

### Controlled Atmosphere Stunning

*Controlled Atmosphere Stunning (CAS) offers significant financial, operational and humane benefits in animal processing. This paper attempts to clarify specifically why CAS is a preferred processing system, and why the poultry and meat processing industries are making the transition to CAS.*

---

#### How Controlled Atmosphere Stunning Works

Live birds are loaded at the farm into specially designed cages. The truck drives into the processor receiving area where the stacked cages are off-loaded onto the CAS production line. The cages are then destacked; the live birds remain in the single layer cages, which are conveyed through a CO<sub>2</sub> tunnel. After the cage exits the tunnel, the stunned birds are dumped onto the shackling conveyor. The cage is then washed, restacked and loaded back on the truck to return to the farm.

#### Processor Savings

- Reduced wing and leg breakage
- Reduction in downgrades
- Reduction in manpower for hanging line
- Reduction in blood spots
- Improvement in yield due to less trimming
- Humane handling approved by several agencies

#### Improved Working Conditions

It's no secret that even in times of high unemployment and job scarcity, hang line turnover is based on days not years. The task of shackling a fighting, 40 lb. tom is both physically and mentally exhausting. Stunned birds, however, offer no resistance and can be shackled with the hangers only lifting the legs into the shackles while the bird lays stunned on the conveyor.

---

#### Why CAS is Preferred to CAK

Controlled Atmosphere Stunning (CAS) differs from controlled atmosphere killing (CAK). In CAS systems, birds are stunned when shackled and bled out. CAK birds are dead when shackled and bled out. Some CAK systems kill the birds while the cages are still on the truck. The fundamental issue between the two systems is twofold. First, the operational benefits of shackling a non-resistive bird (stunned) are achieved with CAS; a stunned bird is as easy to handle as a dead bird. Secondly, the visual inspection to insure that DOA birds are culled from the line is compounded by earlier killings on the truck, not to mention the onset of rigor prior to slitting and picking.

---

#### The Changing Market

Because of the well-documented improvements in animal and operator welfare, Controlled Atmosphere Stunning is becoming a preferred method of processing in the US. Animal welfare aside, the increase in employee morale with less employee turnover, coupled with the positive corporate citizen posturing of CAS, all point to the high return on investment. CAS also affords some processors the opportunity to distinguish an otherwise commodity product as superior due to its lower-stress processing. The marketing distinction holds true at both the foodservice and retail levels.

## The Michigan Success Story

A prominent Michigan turkey co-op processor has been successfully using a CAS system designed by Roger Draft and built by Midway Machine. The farmer cooperative was formed in 1999 in reaction to Sara Lee's decision to stop slaughtering. The co-op purchased and upgraded a potato processing plant, installing a new CAS system. The plant processes 4.5 million turkeys for the 16 co-op owners, or about 18,000 per shift.

As featured in *Food Engineering*, the co-op was faced with the opportunity of building a kill plant from scratch and opted for innovation, installing a controlled atmosphere stunning system, the first such system in the US. The line operates in the range of up to 48 carcasses per minute. The system was completely integrated into the handling process so that no bird is ever

being a more humane process, the system yields a better-quality product, management believes, and tames one of poultry processing's most onerous jobs.

Panicked, pecking birds are enough to make the first day on the job also the last for the majority of workers. By contrast, this producer maintains a relatively clean kill room where the shackling function is characterized as light duty. The same people hanging birds have remained at the job for years.

Unlike plants with high employee turnover, the facility is running well below industry norms.

Humane livestock handling begins in the holding area, where incoming turkeys remain caged in a quiet, room. Specially

*Besides being a more humane process, the system yields a better-quality product, management believes, and tames one of poultry processing's most onerous jobs.*

designed cages eliminate human handling from the time the birds are taken from the farm until their legs are shackled. A ceiling-mounted hoist gently transports the cages, each with

handled by anyone in its live state. Workers place the feet of stunned turkey in shackles as the birds are conveyed, eliminating any lifting. The birds are still unconscious when they reach the automatic throat slitter. The thrashing and flailing associated with electrical stunning that results in worker injuries and blown joints and ruptured blood vessels on the birds does not occur. Besides

a max capacity of 1000 lbs, from flatbed trucks to a conveyor system that feeds the cages into the CO<sub>2</sub> chamber. Each cage is conveyed through the chamber in 2.5 to 3 minutes. When the cage exits, the cage door is automatically opened while the cage is inclined, sliding the fowl onto a conveyor to the nearby shackling team.

