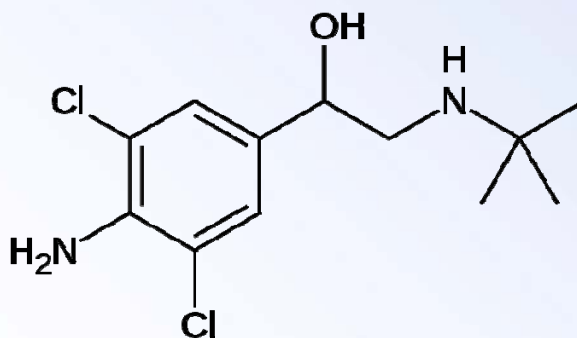


Globalized trade in food means more choice for consumers. However, globalization can also threaten human health. Funded by the European Union, MoniQA (**M**onitoring and **Q**uality **A**ssurance in the Food Supply Chain) brings together 33 organisations from around the world that are working together to help food manufacturers, retail outlets and regulatory bodies to cope with the challenges posed by a globalised food economy.

This factsheet provides an overview of clenbuterol and its detection in Chinese pork.

**The Clenbuterol Molecule**



**MoniQA, an EU-funded project connecting global players in the field of food safety and quality, addresses the melamine crisis and other emerging issues in food safety.**

**What is Clenbuterol?**

Clenbuterol is a bronchodilator used in asthma medicine worldwide for the treatment of allergic respiratory disease in horses. A common trade name is Ventipulmin, and it can be used both orally and intravenously. Clenbuterol is also a non-steroidal anabolic and metabolism accelerator, through a mechanism not well understood, which is why it is used illegally by athletes to build muscle. Its ability, however, to induce weight gain and ensure a greater proportion of muscle makes its illegal use in livestock popular.

Clenbuterol accumulates in the human body through ingestion. It is heat stable only decomposing at temperatures over 172 degrees Celsius. Thus, cooking cannot easily eliminate toxicity. Long-term consumption can lead to malignant tumours but it also poses dangers to patients who have high blood pressure or diabetes.

Patients and those with excess intake often share similar symptoms including palpitations, nausea, vomiting, dizziness, chest tightness, anxiety, shaking, weakness, and instability.

**Clenbuterol in Pork**

Clenbuterol accelerates the catabolism of fat in pigs and, when added to feed, it not only shortens growth time but also increases the sale price of pork and pig organs. Meat containing clenbuterol often has a bright red skin with very little fat. However, approval in the EU is for bovine and equidae use only.

Maximum residue levels in products of animal origin are set in Regulation (EC) 2391/2000 at:

Animal species	Target tissue	MRL
Bovine	Kidney	0.5 µg/kg
	Liver	0.5 µg/kg
	Milk	0.05 µg/kg
	Meat	.1 µg/kg
Equidae	Kidney	0.5 µg/kg
	Liver	0.5 µg/kg
	Meat	0.1 µg/kg

**The Case in China**

In February 2009, 70 people fell ill after eating pork products contaminated with clenbuterol. The victims, all in Guangdong province, consumed meat bought from markets in Guangzhou, the provincial capital of Guangdong, which came from farms in the neighbouring Hunan province.

Since 1998, there have been at least 19 clenbuterol food poisoning cases in China affecting more than 1,750 people including one confirmed death.

In 2006, a series of food borne illnesses in 300 people from Shanghai were associated with meals containing pork or pig intestines contaminated with clenbuterol. In June 2006, employees of a hotel in Foshan suffered from clenbuterol poisoning while hundreds of workers in a glass factory in Guangdong Province were also poisoned by clenbuterol in May 2006.

70 employees at a plastics factory in Jiaying City, Zhejiang Province were taken ill with clenbuterol poisoning after eating pork in the company cafeteria during November 2008. Between October 8 and 18 2008, three people were confirmed to have been poisoned by clenbuterol from pork in Guangdong.

## MoniQA and Clenbuterol

MoniQA devotes a share of its resources to emerging (and previously unforeseen) food safety issues. The case of clenbuterol, whilst not currently an export issue, is nonetheless of international importance as cases are not limited to China.

Though not recent, four separate cases of acute food poisoning in Portugal, involving 50 people, were caused by eating lamb or beef containing clenbuterol between April 1998 and April 2002 (Barbosa et al. 2005), while similar cases have been reported in Spain, (Martinez-Navarro 1990; Garay et al. 1997), France (Pulce et al. 1991) and Italy (Maistro et al. 1995; Brambilla et al. 1997, 2000).

## Methods for detection

Clenbuterol is one of a group of drugs called beta 2-agonists, including mabuterol, terbutaline, carbuterol, cimaterol, salbutamol, clenpenterol, isoxsuprine, bambuterol and ractopamine. For control purposes the matrices of choice are urine and liver. Clenbuterol can be detected using screening methods based on immunochemical properties, eg. ELISA or optical biosensors. Alternatively a wide range of beta agonists can be screened and/or confirmed using liquid chromatography (LC) coupled to tandem mass spectrometry (MS/MS). When performing LCMSMS measurements for clenbuterol and a wide range of beta agonists, it is common for deuterated analogues to be used as internal standards

## References

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## In the Media

- <http://edition.cnn.com/2009/WORLD/asiapcf/02/22/china.poisonings/index.html>
- <http://www.foxnews.com/story/0,2933,500664,00.html>

## Emerging Issues Working Group:

Analytical method collection

Validation level and needs

Background information

Hazard characterisation

Links to RASFF and MoniQA db

Relevant publications

EFSA, FDA, etc...positions

MoniQA workplan

## MoniQA Emerging Issues Working Group

One of several working groups within the MoniQA project, the Emerging Issues Working Group is tasked with keeping a watching brief on new and emerging issues in food safety on a global scale and undertaking horizon scanning for potential, as yet unregulated, food contamination hazards.

Previous topics covered have included melamine in Chinese milk and dioxins in Irish pork and beef.

For specific information about the Emerging Issues Working Group simply click on <http://www.moniqa.org/emerging>

To download other MoniQA factsheets visit <http://www.moniqa.org/media>

For further information please visit our website:

[www.moniqa.org](http://www.moniqa.org) or contact [moniqa@moniqa.org](mailto:moniqa@moniqa.org).

