Cubley Poultry Unit HP3634MQ - dust assessment report
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Alison Holdsworth, Technical Adviser, Lead for Intensive Farming
Environment Management Technical Services

Introduction

A site visit was undertaken to Cubley Farm on 23rd September 2010 to assess the dust controls present on the farm and provide a baseline assessment, prior to a dust monitoring programme.

Background

Sources of dust
Dust from poultry houses mainly originates from feathers, skin particles and used litter, and to a lesser extent from feed, bedding, micro-organisms and fungi.

Dust abatement techniques
Defra financed a project (CTE0408 - Dust abatement techniques in the UK poultry industry June 2008 ADAS, by Walker O. and Emery J.) to look at such techniques in the UK poultry industry. Information from this project has been used to assess the dust control techniques being used at Cubley Poultry Unit.

The control of dust can be split into two categories:

- control at source
- control at exhaust

Control of dust at source
Some of the dust 'control at source' methods, i.e. those used inside a poultry building, are limited in the amount of dust they can remove. It is therefore debatable how practical or economical it is to use control at source abatement techniques as specific 'stand-alone' dust control methods in a poultry house.

Many techniques may well already make a contribution to dust control where they are part of normal flock management techniques. Most farmers already ensure that good quality feed pellets are fed to birds using modern feeders that do not break up the feed and are not over-filled. They also properly clean houses and equipment on a regular basis. Dust extracted bedding material is commonly used because it is better for the birds, more biosecure and affordable.

Control of dust at exhaust
Dust particles that have not been trapped or eliminated at source may become airborne within the building and ultimately exhausted to atmosphere by the ventilation system. Since in many poultry houses air is exhausted via the fans, there may be an opportunity to either vent exhaust air at high velocity or trap dust as this air leaves from these exhaust locations by using 'end of pipe systems'.

Conclusion

After establishing housing and management techniques currently in use, additional information was provided by Moy Park to clarify any points. Tables 1 and 2 below summarise the findings.
It was found that the farm was being operated at the current industry 'best practice' and in some cases beyond, for example downtimes and bedding usage.

Some recommendations for good practice are given at the end.

Table 1 Controls of dust at source

Source of Dust	Issue	How is reduction achieved?	Achieved	Comment
Poultry feed	Dust from silos	Covers put over feed silo pipes	√	Dust covers used on end of feed silo pipes
	Form of feed	Mould into pellets so that dusty ingredients bound together	√	Pelleted food used
	Fat content	Increased fat content so that dusty ingredients bound together	√	Fat content – Comment from Moy Park nutritionist – Moy Park feeds, being high density feeds, use above-average levels of liquid oil. The relationship between oil content and feed pellet quality and feed dust is, however, not a linear and positive relationship. Too much oil leads to pellet breakdown, and higher levels of dust. Higher levels of fat cannot be used as that would lead to higher levels of carcass fat, seriously and adversely affecting the quality of chicken.
	Feed ingredients	Both wheat and barley have been found to be more dusty than maize	√	Comment from Moy Park nutritionist – regarding the statement about wheat and barley being more dusty than maize is inaccurate and erroneous with regard to feed quality, pellet breakdown and dustiness. Maize is the sole cereal source in the USA where pellet quality is much worse than in the UK. Wheat is an excellent ingredient for making pellets, much better than either of the other 2 cereals.
	Feeding method	Hand feeding is preferable to "screw" auger systems and automatic feeders, which can produce increased dust levels	√	Pan feeders used in Houses 1, 2, 5 and 6 so minimal dust produced in these houses. Hand feeding not feasible in broiler houses to ensure all birds receive the same amount of feed
	Over administration of feed	Avoid spilled feed crushed on the floor into particles which become airborne	√	Feed provided every hour not ad lib
Bedding Material	Choice of bedding	Sawdust and flax straw have been found to produce less dust than wheat, barley or rye straw.	√	Dust extracted wood shavings used, so that there is only 3%- 4% dust in the shavings.