## Benefits of Controlled Atmosphere Stunning

### Higher Yields

Fewer downgrades from blood spots and fractures, less trimming and better color.

### Less Handling, Less Stress

Birds remain in the original transport cage until after stunning and before shackling. Fluttering during shackling is eliminated, as are damaged carcasses. CAS reduces handling because the birds are stunned in the original crates and not handled until after stunning, when they are relaxed from the gas.

### Higher Employee Morale

Greatly improved working conditions in what is traditionally the least desirable department of the production facility.

### Marketing Opportunities

Today's protein buyer — both trade and consumer— is more aware than ever of feed sources, product quality and processing. An educated consumer is more apt to purchase quality product — and less likely to settle for a commodity. That's why HumaneAire is helping turkey processors distinguish themselves in the marketplace.

### Offers Options In CO<sub>2</sub> Purchasing

Unlike CAK systems, HumaneAire does not require OEM carbon dioxide, allowing you to leverage your CO<sub>2</sub> purchasing for greater flexibility.

### Cleaner Work Area

Less fluttering and stressed bird handling translates to minimal dust, feathers, dirt, excrement, noise and debris.

### A Leaner System

HumaneAire requires less manpower at each stage — collection, offloading, stunning and shackling. There are fewer variables than traditional electrical shock systems; less disruption and more predictable results.

### More Marketable Product

The retailer and foodservice operator sells a consistently better protein that displays better.

### Maintains Optimum Picking Window

Controlled cycle time assures easy, consistent picking of a relaxed turkey.

### Adoption By Large Scale QSR

Responding to consumer input for humane processing, several large quick serve restaurants have recently announced their preference for suppliers using CAS processing.

### Recycles CO<sub>2</sub> For Lower Costs

Greater effectiveness in stunning, through specially designed airflow, which results in efficient use of recycled CO<sub>2</sub>.

### Constant And Predictable Birds

The continuous inline stunner helps birds to maintain consistent bleed out times, chilling times and feather picking. Unlike other batch type stunning systems where the birds are unpredictable. Also, DOA birds are easily identified with the continuous inline stunner at the time of shackling.

## Industry Trade Publication Coverage

### The following are excerpts from *Watt US Poultry*.

Dr. A. Bruce Webster, poultry science professor, University of Georgia, has conducted a number of experiments where the behavior of chickens is monitored during CAS. Speaking about CAS at the Processor Workshop, he said that commercially available CAS systems were designed to minimize handling of the birds, because the birds are stunned prior to shackling, and to minimize carcass damage. Several different gas mixtures and methods of stunning or killing are being used, and there has been debate over the relative merits from an animal welfare standpoint of the various gas mixtures and techniques for administering the gas.

Webster pointed out the carbon dioxide has several characteristics that are beneficial for use in CAS systems. Carbon dioxide produces anesthesia during the stunning process, and it can reduce convulsions associated with anoxia. Also, carbon dioxide is readily available and relatively inexpensive and, since it is heavier than air, it is relatively easy to contain.

A CAS working group that was comprised of European and American researchers on CAS and United Kingdom government representatives was convened in May 2005 to review existing research on CAS and come up with recommendations. The working group concluded that welfare related differences exist between CAS gas mixtures, but that these differences are not so great or unilateral as to give one gas mixture an advantage over the others.

*Excerpt from Burger King's Move Puts CAS In Spotlight, Watt Poultry USA, O'Keefe, Terrence. (July 2007).*

Quick service restaurant (QSR) chains Wendy's International, Inc., and Burger King Corp. have announced preferences for chicken meat from suppliers who use controlled atmosphere stunning (CAS) systems in the broiler slaughter process. McDonald's Corp.'s website states that around 30 percent of its chicken sourced in Europe is slaughtered using CAS. Each of these three QSR chains has its own animal welfare council. There is no consensus on whether CAS is more humane than electrical stunning, but CAS systems are making inroads in the USA.

Users of CAS systems cite improvements in ergonomics of the live hanging job and, in many applications, increases in

*Users of CAS systems cite improvements in ergonomics of the live hanging job and, in many applications, increases in pounds hung per-man-hour.*

pounds hung per-man-hour. Processors employing CAS also cite improvements in deboning yield resulting from decreased bruising, lower incidence of broken wings and fewer blood spots in the meat. Proponents of electrical stunning are quick to point out that many of the "improvements" experienced by users of CAS systems result from the fact that with many CAS systems the birds are stunned prior to being unloaded from the cage, not from a reduction in carcass damage which occurs during stunning itself.

