More exact, ethical method to tell the sex of baby chickens

December 15 2016

Thanks to an imaging technique called optical spectroscopy, it is possible for hatcheries to accurately determine the sex of a chick within four days of an egg being laid. This non-destructive method picks up on differences in the fluids contained in an egg from which a cockerel will develop, compared to one from which a hen will hatch.

Having such a reasonably cheap method by which to sex eggs can lead to more ethical practices in the poultry industry. It could prevent the annual culling of seven billion day-old cockerels worldwide that have little economic value, but whose female siblings help produce the current global demand of about 68.3 million tons of eggs per year. This is according to Roberta Galli of TU Dresden (Germany) and Gerald Steiner of TU Dresden and Vilnius University (Lithuania), lead authors of an article in Springer's journal *Analytical and Bioanalytical Chemistry*.

The meat of modern laying hen strains differs from that of broiler strains in that it is not as edible. Because their meat is therefore of little economic value, many producers choose to cull day-old cockerel chicks that will not add to egg production. In North America and Europe alone, approximately 790 million chicks are therefore culled annually. The killing of day-old chicks by asphyxiation or by grinding is a problematic and ethical issue that has triggered increasing research aimed at providing suitable alternatives.

The current study is an extension of previous work by the German research team of which Galli and Steiner are part that showed that

imaging techniques can be used to sex incubated chicken eggs. This can be done by noting gender-specific biochemical differences in the embryonic blood contained within an egg shell.

In this study, a laser emitting at a wavelength of 785 nanometres was used to investigate 27 eggs up to 11 days after they were laid. The researchers were able to already note sex-related differences in the near-infrared fluorescence spectrum within 3½ days after incubation. Further analysis showed that the blood of male eggs is characterised by a specific fluorescence band located at ~ 910 nanometers.

Galli and Steiner's team tested whether these fluorescence characteristics, together with changes in the wavelength of light, could be used to classify whether a hen or a cockerel will develop from an egg. When tested on 380 eggs, they accurately did so in 93 percent of cases.

"In ovo sexing based on spectral analysis is non-invasive, does not require extraction of egg material and does not use consumables. Moreover, the method is applicable during the fourth day of incubation, before onset of embryo sensitivity at day seven, and is therefore in agreement with animal welfare," notes Galli.

Steiner says that there is potential to use such fluorescence techniques to develop industrial systems for egg sexing that are not based on expensive spectrometers. It can be done using a few light detectors with suited bandpass filters to measure the signal intensity in selected spectral ranges.

More information: Roberta Galli et al, In ovo sexing of chicken eggs by fluorescence spectroscopy, *Analytical and Bioanalytical Chemistry* (2016). DOI: 10.1007/s00216-016-0116-6

Provided by Springer