Source of Dust	Issue	How is reduction achieved?	Achieved	Comment
		Dust from straw can be reduced effectively if the straw is humidified prior to application.	√	15% - 20% moisture present in the wood shavings.
	Amount of bedding	Deep bedding systems have been shown to contribute less dust than shallow bedding systems	√	12 pallets per house or 1 kg per m2
	Application of bedding into housing	Bedding applied internally	√	Bedding supplied in bales rather than in bulk. Bales opened in housing rather than blown in to reduce dust.
	Age of bedding	As bedding materials break down to a dry friable litter dust production increases.	√	Related to crop length – see below.
Spraying Litter	Administering oil or water mist onto feed	Mainly prevents particles on surfaces from becoming airborne again by making them too heavy	X	There is a risk of causing deterioration in litter condition that could be detrimental to the welfare of the birds.
Relative humidity	Increasing humidity	Using misting systems to increase the humidity at low ventilation rates has been shown to reduce inhalable dust	X	Increasing relative humidity in littered floor systems might increase pododermatitis resulting from damp litter
Ventilation	Increasing ventilation	Dust in “breathing zones” can be significantly controlled by proper airflow velocities.	√	Gable end fans are present on all 6 houses. Whilst increasing ventilation may reduce airborne dust within the house, dust exhausts to the outside environment. Ventilation should be used with other methods to direct and trap particles before they are emitted. Broilers require very careful control of air flow over them as they are readily disturbed by draught and wind-chill. Fully feathered adult birds are much more tolerant of increased airflows at bird level than young birds.
House Cleaning	Between Flocks	Good house cleaning between flocks is essential to reduce the volume and potential for air contamination within the house and via exhaust systems.	√	Contractors remove litter with a bobcat. Vehicles are loaded and immediately covered before to leaving the site.

Source of Dust	Issue	How is reduction achieved?	Achieved	Comment
	Flocks in-situ	In-house dust removal by vacuum cleaner when the birds are in situ, reduces dust that could be disturbed by ventilation and emitted	X	Only feasible for layers in cage systems
	Removal of litter	Litter should be removed as soon as possible so that dust does not continue to exhausted	√	Litter removal takes place the day after bird destocking and from the whole site in one day
	Downtime	Longer downtime between cycles reduces dust emissions over a year	√	The average downtime between crops for: 2007 was 11.4 days 2008 was 10.3 days 2009 was 12.6 days 2010 was 15 days (Moy Park figures)
Genotype	Animal activity	Birds that exhibit higher activity levels create elevated levels of dust in the air	√	Good management ensures the welfare of the birds and avoids high activity levels
	Feather Crunchiness	Greater feather crunchiness causes increased dust levels at moulting periods	√	Comment from Moy Park vet - The genotype has no impact (Ross/ Cobb/ Hubbard breeds) are genetically bred with no major deferences. Broilers do not have long life (up to 42 days max) therefore birds do not loose their feathers (moulting) as in breeders (up to 62 weeks)
Number of birds	Reduce flock numbers	Less birds produce less dust due to less activity	√	The site is permitted for 69,900 birds The average placement in: 2007 was 62,830 2008 was 65,010 2009 was 64,079 2010 was 62,591 (Moy Park figures)
Crop cycle length	Reduce crop cycle	Birds grown to a shorter cycle length and lower weight produce less dust as most dust is emitted from day 20. Standard for industry is 42 day cycle grown to about 2kg.	√	The average crop length for: 2007 was 41 days 2008 was 39 days 2009 was 39 days 2010 was 38 days (Moy Park figures)

Table 2 Controls of dust at exhaust

Dust control	Method	How is reduction achieved?	Achieved	Comment
Dry Filters	Dust extraction	Dry filters can be fitted to internal air recirculation units	X	Used when air change rates are relatively low and where the system will not interfere with the air distribution within the house. Removal of smaller particles would need both large and impractical surface area of filter, or very frequent cleaning or changing. Issues with high energy consumption and fan efficiency
Screens and wind breaks	Natural tree belt	They rely on exhaust air being directed towards them, typically from end-wall mounted systems, so that dust particles can be both intercepted and air lifted into the atmosphere for better dilution and dispersion. Various types of trees have been used in vegetative screens, and they have been seen to reduce dust levels by approximately 50%.	√	Natural screens have the added advantage of also reducing odour, noise and visual impact on the local environment.

Recommendations

- Install a weather station to collect daily data
- Keep a complaints log that compares complaints to weather data, management practices e.g. destocking and other dust producing activities close to the farm.