*Excerpt from Stunning Debate Continues. Watt Poultry USA, O'Keefe, Terrence. (June 2008).*

---

### Industry Consultants On CAS:

#### *Dr. Temple Grandin*

Dr. Temple Grandin is a foremost expert on the handling and slaughtering of animals. She is an associate professor of animal science at Colorado State University and the founder of Grandin Livestock Handling Systems. She designed the animal-handling systems used in nearly half of the cattle slaughterhouses in the United States. Dr. Grandin has authored more than 300 publications, and she has served as a consultant in animal welfare for companies including McDonald's, Burger King, and Wendy's.

*"Controlled atmosphere stunning of chickens has important welfare advantages ... The U.S. poultry industry should move toward controlled atmosphere stunning."*

## *Industry Views on CAS*

### **Excerpts from various websites.**

"MBA Poultry in Nebraska and Michigan Turkey Producers have begun using controlled atmosphere stunning (CAS), in which the birds are rendered unconscious before being shackled. As a result, 'The MBA plant no longer has a dim, dusty hanging room. Instead the hanging area in the same room as the CAS system is well lit and relatively calm since the birds are already unconscious. The environment seems to be something MBA employees appreciate since turnover among hangers has dropped by at least 75 percent since the CAS system was installed.'"

*"Stunning Results," Poultry magazine, June/July 2005*

"By using a mechanized loader in conjunction with a CAS system, the system employed by Michigan Turkey Producers ensures that 'birds can be loaded at the farm and unloaded at the plant without being touched by human hands when the birds are conscious.'"

*"MTP Cooks Its Way to Value," Watt Poultry USA, September 2006*

"The installation of gas stunning markedly reduced downgrades due to hemorrhages and bone fractures and improved fillet color and texture compared to previous stunning with an AC water-bath unit. As in EU plants, MBA Poultry can justify gas stunning based on the contribution from incremental revenue, which more than offsets the additional capital and operating costs incurred."

*"Future of Gas Stunning," Watt Poultry USA, April 2005*

"Since gas stunning may be performed while birds are still in their transport containers, this method has been suggested as a more welfare-friendly option."

*Poultry Science article concerning welfare during stunning and slaughter, 1998*

"We are starting to quantify the improvements in yield and labor, but visually we already see the benefits in wings, wing meat, and breast meat."

*Watt Poultry USA article concerning Cooper Farms, November 2006*

"Innovations in turkey slaughter processes have been gaining acceptance. The use of gas systems, rather than passing turkeys' heads through electrified water baths, are in use by some processing plants in the United States and Europe, and these efforts should be commended for improving the animals' welfare."

*Humane Society of the U.S. report on The Welfare of Animals in the Turkey Industry*

"CAS gives MTP a yield benefit which they see at pack out, and the system improves the quality of the deboned meat because there are fewer blood spots. Visitors to the MTP plant frequently comment on the lower number of broken wings and bruises that they see on MTP birds versus at other plants."

*Watt Poultry USA article concerning Michigan Turkey Producers, September 2006*

"Overall, the economics of CAS for a given slaughter plant will depend on the type of birds being processed and a plant's finished product mix. CAS systems in use in the USA for broilers and turkeys have provided processors yield and grade improvements. The relative value of these improvements will depend on the type of birds being processed and the products produced. For example, a reduction in blood spots in breast meat is of more value to a deboning plant than to a cut-up or whole-bird plant. Industry sources report that yield improvements at turkey deboning plants employing CAS can easily offset the additional cost of using CAS."

*Watt Poultry USA article concerning Burger King, December 2007*

"Eight U.S. turkey plants are employing CAS at this time and, according to industry sources, several others are considering switching to this technology. There were 37 turkey slaughter plants in WATT Poultry USA's February 2008 Top Turkey Company Survey. To date, the plants adopting CAS systems generally process large toms. Several turkey companies employing CAS report improved deboning yield because of a reduction in bruising, broken wings, hemorrhaging and blood spots in meat."

*"Poultry Stunning Debate Continues," Watt Poultry USA, June 2008*

---

## **CAS System Engineers**

For additional information on Controlled Atmosphere Stunning, contact:

# **HUMANAIRE™ CAS**

## **Controlled Atmosphere Stunning System**

### **SALES – Draft, LLC**

5500 E. 68th Street P 231-652-3642  
Newaygo, MI 49337 C 616-240-8674 E rogerdraft@aol.com

### **MANUFACTURING – Midway Machine Technologies**

555 N. State Street P 616-772-0808  
Zeeland, MI 49464 F 616-772-3986 W midwaymachine.com