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## Avian Advice, August 2018

Dale Bumpers College of Agricultural, Food, and Life Sciences (University of Arkansas, Fayetteville). Center of Excellence for Poultry Science

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August 2018

# Avian Advice

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## Controlled atmosphere stunning

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### Controlled atmosphere stunning in the news

Controlled atmosphere stunning (or controlled atmosphere killing) is receiving increasing attention. Controlled atmosphere stunning is increasingly being used for commercial slaughter in Europe. In March 2018, Cargill announced that it will be installing a \$22 million controlled atmospheric stunning system at its poultry processing plant in London, Ontario (Canada). Perdue Farms announced in 2017 they would be adopting the requirements of "Joint Animal Protection Organization Statement on Broiler Chicken Welfare Issues" which includes controlled atmosphere stunning. Tyson Foods is also using controlled atmospheric stunning in at least one processing plant. Interestingly, 62% of poultry professionals considered that between 10 and 49% of broiler chickens will be treated 62% of poultry professionals according to the 2017 WATT/Rennier Poultry Confidence Index survey. Moreover, 31% of poultry professionals project that over 50% of broilers in the USA.

### Controlled Atmospheric Stunning and activist organizations

Controlled atmosphere stunning is not required and not slated to be required by the Global Animal Partnership (GAP). However, it will be required by 2024 under the "Joint Animal Protection Organization Statement on Broiler Chicken Welfare Issues" – a document signed by a series of animal activist groups including in alphabetical order: Animal Equality, ASPCA, Compassion in World Farming, Compassion over Killing, Humane League, Humane Society International, Humane Society of the United States (HSUS), Mercy for Animals and World Animal Protection. Another activist group, PETA also support a shift to controlled atmosphere stunning.

### What is controlled atmosphere stunning or controlled atmosphere killing?

Controlled atmosphere stunning irreversibly induces poultry to a state of insensibility. Controlled atmosphere stunning is achieved by increasing the carbon dioxide partial pressure, by very low oxygen partial pressure or both. This can entail using carbon dioxide initially at least 40 % to achieve unconsciousness and then 80-90% carbon dioxide or carbon dioxide in combination with either nitrogen and/or argon.

Single and two-phase controlled atmospheric systems have been used, respectively the following:

- Single phase hypercapnic anoxic mixture of 60% argon, 30% carbon dioxide and less than 2% oxygen
- Biphasic hypercapnic hyperoxygenation mixture with initially 30% carbon dioxide, 30% oxygen and 30% nitrogen (anesthetic phase) and followed by 80% carbon dioxide, 5% oxygen and 15% nitrogen (euthanasia phase).

Temple Grandin has argued for the benefits of the approach stating that "Electrical stunning provides instant insensibility, but live shackling is definitely bad for bird welfare. The available evidence from research is broadly supportive that controlled atmospheric stunning is humane. Except for a single study from Brazil, there is a lack of research comparing multiple indices of stress and/or well-being between broilers subjected to electrical stunned plus shackling and controlled atmosphere stunning.

### Low atmospheric pressure stunning - an alternative to controlled atmosphere stunning

An alternative to controlled atmosphere stunning is low atmospheric pressure stunning or LAPS (hypobaric hypoxia) is another method to achieve unconsciousness. Stunning is achieved by progressive hypobaric hypoxia with final atmospheric pressures of <26.6 kilopascals (kPa) (<199 mm mercury). There is evidence based on physiological and behavioral metrics that LAPS is as humane as other methods of controlled atmosphere stunning. Evidence that LAPS is a humane system comes from the lack of increases in heart rate and circulating concentrations of the stress hormone, corticosterone. The concentrations of corticosterone are lower in meat-type stunned by chickens by LAPS than electrical stunning.

Low atmospheric pressure is an irreversible stunning technique when the final atmospheric pressure achieved is 80.6 kPa after 4.67 minutes. Within a minute, the following behaviors are observed: mouth opening, head shaking and open mouth breathing together with ataxia (loss of control of bodily movements). Between one and two minutes, chickens exhibit markers for unconsciousness, namely loss of posture and convulsions. Birds were motionless after 200 seconds. As these behaviors were similar to those observed with controlled atmospheric systems, many researchers consider that low atmospheric pressure stunning is a humane technique.

### Conclusions

Shifting stunning in poultry processing from electrical to controlled atmosphere stunning or low atmospheric pressure stunning will be expensive requiring major investment in equipment. While this investment may be welcomed by some including potentially activists, it is not fully clear the extent to which or even whether the approaches improve broiler chicken welfare.

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