.
- Mechanical ventilation systems to be designed to exhaust shed air as far as possible from nearby receptors.
- Bedding within sheds to be maintained within the optimum moisture range to minimise odour and dust emissions.
- Removal of bedding from sheds to be carried out in weather conditions which minimise impact on sensitive receptors.
- All operations and activities conducted at the premises to be carried out in a manner that will minimise dust at the boundary of the premises.
- All solid by-products (e.g. bedding litter) to be stored in an impervious, free-draining, bunded area.
- Solids to be stored as far away from sensitive receptors as practicable.
- Wherever possible, movement of solids to be carried out in weather conditions which minimise odour emissions.
- Application of solids to land to be carried out in weather conditions which minimise odour and dust emissions and impact on sensitive receptors. Solids to be incorporated into soil immediately after application.
- Carcasses to be disposed of in a manner which minimises odour and dust emissions.
- Carcasses which are buried to be covered with sufficient soil to prevent odour emissions.



## Egg production: air quality management checklist

This checklist has been designed for:

- local government officers—to help identify potential air emission problems and provide advice to operators.
- operators—to help identify and manage potential air emission problems.

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Company

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Address

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Site location

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Contact	Permit assessment
	Complaint response
Phone	Compliance inspection
Fax	Time & date of inspection
Email	Inspector's name

### A Site location and context

What are nearby sensitive land uses (e.g. schools, hospitals, car dealers).

	Land use	Distance	Comments
North			
South			
East			
West			

What are the prevailing winds at the site? (morning/afternoon/night)

Summer		Autumn	
Winter		Spring	

How will the surrounding topography or nearby buildings affect dispersion of any air pollution that is emitted from the site?

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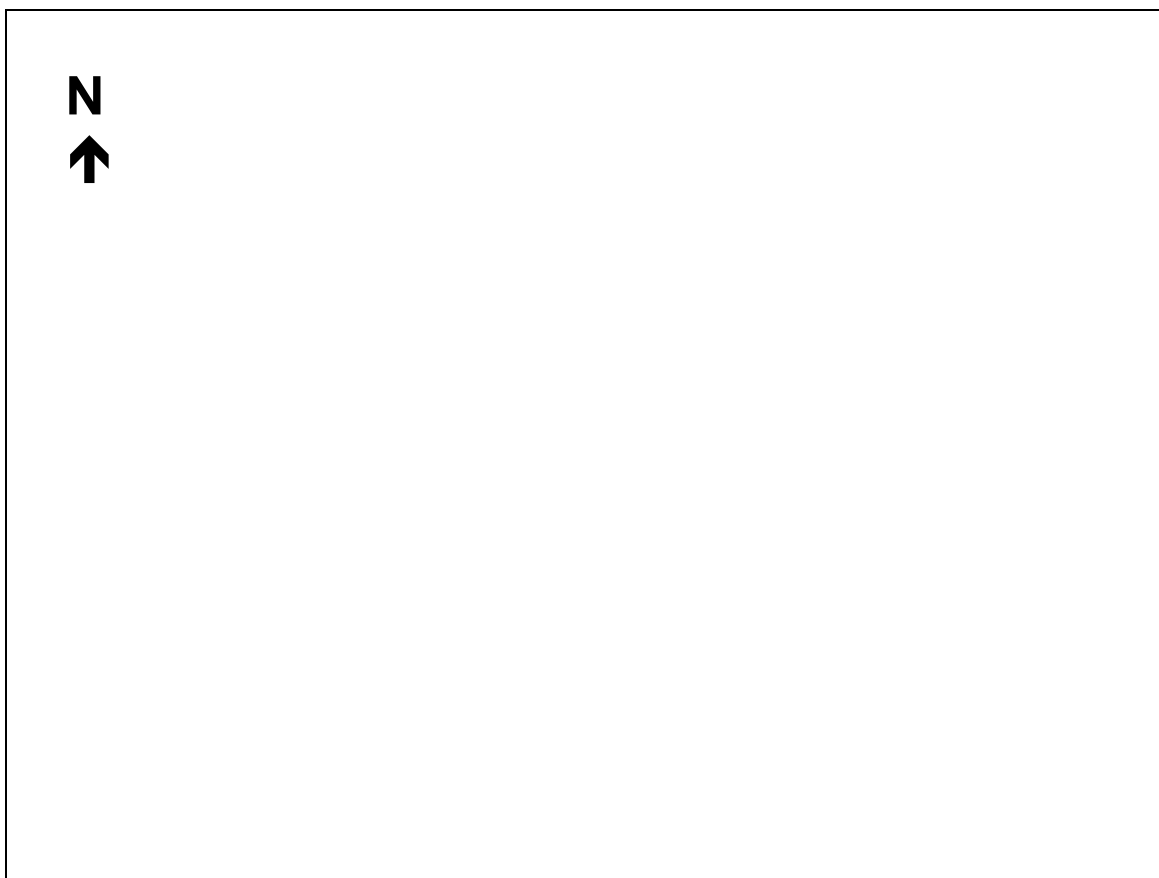
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## B Sketch plan of the site

Draw a sketch plan of the site showing the surrounding land uses, nearby buildings and local topography.



Note particularly:

- nearby sensitive land uses (schools, homes, other affected premises)
- locations of any complainants
- locations and heights of nearby buildings or trees
- locations and heights of stacks on premises
- wind directions during times of complaint (night and day)
- any other relevant features.

Comments:

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## D Core business and activities

Tick if yes and add comments as appropriate.

Types of operation

Operation	No.	Size (birds)	Comments
Cages			
Barns			
Free-range			
Other			

Treatment of wastes

Wastes treated	Method	Comments
Shed litter	Land application	
	Composting	
	Storage	
Carcasses	Burial	
	Composting	
	Rendering	
Other		

Location and numbers of ventilation discharge points

Location	Forced or natural	No.	Comments

Operational conditions

Aspect	Condition/activity	Yes/no/NA
Accommodation— general	Sheds relatively clean?	
	Sheds well ventilated?	
	Comfortable to breath inside?	
	Not dusty inside?	
	Run-off excluded from shed?	
	Evaporative coolers drain away from shed?	
Mechanically ventilated	Exhaust located at furthest end of shed from sensitive receptors?	
Barn	Litter mostly dry?	
	No wet patches under waterers?	
	Floor well covered with litter?	
Free-range	No piles of manure on run or in shelters?	
	Ground partially covered by vegetation?	
Solids management	Operations carried out during day time?	
	Screens around storage areas?	
	Transport vehicles well covered?	
	Solids movement areas tidy?	
	Solids stored in well-defined piles?	
	Storage area dry and well-drained?	
	Carcasses well covered?	
	Stormwater excluded?	
Land application	No by-products visible on soil surface?	
	Vegetation on soil surface?	
	Spreading operations done during day?	

Comments and recommendations on operations:

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## E Management of odorous materials

How are odorous materials stored?

	Open storage	Covered storage	Bin or hopper storage	Comments
Manure				
Shed litter				
Compost				

How are odorous materials moved?

Operation	Weather considered?	Comment
Litter clearing from sheds		
Movement from storage		
Land application		

Comments on the general standard of housekeeping:

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## F Complaints from nearby premises

Odours

Date	Complainant	Distance and direction from farm	Time of day	Comments

Dust

Date	Complainant	Distance and direction from farm	Time of day	Comments



