

Options for disposal of chicken manure

Briefing Note

October 20, 2008

Background

The Nitrates Directive 91/676/EC places restrictions on the amount of organic nitrogen that can be spread on land. This is generally limited to 170 kg N per hectare per year although some countries have achieved derogations from this limit and are allowed to spread higher amounts – up to 250 kg N per hectare per year.

Approximately 485, 000 tonnes of chicken manure are produced annually in NI. This manure – particularly broiler litter - is very high in nitrogen. It is necessary therefore to address how to dispose of this litter given the requirements of the Nitrates Directive.

The DARD Global Research Unit at AFBI was asked by the Expert Group for the Alternative Use of Manures (EGUAM), established by DARD IN 2005, to provide scientific and technical input on ways to address this issue. The Group reported in 2006¹. The group concluded that there was an urgent need for business plans to be brought forward by industry or associated private sector Renewable Energy developers for the application of anaerobic digester/combined heat and power (AD/CHP) plants for the intensive dairy and pig industries, and a litter fired generator for the poultry sector.

This paper provides an *overview* of the most viable alternatives to incineration for disposing of chicken litter, in no order of merit; however the EGUAM report should be referred to for technical detail.

Options

1. Manure Utilisation

(i). Pelletising

The chicken manure is dried and made into pellets at high temperature and pressure. These pellets can then be used as a soil conditioner. An example of such an operation is [Perdue-AgriRecycle](#) in the USA which claims to process the equivalent of 400 poultry houses each year. The EGUAM report refers to the parent company AgriRecycle offering a turnkey plant with a capacity to process 120, 000 tonnes per year and costing between £4.5m and £5.7m. A large site is required – approximately

¹ [An evaluation of manure treatment systems designed to improve nutrient management](#)

40 acres and a lead in time of 6-9 months until commissioning. The report also indicates that plants can be bought and operated on a profit-sharing basis or bought outright and the company buy and market *all* the fertiliser produced.

It should be noted that given the volume of chicken manure produced in NI each year it would require 4 such plants to be established. This would require four sites, accompanying planning applications and associated issues to be dealt with on a case-by-case basis.

(ii). Composting

Composting is the aerobic decomposition of organic material in a controlled environment. The end result is a nutrient-rich soil conditioner. There are two common methods for composting:

1. Windrow – composting material in open rows; and
2. In-vessel composting

Although the compost is biologically deactivated, the original litter will contain category III waste (animal by-products) which would have implications for the use of the compost. NWP, a NI recycling company is refurbishing its Keady operation which should ensure that it is the first fully-complaint composting animal by-products facility in NI when completed².

Composting may be at farm level or centralised. Markets for end-product are still not fully developed which may affect the feasibility of this option.

2. Energy Production

(i). Anaerobic digestion – Combined heat and power

Anaerobic digestion is a well-established proven technology in which organic waste e.g. manure, is converted to biogas in the absence of oxygen. It is widely used across a number of European countries at both farm and centralised level in by utilising a mixed waste stream. The EGUAM report states that at a technical level the development of Centralised Anaerobic Digestion (CAD) has potential in NI. One report cited by EGUAM – Frost 2005³ - suggests that there is potential for at least five CAD systems in NI with a combined power output of 6MW electric and 5 MW heat (1.2MW_e plus 1MW_h per plant).

An earlier report by Power⁴ (2003) indicated that, assuming 20% of total agri-waste was available, NI agri-wastes could contribute approximately 5 MWe (with chicken litter providing 5.8MWe separately).

² <http://www.nwp-recycle.com/NWP-Products.aspx>

³ Frost, J.P. (2005). Opportunities for Anaerobic Digester CHP systems to treat municipal and farm waste. (www.dardni.gov.uk/consultations/con05026a.htm)

⁴ Power, P.B. (2003). A study into the economic renewable energy resource in Northern Ireland and the ability of the electricity network to accommodate renewable generation up to 2010. A report prepared by P.B. Power, 30th June 2003. (www.detini.gov.uk/cqi-bin/donwutildoc?id=73)

Anaerobic digestion does not remove nitrogen - or phosphate – from the manure although it could play a role in the collection and redistribution of nutrients that would assist in compliance with the Nitrates Directive though again the markets are not yet fully developed for such fertilisers.

There are also many other factors to consider – common to all options described in this paper - in determining the viability of such a project including dealing with category III animal waste which would form part of the chicken litter (e.g. carcasses, feathers); economic viability (cost for electricity/heat generated); location(s) and planning permission; licensing; public acceptability etc.

3. Conclusion

There are a number of potential alternatives to incineration of poultry waste that could aid compliance with the requirements of the Nitrates Directive. However, each has potential drawbacks associated with economic viability, issues associated with planning, environmental impact, and questions over the market for the end-product to name a few. The EGUAM report describes other potential options, apart from those referred to in this paper, including gasification and pyrolysis⁵. However, the report indicates that these technologies are – to date - less proven compared to incineration and there are also concerns about operational reliability.

⁵ These treatment processes are defined as 'incineration' under *Directive 2000/76/EC of the European Parliament and of the Council of 4th December 2000 on the incineration of waste*